ROBO CYLINDER

ROBO Cylinder
RCP3 Actuator
Slider Type

Operating Manual

Fourteenth Edition

Motor coupling types:	[Slim Small ROBO Cylinders]	SA2AC/SA2BC SA3C/SA4C/SA5C/SA6C
Motor reversing types:	[Slim Small ROBO Cylinders]	SA2AR/SA2BR SA3R/SA4R/SA5R/SA6R

IAI America, Inc.

ROBO CYLINDER

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.
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- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

Table of Contents

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	● 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. 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) ● Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. ● Do not use it in any of the following environments. 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact ● For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

No.	Operation Description	Description
2	Transportation	● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. ● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the operation manual for each model. ● Do not step or sit on the package. ● Do not put any heavy thing that can deform the package, on it. ● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. ● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit. ● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. ● Do not get on the load that is hung on a crane. ● Do not leave a load hung up with a crane. ● Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. ● Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	(1) Installation of Robot Main Body and Controller, etc. ● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. ● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. ● When using the product in any of the places specified below, provide a sufficient shield. 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.
		(3) Grounding ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm^2 (AWG20 or equivalent) or more for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). ● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).

No.	Operation Description	Description
4	Installation and Start	(4) Safety Measures ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign "Under Operation" at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.

No.	Operation Description	Description
6	Trial Operation	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. ● When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. ● Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. ● Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	● Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. ● Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. ● Make sure to operate automatic operation start from outside of the safety protection fence. ● In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. ● When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

No.	Operation Description	Description
8	Maintenance and Inspection	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● For the grease for the guide or ball screw, use appropriate grease according to the Operation Manual for each model. ● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. ● The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. ● Pay attention not to lose the cover or untightened screws, and make sure to put the product back to the original condition after maintenance and inspection works. Use in incomplete condition may cause damage to the product or an injury. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.
9	Modification and Dismantle	● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. ● When removing the actuator for disposal, pay attention to drop of components when detaching screws. ● Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	● Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device. ● See Overseas Specifications Compliance Manual to check whether complies if necessary. ● For the handling of actuators and controllers, follow the dedicated operation manual of each unit to ensure the safety.

Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the 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. Make sure to follow the usage condition, environment and specification range of the product.

Operation out of the guarantee could cause a drop in performance or malfunction of the product.

2. Do Not Set Speed and Acceleration/Deceleration Higher

Do not set speed and acceleration/deceleration higher than the rated values. It causes vibration, failure, or shortening of life. If acceleration/deceleration higher than the rated value is set, creeping phenomenon or coupling slide may occur.

3. The Allowable Load Moment Must be Within the Tolerance.

The allowable load moment must be within the tolerance value. If a load exceeding the allowable load moment is applied, the life may be shortened. If an extreme load is applied, flaking may occur.

4. 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.

5. Oil Film of Grease May Run Out If Short-distance Reciprocating Operation is Performed.

Grease film may run out if the actuator is moved back and forth continuously over a distance of 30mm or less. As a guide, perform a back-and-forth operation five times or so over a distance of 50mm or more after a back-and-forth operation over such short distance has been repeated 5,000 to 10,000 times. (For ROBO Cylinder with its stroke less than 50mm, have a back-and-forth operation with using the whole distance of the stroke length.) This will restore oil film.

6. Turn on the servo after making sure the slider or rod is away from the mechanical end.

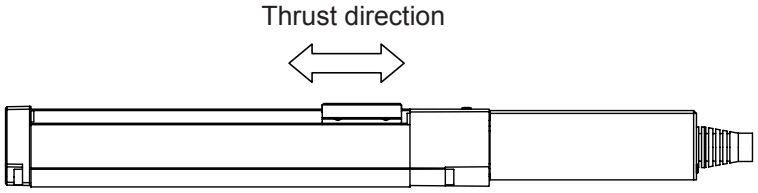
If the servo is turned on when the slider or rod is positioned near the mechanical end, the pole phase may not be detected and pole non-confirmation error or excitation detection error may occur.
Accordingly, turn on the servo after making sure the slider or rod is away from the mechanical end.

7. 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.

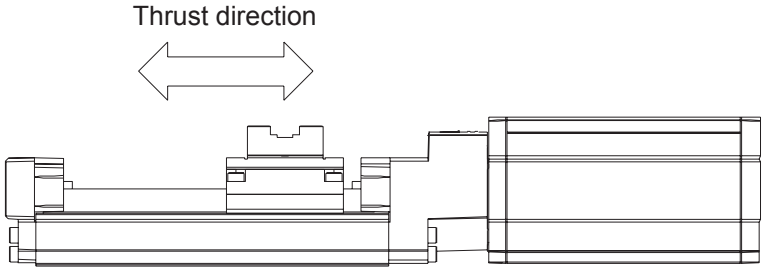
Subjecting the actuator to an external force or an impact load at levels above the allowable capacity may damage or destroy internal components.

Model	Allowable external force in thrust direction [N (kgf)]
SA2A, SA2B	Allowable Static Load Moment or less [Refer to 1.2.6 [1], “SA2A and SA2B”]
SA3	50 (5.1)
SA4	160 (16.3)
SA5	220 (22.4)
SA6	220 (22.4)

SA2A, SA2B



SA3, SA4, SA5, SA6



8. 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.

Actuator damage may occur such as broken nut.

9. Handle the stainless sheet with special care.

- 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.

10. 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.because the spiral sheet may deform.

International Standards Compliances

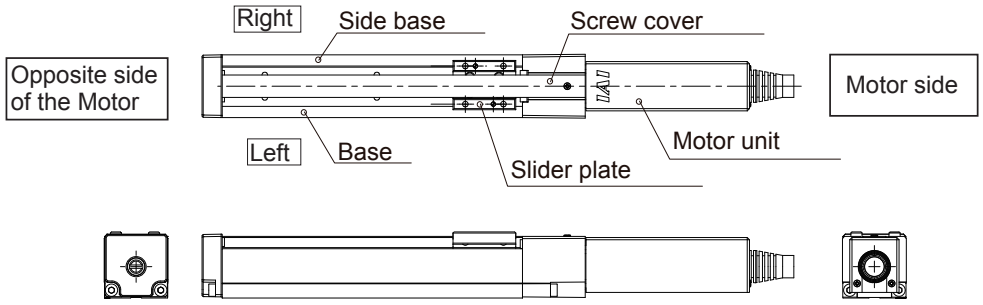
This actuator complies with the following overseas standard.
Refer to Overseas Standard Compliance Manual (ME0287) for more detailed information.

RoHS Directive	CE Marking
○	○

Names of the Parts

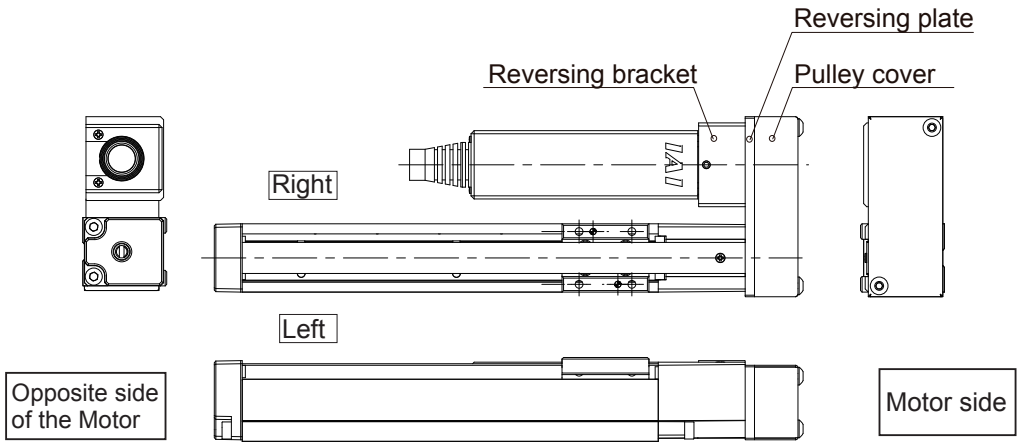
In this Operation Manual, the left and right sides are indicated by looking at the actuator from the motor end, with the actuator placed horizontally, as shown in the figure below.

● Motor coupling types: SA2AC/SA2BC

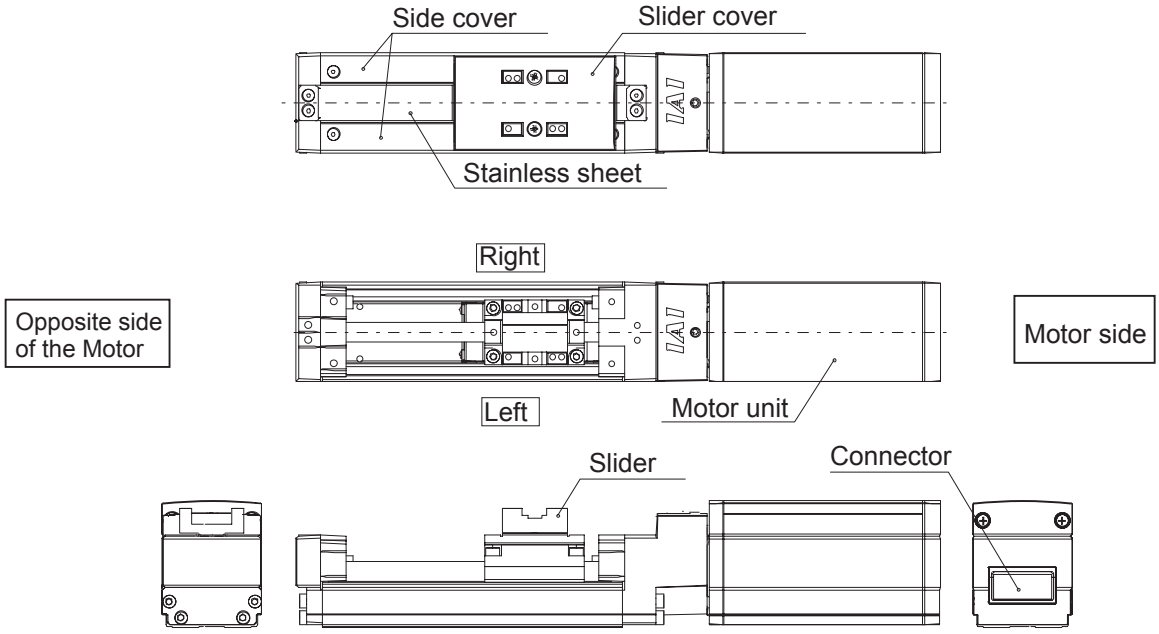


The connector position shown above is for when cable exit direction is not changed.

● Motor reversing types: SA2AR/SA2BR

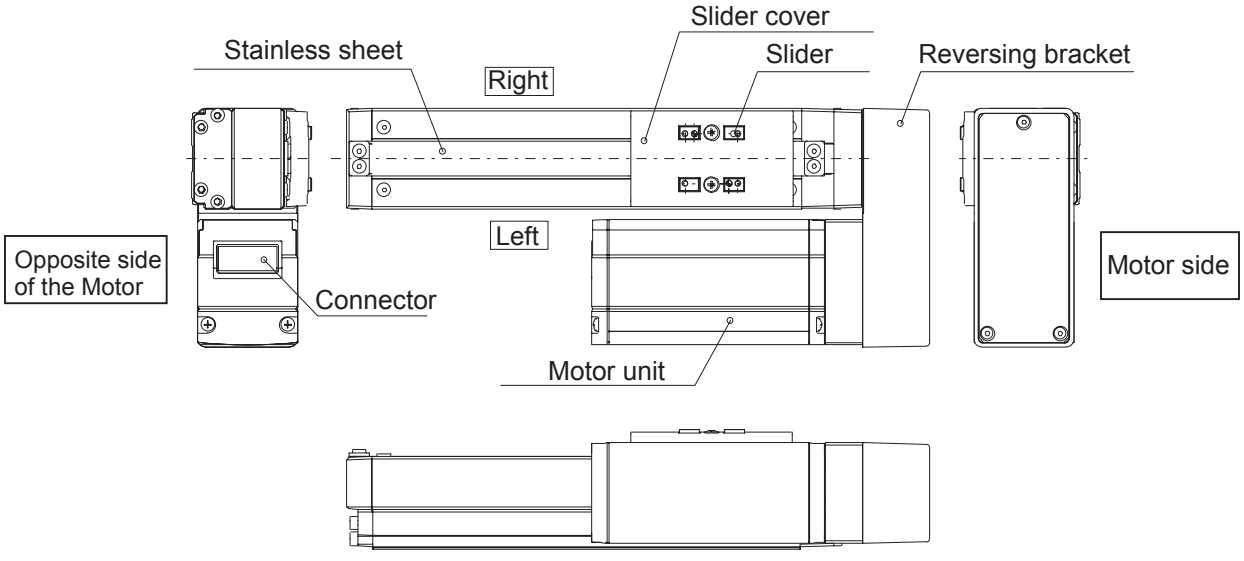


● Motor coupling types: RCP3-SA3C/SA4C/SA5C/SA6C



The connector position shown above is for when cable exit direction is not changed.

● Motor reversing types: RCP3-SA3R/SA4R/SA5R/SA6R



1. Specifications Check

1.1 Checking the Product

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

1.1.1 Parts

No.	Name	Model number	Quantity	Remarks
1	Actuator	Refer to “How to Read the Model Nameplate” and “How to Read the Model Number.”	1	
Accessories				
2	Motor • Encoder Cables (Note 1)		1	
3	First Step Guide		1	
4	Operating Manual (DVD)		1	
5	Safety Guide		1	

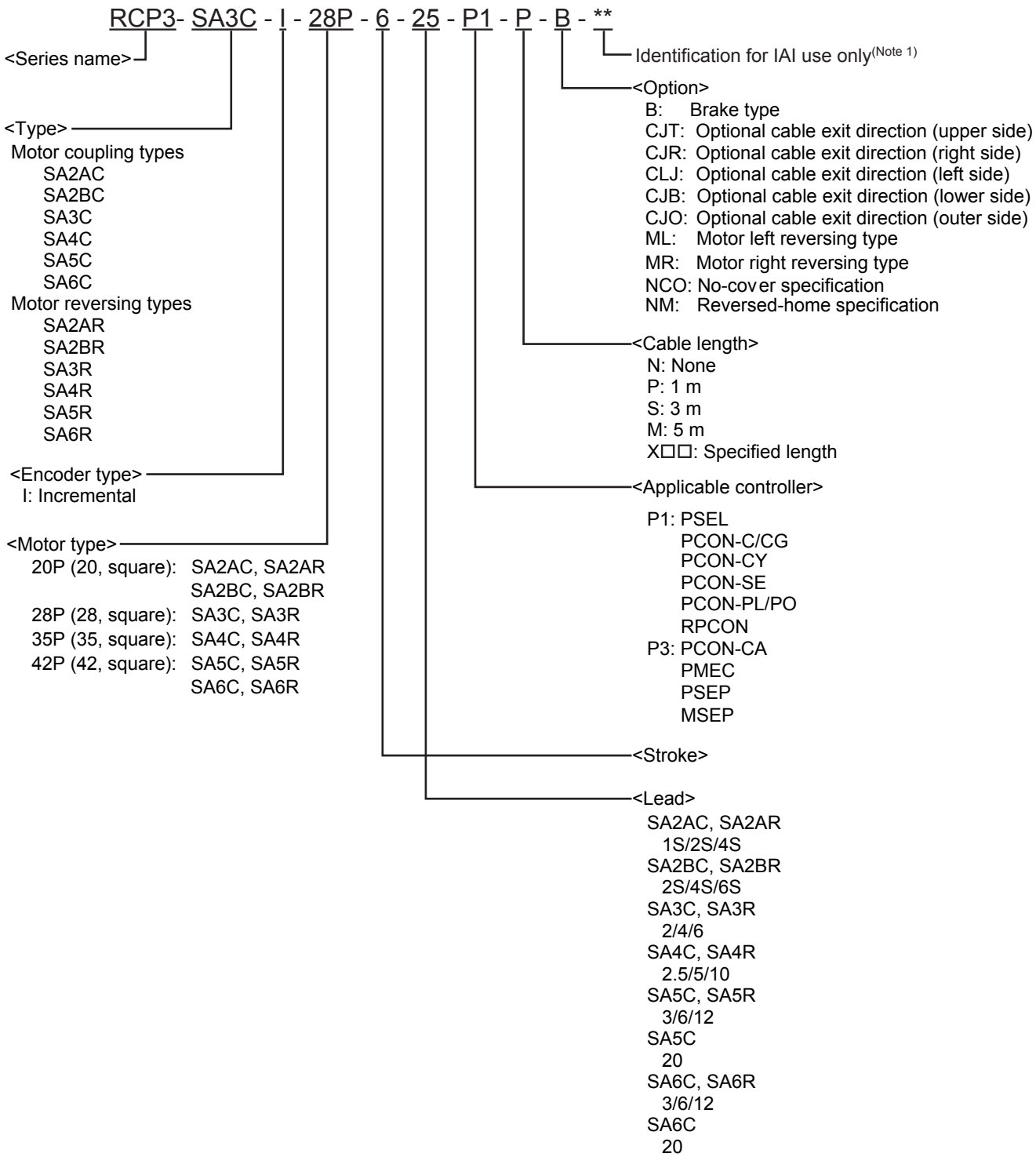
Note 1 The motor • encoder cables differ between the standard model and robot cable.
[Refer to 1.4 “Motor • Encoder Cables.”]

1.1.2 Operating Manuals for the Controllers Related to this Product

No.	Name	Control No.
1	Operating Manual for ASEL Controller	ME0165
2	Operating Manual for PCON-CA/CFA Controller	ME0289
3	Operating Manual for ACON-C/CG/CF Controller	ME0176
4	Operating Manual for ACON-CY Controller	ME0167
5	Operating Manual for ACON-SE Controller	ME0171
6	Operating Manual for ACON-PL/PO Controller	ME0166
7	Operating Manual for MEC Controller	ME0245
8	Operating Manual for PSEP/ASEP/DSEP Controller	ME0267
9	Operating Manual for MSEP Controller	ME0299
10	Operating Manual for ROBONET	ME0208
11	Operating Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
12	Operating Manual for Software RCM-101-MW/RCM-101-USB	ME0155
13	Operating Manual for MEC PC Software	ME0248
14	Operating Manual for Teaching Pendant SEL-T/TD	ME0183
15	Operating Manual for Teaching Pendant CON-T/TG	ME0178
16	Operating Manual for Touch Panel Teaching Pendant CON-PT/PD/PG	ME 0227
17	Operating Manual for Touch Panel Teaching CON-PTA/PDA/PGA	ME0295
18	Operating Manual for Dedicated ASEP/PSEP Touch Panel Teaching SEP-PT	ME0217
19	Operating Manual for Simple Teaching Pendant RCM-E	ME0174
20	Operating Manual for Data Setter RCM-P	ME0175
21	Operating Manual for Touch Panel Display RCM-PM-01	ME0182

1.1.3 How to Read the Model Nameplate

1.1.4 How to Read Model



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

1.2 Specifications

1.2.1 Speed

Speed limits (Unit: mm/s)

Model name	Motor type	Lead [mm]	Minimum Speed	Stroke [mm]					
				25	50	75	100	125	150
SA2AC, SA2AR	20P	1	1.25	50				-	-
		2	2.5	100				-	-
		4	5.0	180	200				
SA2BC, SA2BR	20P	2	2.5	100					
		4	5.0	180	200				
		6	7.5	180	200	300			

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

Speed limits (Unit: mm/s)

Model name	Motor type	Lead [mm]	Minimum Speed	Stroke [mm]															
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
SA3C, 3R	28P	2	2.5	100						-	-	-	-	-	-	-	-	-	-
		4	5.0	200						-	-	-	-	-	-	-	-	-	-
		6	7.5	300						-	-	-	-	-	-	-	-	-	-
SA4C, 4R	35P	2.5	3.12	125										-	-	-	-	-	-
		5	6.25	250										-	-	-	-	-	-
		10	12.5	380	500									-	-	-	-	-	-
SA5C, 5R	42P	3	3.75	150											140	120	105	90	80
		6	7.5	300											285	245	210	185	165
		12	15	380	540	600									570	490	425	370	330
SA5C	42P	20	25	380	540	660	770	860	940	1000						910	790	690	610
				380	540	660	770	800 (Stroke 250 to 650, vertically installed)									790	690	610
SA6C, 6R	42P	3	3.75	150											140	120	105	90	80
		6	7.5	300											285	245	210	185	165
		12	15	380	540	600									570	490	425	370	330
SA6C	42P	20	25	380	540	660	770	860	940	1000						910	790	690	610
				380	540	660	770	800 (Stroke 250 to 650, vertically installed)									790	690	610

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

1.2.2 Acceleration and payloads

Model	Motor type	Lead (mm)	Rated acceleration (G)		Maximum speed (mm/s)	Payloads (kg)
SA2AC SA2AR	20P	1	Horizontal	0.2	50	1
		2	Horizontal	0.2	100	0.5
		4	Horizontal	0.2	200	0.25
SA2BC SA2BR	20P	2	Horizontal	0.2	100	1
		4	Horizontal	0.2	200	0.5
		6	Horizontal	0.2	300	0.25
SA3C SA3R	28P	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

[Controllers (without “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)		Speed (mm/s)	Payloads (kg)
SA4C SA4R	35P	2.5	Horizontal	0.2	20.8	6
					41.7	
					62.5	
					83.3	
					104.2	
					125	
			Vertical	0.2	20.8	3
					41.7	
					62.5	
					83.3	
					104.2	
					125	
		5	Horizontal	0.3	41.7	4
					83.3	
					125	
					166.7	
					108.3	
					250	
			Vertical	0.2	41.7	1.5
					83.3	
					125	
					166.7	
					108.3	
					250	
		10	Horizontal	0.3	83.3	2
					166.7	
					250	
					333.3	
					416.7	
					500	
			Vertical	0.2	83.3	1
					166.7	
					250	
					333.3	
					416.7	
					500	0.5

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA4C	35P	2.5	0.2	Horizontal	0.2	20.8	11
						41.7	
						62.5	
						83.3	9
						104.2	
						125	
					0.3	20.8	10
						41.7	
						62.5	
						83.3	8
						104.2	
						125	
					0.5	20.8	9
						41.7	
						62.5	
						83.3	7
						104.2	
						125	
					0.7	20.8	8
						41.7	
						62.5	
						83.3	6
						104.2	
						125	
			0.2	Vertical	0.1	20.8	8
						41.7	
						62.5	
						83.3	
						104.2	
						125	5
					0.2	20.8	8
						41.7	
						62.5	
						83.3	
						104.2	6
						125	4
					0.3	20.8	8
						41.7	
						62.5	
						83.3	
						104.2	6
						125	4

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA4C	35P	5	0.3	Horizontal	0.2	41.7	10
						83.3	
						125	
						166.7	
						108.3	9
						250	8
					0.3	41.7	9
						83.3	
						125	
						166.7	
						108.3	8
						250	7
					0.5	41.7	8
						83.3	
						125	
						166.7	
						108.3	7
						250	6
					0.7	41.7	7
						83.3	
						125	
						166.7	
						108.3	6
						250	5
			0.2	Vertical	0.1	41.7	4
						83.3	
						125	
						166.7	
						108.3	
						250	3
					0.2	41.7	4
						83.3	
						125	
						166.7	
						108.3	
						250	2.5
					0.3	41.7	4
						83.3	
						125	
						166.7	
						108.3	
						250	2

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA4C	35P	10	0.3	Horizontal	0.2	83.3	9
						166.7	
						250	7
						333.3	6
						416.7	5
						500	4
					0.3	83.3	7.5
						166.7	
						250	6
						333.3	5
						416.7	4
						500	3
					0.5	83.3	6.5
						166.7	
						250	5
						333.3	4
						416.7	3
						500	2
					0.7	83.3	5.5
						166.7	
						250	4
						333.3	3
						416.7	2
						500	1
			0.2	Vertical	0.1	83.3	1.5
						166.7	
						250	
						333.3	
						416.7	
						500	1
					0.2	83.3	1.5
						166.7	
						250	
						333.3	
						416.7	
						500	0.5
					0.3	83.3	1.5
						166.7	
						250	
						333.3	
						416.7	
						500	0.5

[Controllers (without “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)		Speed (mm/s)	Payloads (kg)
SA5C SA5R	42P	3	Horizontal	0.2	25	10
					50	
					75	
					100	
					125	
					150	
			Vertical	0.2	25	4
					50	
					75	
					100	
					125	
					150	2
		6	Horizontal	0.3	50	8
					100	
					150	
					200	
					250	
					300	6
			Vertical	0.2	50	2
					100	
					150	
					200	
					250	
					300	1
		12	Horizontal	0.3	100	6
					200	
					300	
					400	4
					500	3
					600	2
			Vertical	0.2	100	1
					200	
					300	
					400	
					500	0.5
					600	

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA5C	42P	3	0.2	Horizontal	0.2	25	19
						50	
						75	
						100	
						125	16
						150	12
					0.3	25	14
						50	
						75	
						100	
						125	11
						150	8
					0.5	25	9
						50	
						75	
						100	
						125	7
						150	5
					0.7	25	7
						50	
						75	
						100	
						125	5
						150	3
			0.2	Vertical	0.1	25	10
						50	
						75	
						100	
						125	7
						150	4
					0.2	25	10
						50	
						75	
						100	9
						125	6
						150	3
					0.3	25	10
						50	
						75	
						100	8
						125	5
						150	2

If the stroke is long, the maximum speed may be lo wer than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA5C	42P	6	0.3	Horizontal	0.2	50	12
						100	
						150	
						200	
						250	10
						300	7
					0.3	50	10
						100	
						150	
						200	
						250	8.5
						300	6
					0.5	50	8
						100	
						150	
						200	
						250	6
						300	3
					0.7	50	6
						100	
						150	
						200	
						250	4.5
						300	1
			0.2	Vertical	0.1	50	5
						100	
						150	
						200	
						250	3.5
						300	2
					0.2	50	5
						100	
						150	
						200	4.5
						250	3
						300	1.5
					0.3	50	5
						100	
						150	
						200	3.5
						250	2
						300	0.5

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA5C	42P	12	0.3	Horizontal	0.2	100	8
						200	
						300	6
						400	5
						500	4
						600	3
					0.3	100	6
						200	
						300	
						400	4
						500	3
						600	2
					0.5	100	4
						200	
						300	
						400	3
						500	2
						600	1
					0.7	100	3
						200	
						300	
						400	2.5
						500	1.5
						600	0.5
			0.2	Vertical	0.1	100	2
						200	
						300	
						400	
						500	1
						600	0.5
					0.2	100	2
						200	
						300	
						400	
						500	1
						600	0.5
					0.3	100	2
						200	
						300	
						400	
						500	1
						600	0.5

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (without “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA5C	42P	20	0.3	Horizontal	0.2	166	4
						333	
						500	3
						666	
						833	2
						1000	
					0.3	166	4
						333	
						500	3
						666	
						833	2
						1000	
					0.5	166	2
						333	
						500	1.5
						666	
						833	1
						1000	0.5
					0.7	166	2
						333	
						500	1.5
						666	
						833	1
						1000	0.3
			0.2	Vertical	0.1	166	0.5
						333	
						500	
						666	
						833	-
						1000	-
					0.2	166	0.5
						333	
						500	
						666	
						833	-
						1000	-

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
When the stroke is between 250 and 600 mm and the actuator is installed vertically, the maximum speed is 800 mm/s or below.
[Refer to 1.2.1, “Speed.”]

[Controllers (without “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)		Speed (mm/s)	Payloads (kg)
SA6C SA6R	42P	3	Horizontal	0.2	25	10
					50	
					75	
					100	
					125	
					150	
			Vertical	0.2	25	4
					50	
					75	
					100	
					125	
					150	2
		6	Horizontal	0.3	50	8
					100	
					150	
					200	
					250	
					300	6
			Vertical	0.2	50	2
					100	
					150	
					200	
					250	
					300	1
		12	Horizontal	0.3	100	6
					200	
					300	
					400	4
					500	3
					600	2
			Vertical	0.2	100	1
					200	
					300	
					400	
					500	0.5
					600	

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA6C	42P	3	0.2	Horizontal	0.2	25	19
						50	
						75	
						100	
						125	16
						150	12
					0.3	25	14
						50	
						75	
						100	
						125	11
						150	8
					0.5	25	9
						50	
						75	
						100	
						125	7
						150	5
					0.7	25	7
						50	
						75	
						100	
						125	5
						150	3
			0.2	Vertical	0.1	25	10
						50	
						75	
						100	
						125	7
						150	4
					0.2	25	10
						50	
						75	
						100	9
						125	6
						150	3
					0.3	25	10
						50	
						75	
						100	8
						125	5
						150	2

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA6C	42P	6	0.3	Horizontal	0.2	50	12
						100	
						150	
						200	
						250	10
						300	7
					0.3	50	10
						100	
						150	
						200	
						250	8.5
						300	6
					0.5	50	8
						100	
						150	
						200	
						250	6
						300	3
					0.7	50	6
						100	
						150	
						200	
						250	4.5
						300	1
			0.2	Vertical	0.1	50	5
						100	
						150	
						200	
						250	3.5
						300	2
					0.2	50	5
						100	
						150	
						200	4.5
						250	3
						300	1.5
					0.3	50	5
						100	
						150	
						200	3.5
						250	2
						300	0.5

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA6C	42P	12	0.3	Horizontal	0.2	100	8
						200	
						300	6
						400	5
						500	4
						600	3
					0.3	100	6
						200	
						300	
						400	4
						500	3
						600	2
					0.5	100	4
						200	
						300	
						400	3
						500	2
						600	1
					0.7	100	3
						200	
						300	
						400	2.5
						500	1.5
						600	0.5
			0.2	Vertical	0.1	100	2
						200	
						300	
						400	
						500	1
						600	0.5
					0.2	100	2
						200	
						300	
						400	
						500	1
						600	0.5
					0.3	100	2
						200	
						300	
						400	
						500	1
						600	0.5

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
[Refer to 1.2.1, “Speed.”]

[Controllers (with “H” at the end of the model number)]

Model	Motor type	Lead (mm)	Rated acceleration (G)	Acceleration (G)		Speed (mm/s)	Payloads (kg)
SA6C	42P	20	0.3	Horizontal	0.2	166	4
						333	
						500	3
						666	
						833	2
						1000	
					0.3	166	4
						333	
						500	3
						666	
						833	2
						1000	
					0.5	166	2
						333	
						500	1.5
						666	
						833	1
						1000	0.5
					0.7	166	2
						333	
						500	1.5
						666	
						833	1
						1000	0.3
			0.2	Vertical	0.1	166	0.5
						333	
						500	
						666	
						800	
						833	
						1000	-
					0.2	166	0.5
						333	
						500	
						666	
						800	
						833	
						1000	-

If the stroke is long, the maximum speed may be lower than the applicable speed shown in the table.
When the stroke is between 250 and 600 mm and the actuator is installed vertically, the maximum speed is 800 mm/s or below.
[Refer to 1.2.1, “Speed.”]

1.2.3 Drive system

Model name	Motor type	Lead [mm]	No. of encoder pulses	Ball Screw and Lead Screw Type		
				Type	Diameter	Accuracy
SA2A	20P	1	800	Lead screw Rolled	ϕ10mm	C10
		2				
		4				
SA2B	20P	2		Lead screw Rolled	ϕ10mm	C10
		4				
		6				
SA3	28P	2		Ball screw Rolled	ϕ6mm	C10
		4				
		6				
SA4	35P	2.5		Ball screw Rolled	ϕ8mm	C10
		5				
		10				
SA5	42P	3		Ball screw Rolled	ϕ10mm	C10
		6				
		12				
		20				
SA6	42P	3		Ball screw Rolled	ϕ10mm	C10
		6				
		12				
		20				

1.2.4 Common

Model name	Item	Specification
SA2A, SA2B	Positioning repeatability (Note 1)	±0.05 mm
	Backlash (Note 1)	0.3 mm or less
	Base	Material: Aluminum with white alumite treatment

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

Model name	Item	Specification	
		SA5C, SA6C – Lead other than 20 mm	SA5C, SA6C – Lead 20 mm
SA3, SA4, SA5, SA6	Positioning repeatability (Note 2)	±0.02 mm	±0.03 mm
	Backlash (Note 2)	0.1 mm or less	
	Base	Material: Aluminum with special alumite treatment	

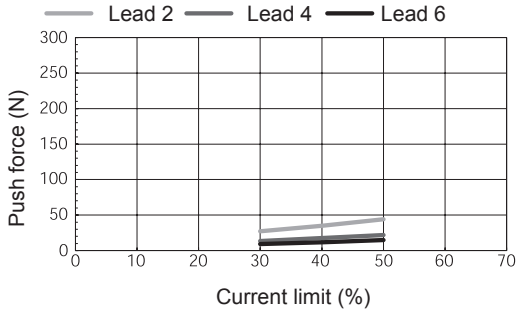
Note 2 The values shown above are the accuracy at the delivery from the factory.
It does not include the consideration of time-dependent change as it is used.

1.2.5 Relation between Current Limit Value and Pressing Force

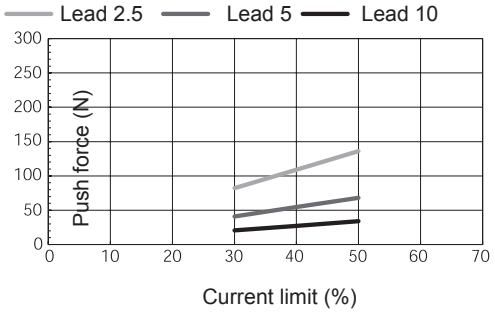
Note SA2AC, SA2BC, SA2AR and SA2BR cannot perform pressing.

	RCP3 SA3			RCP3 SA4			RCP3 SA5, 6		
Current Limit (%)	Push force Lead 2 (N)	Push force Lead 4 (N)	Push force Lead 6 (N)	Push force Lead 2.5 (N)	Push force Lead 5 (N)	Push force Lead 10 (N)	Push force Lead 3 (N)	Push force Lead 6 (N)	Push force Lead 12 (N)
30	27	14	9	82	41	21	113	57	28
40	35	18	12	109	55	27	151	76	38
50	44	22	15	136	68	34	189	95	47

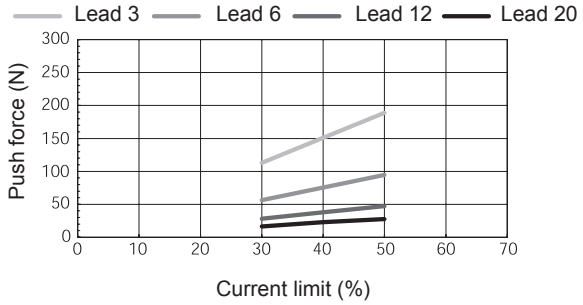
RCP3 Slider Type Push Force
SA3



RCP3 Slider Type Push Force
SA4



RCP3 Slider Type Push Force
SA5, SA6



⚠ Caution:
1. The relation of the current limit and the pressing force is a reference when assuming the speed is 20mm/s.
2. There is a little variance in the actual pressing force.The variance of the pressing force becomes large when the current limit value is low.
3. Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. even a case that it would not operate. The product cannot be used above 50%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
4. When the approach speed to the pressing start position (setting in the position table) is 20mm/s or less, pressing will be performed with the approach speed.In such a case also the pressing force will be unstable.In such cases, check in advance that the actuator can be used with no problem before omit using.

1.2.6 Allowable Load Moment of the Actuator

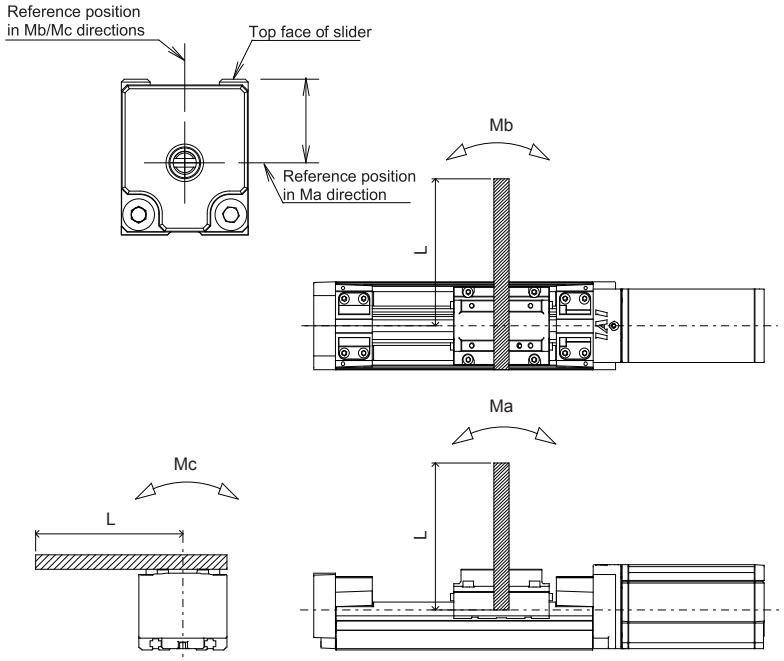
[1] SA2A and SA2B

- 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 payloads for the slider. (See diagram below.)

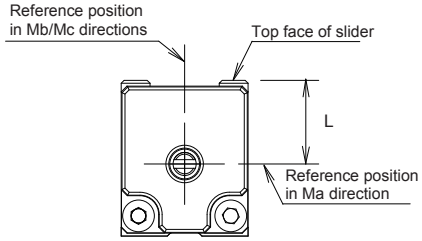
Loads moment must not apply in Ma or Mb direction other than during acceleration/deceleration.

Type	Allowable Dynamic Load Moment [N•mm (kgf/mm)]			Allowable Static Load Moment [N•mm (kgf/mm)]			Allowable overhang load [L]
	Ma	Mb	Mc	Ma	Mb	Mc	
SA2A	74 (7.6)	74 (7.6)	43 (4.4)	570 (58.2)	570 (58.2)	331 (33.8)	Ma direction: 50mm Mb or Mc direction: 50mm
SA2B	198 (20.2)	198 (20.2)	143 (14.6)	1140 (116.3)	1140 (116.3)	821 (83.8)	Ma direction: 50mm Mb or Mc direction: 50mm

Load moment directions and overhang load directions



In the calculation of the moment in Ma and Mc directions, set the datum position at Lmm from the slider top surface as shown in the figure below.



Model	L
SA2A	14.5
SA2B	15.5

⚠ Caution: Application of an excessive load moment may produce unwanted results such as a shorter life of the guide. Also note that using the actuator with an overhang load exceeding the allowable limit may generate vibration or negatively affect the life of the guide.

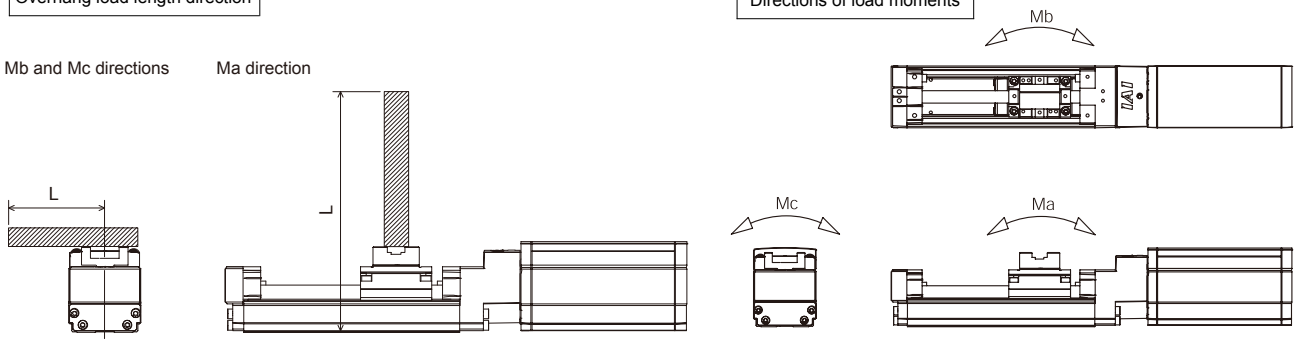
[2] SA3, SA4, SA5, and SA6

- 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 payloads for the slider. (See diagram below.)

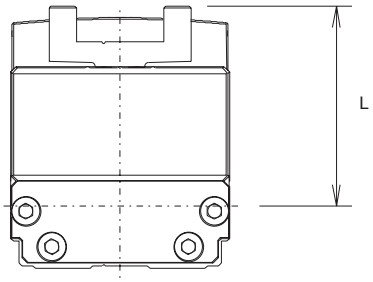
Type	Allowable Dynamic Load Moment [N•m (kgf/m)]			Allowable Static Load Moment [N•m (kgf/m)]			Allowable overhang load [L]
	Ma	Mb	Mc	Ma	Mb	Mc	
SA3	1.96 (0.2)	2.84 (0.29)	3.14 (0.32)	5.0 (0.51)	7.1 (0.72)	7.9 (0.81)	Ma direction: 100mm Mb or Mc direction: 100mm
SA4	3.04 (0.31)	4.31 (0.44)	5.00 (0.51)	6.8 (0.69)	9.7 (0.99)	13.3 (1.36)	Ma direction: 120mm Mb or Mc direction: 120mm
SA5	3.92 (0.40)	5.58 (0.57)	8.53 (0.87)	10.2 (1.04)	14.6 (1.49)	22.4 (2.29)	Ma direction: 130mm Mb or Mc direction: 130mm
SA6	4.31 (0.44)	6.17 (0.63)	10.98 (1.12)	17.6 (1.80)	25.2 (2.57)	44.5 (4.54)	Ma direction: 150mm Mb or Mc direction: 150mm

Overhang load length direction

Directions of load moments



In the calculation of the moment in Ma and Mc directions, set the datum position at Lmm from the slider top surface as shown in the figure below.



Offset reference positions for Ma and Mc moments

Model	SA3	SA4	SA5	SA6
L （mm）	29.5	36.5	43.5	47

⚠ Caution: Application of an excessive load moment may produce unwanted results such as a shorter life of the guide. Also note that using the actuator with an overhang load exceeding the allowable limit may generate vibration or negatively affect the life of the guide.

1.2.7 Duty Ratio in Continuous Operation

Operation can be performed with the duty ratio at 100%.
The duty ratio is the ratio of operation expressed in % to show the duration when the actuator is operating in 1 cycle.

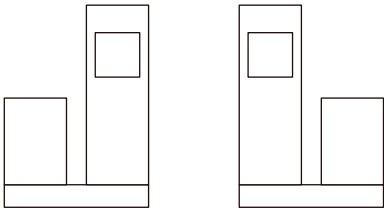
1.3 Options

1.3.1 Brake Type (Model: B)

Application: SA3C, SA4C, SA5C, SA6C, SA3R, SA4R, SA5R and SA6R.
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.

1.3.2 Motor Reversing to Left, Motor Reversing to Right (Moel: ML, MR)

Application: 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.



1.3.3 Reversed-home Specification (Model: NM)

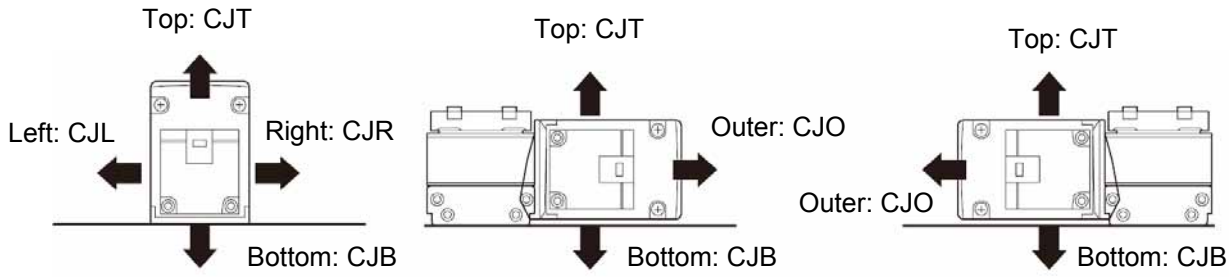
The standard home position is on the motor side. However, the motor position will be reversed if it is desirable in view of the layout of the system, etc.
(Note) The home position is adjusted at the factory before shipment. If you wish to change the home after the delivery of your actuator, you must return the actuator to IAI for adjustment.

1.3.4 No-cover Type (Model: NCO)

Application: SA3C, SA4C, SA5C, SA6C, SA3R, SA4R, SA5R and SA6R.
With this option, the actuator can be specified without side cover.
(Refer to 7, “External Dimensions” for the external dimensions with and without side cover.)

1.3.5 Changing the Cable Exit Direction (Model: CJT, CJR, CJL, CJB, CJO)

Application: SA3C, SA4C, SA5C, SA6C, SA3R, SA4R, SA5R and SA6R.
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).



Coupling type

Motor-reversing type,
reversed to left (ML)

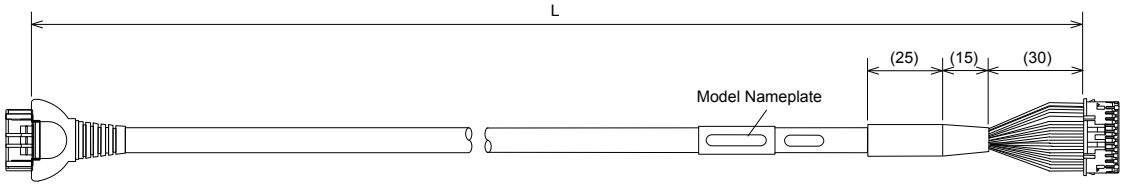
Motor-reversing type,
reversed to Right (MR)

1.4 Motor • Encoder Cables

1.4.1 PMEC, PSEP or MSEP Controller Cables

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

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



Actuator Side

Electric Wire Color	Symbol	Pin No.
Black	ϕA	A1
White	VMM	B1
Brown	ϕ/A	A2
Green	ϕB	B2
Yellow	VMM	A3
Red	ϕ/B	B3
Orange	LS+	A4
Gray	LS-	B4
White	-	A6
Yellow	-	B6
Red	A+	A7
Green	A-	B7
Black	B+	A8
Brown	B-	B8
Black (Identification tape)	BK+	A5
Brown (Identification tape)	BK-	B5
Green (Identification tape)	GND_{LS}	A9
Red (Identification tape)	VPS	B9
White (Identification tape)	VCC	A10
Yellow (Identification tape)	GND	B10
-	NC	A11
-	Shield, FG	B11

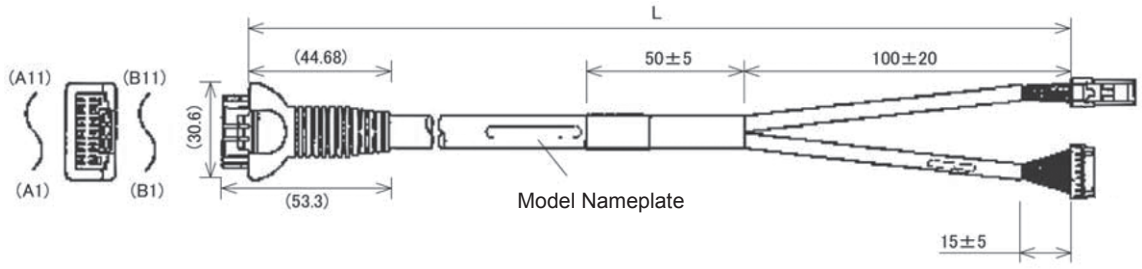
Controller Side

Pin No.	Symbol	Electric Wire Color
1	ϕA	Black
2	VMM	White
3	ϕ/A	Brown
4	ϕB	Green
5	VMM	Yellow
6	ϕ/B	Red
7	LS+	Orange
8	LS-	Gray
11	-	White
12	-	Yellow
13	A+	Red
14	A-	Green
15	B+	Black
16	B-	Brown
9	BK+	Black (Identification tape)
10	BK-	Brown (Identification tape)
20	GND_{LS}	Green (Identification tape)
18	VPS	Red (Identification tape)
17	VCC	White (Identification tape)
19	GND	Yellow (Identification tape)
21	NC	-
24	Shield, FG	-
22	-	-
23	-	-

1.4.2 PCON, PSEL Controller Cables

Motor • Encoder Integrated Cables For RCP3
(CB-PCS-MPA□□□)

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



Actuator Side

Electric Wire Color	Symbol	Pin No.
Black	ϕA	A1
White	VMM	B1
Red	ϕ/A	A2
Green	ϕB	B2
Yellow	VMM	A3
Brown	ϕ/B	B3
-	NC	A4
-	NC	B4
Pink (Red•)	BK+	A5
Pink (Blue•)	BK-	B5
White (Red•)	LS+	A6
White (Blue•)	LS-	B6
Orange (Red•)	A+	A7
Orange (Blue•)	A-	B7
Gray (Red•)	B+	A8
Gray (Blue•)	B-	B8
-	NC	A9
Orange (Blue• continuous	VPS	B9
Gray (Red• continuous)	VCC	A10
Gray (Blue• continuous)	GND	B10
-	NC	A11
-	Shield, FG	B11

Controller Side

Pin No.	Symbol	Electric Wire Color
B1	ϕA	Red
A2	VMM	Yellow
A1	ϕ/A	Black
B3	ϕB	-
B2	VMM	-
A3	ϕ/B	-
3	NC	Yellow (Red•)
2	NC	Yellow (Blue•)
14	BK+	Pink (Red•)
13	BK-	Pink (Blue•)
16	LS+	White (Red•)
15	LS-	White (Blue•)
12	A+	Orange (Red•)
11	A-	Orange (Blue•)
10	B+	Gray (Red•)
9	B-	Gray (Blue•)
8	NC	Orange (Red• continuous)
7	VPS	Orange (Blue• continuous)
6	VCC	Gray (Red• continuous)
5	GND	Gray (Blue• continuous)
4	NC	-
1	Shield, FG	-

2. Installation

2.1 Transportation

[1] Handling of the Actuator

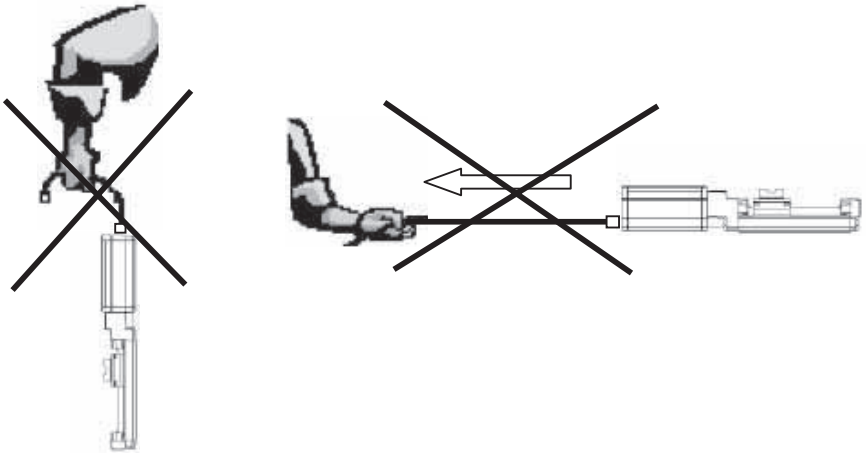
Unless otherwise specified, the actuator is shipped with 1 axis unit packaged separately.

(1) Handling the Packed Unit

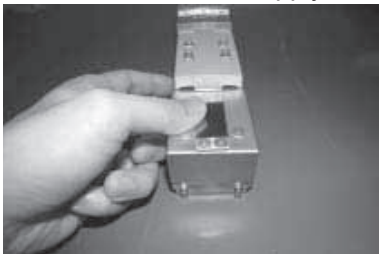
- Do not damage or drop. The package is not applied with any special treatment that enables it to resist an impact caused by a drop or crash.
- Transport a heavy package with at least more than two operators. Consider an appropriate method for transportation.
- Keep the unit in a horizontal orientation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

(2) Handling the Actuator After Unpacking

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



- Hold the base part or bracket part of the body when transporting the actuator main body.
- Do not hit or drop the actuator during transportation. Especially, pay attention to the side cover.
- Do not attempt to force any part of the actuator. Do not apply force especially on the stainless sheet.



[2] Handling in the Assembled Condition

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

(1) How to Handle the Package

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

(2) How to Handle after Unpackaged

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

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

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

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

2.2 Installation and Storage • Preservation Environment

[1] Installation Environment

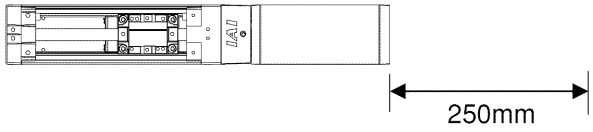
The actuator should be installed in a location other than those specified below.
Also provide sufficient work space required for maintenance inspection.

- Where the actuator receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 0 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds 85% RH
- Where the actuator receives direct sunlight
- Where the actuator is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of powder dust, salt or iron (at level exceeding what is normally expected in an assembly plant)

- Where the actuator is subject to splashed water, oil (including oil mist or cutting fluid) or chemical solutions
- Where the actuator receives impact or vibration
  (For SA2A and SA2B, use in an environment that dust is floating can shorten the product life extremely.)

If the actuator is used in any of the following locations, provide sufficient shielding measures:
- Where noise generates due to static electricity, etc.
- Where the actuator is subject to a strong electric or magnetic field
- Where the actuator is subject to ultraviolet ray or radiation

Open space required for maintenance inspection



[2] Storage • Preservation Environment

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

2.3 How to Install

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

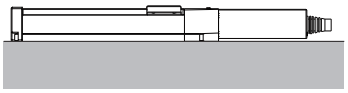
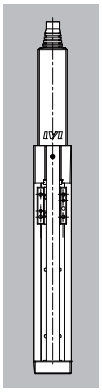
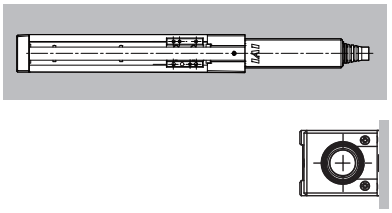
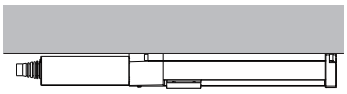
2.3.1 Installation

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
SA2A, SA2B	○	x	x	x
SA3	○	○	○	△
SA4	○	○	△	△
SA5	○	○	△	△
SA6	○	○	△	△

Installation posture

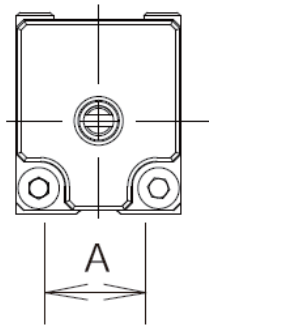
Horizontal	Vertical	Sideways	Ceiling mount
			

⚠ Caution: 1. 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.

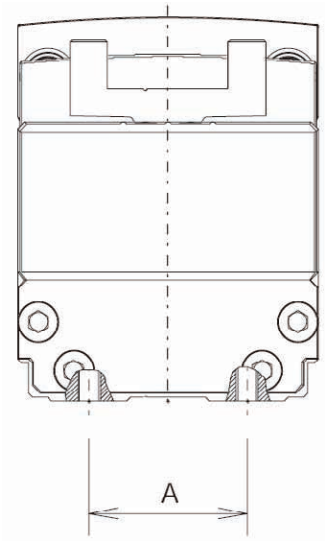
2. Excluding SA2A and SA2B can be installed sideways or ceiling mount, but the actuators must be checked daily. If the actuator is installed sideways or ceiling mount, the stainless sheet may be slacked or displaced. If the actuator is used continuously while the stainless sheet is slacked or displaced, 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 5.9 Stainless Sheet Replacement/Adjustment (SA3, SA4, SA5 and SA6 types with slider cover).]

2.3.2 Installation of Avtuator

The actuator mounting surface should be machined or otherwise processed to a smooth surface ofequivalent precision.
For SA3, SA4, SA5 and SA6, make the flatness of the surface 0.05mm/m or less.
The platform should have a structure stiff enough to install the unit so it would not generate vibration or other abnormality.
This actuator contains installation tap holes which allow it to be secured from the rear.
(Note that tap hole size depends on model. Please see diagrams below and 7. External Dimensions.)
The actuator also contains reamed holes for use with positioning pins.



SA2A and SA2B type



SA3, SA4, SA5 and SA6

Model	Tap size and maximum screw-in depth	Applicable bolt	Tightening torque		A (mm)	Reamed hole (mm)
			Bolt bearing surface is steel	Bolt bearing surface is aluminum		
SA2A	M3, depth 5	M3	1.54 N-m (0.16 kgf-m)	0.83 N-m (0.085 kgf-m)	10	ϕ2H7, depth 3 from bottom face of base
SA2B	M3, depth 4	M3				
SA3	M3, depth 5	M3	1.54 N-m (0.16 kgf-m)	0.83 N-m (0.085 kgf-m)	17	ϕ2H7, 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	ϕ2.5H7, 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	ϕ2.5H7, 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	ϕ3H7, 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.

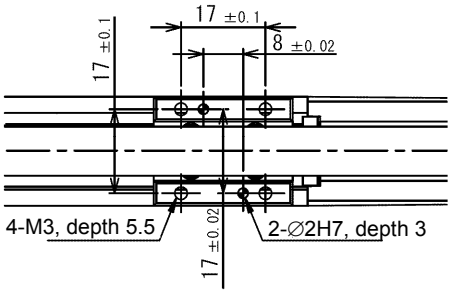
⚠ Caution: Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the tapped holes may be damaged, actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.

2.3.3 Installation of the Load

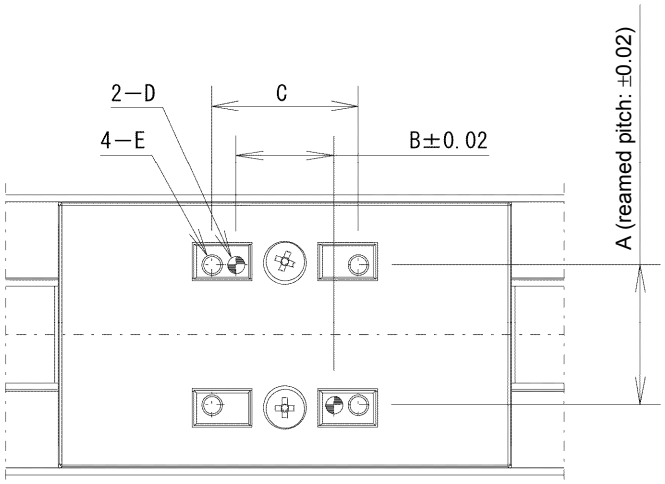
- Please attach the load to the device using the tap holes in the slider.
- The process for attaching these to the main unit is similar to the installation process of the main unit. Use of high-tension bolts meeting at least ISO-10.9 standard is recommended for mounting. The table below shows the recommended tightening torque. 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 screw in pins deeper than indicated in the table below, as this can damage the tap holes, resulting in insecure installation of the load, reduced precision of device, and possible accidents.
  Do not tighten the mounting screws to torques exceeding the applicable value shown in the table below. Doing so may damage the tapped holes.



SA2A and SA2B types

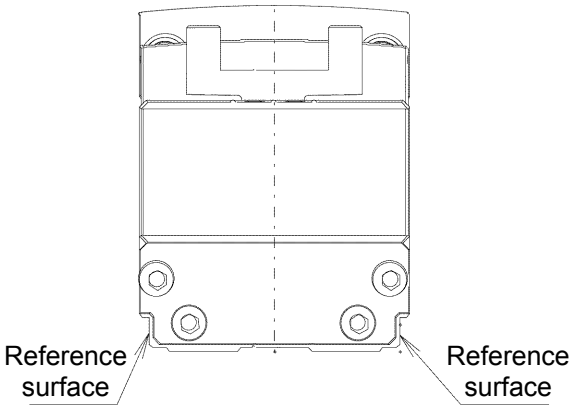


SA3, SA4, SA5 and SA6 types

Model	A	B	C	D	E	Mounting screws	
						Nominal thread size	Tightening torque
SA2A SA2B						M3	0.83 N-m (0.085 kgf-m)
SA3	17	11	17	∅2H7, depth 5	M3, depth 6	M3	0.83 N-m (0.085 kgf-m)
SA4	20	14	21	∅2.5H7, depth 5	M3, depth 6	M3	0.83 N-m (0.085 kgf-m)
SA5	26	14	22	∅2.5H7, depth 5	M4, depth 8	M4	1.76 N-m (0.18 kgf-m)
SA6	31	15	25	∅3H7, depth 5	M5, depth 10	M5	3.42 N-m (0.35 kgf-m)

2.3.4 Mounting Surface

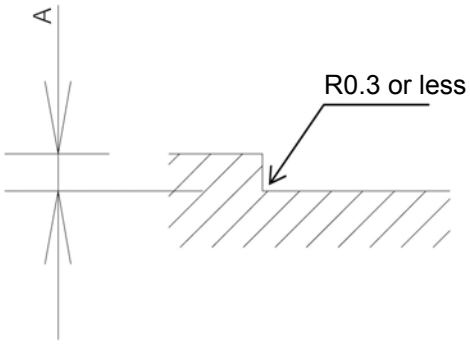
- For the platform to install the actuator, ensure the structure that possesses enough stiffness to avoid vibration being generated.
- RCA2-SA3C, SA4C, SA5C, SA6C, SA3R, SA4R, SA5R, SA6R
  The side and bottom faces of the base provide reference surfaces for slider travel. When it is necessary that the 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.



SA3, SA4, SA5 and SA6 types

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.



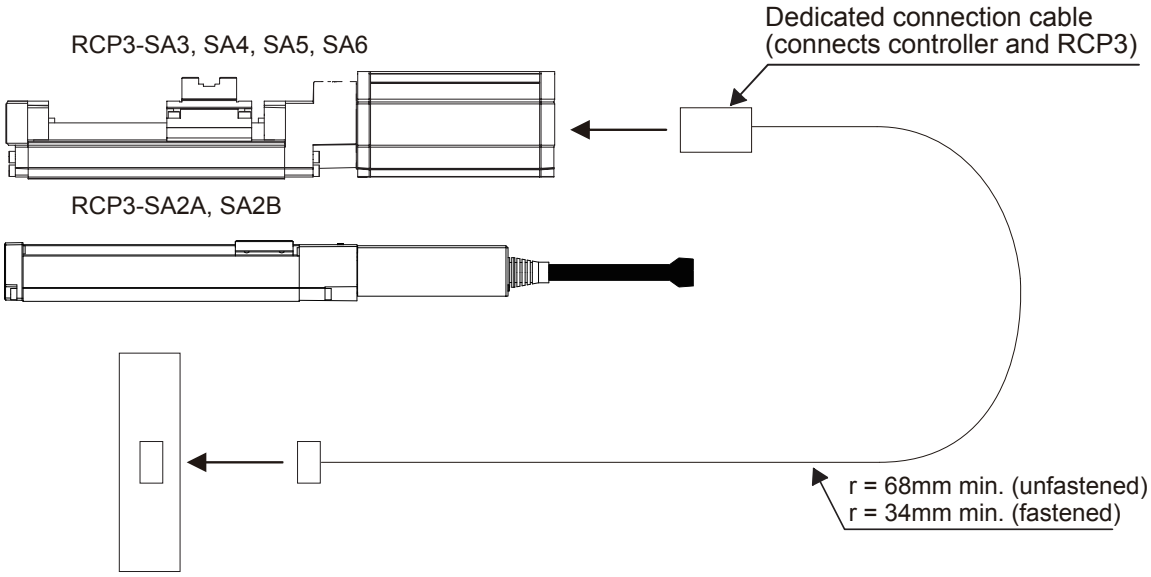
Model	Length of A (mm)
SA3, SA4, SA5 and SA6 types	2 to 4 or less

3. Connecting with the Controller

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

- If the dedicated connection cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Do not cut and reconnect the dedicated connection cable for extension or shorten the cable.
- Do not pull on the dedicated connection cable or bend it forcibly.
- The actuator cable out of the motor unit for SA2AC, SA2AR, SA2BC and SA2BR is for fixed use. Make sure to fix it so it would not be exposed to repeatable bending.

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



Dedicated controller

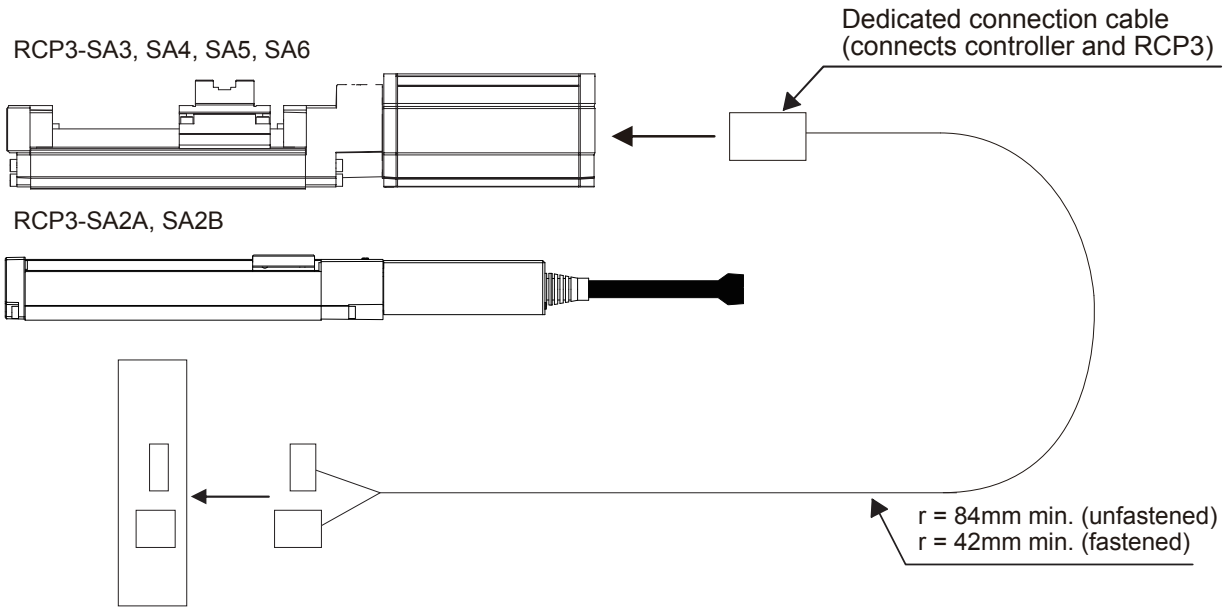
- PMEC
- PSEP
- MSEP

Dedicated connection cable

- Pulse motor cable: CB-APSEP-MPA□□□

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

Example) 080 = 8m



Dedicated connection cable

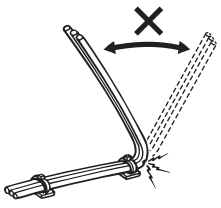
• Pulse motor cable: CB- PCS - MPA□□□

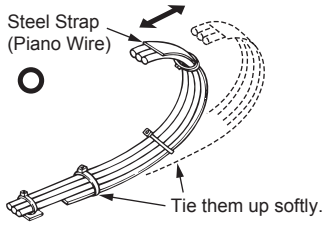
*) □□□ indicates the cable length L. Up to 20m can be specified.

Example) 080 = 8m

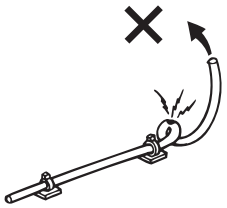
⚠ Warning: For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure,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

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

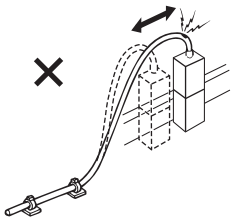




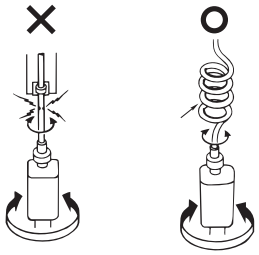
- Do not let the cable bend, kink or twist.



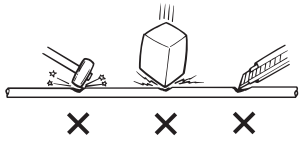
- Do not pull the cable with a strong force.



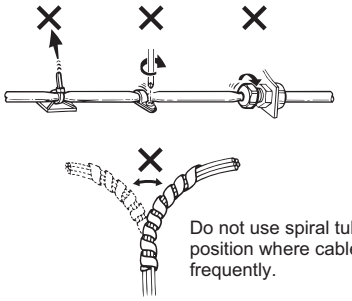
- Pay attention not to concentrate the twisting force to one point on a cable.



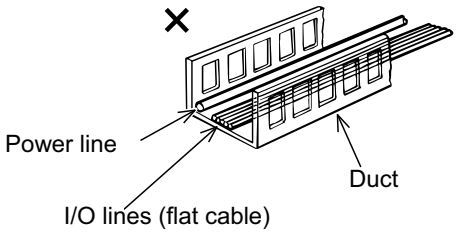
- Do not pinch, drop a heavy object onto or cut the cable.



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

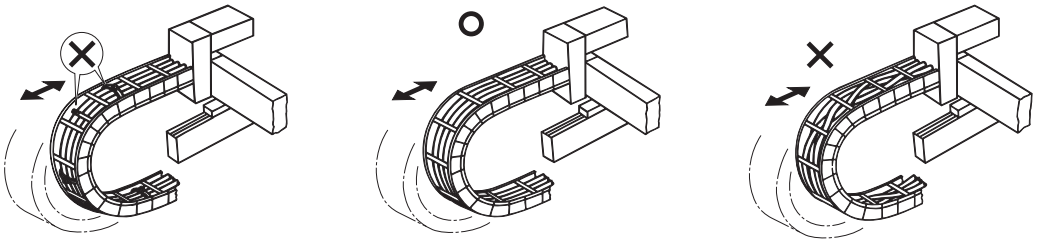


- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable track.

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



4. Operation

4.1 Home Return

4.1.1 Adjusting the Home Position

The actuator home position can be adjusted by changing parameter.(Note 1) 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.

Note 1: The items to set up in the parameters differ depending on the controller.
PCON controller: No. 22, home return offset distance
PSEL controller: Parameter No. 12 for each axis, home preset value
PSEP controller: No. 16, home return offset distance
PMEC controller: No. 16, home return offset distance
MSEP controller: No. 16, home return offset distance

4.1.2 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.

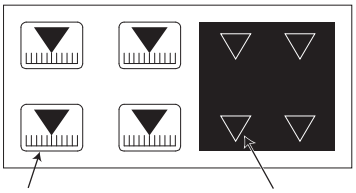
⚠ Caution: The encoder plays an important role in the detection of position and home signals, and its phase is adjusted precisely. Never touch the encoder to change the home position.

4.1.3 How to use the home mark

◆ Please affix these marks to the actuator as home markers as needed.

Contents of sticker

Home mark sticker



× 1 sheet

Home mark scale × 4 Home mark × 4

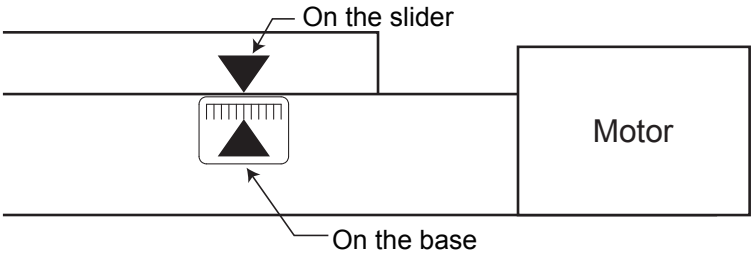
(Scale: 1 mm graduation mark, 10 mm width)

- Peel off the marks from the base sheet.

Note 1. Every mark has sticky back.
2. Remove smear and stain from the surface.
3. Avoid label or nameplate as a marking location.

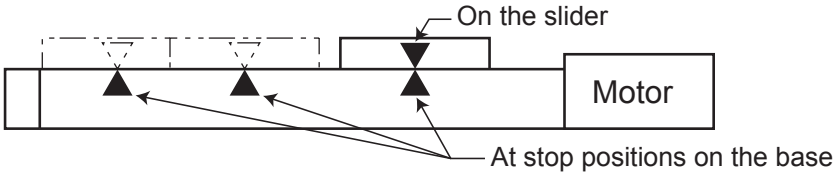
Example of Use

1) Used to indicate the direction of actuator home



- Attach both stickers when actuator is stopped in home position

2) Used as stop positions



5. Maintenance Inspection

5.1 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.

(SA2A and SA2B types)

	External visual inspection	Internal inspection	Greasing (Note 2)
Start of work inspection	○		
1-month inspection	○		
3-month inspection	○	○	
6-month inspection	○	○	○
Every 6 months thereafter	○	○	○

(SA3, SA4, SA5 and SA6 types)

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

Note 1 If grease is found degraded as a result of interior check, add grease.
Note 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. (If the stroke of the ROBO Cylinder is less than 50 mm, move the actuator back and force over the entire stroke.) This will restore oil film.

5.2 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, Slacks	Check this item on SA3, SA4, SA5 and SA6 types with stainless sheet.
Overall	Irregular noise, vibration	

- If the stainless sheet is slacked, make adjustment to remove slacks 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.

5.3 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.

5.4 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, etc., adjust the stainless sheet.
[For the stainless sheet adjustment procedure, refer to 5.9, “Stainless Sheet Replacement/Adjustment”]

5.5 Internal Inspections

5.5.1 SA2A and SA2B

Turn off the power and inspect visually after removing the screw cover in the case of slider types, or after removing the pulley cover in the case of reversing types.
An internal inspection should check the following things.

Main unit	Loose actuator mounting bolts, other loose items
Guide section	Lubrication, buildup

Visually inspect the interior of the machine. 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.

5.5.2 SA3, SA4, SA5 and SA6

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.
An internal inspection should check the following things.

Main unit	Loose actuator mounting bolts, other loose items
Guide section	Lubrication, buildup
Belt (reversing types)	Belt wear and 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. For inspection and adjustment of the belt, refer to 5.8.

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.

5.6 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.

5.7 Greasing Guides

5.7.1 SA2A and SA2B

[1] Applicable greases

This product has been shipped with synthetic poly-α olefin grease applied to both the lead screw and slide guide.
IAI uses the following grease in our plant.

Applicable location	Manufacturer	Model number
Lead screw/slide guide	Sumico Lubricant Co., Ltd.	Sumitec 308

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

⚠ Warning:
Never use anything other than synthetic poly-α olefin grease. Mixing fluorine-based grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

[2] How to apply grease

When greasing the guide, use a grease syringe to apply grease between the slider and base (guide-piece retention groove) and then move the slider back and forth to spread the grease evenly.
When greasing the lead screw, clean the screw, manually apply grease, and then move the slider back and forth to spread the grease evenly.

⚠ Caution: When moving the slider back and forth, do not move the slider directly by hand, but operate it using the jog function, etc.
Move the actuator directly with hand may apply excess force to it, which result in a malfunction of the actuator such as damage to nut.

5.7.2 SA3, SA4, SA5 and SA6

[1] Applicable greases

[Applicable greases for guide (SA3, SA4, SA5 and SA6 types)]
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 fluorine-based grease. Mixing fluorine-based grease with lithium-based grease not only reduces the performance of the grease, it may even cause damage to the actuator.

[Applicable greases for ball screw (SA3, SA4, SA5 and SA6 types)]
The grease initially used is lithium-based grease.
IAI uses the following grease in our plant. (Excludes SA3 type)

Kyodo Yushi	Multitemp LRL 3

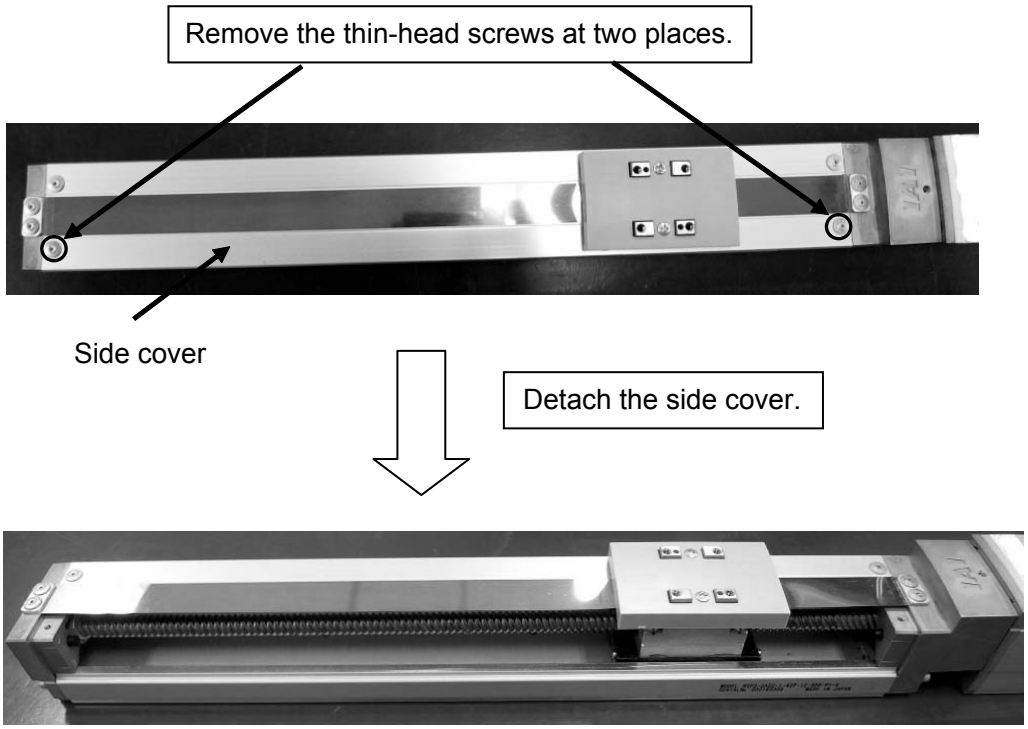
* RCP3 SA3 type uses the following grease.

Idemitsu Kosan	Daphne Eponex Grease No. 2

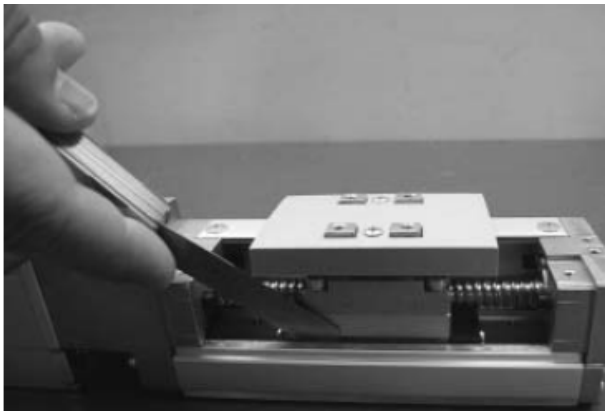
⚠ Warning:
Never use fluorine-based grease. Mixing fluorine-based grease with lithium-based grease not only reduces the performance of the grease, it may even cause damage to the actuator.

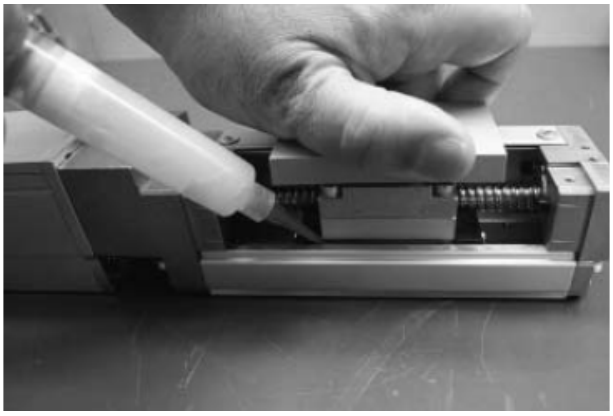
[2] How to apply grease

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.





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.

3) If the side cover and stainless sheet are present, put side cover back on.
Hitting it on the edge of the stainless steel sheet when attaching may cause the sheet damaged or meandered, which may result in earlier degradation or wear-out of the sheet.
Prepare a shim (of approx. 0.1 to 0.2mm) to insert it between the sheet and cover to protect the sheet edge from being touched, and slightly push up the sheet to fit the cover in.

⚠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.
- When having the slider moved back and forth manually by hand, make sure not to apply external force to the thrust directions that exceeds the value stated in Caution in Handling. (If the slider will not move, operate it using a jog function.)

5.8 Belt

5.8.1 Inspection of belt

Visually inspect the belt after removing the pulley cover.
Although the durability of the belt is affected significantly by the operating conditions, generally the belt has a flex life of several million times.
As a reference of when the belt should be actually replaced, replace the belt if any of the following conditions is observed:

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

5.8.2 Applicable belt

[1] Applicable belt for SA2AR and SA2BR
Manufacturer: Mitsuboshi Belting Ltd.

Belt model number (type)
40S2M104G (clean rubber type)

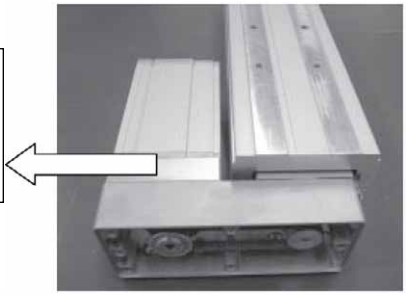
[2] Applicable belt for SA3R, SA4R, SA5R and SA6R
Manufacturer: Bando Chemical Industries, Ltd.

Belt model number (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

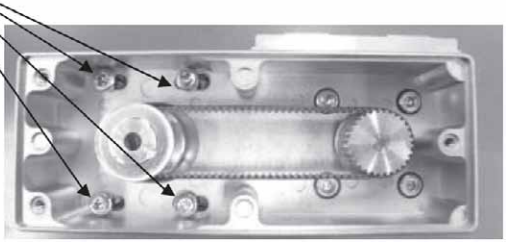
5.8.3 Adjustment of belt tension

Remove the pulley cover, loosen the tension adjustment bolts (4 locations) (2 pcs on the SA2AR and SA2BR), and move the motor to the left as shown below to tension the belt. After the adjustment is finished, tighten the tension adjustment bolts.

Tension
SA2AR and SA2BR: 0.51 kgf
SA3R: 1.5 ± 0.1 kgf
Other than SA3R: 2.5 ± 0.1 kgf



Tension adjustment bolt		
Model	Nominal thread size	Tightening torque
SA2AR/SA2BR	M3	0.83 N-m (0.085 kgf-m)
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)

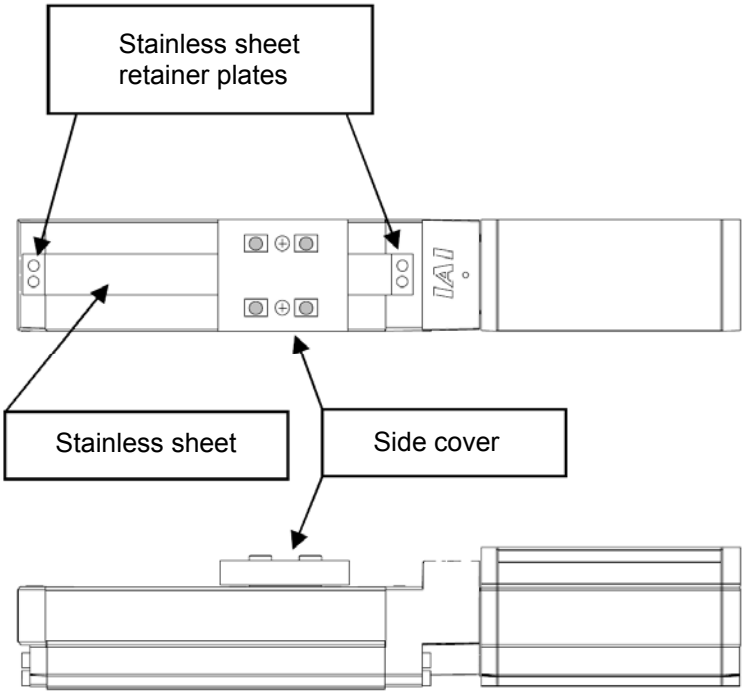


5.9 Stainless Sheet Replacement/Adjustment (SA3, SA4, SA5 and SA6 with side cover)

It is possible to replace the stainless sheet without removing the side cover.
[Items required for replacing the stainless sheet]

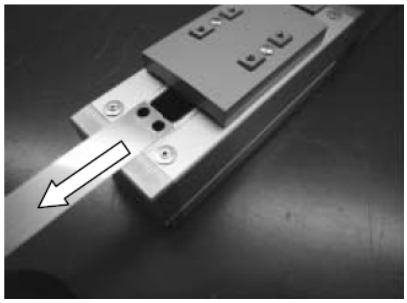
- Repl acement stainless sheet
- Hex wrench set
- Cello phane tape

[Part names]

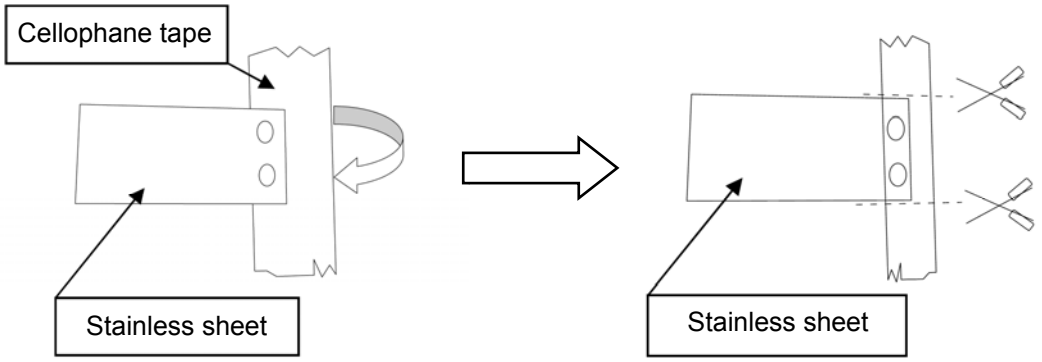


[Procedure]

[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.

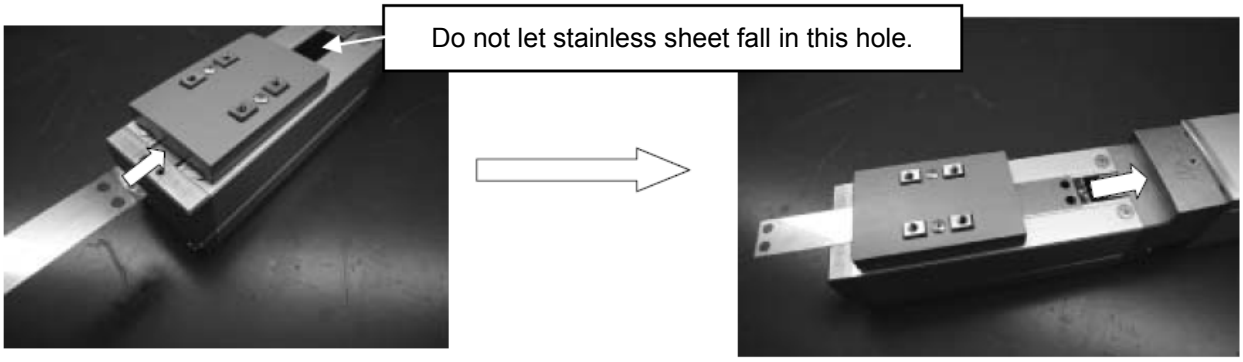


[3] Apply cellophane tape to one side of the new stainless sheet.

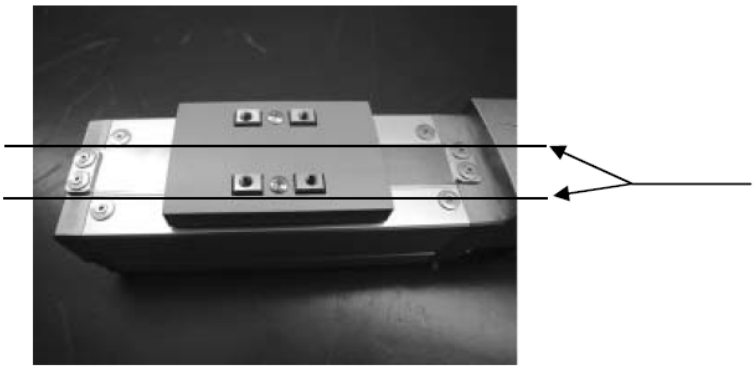


Apply the cellophane tape as though sandwiching the stainless sheet, leaving about 3 mm of tape sticking out from the stainless sheet. Cut off the excess tape.

[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.

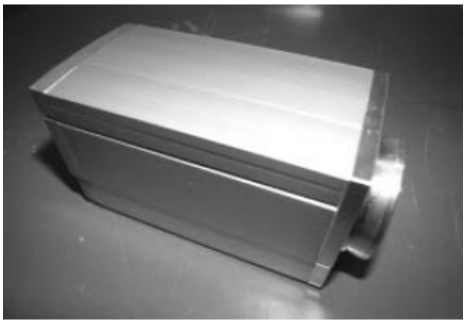


Two grooves are cut into the main unit to serve as guides for attaching the stainless sheet. Install the stainless sheet so that it comes to the center of the two grooves. Be careful not to install it in a position where it bends.

[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 having the slider moved back and forth manually by hand, make sure not to apply external force to the thrust directions that exceeds the value stated in Caution in Handling. (If the slider will not move, operate it using a jog function.)

5.10 Motor Replacement



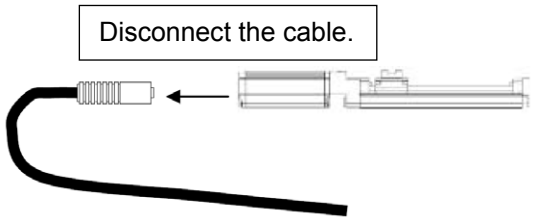
Refer to 5.11 for reversing types.
[Items required for replacing the motor]

- Replacement motor unit

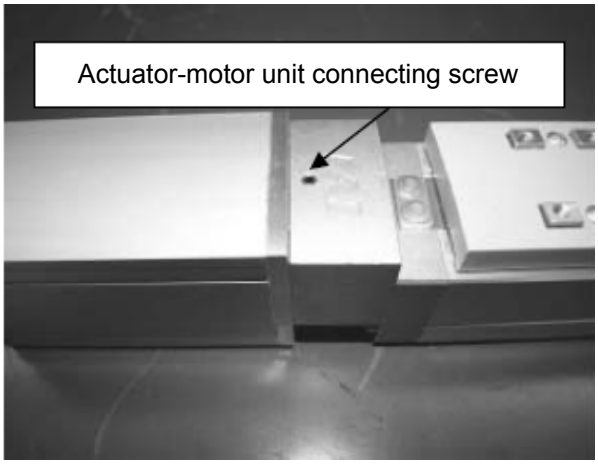
Axis type			Model number	
			Without brake	With brake
RCP3 (black encoder cable connector)	Slider type	SA2AC SA2BC	RCP3-MU00A	RCP3-MU00A-B
		SA3C	RCP3-MU1A	RCP3-MU1A-B
		SA4C	RCP3-MU2A	RCP3-MU2A-B
		SA5C	RCP3-MU3A	RCP3-MU3A-B
		SA6C		

- Hex wrench set

[Procedure]
[1] 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. (Cross-recessed cap screws M2 are used on the SA2AC and SA2BC.)

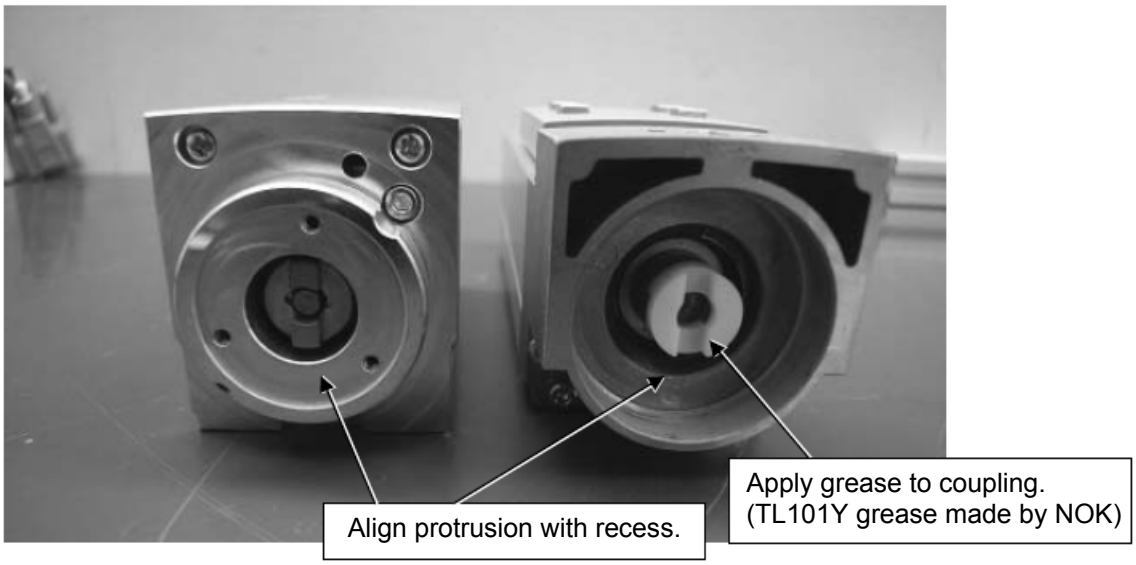


(Example for SA3C, SA4C, SA5C and SA6C types)

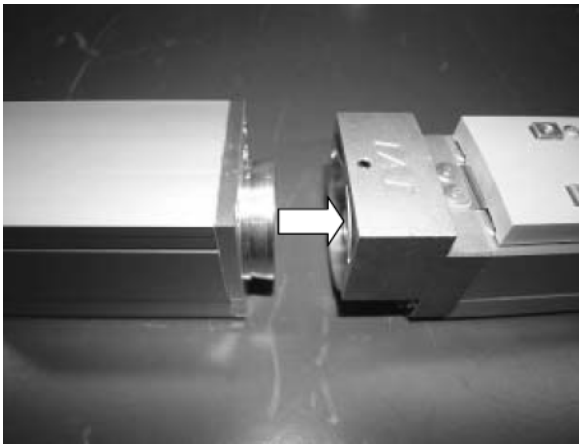


[2] Detach the motor unit.

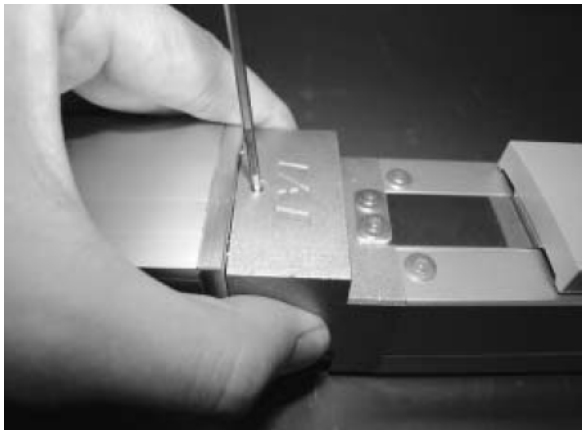
[3] Align the actuator side and replacement motor unit side projection section and the slit orientation.



[4] Install the replacement motor by fitting the protrusion of one unit in the recess of the other.



[5] Use a 2 mm hex wrench to remove the screw fastening the motor unit and the actuator. (Cross-recessed cap screws M2 are used on the SA2AC and SA2BC.)



5.11 Replacement of Belt and Motor for Reversing Types

[Items required for replacing the motor]

- Replacement motor unit for reversing type

Axis type			Model number	
			Without brake	With brake
RCP3 (black encoder cable connector)	Slider type	SA2AR SA2BR	RCP3-MU00B	RCP3-MU00B-B
		SA3R	RCP3-MU1B	RCP3-MU1B-B
		SA4R	RCP3-MU2B	RCP3-MU2B-B
		SA5R	RCP3-MU3B	RCP3-MU3B-B
		SA6R		

- Belt
- Applicable belt for SA2AR and SA2BR

Manufacturer: Mitsuboshi Belting Ltd.

Belt model number (type)
40S2M104G (clean rubber type)

- Applicable belt for SA3R, SA4R, SA5R and SA6R

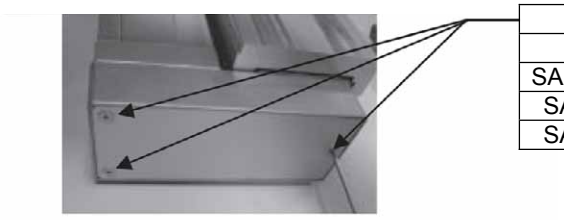
Manufacturer: Bando Chemical Industries, Ltd.

Belt model number (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

- Tension gauge
- Hex wrench set

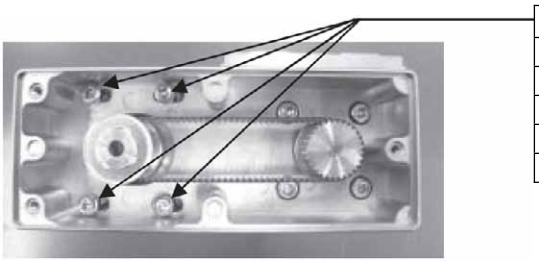
[Procedure]

[1] Remove the pulley cover.
Remove the mounting screws (2 pcs on the SA2AR, SA2BR and SA3R, or 3 pcs on all other models).



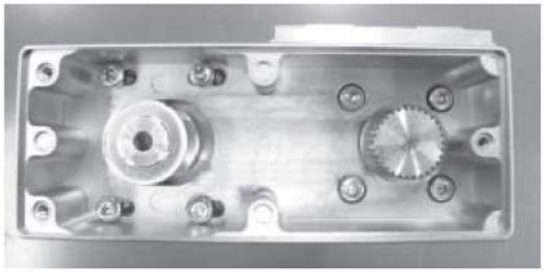
Mounting screw		
Model	Nominal thread size	Applicable hex wrench
SA2AR/SA2BR	M3	2.5 mm across flats
SA3R/SA4R	M2.5	1.5 mm across flats
SA5R/SA6R	M3	2.5 mm across flats

[2] Loosen the tension adjustment bolts (4 locations) (2 pcs on the SA2AR and SA2BR) and slack the belt.

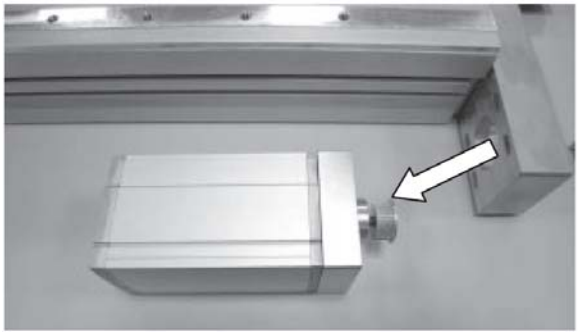


Tension adjustment bolts		
Model	Nominal thread size	Applicable hex wrench
SA2AR/SA2BR	M3	2.5 mm across flats
SA3R	M2.6	2 mm across flats
SA4R	M3	2.5 mm across flats
SA5R/SA6R	M4	3 mm across flats

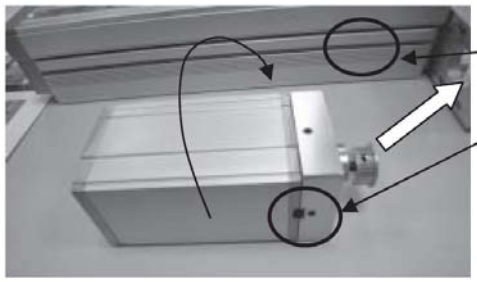
[3] Remove the belt from the pulleys. When replacing the belt, proceed to step [6].

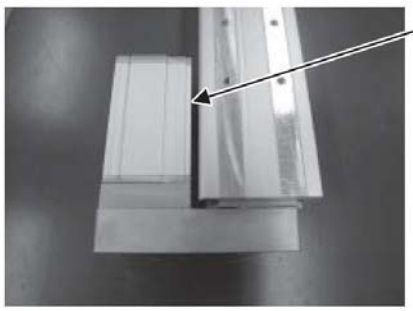


[4] Remove the tension adjustment bolts and pull out the motor unit.

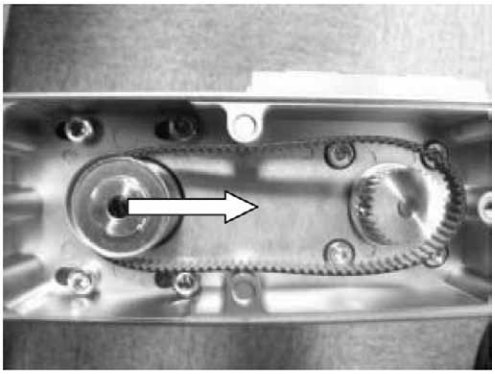


[5] Install the replacement motor unit.
As shown below, install the motor unit by making sure the specified surface of the motor unit faces the base of the actuator.
Loosely secure the motor unit using the tension adjustment bolts.

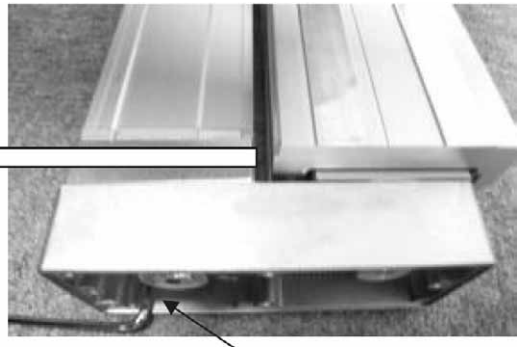




[6] Move the motor unit in the direction of the arrow shown below, and then install the belt.
When replacing the belt, install the replacement belt.



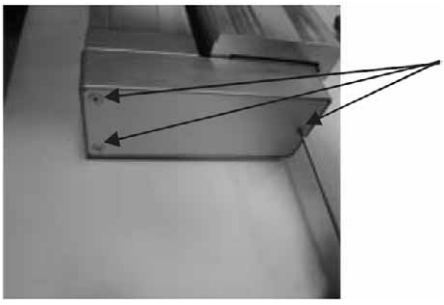
[7] Pass around the base of the motor unit a strong string (or long tie band) that has been looped into a ring, and pull the ring with a tension gauge. After confirming the specified tension, tighten the tension adjustment bolts uniformly.



Tension
SA2AR and SA2BR: 0.51 kgf
SA3R: 1.5 ± 0.1 kgf
Other than SA3R: 2.5 ± 0.1 kgf

Tension adjustment bolt		
Model	Nominal thread size	Tightening torque
SA2AR/SA2BR	M3	0.83 N•m (0.085 kgf•m)
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)

[8] Install the pulley cover.



Mounting screws (2 pcs on the SA2AR, SA2BR and SA3R, or 3 pcs on all other models).

6. Life

6.1 Life of Ball Screw Actuator

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

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

C_{IA}: Allowable dynamic load moment
fW: Load factor (= 1.2)
M_{50}: 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:

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

L: Traveling life (survival probability of 90%)
C_{IA}: Allowable dynamic moment
P: Applicable moment

6.2 Life of Slip Screw Actuator

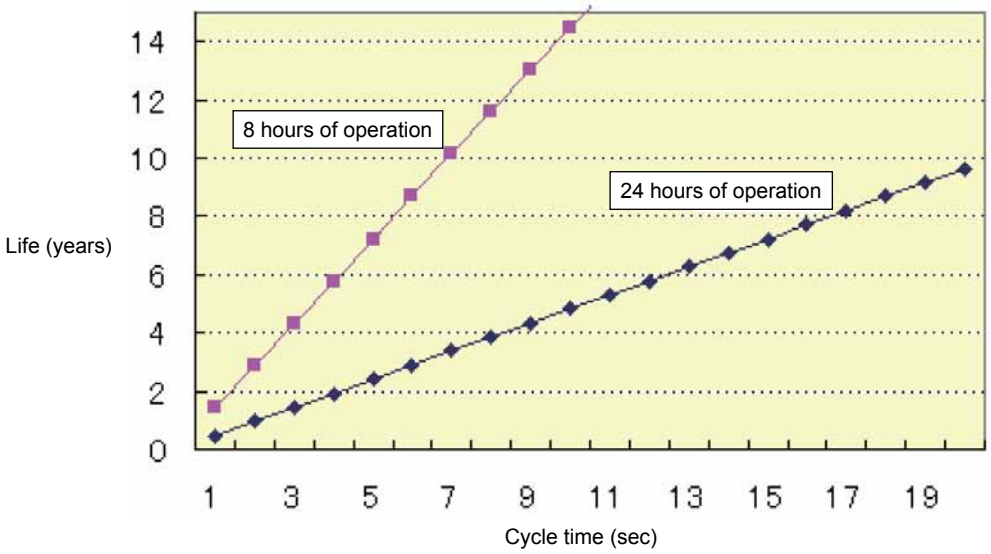
This type of actuator adopts a slip screw and its nut wears.
The life of a slip screw actuator is calculated roughly based on the wear amount of the nut.
As the nut wears, the positioning precision of the actuator drops due to increased backlash, etc.
(Rough guide for actuator life)

10 million cycles when used horizontally

6.2.1 Relationship of Cycle Time and Product Life

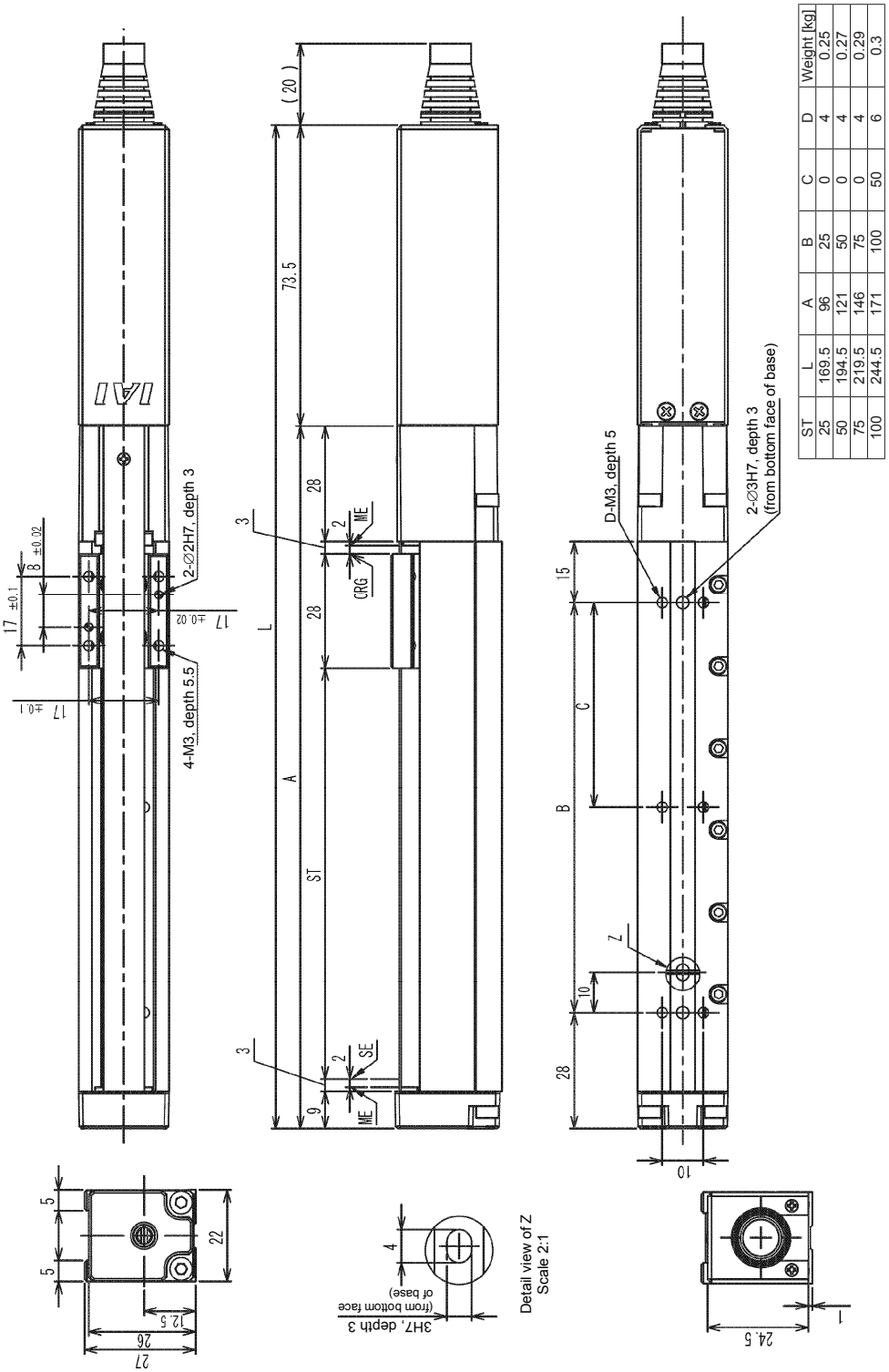
(1) Horizontal application

The graph below shows the relationship between the cycle time for one back-and-forth operation and the life of the product in a horizontal application (product life: 10 million cycles).
The lines for product life based on 8 hours of operation and 24 hours of operation a day, for 240 days a year, are shown. Use this graph as a reference when determining the product life.



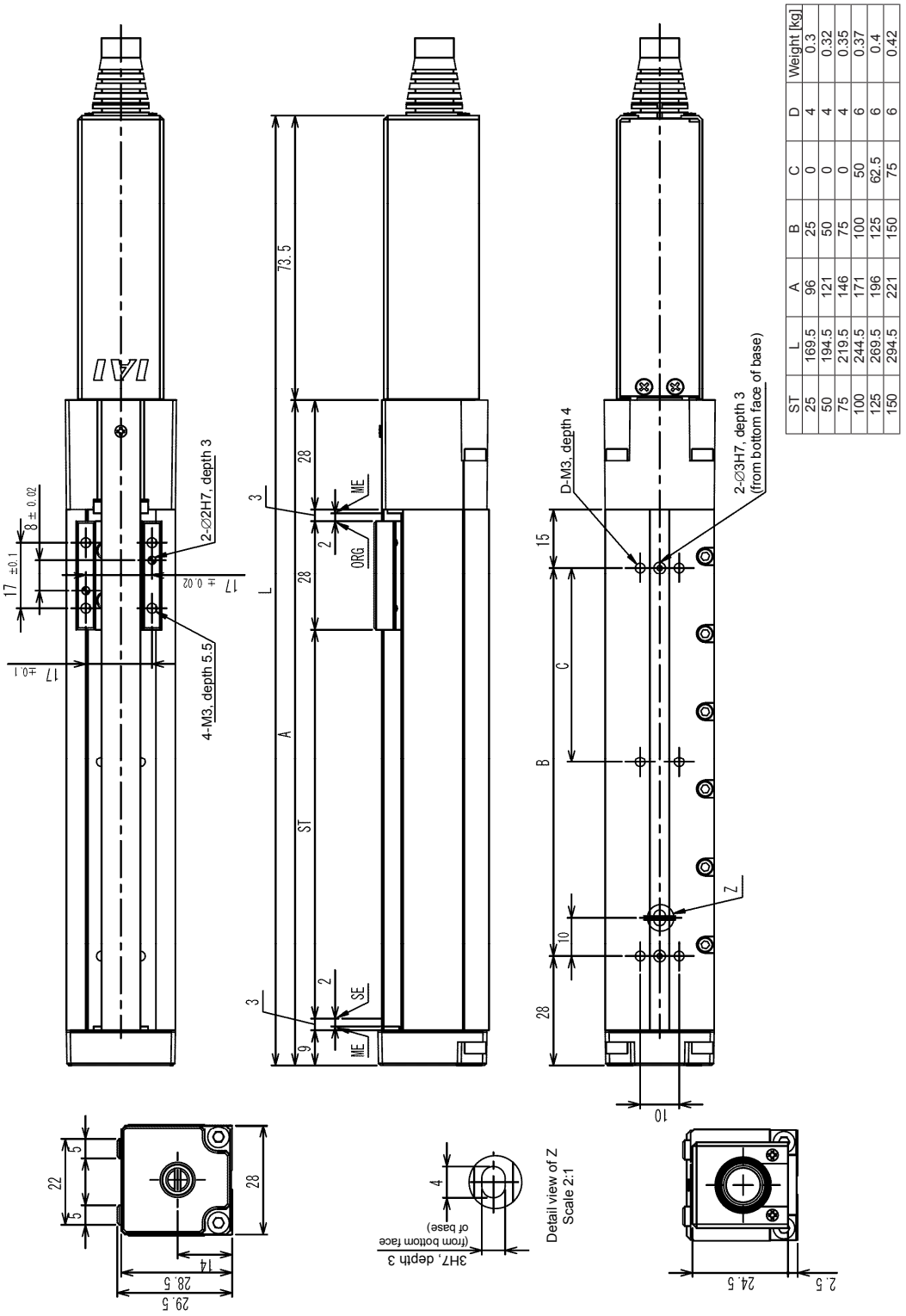
7. External Dimansions

7.1 RCP3-SA2AC



ST	L	A	B	C	D	Weight [kg]
25	169.5	96	25	0	4	0.25
50	194.5	121	50	0	4	0.27
75	219.5	146	75	0	4	0.29
100	244.5	171	100	50	6	0.3

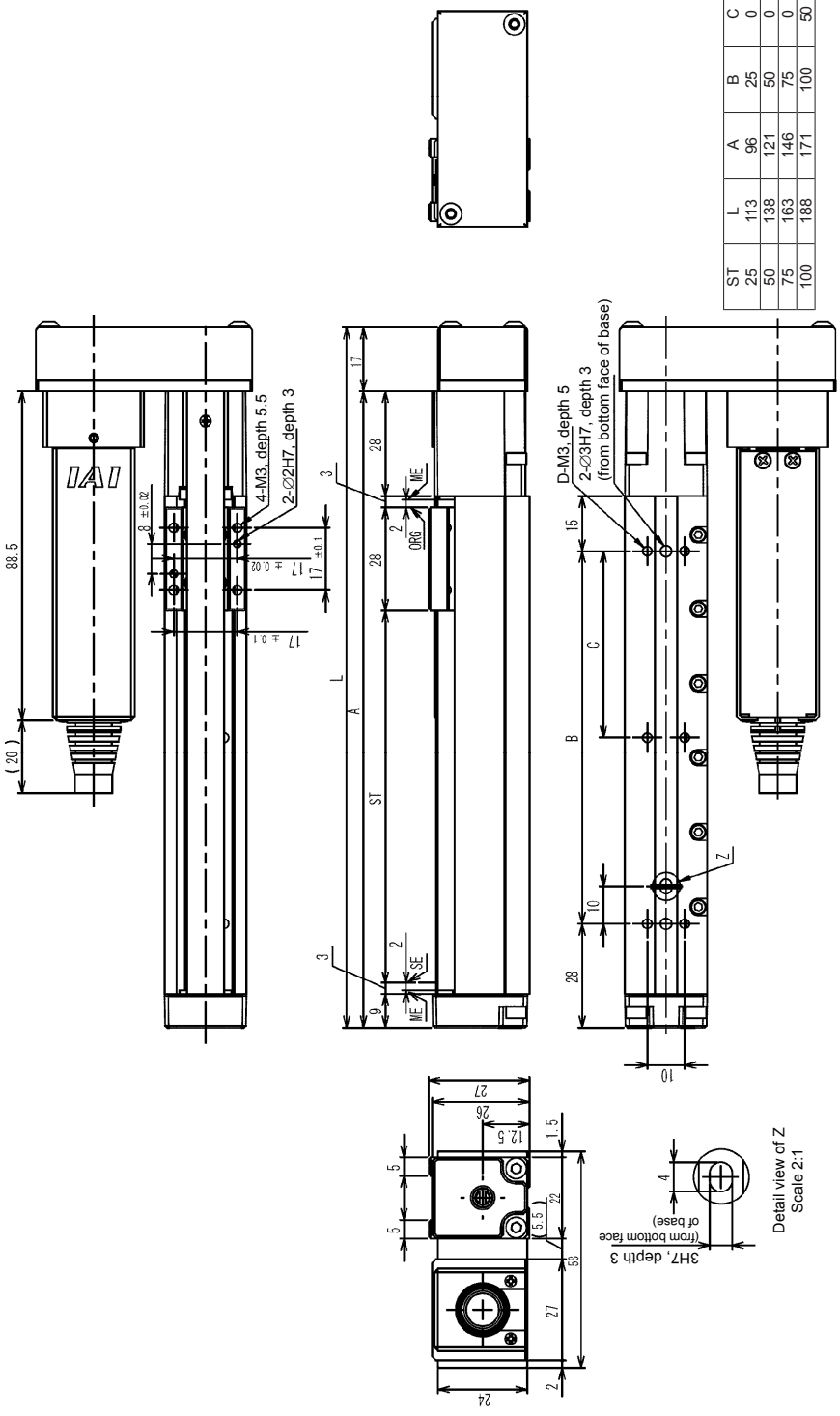
7.2 RCP3-SA2BC



ST	L	A	B	C	D	Weight [kg]
25	169.5	96	25	0	4	0.3
50	194.5	121	50	0	4	0.32
75	219.5	146	75	0	4	0.35
100	244.5	171	100	50	6	0.37
125	269.5	196	125	62.5	6	0.4
150	294.5	221	150	75	6	0.42

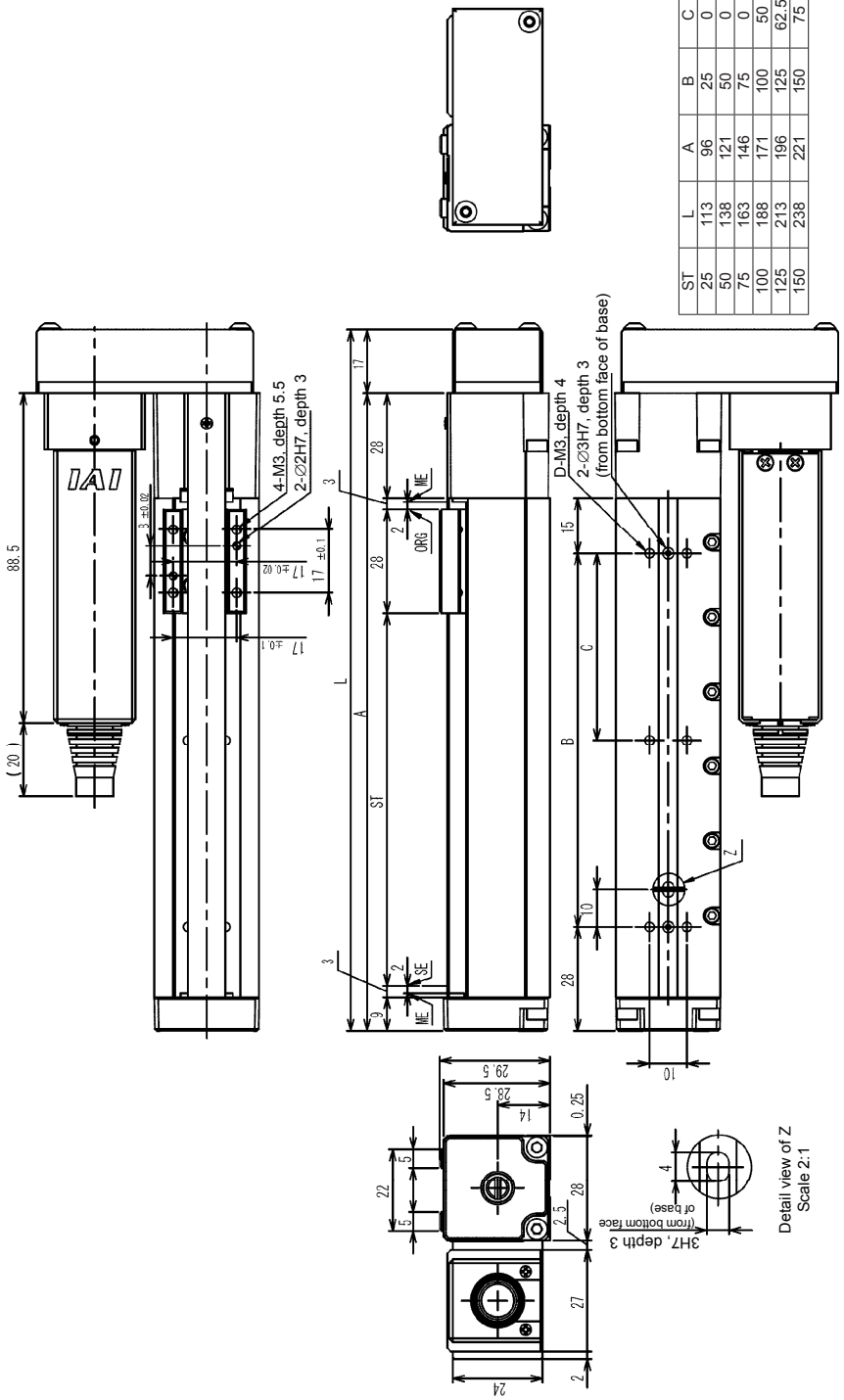
7.3 RCP3-SA2AR, Reversing to Right

ST	L	A	B	C	D	Weight [kg]
25	113	96	25	0	4	0.28
50	138	121	50	0	4	0.3
75	163	146	75	0	4	0.32
100	188	171	100	50	6	0.33

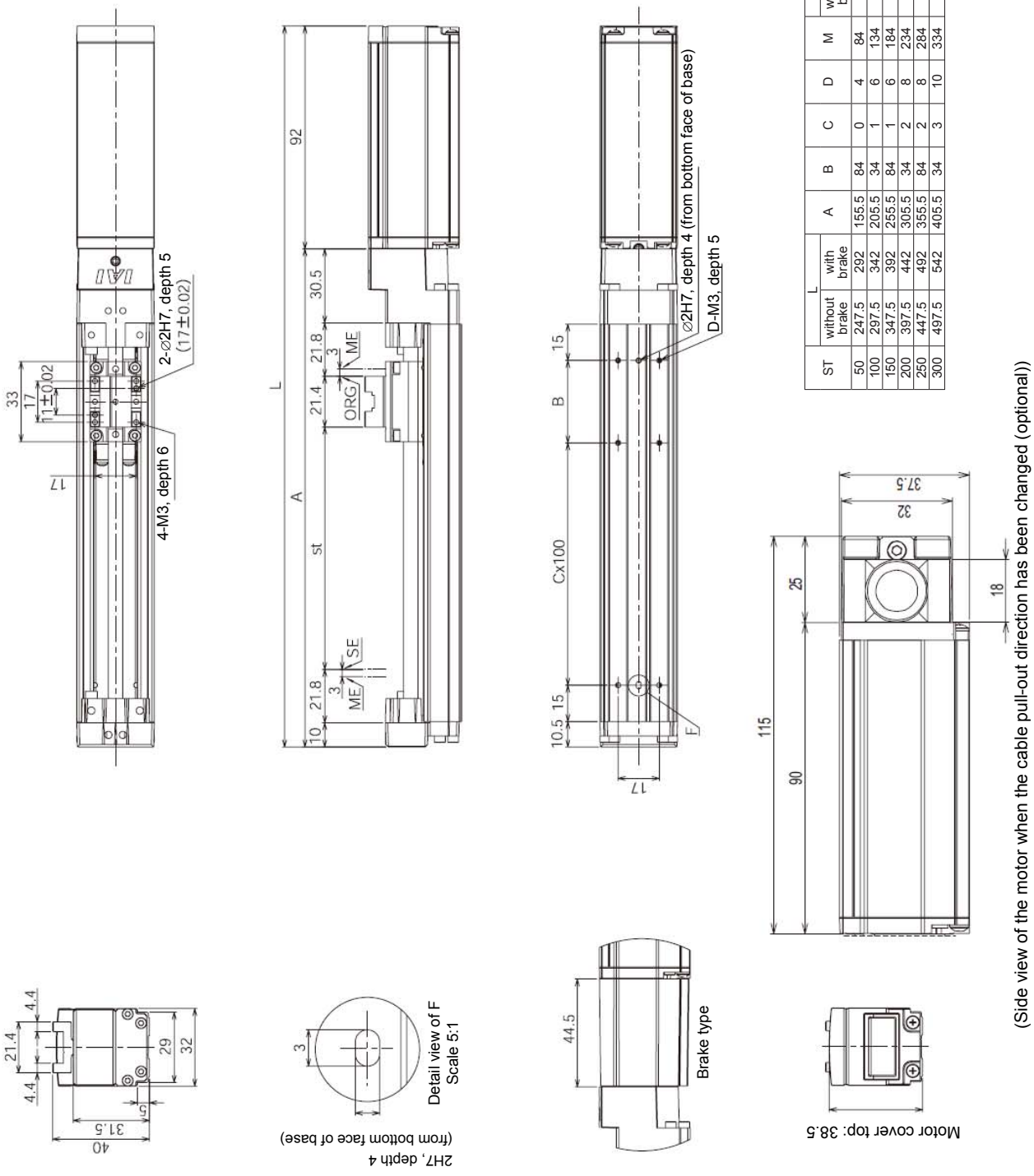


7.4 RCP3-SA2BR, Reversing to Right

ST	L	A	B	C	D	Weight [kg]
25	113	96	25	0	4	0.32
50	138	121	50	0	4	0.34
75	163	146	75	0	4	0.37
100	188	171	100	50	6	0.39
125	213	196	125	62.5	6	0.42
150	238	221	150	75	6	0.46



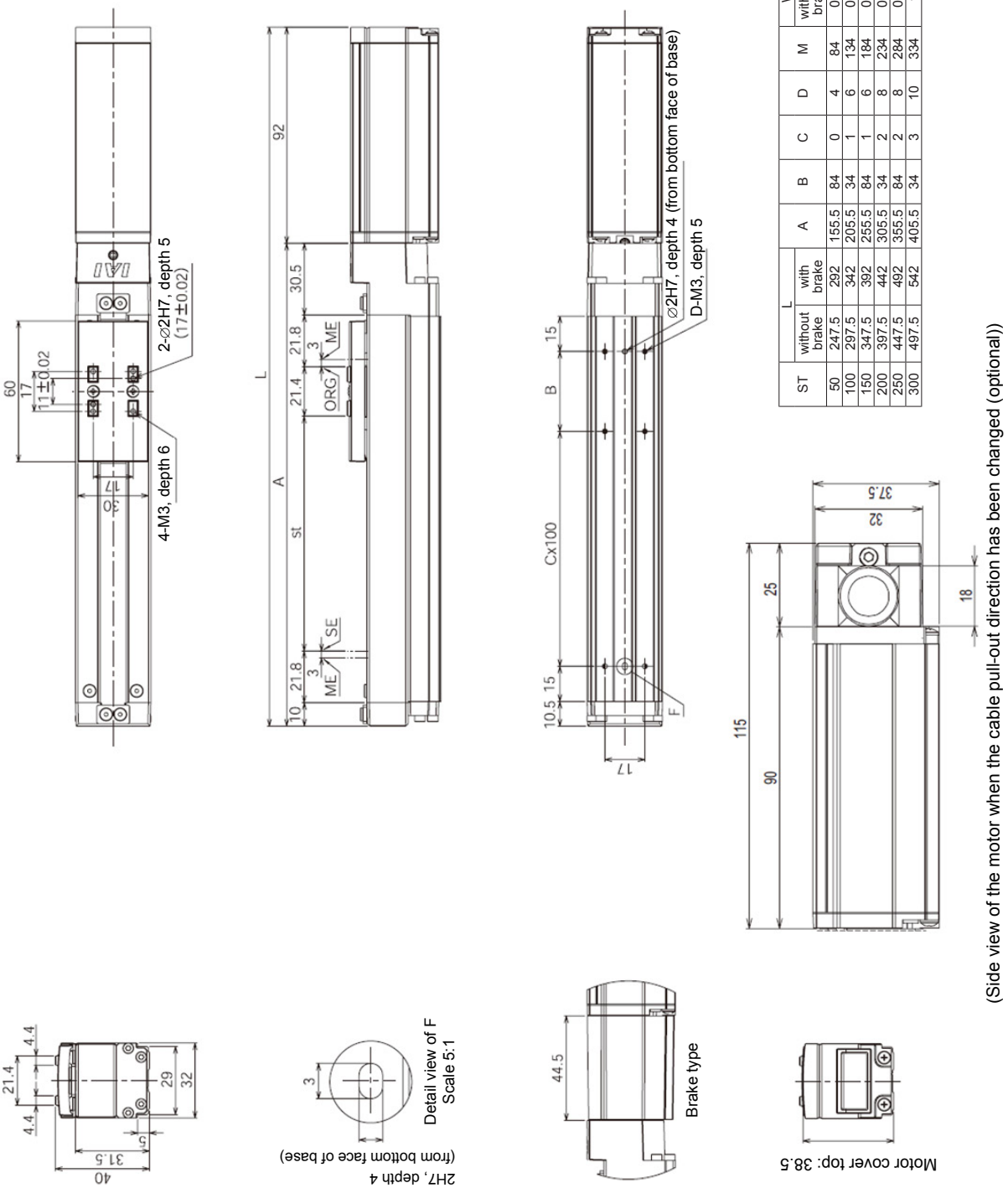
7.5 RCP3-SA3C



ST	L without brake	L with brake	A	B	C	D	M	Weight [kg] without brake	Weight [kg] 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	0.7	0.9
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
250	447.5	492	355.5	84	2	8	284	0.8	1
300	497.5	542	405.5	34	3	10	334	0.9	1.1

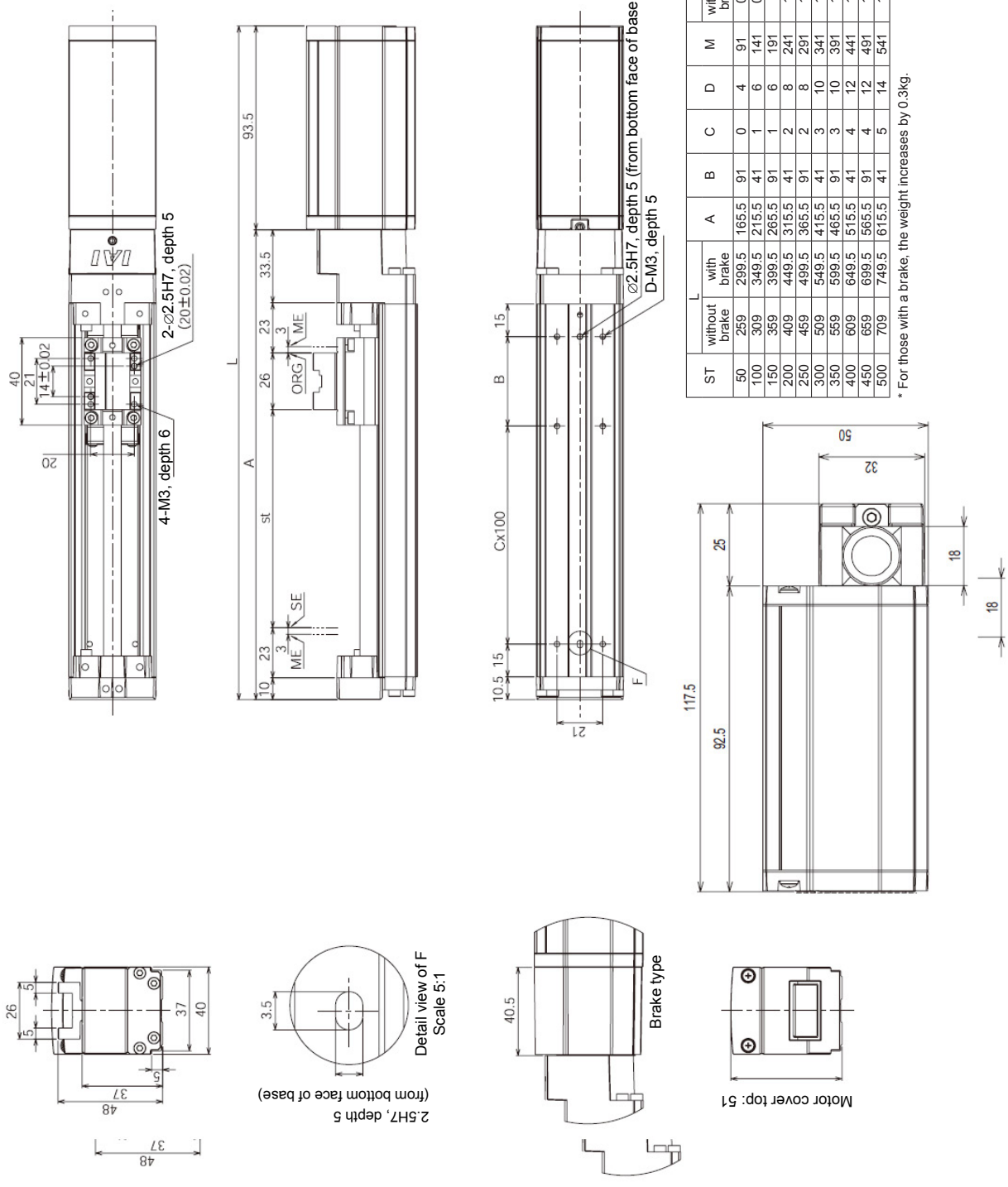
(Side view of the motor when the cable pull-out direction has been changed (optional))

7.6 RCP3-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	0.7	0.9
100	297.5	342	205.5	34	1	6	134	0.7	0.9
150	347.5	392	255.5	84	1	6	184	0.8	1
200	397.5	442	305.5	34	2	8	234	0.9	1.1
250	447.5	492	355.5	84	2	8	284	0.9	1.1
300	497.5	542	405.5	34	3	10	334	1	1.2

7.7 RCP3-SA4C

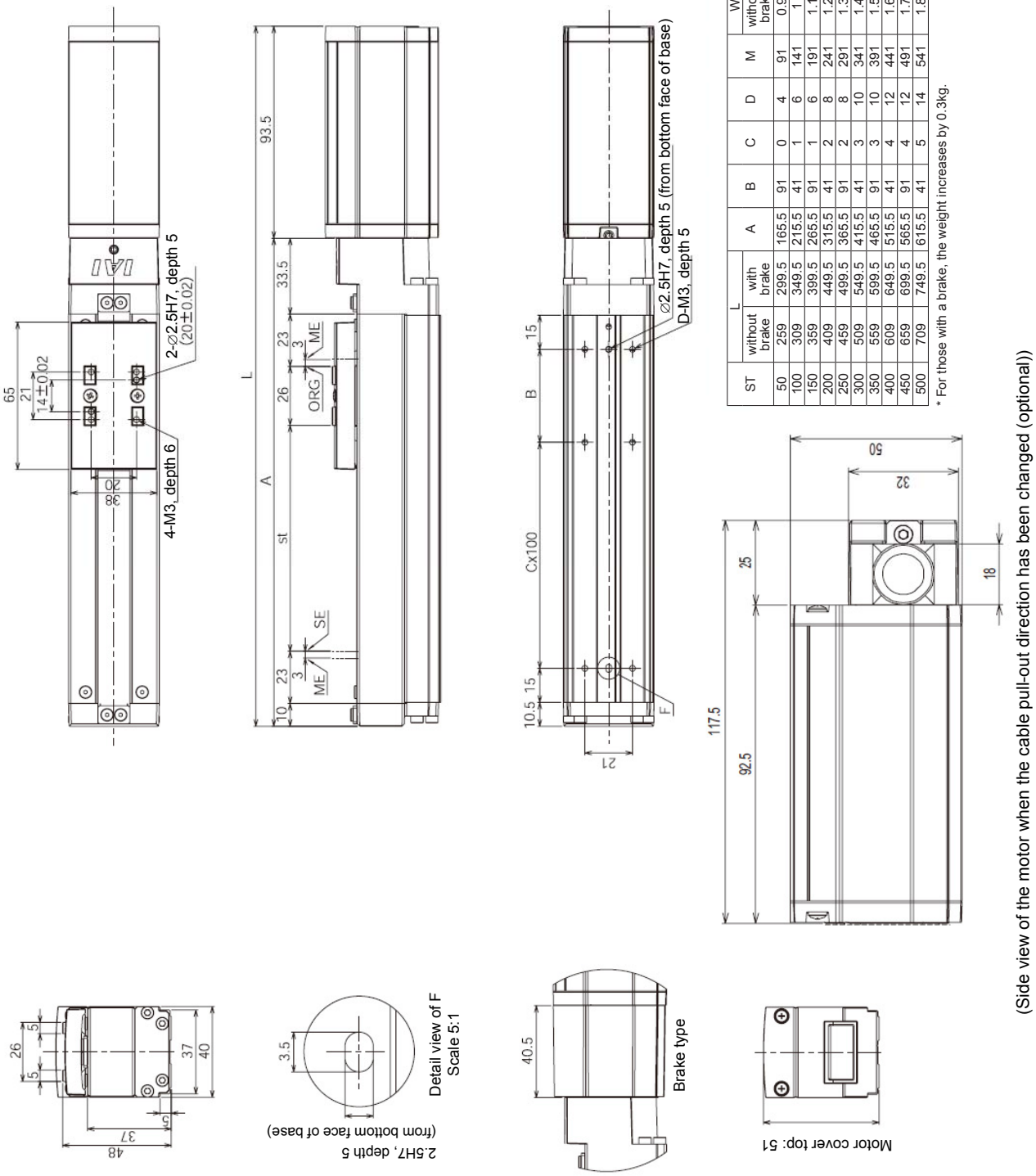


ST	L without brake	L with brake	A	B	C	D	M	Weight [kg] without brake	Weight [kg] with brake
50	259	299.5	165.5	91	0	4	91	0.9	1.2
100	309	349.5	215.5	41	1	6	141	0.9	1.2
150	359	399.5	265.5	91	1	6	191	1	1.3
200	409	449.5	315.5	41	2	8	241	1.1	1.4
250	459	499.5	365.5	91	2	8	291	1.2	1.5
300	509	549.5	415.5	41	3	10	341	1.2	1.5
350	559	599.5	465.5	91	3	10	391	1.3	1.6
400	609	649.5	515.5	41	4	12	441	1.4	1.7
450	659	699.5	565.5	91	4	12	491	1.5	1.8
500	709	749.5	615.5	41	5	14	541	1.5	1.8

* For those with a brake, the weight increases by 0.3kg.

(Side view of the motor when the cable pull-out direction has been changed (optional))

7.8 RCP3-SA4C with Side Cover

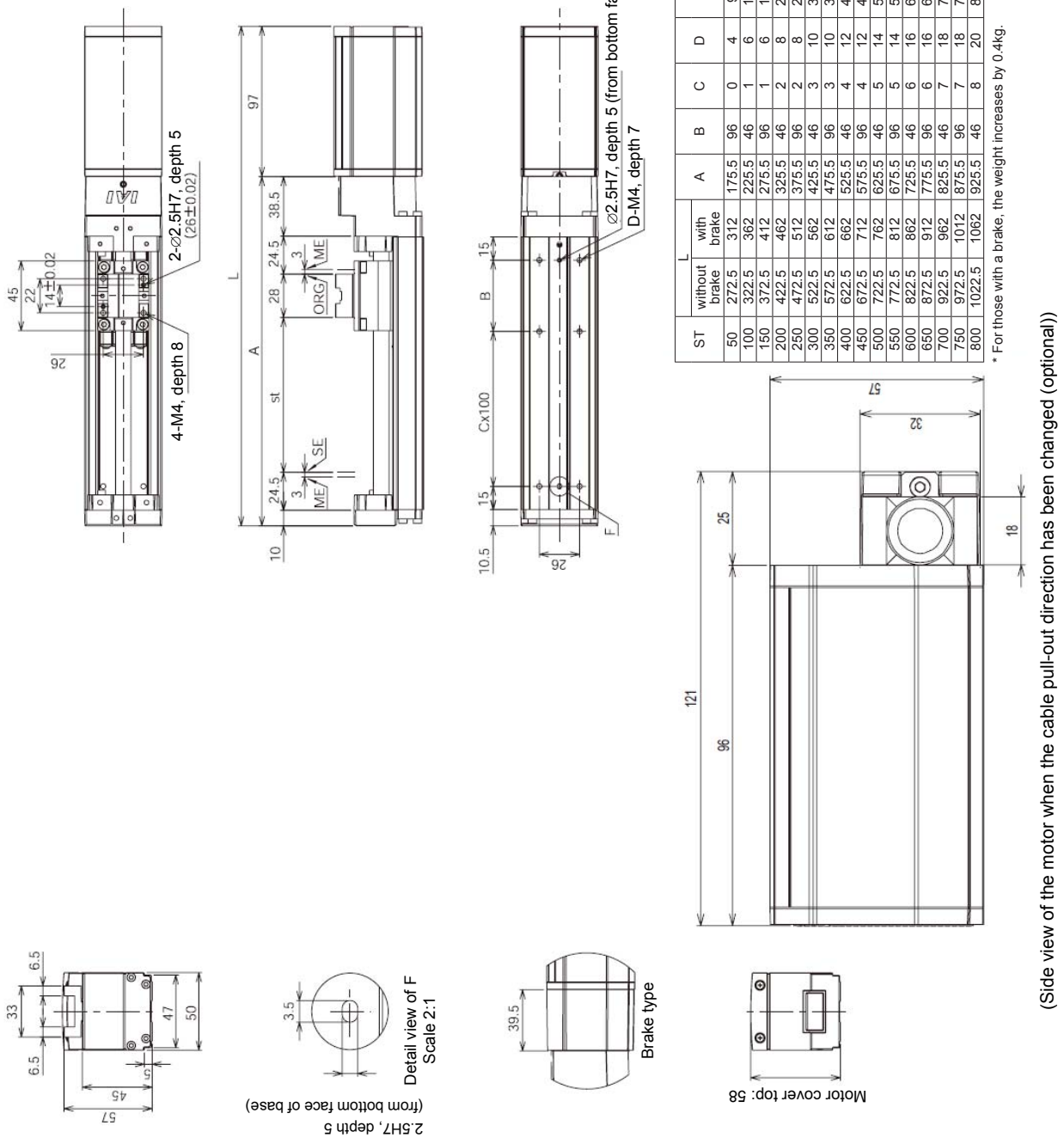


ST	L without brake	L with brake	A	B	C	D	M	Weight [kg] without brake	Weight [kg] with brake
50	259	299.5	165.5	91	0	4	91	0.9	1.2
100	309	349.5	215.5	41	1	6	141	1	1.3
150	359	399.5	265.5	91	1	6	191	1.1	1.4
200	409	449.5	315.5	41	2	8	241	1.2	1.5
250	459	499.5	365.5	91	2	8	291	1.3	1.6
300	509	549.5	415.5	41	3	10	341	1.4	1.7
350	559	599.5	465.5	91	3	10	391	1.5	1.8
400	609	649.5	515.5	41	4	12	441	1.6	1.9
450	659	699.5	565.5	91	4	12	491	1.7	2
500	709	749.5	615.5	41	5	14	541	1.8	2.1

* For those with a brake, the weight increases by 0.3kg.

(Side view of the motor when the cable pull-out direction has been changed (optional))

7.9 RCP3-SA5C

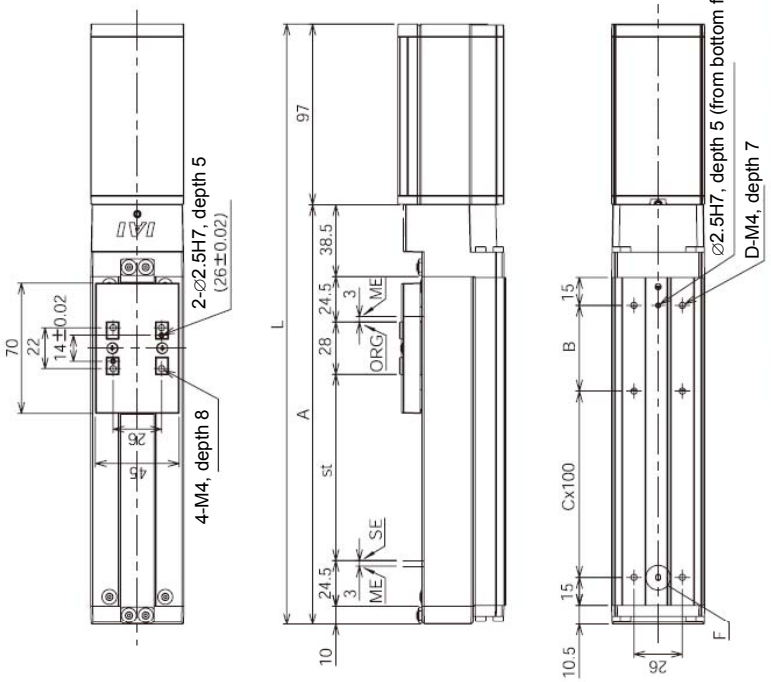


ST	L		A	B	C	D	M	Weight [kg]	
	without brake	with brake						without brake	with brake
50	272.5	312	175.5	96	0	4	96	1.3	1.7
100	322.5	362	225.5	46	1	6	146	1.4	1.8
150	372.5	412	275.5	96	1	6	196	1.5	1.9
200	422.5	462	325.5	46	2	8	246	1.6	2
250	472.5	512	375.5	96	2	8	296	1.7	2.1
300	522.5	562	425.5	46	3	10	346	1.8	2.2
350	572.5	612	475.5	96	3	10	396	2	2.4
400	622.5	662	525.5	46	4	12	446	2.1	2.5
450	672.5	712	575.5	96	4	12	496	2.2	2.6
500	722.5	762	625.5	46	5	14	546	2.3	2.7
550	772.5	812	675.5	96	5	14	596	2.4	2.8
600	822.5	862	725.5	46	6	16	646	2.5	2.9
650	872.5	912	775.5	96	6	16	696	2.6	3
700	922.5	962	825.5	46	7	18	746	2.8	3.2
750	972.5	1012	875.5	96	7	18	796	2.9	3.3
800	1022.5	1062	925.5	46	8	20	846	3	3.4

* For those with a brake, the weight increases by 0.4kg.

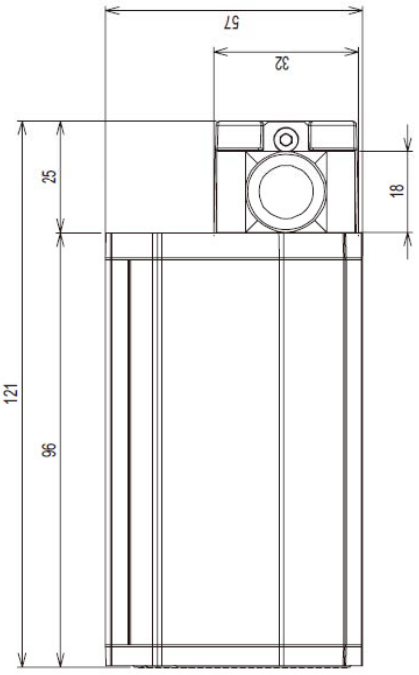
(Side view of the motor when the cable pull-out direction has been changed (optional))

7.10 RCP3-SA5C with Side Cover

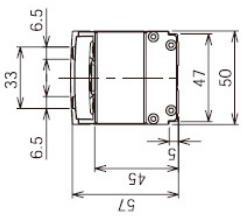


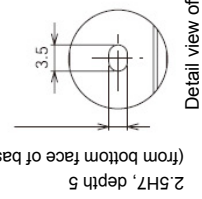
ST	L without brake	L with brake	A	B	C	D	M	Weight [kg] without brake	Weight [kg] with brake
50	272.5	312	175.5	96	0	4	96	1.4	1.8
100	322.5	362	225.5	46	1	6	146	1.5	1.9
150	372.5	412	275.5	96	1	6	196	1.6	2
200	422.5	462	325.5	46	2	8	246	1.8	2.2
250	472.5	512	375.5	96	2	8	296	1.9	2.3
300	522.5	562	425.5	46	3	10	346	2	2.4
350	572.5	612	475.5	96	3	10	396	2.2	2.6
400	622.5	662	525.5	46	4	12	446	2.3	2.7
450	672.5	712	575.5	96	4	12	496	2.5	2.9
500	722.5	762	625.5	46	5	14	546	2.6	3
550	772.5	812	675.5	96	5	14	596	2.7	3.1
600	822.5	862	725.5	46	6	16	646	2.9	3.3
650	872.5	912	775.5	96	6	16	696	3	3.4
700	922.5	962	825.5	46	7	18	746	3.2	3.6
750	972.5	1012	875.5	96	7	18	796	3.3	3.7
800	1022.5	1062	925.5	46	8	20	846	3.4	3.8

* For those with a brake, the weight increases by 0.4kg.

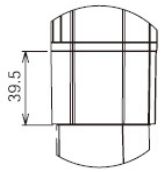


(Side view of the motor when the cable pull-out direction has been changed (optional))

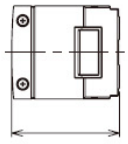




Detail view of F
Scale 2:1

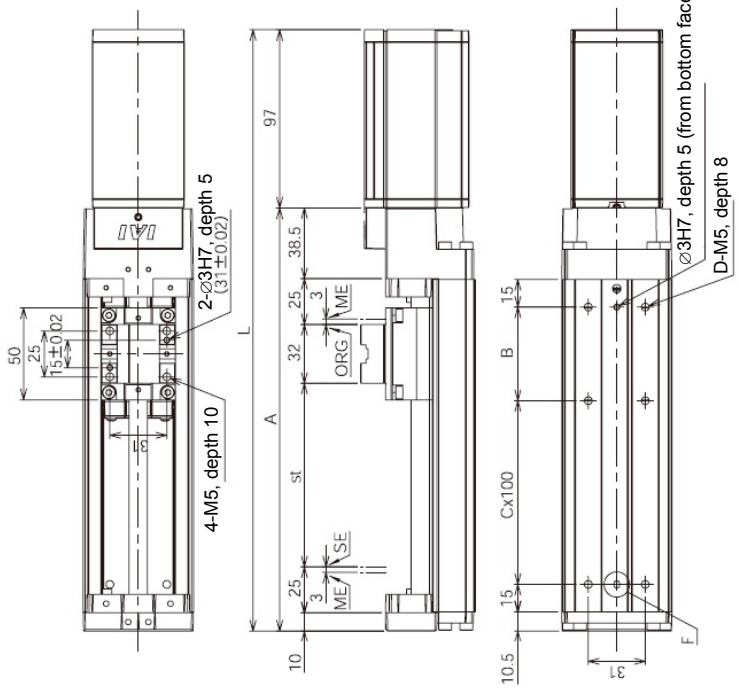


Brake type



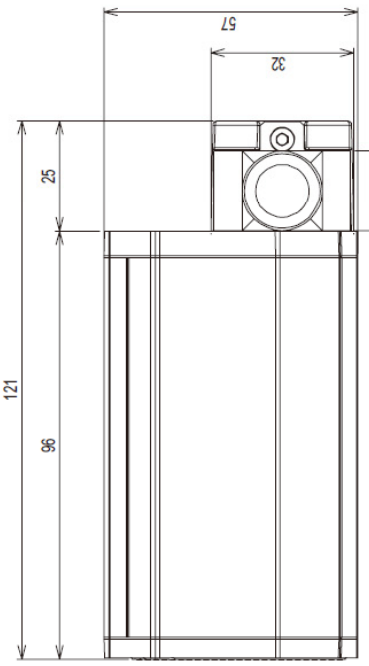
Motor cover top: 58

7.11 RCP3-SA6C

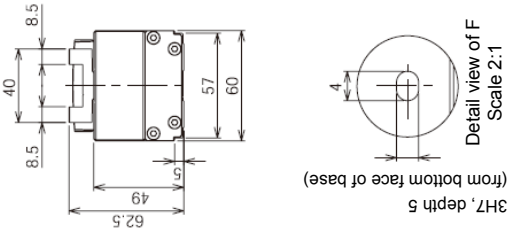


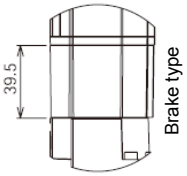
ST	L without brake	L with brake	A	B	C	D	M	Weight [kg] without brake	Weight [kg] with brake
50	277.5	317	180.5	101	0	4	101	1.5	1.9
100	327.5	367	230.5	51	1	6	151	1.7	2.1
150	377.5	417	280.5	101	1	6	201	1.8	2.2
200	427.5	467	330.5	51	2	8	251	2	2.4
250	477.5	517	380.5	101	2	8	301	2.1	2.5
300	527.5	567	430.5	51	3	10	351	2.3	2.7
350	577.5	617	480.5	101	3	10	401	2.4	2.8
400	627.5	667	530.5	51	4	12	451	2.6	3
450	677.5	717	580.5	101	4	12	501	2.7	3.1
500	727.5	767	630.5	51	5	14	551	2.8	3.2
550	777.5	817	680.5	101	5	14	601	3	3.4
600	827.5	867	730.5	51	6	16	651	3.1	3.5
650	877.5	917	780.5	101	6	16	701	3.3	3.7
700	927.5	967	830.5	51	7	18	751	3.4	3.8
750	977.5	1017	880.5	101	7	18	801	3.6	4
800	1027.5	1067	930.5	51	8	20	851	3.7	4.1

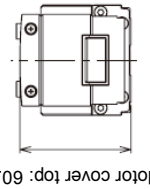
* For those with a brake, the weight increases by 0.4kg.



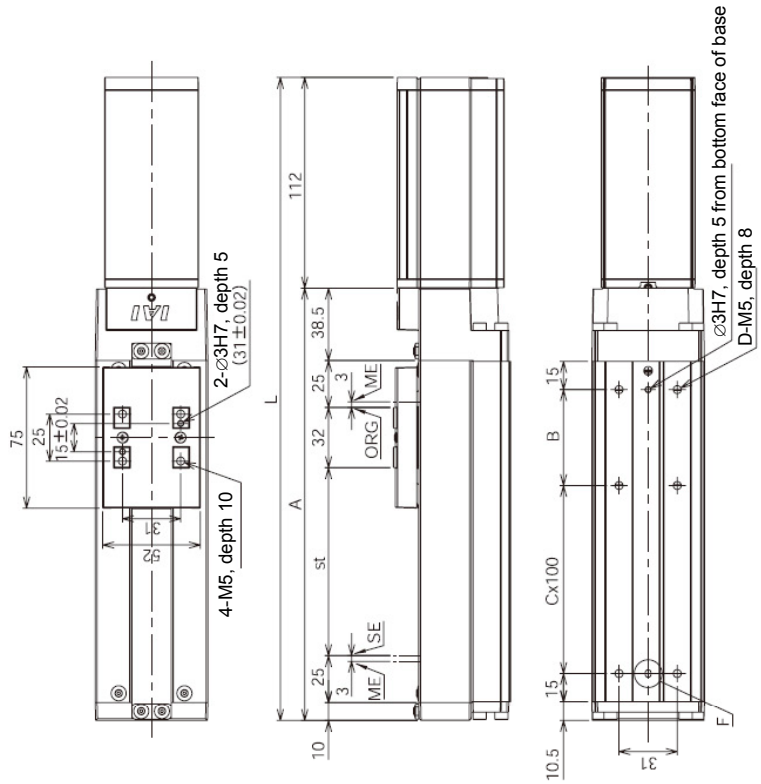
(Side view of the motor when the cable pull-out direction has been changed (optional))





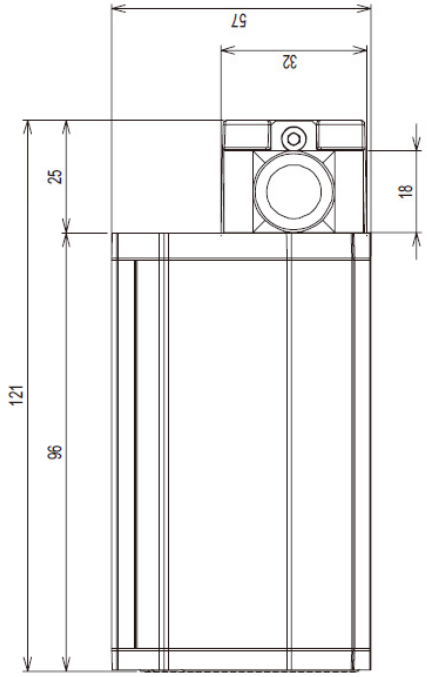


7.12 RCP3-SA6C with Side Cover

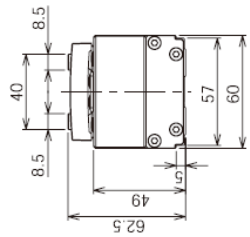


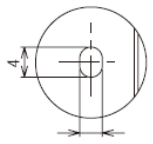
ST	L		A	B	C	D	M	Weight [kg]	
	without brake	with brake						without brake	with brake
50	277.5	317	180.5	101	0	4	101	1.6	2
100	327.5	367	230.5	51	1	6	151	1.8	2.2
150	377.5	417	280.5	101	1	6	201	2	2.4
200	427.5	467	330.5	51	2	8	251	2.1	2.5
250	477.5	517	380.5	101	2	8	301	2.3	2.7
300	527.5	567	430.5	51	3	10	351	2.5	2.9
350	577.5	617	480.5	101	3	10	401	2.7	3.1
400	627.5	667	530.5	51	4	12	451	2.8	3.2
450	677.5	717	580.5	101	4	12	501	3	3.4
500	727.5	767	630.5	51	5	14	551	3.2	3.6
550	777.5	817	680.5	101	5	14	601	3.3	3.7
600	827.5	867	730.5	51	6	16	651	3.5	3.9
650	877.5	917	780.5	101	6	16	701	3.7	4.1
700	927.5	967	830.5	51	7	18	751	3.9	4.3
750	977.5	1017	880.5	101	7	18	801	4	4.4
800	1027.5	1067	930.5	51	8	20	851	4.2	4.6

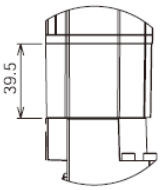
* For those with a brake, the weight increases by 0.4kg.

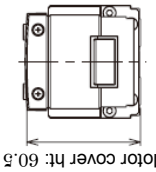


(Side view of the motor when the cable pull-out direction has been changed (optional)

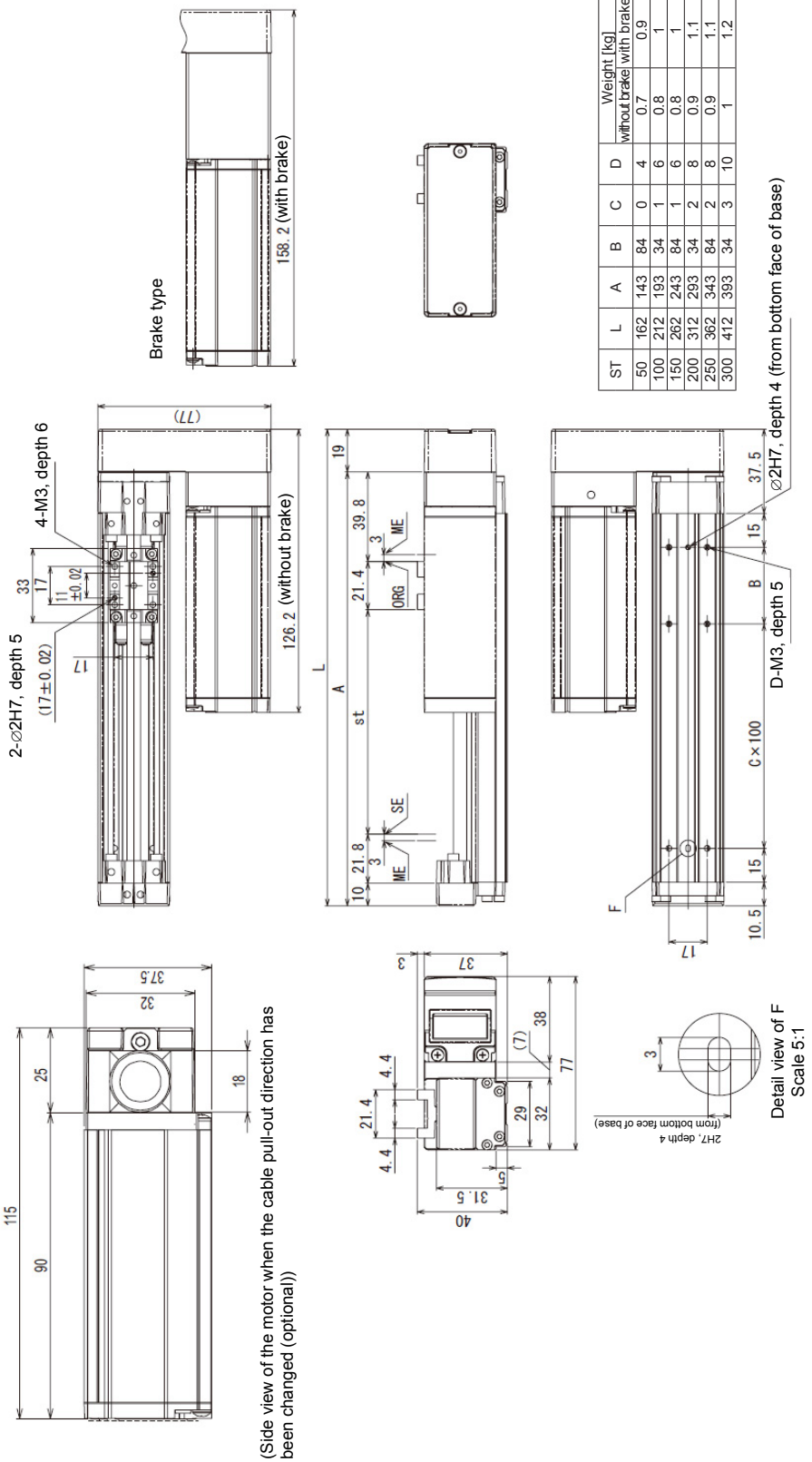






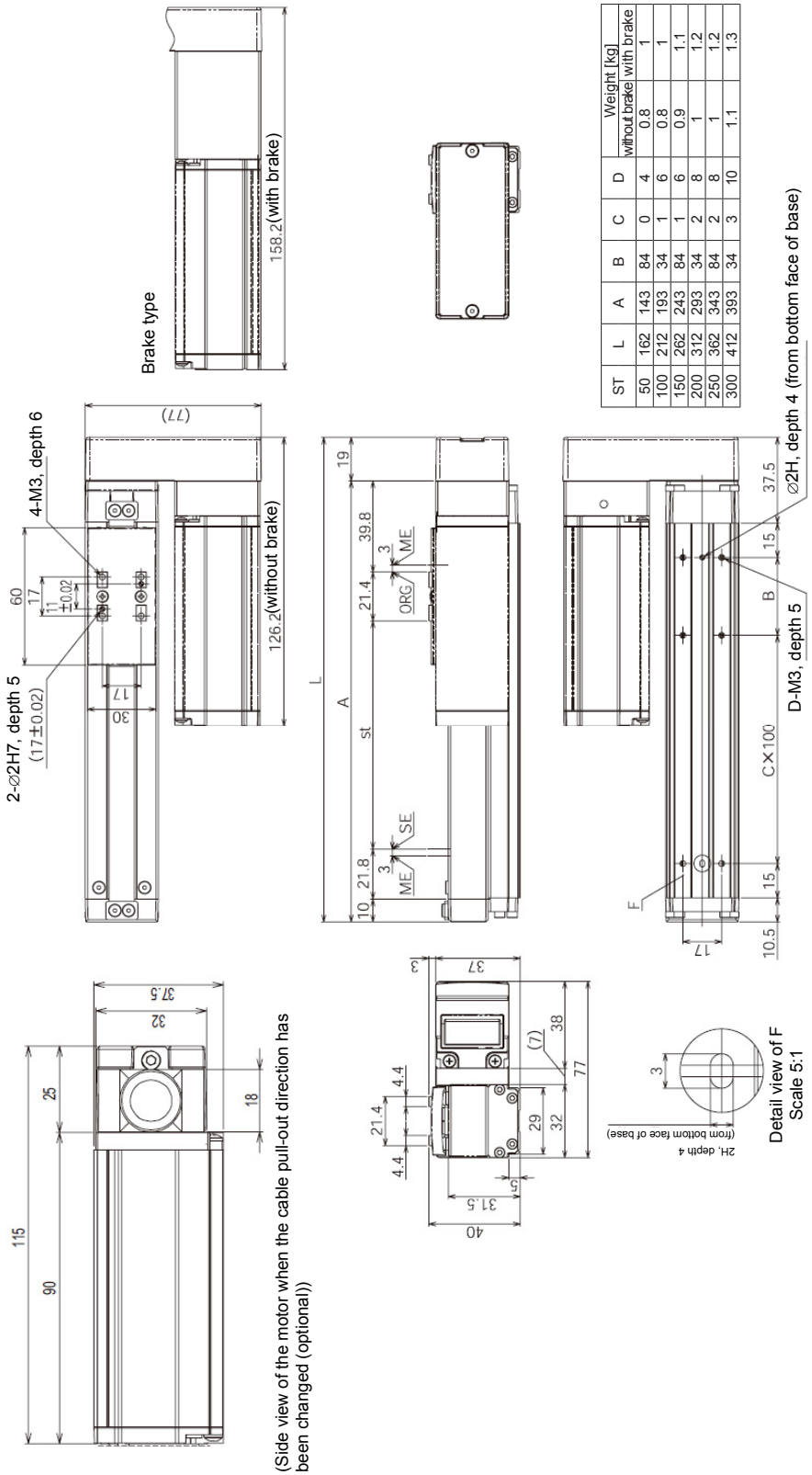


7.13 RCP3-SA3R, Reversing to Left (Right)



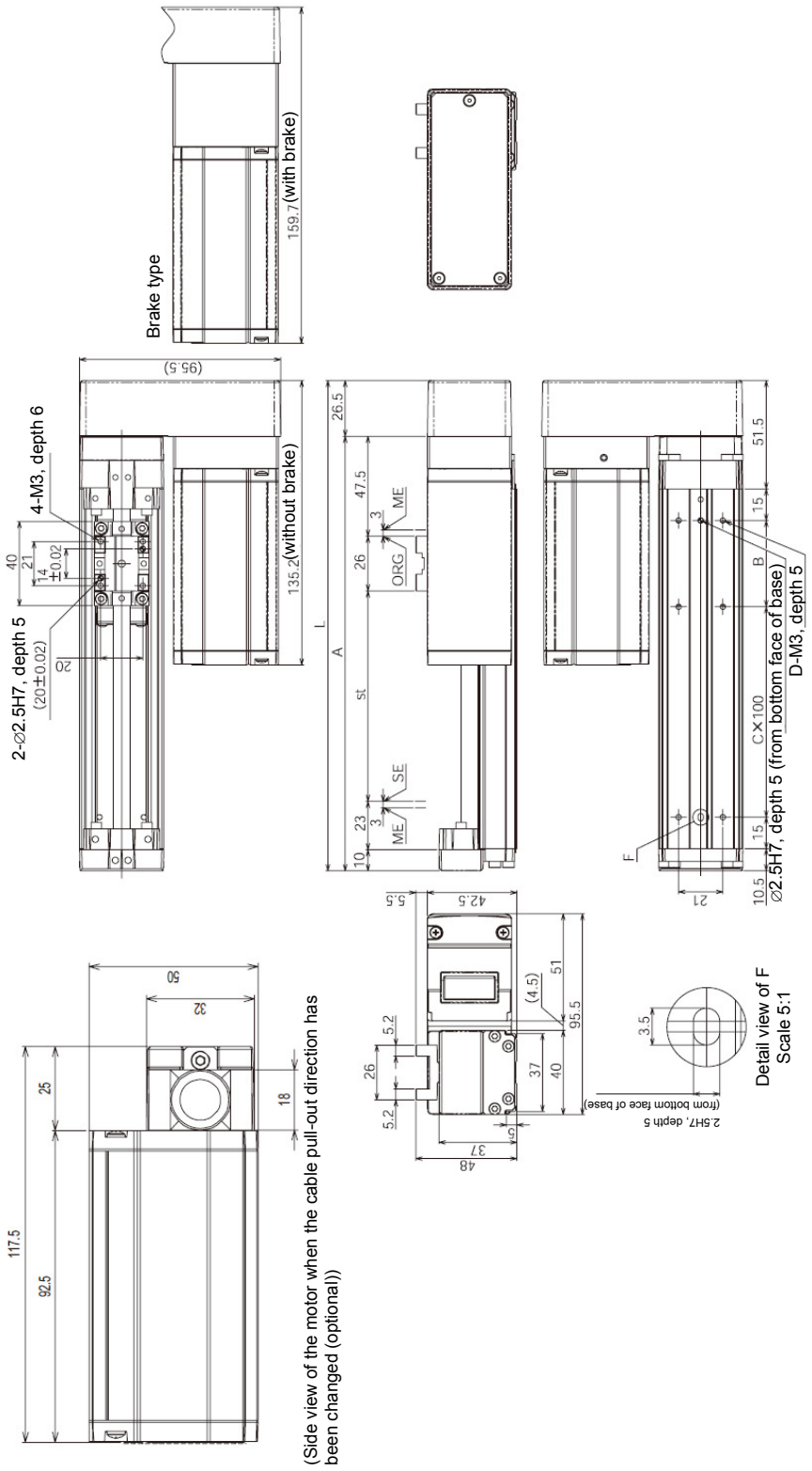
ST	L	A	B	C	D	Weight [kg] without brake	Weight [kg] with brake
50	162	143	84	0	4	0.7	0.9
100	212	193	34	1	6	0.8	1
150	262	243	84	1	6	0.8	1
200	312	293	34	2	8	0.9	1.1
250	362	343	84	2	8	0.9	1.1
300	412	393	34	3	10	1	1.2

7.14 RCP3-SA3R with Side Cover, Reversing to Left (Right)



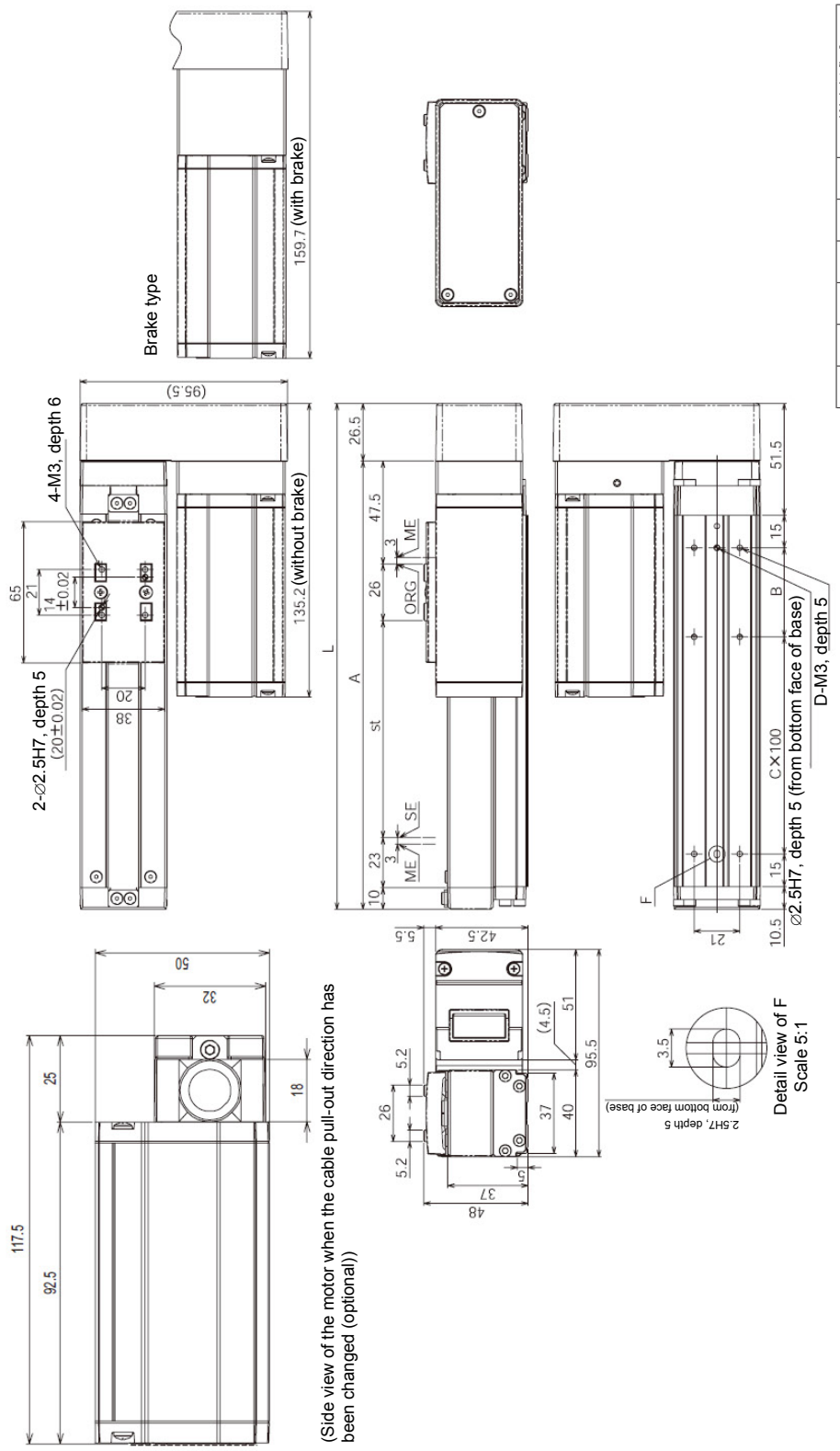
ST	L	A	B	C	D	Weight [kg] without brake	Weight [kg] with brake
50	162	143	84	0	4	0.8	1
100	212	193	34	1	6	0.8	1
150	262	243	84	1	6	0.9	1.1
200	312	293	34	2	8	1	1.2
250	362	343	84	2	8	1	1.2
300	412	393	34	3	10	1.1	1.3

7.15 RCP3-SA4R, Reversing to Left (Right)



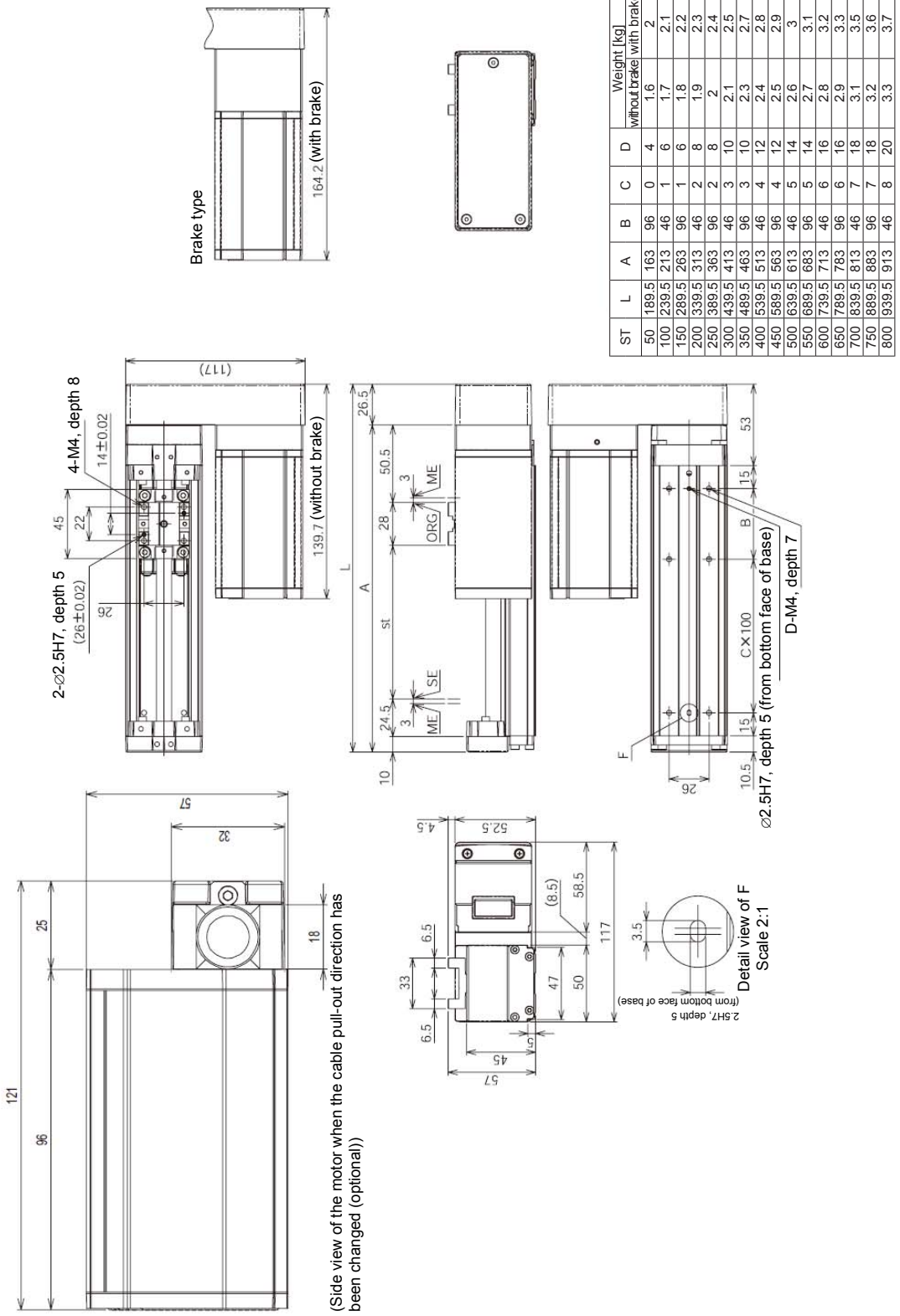
ST	L	A	B	C	D	Weight [kg]	
						without brake	with brake
50	183	156.5	91	0	4	1.1	1.4
100	233	206.5	41	1	6	1.1	1.4
150	283	256.5	91	1	6	1.2	1.5
200	333	306.5	41	2	8	1.3	1.6
250	383	356.5	91	2	8	1.4	1.7
300	433	406.5	41	3	10	1.4	1.7
350	483	456.5	91	3	10	1.5	1.8
400	533	506.5	41	4	12	1.6	1.9
450	583	556.5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

7.16 RCP3-SA4R with Side Cover, Reversing to Left (Right)



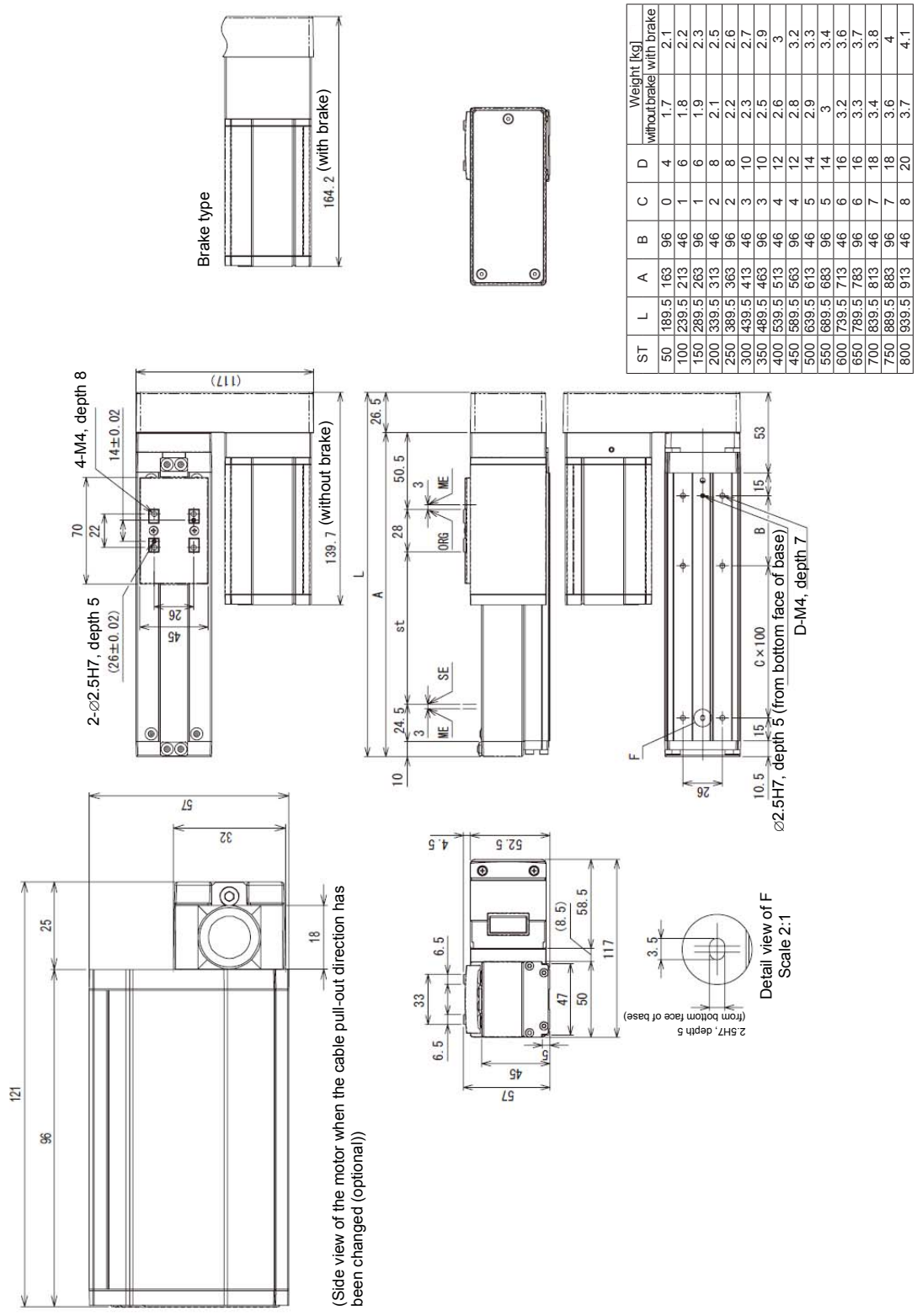
ST	L	A	B	C	D	Weight [kg]	
						without brake	with brake
50	183	156.5	91	0	4	1.1	1.4
100	233	206.5	41	1	6	1.2	1.5
150	283	256.5	91	1	6	1.3	1.6
200	333	306.5	41	2	8	1.4	1.7
250	383	356.5	91	2	8	1.5	1.8
300	433	406.5	41	3	10	1.6	1.9
350	483	456.5	91	3	10	1.7	2
400	533	506.5	41	4	12	1.8	2.1
450	583	556.5	91	4	12	1.9	2.2
500	633	606.5	41	5	14	2	2.3

7.17 RCP3-SA5R, Reversing to Left (Right)



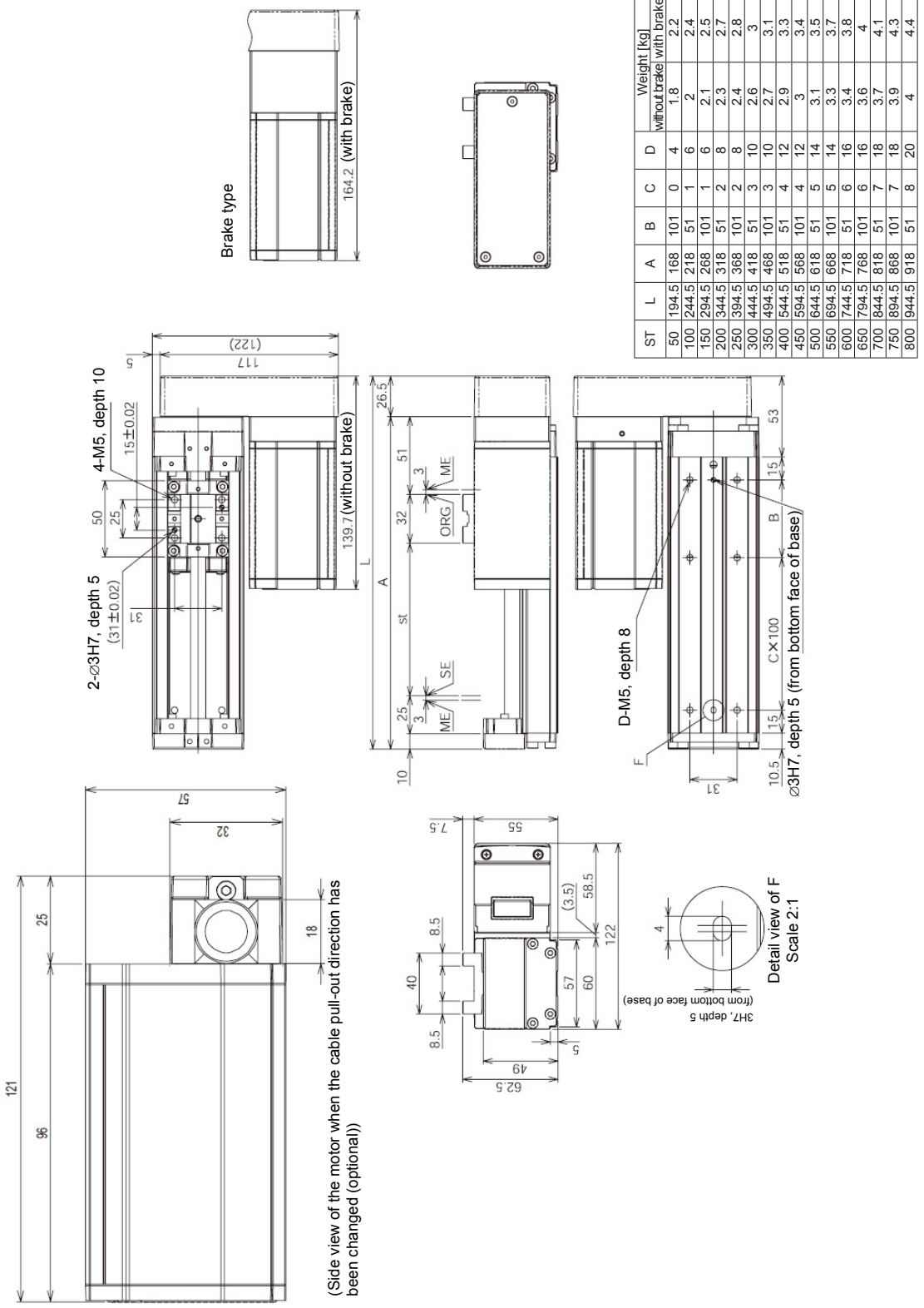
ST	L	A	B	C	D	Weight [kg] without brake	Weight [kg] with brake
50	189.5	163	96	0	4	1.6	2
100	239.5	213	46	1	6	1.7	2.1
150	289.5	263	96	1	6	1.8	2.2
200	339.5	313	46	2	8	1.9	2.3
250	389.5	363	96	2	8	2	2.4
300	439.5	413	46	3	10	2.1	2.5
350	489.5	463	96	3	10	2.3	2.7
400	539.5	513	46	4	12	2.4	2.8
450	589.5	563	96	4	12	2.5	2.9
500	639.5	613	46	5	14	2.6	3
550	689.5	683	96	5	14	2.7	3.1
600	739.5	713	46	6	16	2.8	3.2
650	789.5	783	96	6	16	2.9	3.3
700	839.5	813	46	7	18	3.1	3.5
750	889.5	883	96	7	18	3.2	3.6
800	939.5	913	46	8	20	3.3	3.7

7.18 RCP3-SA5R with Side Cover, Reversing to Left (Right)



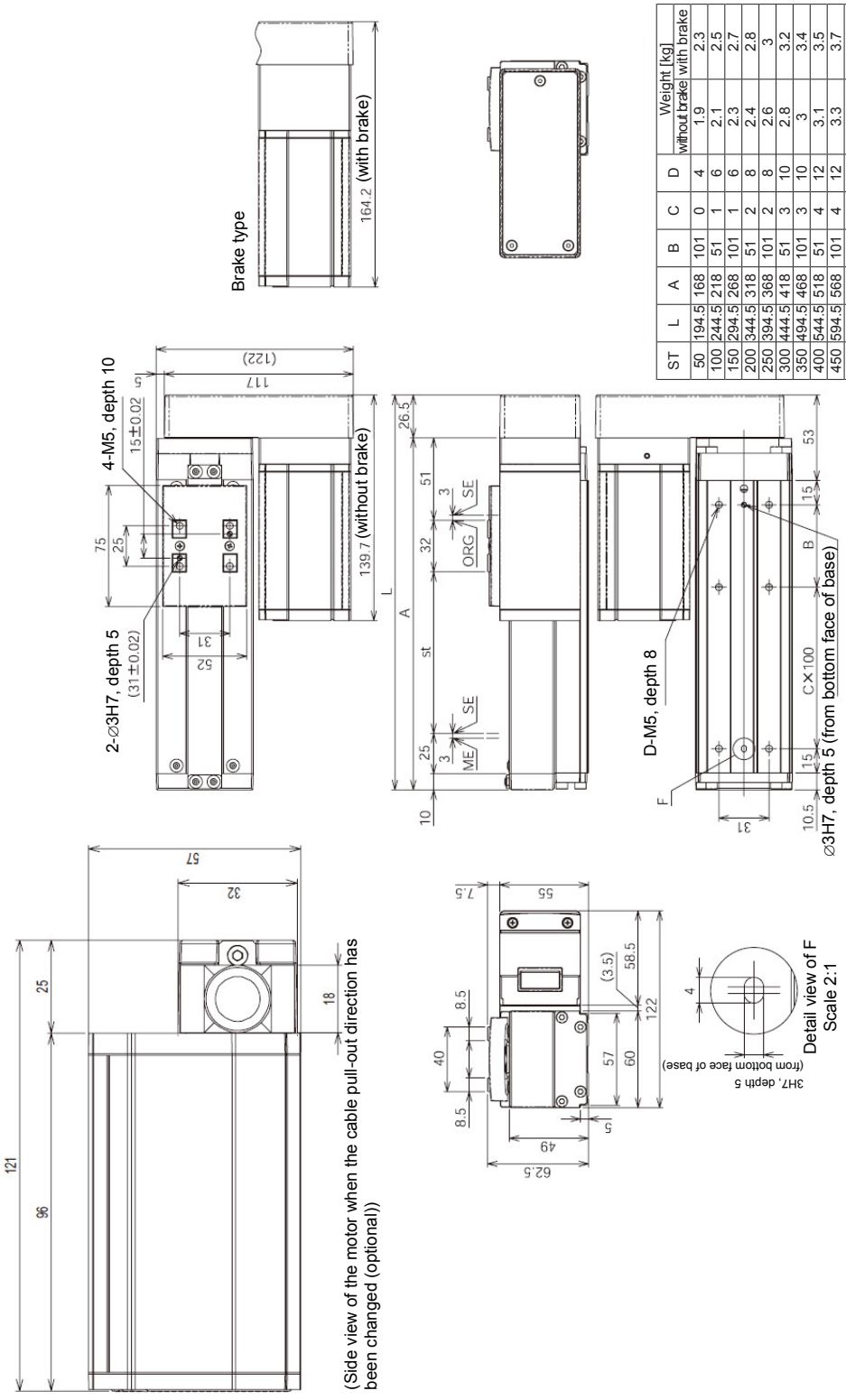
ST	L	A	B	C	D	Weight [kg] without brake	Weight [kg] with brake
50	189.5	163	96	0	4	1.7	2.1
100	239.5	213	46	1	6	1.8	2.2
150	289.5	263	96	1	6	1.9	2.3
200	339.5	313	46	2	8	2.1	2.5
250	389.5	363	96	2	8	2.2	2.6
300	439.5	413	46	3	10	2.3	2.7
350	489.5	463	96	3	10	2.5	2.9
400	539.5	513	46	4	12	2.6	3
450	589.5	563	96	4	12	2.8	3.2
500	639.5	613	46	5	14	2.9	3.3
550	689.5	683	96	5	14	3	3.4
600	739.5	713	46	6	16	3.2	3.6
650	789.5	783	96	6	16	3.3	3.7
700	839.5	813	46	7	18	3.4	3.8
750	889.5	883	96	7	18	3.6	4
800	939.5	913	46	8	20	3.7	4.1

7.19 RCP3-SA6R, Reversing to Left (Right)



ST	L	A	B	C	D	Weight [kg] without brake	Weight [kg] with brake
50	194.5	168	101	0	4	1.8	2.2
100	244.5	218	51	1	6	2	2.4
150	294.5	268	101	1	6	2.1	2.5
200	344.5	318	51	2	8	2.3	2.7
250	394.5	368	101	2	8	2.4	2.8
300	444.5	418	51	3	10	2.6	3
350	494.5	468	101	3	10	2.7	3.1
400	544.5	518	51	4	12	2.9	3.3
450	594.5	568	101	4	12	3	3.4
500	644.5	618	51	5	14	3.1	3.5
550	694.5	668	101	5	14	3.3	3.7
600	744.5	718	51	6	16	3.4	3.8
650	794.5	768	101	6	16	3.6	4
700	844.5	818	51	7	18	3.7	4.1
750	894.5	868	101	7	18	3.9	4.3
800	944.5	918	51	8	20	4	4.4

7.20 RCP3-SA6R with Side Cover, Reversing to Left (Right)



ST	L	A	B	C	D	Weight [kg] without brake	Weight [kg] with brake
50	194.5	168	101	0	4	1.9	2.3
100	244.5	218	51	1	6	2.1	2.5
150	294.5	268	101	1	6	2.3	2.7
200	344.5	318	51	2	8	2.4	2.8
250	394.5	368	101	2	8	2.6	3
300	444.5	418	51	3	10	2.8	3.2
350	494.5	468	101	3	10	3	3.4
400	544.5	518	51	4	12	3.1	3.5
450	594.5	568	101	4	12	3.3	3.7
500	644.5	618	51	5	14	3.5	3.9
550	694.5	668	101	5	14	3.6	4
600	744.5	718	51	6	16	3.8	4.2
650	794.5	768	101	6	16	4	4.4
700	844.5	818	51	7	18	4.2	4.6
750	894.5	868	101	7	18	4.3	4.7
800	944.5	918	51	8	20	4.5	4.9

8 Warranty

8.1 Warranty Period

One of the following periods, whichever is shorter:
- 18 months after shipment from our company
- 12 months after delivery to the specified location

8.2 Scope of the Warranty

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

(1) The breakdown or problem in question pertains to our product as delivered by us or our authorized dealer.

(2) The breakdown or problem in question occurred during the warranty period.

(3) The breakdown or problem in question occurred while the product was in use for an appropriate purpose under the conditions and environment of use specified in the operation manual and catalog.

(4) The breakdown of problem in question was caused by a specification defect or problem, or by a quality issue with our product.

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

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

8.3 Honoring the Warranty

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

8.4 Limited Liability

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

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

(1) If our product is combined with another product or any system, device, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc. In such a case we will not be liable for the conformance of our product with the applicable standards, etc.

(2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:

[1] Medical equipment pertaining to maintenance or management of human life or health
[2] A mechanism or mechanical equipment intended to move or transport people (such as a vehicle, railway facility or aviation facility)
[3] Important safety parts of mechanical equipment (such as safety devices)
[4] Equipment used to handle cultural assets, art or other irreplaceable items

(3) Contact us at the earliest opportunity if our product is to be used in any condition or environment that differs from what is specified in the catalog or operation manual.

8.6 Other Items Excluded from Warranty

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

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

Change History

Revision Date	Description of Revision
May 2009	First edition
December 2009	Second edition Added allowable static moments in 11.2.1, “Loads on SA3, SA4, SA5 and SA6 types.“ Added details on the cable exit direction (options).
March 2010	Third edition Added the strokes of SA4C, SA5C, SA6C, SA4A, SA5R and SA6R in 2, “External Dimensions.” Added details on the performance improvements made to SA4C, SA5C, SA6C, SA4A, SA5R and SA6R as a result of improvements to controller functions, in 6, “Specifications.”
July 2010	Forth edition Page 9 Added a “caution regarding the position to turn on the servo” under “Handling Precautions.”
November 2010	Fifth edition Page 72, 73 Cable length: 10 m → 20 m Page 38 Added “Operation Manual for MEC Controller” and “Operation Manual for MEC PC Software” under “Operation Manuals Relating to This Product.” Page 39, 40 Added information on SA5C and SA6C actuators of lead 20 mm under 5.4, “How to Read the Model Number” and 6, “Specifications.” Page 63, 64 Added information on SA5C and SA6C actuators of lead 20 mm in the graphs of 7.1, "Notes on Use Regarding Maximum Speed and Load Mass." Page 65 Added information on SA5C and SA6C actuators of lead 20 mm in the graphs of 7.2, “Notes on Use Regarding Push-motion Operation.” Page 66 Changed the title of Chapter 8 from “Installation Environment and Preservation Environment” to “…Storage/Preservation Environment.” Page 67 Corrected the figure of vertical installation in 9, “Installation” by turning it upside down. Install the motor so that it faces down. → Install the motor so that it comes to the top side. If the installed motor faces up… → If the motor is installed at the bottom side… Page 82 Added PMEC controller in 11.3, “Adjusting the Home Position.” Page 84 Added 12.1, “Life of Ball Screw Actuator.” Page 87 Added 13.4, “Adjusting the Stainless Sheet.”
April 2011	Sixth edition A page for CE Marking added
June 2011	Seventh edition Page 66 Contents of caution for vertically oriented mount changed.

Revision Date	Description of Revision
July 2011	Eighth edition Page 66 Change in ceiling installation availability (×: Not possible → △: Daily inspection is required) Page 101, 102 Contents changed in 14. Warranty
March 2012	Ninth edition Contents changed in Safety Guide Caution notes added for when working with two or more persons Page 65 Note added to tell platform should have a structure with enough stiffness Page 66 Note changed to 1.8 times more of the nominal diameter for the length of thread engagement on aluminum
March 2012	Tenth edition Contents added and changed in Safety Guide Page 8 Caution in Handling added Pages 14 to 33 Weight added to appearance drawing Page 74 Static rated load and Dynamic rated load are deleted. Pages 91 Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care. Pages 100, 101 Contents changed in 14 Warranty
June 2013	Eleventh edition Revised overall
August 2013	Twelfth edition Page 63 Pictures changed
October 2013	Thirteenth edition Page 35 Corrected the unit of the table. N•m → N•mm Page 36 Corrected the unit of the table. kgf/mm → kgf/m
December 2013	Fourteenth edition Page 15 Note corrected PCON-CA P1 → P3

Manual No.: ME3672-14A (December 2013)

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