

ROBO Cylinder Radial Cylinder RCP4 Actuator Slider Type Operation Manual

═══════════ **Sixth Edition** ═══════════

Standard type Motor straight type, RCP4-RA5C, RA6C, RA7C
Standard type Motor reversing type, RCP4-RA5R, RA6R, RA7R
Clean Room type Motor straight type, RCP4CR-SA5C, SA6C SA7C

Please Read Before Use

Thank you for purchasing our product.

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

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

The CD or DVD that comes with the product contains Operation Manuals for IAI products.

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

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

[Important]

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

RC **ROBO** _____
CYLINDER _____

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Safety Guide

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

Safety Precautions for Our Products

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

No.	Operation Description	Description
1	Model Selection	<ul style="list-style-type: none"> ● This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. <ol style="list-style-type: none"> 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) ● Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. ● Do not use it in any of the following environments. <ol style="list-style-type: none"> 1) Location where there is any inflammable gas, inflammable object or 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	<ul style="list-style-type: none"> ● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. ● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the 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	<ul style="list-style-type: none"> ● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. ● Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> ● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. ● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. ● When using the product in any of the places specified below, provide a sufficient shield. <ol style="list-style-type: none"> 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. <p>(3) Grounding</p> <ul style="list-style-type: none"> ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm^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	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	<ul style="list-style-type: none"> ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign "Under Operation" at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>

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

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

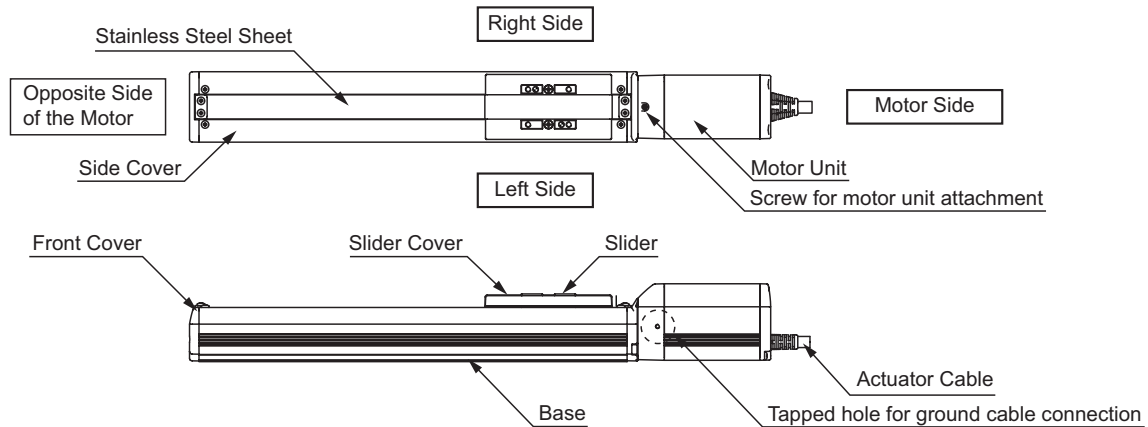
Caution in Handling

1. Do not attempt to establish the settings for the speed and acceleration/deceleration above the allowable range.
An operation with speed and acceleration/deceleration beyond the allowable range may cause an abnormal noise, vibration, malfunction or shortened life.
2. Set the allowable load moment within the allowable range.
An operation with the load beyond the allowable load moment may cause an abnormal noise, vibration, malfunction or shortened life. If it is extreme, flaking may occur on the guide.
3. Set the overhang length within the allowable range.
Attaching a load with an overhang length above the allowable range may cause vibration and abnormal noise.
4. If back and forth operations are performed repeatedly in short distance, it may wear out the film of grease.
Continuous back and forth operation within a distance less than 30mm may cause wear of grease. As a reference, have approximately 5 cycles of back and forth operation in a distance more than 50mm in every 5,000 to 10,000 cycles to regenerate the oil film. Keep using the actuator with the grease worn out may cause malfunction. If it is extreme, flaking may occur on the guide.
5. Do not attempt to hit the slider against an abstacle with high speed.
It may destroy the coupling.
6. Make sure to attach the actuator properly by following this instruction manual.
Using the product with the actuator not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.
7. Ensure use of the product in the specified conditions, environments and ranges.
An operation out of the specified conditions may cause a drop in performance or malfunction of the product.

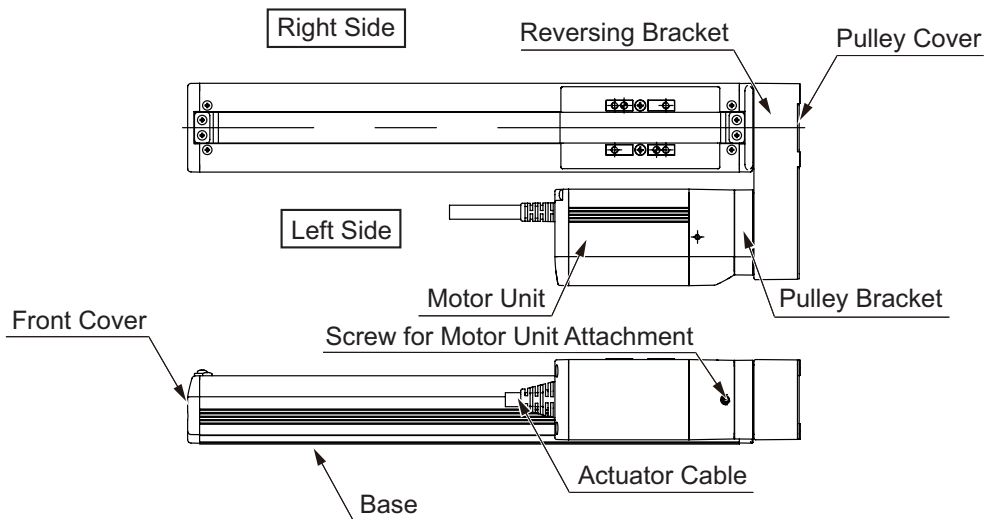
Names of the Parts

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.

1. Standard Type Motor Straight Type RCP4

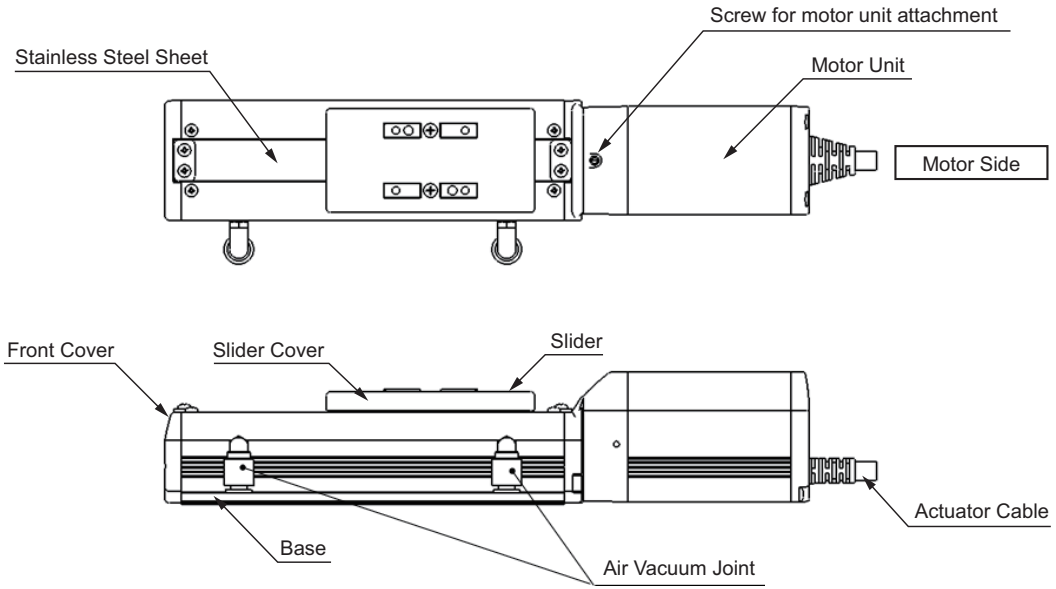


2. Standard Type Motor Reversing Type RCP4



The direction of the motor is either left reversed: ML (shown in figure above) or right reversed: MR.

3. Clean Room Type Motor Straight Type RCP4CR



1. Specification 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 fault 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	In-house made seals		1	
4	First Step Guide		1	
5	Operation Manual (CD/DVD)		1	
6	Safety Guide		1	

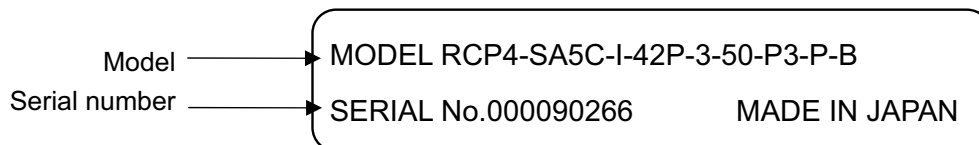
Note 1 The motor • encoder cables supplied vary depending on the controller used. [Refer to 1.4, "Motor • Encoder Cables."]

1.1.2 Related Operation Manuals for the Each Controller Supported by this Product

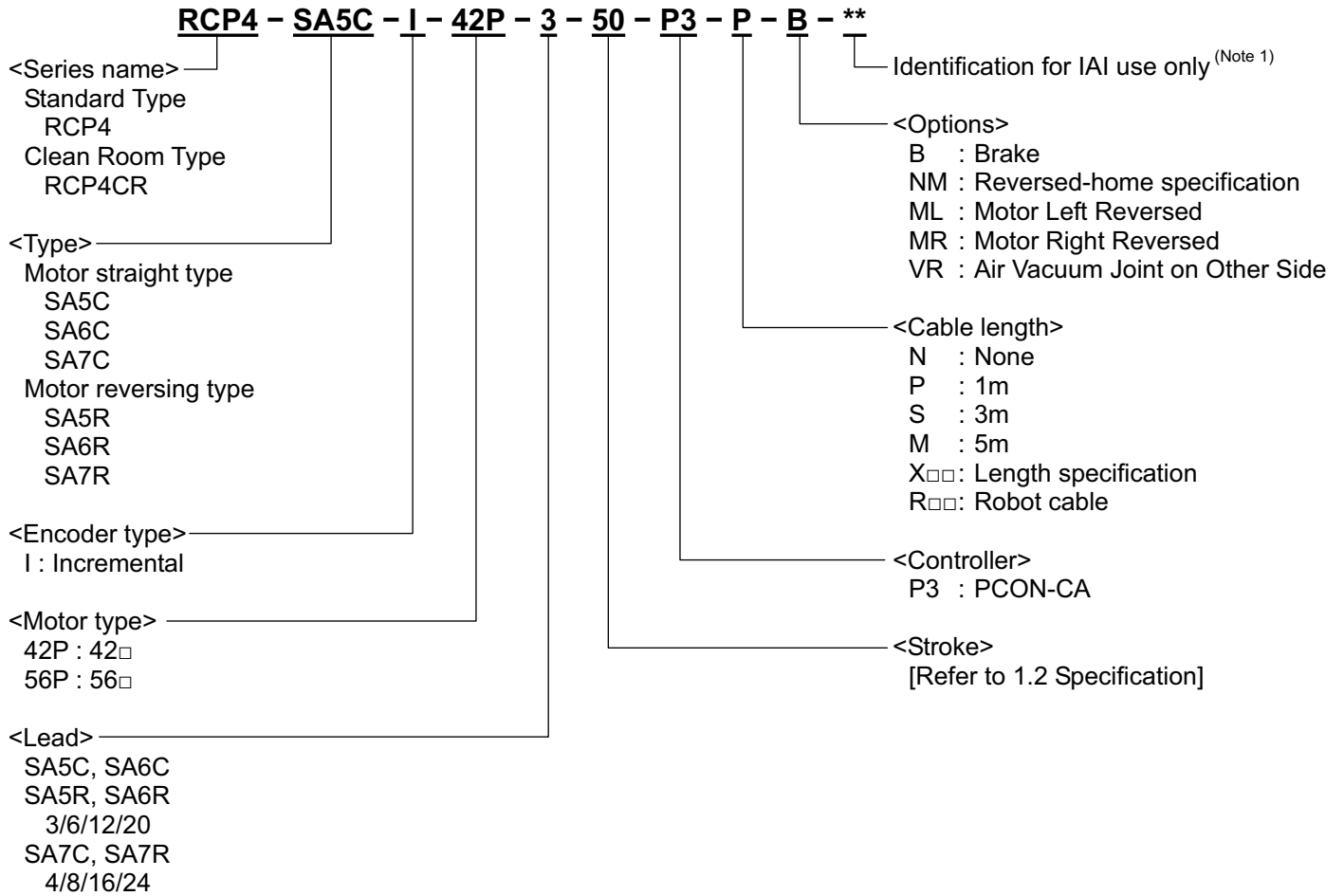
Shown below is a list of the instruction manuals for the controllers related to this product which is recorded in Instruction Manual (DVD).

No.	Name	Control No.
1	Operation Manual for PCON-CA Controller	ME0289
2	Operation Manual for RC PC Software RCM-101-MW/RCM-101-USB	ME0155
3	Operation Manual for CON-PTA/PDA/PGA	ME0295

1.1.3 How to Read the Model Nameplate



1.1.4 How to Read the Model Number



Note 1 Identification for IAI use only : It may be displayed for IAI use. It is not a code to show the model type.

1.2 Specification

1.2.1 Speed

[When high-output setting is effective]

Speed limits (Unit: mm/s)

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Stroke [mm]																
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	
SA5C	42P	3	Horizontal	225										195	165	140	120	105	90	80
			Vertical	225										195	165	140	120	105	90	80
		6	Horizontal	450										395	335	285	245	215	185	165
			Vertical	450										395	335	285	245	215	185	165
		12	Horizontal	900										795	665	570	490	425	375	330
			Vertical	900										795	665	570	490	425	375	330
		20	Horizontal	1440										1225	1045	900	785	690	610	
			Vertical	1280										1225	1045	900	785	690	610	
SA6C	42P	3	Horizontal	225										195	165	140	120	105	90	80
			Vertical	225										195	165	140	120	105	90	80
		6	Horizontal	450										395	335	285	245	215	185	165
			Vertical	450										395	335	285	245	215	185	165
		12	Horizontal	900										795	670	570	490	430	375	335
			Vertical	900										795	670	570	490	430	375	335
		20	Horizontal	1440										1230	1045	905	785	690	615	
			Vertical	1280										1230	1045	905	785	690	615	
SA7C	56P	4	Horizontal	245										215	185	160	145	125		
			Vertical	210										185	160	145	125			
		8	Horizontal	490										430	375	325	290	255		
			Vertical	490										430	375	325	290	255		
		16	Horizontal	980										865	750	655	580	515		
			Vertical	840										750	655	580	515			
		24	Horizontal	1200										1155	1010	890	790			
			Vertical	1200										1155	1010	890	790			
SA5R	42P	3	Horizontal	225										195	165	140	120	105	90	80
			Vertical	225										195	165	140	120	105	90	80
		6	Horizontal	450										395	335	285	245	215	185	165
			Vertical	450										395	335	285	245	215	185	165
		12	Horizontal	900										795	665	570	490	425	375	330
			Vertical	800										795	665	570	490	425	375	330
		20	Horizontal	1440										1225	1045	900	785	690	610	
			Vertical	1120										1045	900	785	690	610		
SA6R	42P	3	Horizontal	225										195	165	140	120	105	90	80
			Vertical	225										195	165	140	120	105	90	80
		6	Horizontal	450										395	335	285	245	215	185	165
			Vertical	450										395	335	285	245	215	185	165
		12	Horizontal	900										795	670	570	490	430	375	335
			Vertical	900										795	670	570	490	430	375	335
		20	Horizontal	1280										1230	1045	905	785	690	615	
			Vertical	1280										1230	1045	905	785	690	615	

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Stroke [mm]															
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
SA7R	56P	4	Horizontal	210												185	160	145	125
			Vertical	210												185	160	145	125
		8	Horizontal	490										430	375	325	290	255	
			Vertical	490										430	375	325	290	255	
		16	Horizontal	840												750	655	580	515
			Vertical	700												655	580	515	
		24	Horizontal	1000												890	790		
			Vertical	1000												890	790		

[When high-output setting is ineffective]

Speed limits (Unit: mm/s)

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Stroke [mm]																
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	
SA5C	42P	3	Horizontal	150												140	120	105	90	80
			Vertical	150												140	120	105	90	80
		6	Horizontal	300												285	245	215	185	165
			Vertical	300												285	245	215	185	165
		12	Horizontal	600												570	490	425	375	330
			Vertical	600												570	490	425	375	330
20	Horizontal	960												900	785	690	610			
	Vertical	960												900	785	690	610			
SA6C	42P	3	Horizontal	150												140	120	105	90	80
			Vertical	150												140	120	105	90	80
		6	Horizontal	300												285	245	215	185	165
			Vertical	300												285	245	215	185	165
		12	Horizontal	600												570	490	430	375	335
			Vertical	600												570	490	430	375	335
20	Horizontal	960												905	785	690	615			
	Vertical	960												905	785	690	615			
SA7C	56P	4	Horizontal	140														125		
			Vertical	140														125		
		8	Horizontal	280														255		
			Vertical	280														255		
		16	Horizontal	560														515		
			Vertical	560														515		
24	Horizontal	1000												890		790				
	Vertical	800												890		790				
SA5R	42P	3	Horizontal	150												140	120	105	90	80
			Vertical	150												140	120	105	90	80
		6	Horizontal	300												285	245	215	185	165
			Vertical	300												285	245	215	185	165
		12	Horizontal	600												570	490	425	375	330
			Vertical	600												570	490	425	375	330
20	Horizontal	960												900	785	690	610			
	Vertical	800												785	690	610				
SA6R	42P	3	Horizontal	150												140	120	105	90	80
			Vertical	150												140	120	105	90	80
		6	Horizontal	300												285	245	215	185	165
			Vertical	300												285	245	215	185	165
		12	Horizontal	600												570	490	430	375	335
			Vertical	600												570	490	430	375	335
20	Horizontal	960												905	785	690	615			
	Vertical	960												905	785	690	615			
SA7R	56P	4	Horizontal	140														125		
			Vertical	140														125		
		8	Horizontal	280														255		
			Vertical	280														255		
		16	Horizontal	560														515		
			Vertical	560														515		
24	Horizontal	600																		
	Vertical	400																		

1.2.2 Maximum Acceleration and Transportable Weight

If the transportable weight is smaller than as specified, the acceleration/deceleration can be raised beyond the applicable level.

[When high-output setting for motor straight type is effective]

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA5C	42P	3	Horizontal	0	20	20	18	18	14
				25	20	20	18	18	14
				50	20	20	18	18	14
				75	20	20	18	18	14
				100	20	18	18	16	12
				125	20	18	18	16	12
				150	20	18	18	12	10
				175	20	18	14	10	6
				200	20	18	8	—	—
			225	20	6	—	—	—	
			Vertical	0	12	12	12	—	—
				25	12	12	12	—	—
				50	12	12	12	—	—
				75	12	12	12	—	—
				100	12	12	12	—	—
				125	12	12	12	—	—
				150	12	11	10	—	—
				175	11	9	8	—	—
		200		9	7	6	—	—	
		225	6	5	—	—	—		
		6	Horizontal	0	18	18	14	14	12
				50	18	18	14	14	12
				100	18	18	14	14	12
				150	18	18	14	14	12
				200	18	18	14	14	12
				250	18	18	14	14	12
				300	18	18	14	14	10
				350	18	18	12	11	8
				400	18	14	10	7	6
			450	16	10	6	4	2	
			Vertical	0	6	6	6	—	—
				50	6	6	6	—	—
				100	6	6	6	—	—
				150	6	6	6	—	—
				200	6	6	6	—	—
				250	6	6	5.5	—	—
				300	6	5.5	5	—	—
				350	6	4.5	4	—	—
		400		4.5	3.5	3	—	—	
		450	3.5	2	2	—	—		

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA5C	42P	12	Horizontal	0	9	9	9	9	8
				100	9	9	9	9	8
				200	9	9	9	9	8
				300	9	9	9	9	8
				400	9	9	9	9	8
				500	9	9	9	8	6.5
				600	9	9	9	6	4
				700	9	9	8	4	2.5
				800	—	7	5	2	1
			900	—	5	3	1	1	
			Vertical	0	2.5	2.5	2.5	—	—
				100	2.5	2.5	2.5	—	—
				200	2.5	2.5	2.5	—	—
				300	2.5	2.5	2.5	—	—
				400	2.5	2.5	2.5	—	—
				500	2.5	2.5	2.5	—	—
				600	2.5	2.5	2.5	—	—
				700	2.5	2.5	2	—	—
		800		—	1.5	1	—	—	
		900	—	0.5	0.5	—	—		
		20	Horizontal	0	6.5	6.5	5	5	4
				160	6.5	6.5	5	5	4
				320	6.5	6.5	5	5	4
				480	6.5	6.5	5	5	4
				640	6.5	6.5	5	5	4
				800	6.5	6.5	5	4	3
				960	—	6.5	5	3	2
			Vertical	1120	—	6	3	2	1.5
				1280	—	—	1	1	1
				1440	—	—	1	0.5	—
				0	1	1	1	—	—
				160	1	1	1	—	—
320	1			1	1	—	—		
480	1			1	1	—	—		
640	1	1	1	—	—				
800	1	1	1	—	—				
960	—	1	1	—	—				
1120	—	0.5	0.5	—	—				
1280	—	—	0.5	—	—				
1440	—	—	—	—	—				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA6C	42P	3	Horizontal	0	25	25	25	25	25
				25	25	25	25	25	25
				50	25	25	25	25	25
				75	25	25	25	25	25
				100	25	25	25	25	25
				125	25	25	25	25	25
				150	25	25	25	25	22.5
				175	25	25	25	20	19
				200	25	25	20	18	16
			225	25	18	16	15	12	
			Vertical	0	12	12	12	-	-
				25	12	12	12	-	-
				50	12	12	12	-	-
				75	12	12	12	-	-
				100	12	12	12	-	-
				125	12	12	12	-	-
				150	12	11	10	-	-
				175	11	9	8	-	-
		200		9	7	6	-	-	
		225	6	5	-	-	-		
		6	Horizontal	0	25	25	20	16	14
				50	25	25	20	16	14
				100	25	25	20	16	14
				150	25	25	20	16	14
				200	25	25	20	16	14
				250	25	25	20	16	14
				300	25	25	20	15	11
				350	25	20	14	12	9
				400	25	16	10	8	6.5
			450	18	12	6	5	2.5	
			Vertical	0	6	6	6	-	-
				50	6	6	6	-	-
				100	6	6	6	-	-
				150	6	6	6	-	-
				200	6	6	6	-	-
				250	6	6	5.5	-	-
300	6			5.5	5	-	-		
350	6			4.5	4	-	-		
400	4.5	3.5		3	-	-			
450	3.5	2	2	-	-				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA6C	42P	12	Horizontal	0	15	15	12.5	11	10
				100	15	15	12.5	11	10
				200	15	15	12.5	11	10
				300	15	15	12.5	11	10
				400	15	14	11	10	8.5
				500	15	13	10	8	6.5
				600	15	12	9	6	4
				700	12	10	8	4	2.5
				800	10	7	5	2	1
			900	–	5	3	1	1	
			Vertical	0	2.5	2.5	2.5	–	–
				100	2.5	2.5	2.5	–	–
				200	2.5	2.5	2.5	–	–
				300	2.5	2.5	2.5	–	–
				400	2.5	2.5	2.5	–	–
				500	2.5	2.5	2.5	–	–
				600	2.5	2.5	2.5	–	–
				700	2.5	2.5	2	–	–
		800		2	1.5	1	–	–	
		900	–	0.5	0.5	–	–		
		20	Horizontal	0	10	10	9	7	6
				160	10	10	9	7	6
				320	10	10	9	7	6
				480	10	10	9	7	6
				640	10	10	8	6	5
				800	10	9	6.5	4.5	3
				960	–	8	5	3.5	2
				1120	–	6.5	3	2	1.5
				1280	–	–	1	1	1
			1440	–	–	1	0.5	–	
			Vertical	0	1	1	1	–	–
				160	1	1	1	–	–
				320	1	1	1	–	–
				480	1	1	1	–	–
				640	1	1	1	–	–
				800	1	1	1	–	–
960	–			1	1	–	–		
1120	–			0.5	0.5	–	–		
1280	–	–		0.5	–	–			
1440	–	–	–	–	–				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA7C	56P	4	Horizontal	0	45	45	45	40	40
				35	45	45	45	40	40
				70	45	45	45	40	40
				105	45	45	45	40	35
				140	45	45	35	30	25
				175	45	30	18	-	-
				210	45	8	-	-	-
			245	35	-	-	-	-	
			Vertical	0	25	25	25	-	-
				35	25	25	25	-	-
				70	25	25	25	-	-
				105	22	20	19	-	-
				140	16	14	12	-	-
				175	11	9	7.5	-	-
		210		8	-	-	-	-	
		245	-	-	-	-	-		
		8	Horizontal	0	45	45	45	40	40
				70	45	45	45	40	40
				140	45	45	40	38	35
				210	45	40	35	30	24
				280	40	30	25	20	15
				350	35	20	9	4	-
				420	25	7	-	-	-
			490	15	-	-	-	-	
			Vertical	0	16	16	16	-	-
				70	16	16	16	-	-
				140	16	16	16	-	-
				210	11	10	9.5	-	-
280	9			8	7	-	-		
350	7			5	4	-	-		
420	5	2		-	-	-			
490	2	-	-	-	-				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA7C	56P	16	Horizontal	0	40	40	35	28	27
				140	40	40	35	28	27
				280	40	38	35	25	24
				420	35	25	20	15	10
				560	25	20	15	10	6
				700	20	15	10	5	3
				840	–	9	4	2	2
			980	–	4	–	–	–	
			Vertical	0	8	8	8	–	–
				140	8	8	8	–	–
				280	8	8	8	–	–
				420	6	5	4.5	–	–
				560	5	4	3	–	–
				700	4	3	2	–	–
		840		–	1	–	–	–	
		980	–	–	–	–	–		
		24	Horizontal	0	20	20	18	16	14
				200	20	20	18	16	14
				400	20	20	18	16	14
				600	20	16	15	10	9
				800	16	12	10	7	4
				1000	–	8	4.5	4	2
				1200	–	5.5	2	2	1
			Vertical	0	3	3	3	–	–
				200	3	3	3	–	–
				400	3	3	3	–	–
				600	3	3	3	–	–
				800	–	3	2.5	–	–
1000	–			2	1.5	–	–		
1200	–			1	1	–	–		

[When high-output setting for motor reversing type is effective]

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA5R	42P	3	Horizontal	0	20	20	18	18	14
				25	20	20	18	18	14
				50	20	20	18	18	14
				75	20	20	18	18	14
				100	20	18	18	16	12
				125	20	18	18	16	12
				150	20	18	18	12	10
				175	20	18	14	10	6
				200	20	18	8	—	—
			225	20	6	—	—	—	
			Vertical	0	12	12	12	—	—
				25	12	12	12	—	—
				50	12	12	12	—	—
				75	12	12	12	—	—
				100	12	12	12	—	—
				125	12	12	12	—	—
				150	12	11	10	—	—
				175	11	9	8	—	—
		200		9	7	6	—	—	
		225	5	3	—	—	—		
		6	Horizontal	0	18	18	14	14	12
				50	18	18	14	14	12
				100	18	18	14	14	12
				150	18	18	14	14	12
				200	18	18	14	14	12
				250	18	18	14	14	12
				300	18	18	14	14	10
				350	18	18	12	11	8
				400	18	14	10	7	6
			450	16	10	6	4	2	
			Vertical	0	6	6	6	—	—
				50	6	6	6	—	—
				100	6	6	6	—	—
				150	6	6	6	—	—
				200	6	6	6	—	—
				250	6	6	5.5	—	—
300	6			5.5	5	—	—		
350	5.5			4.5	4	—	—		
400	4.5	3.5		3	—	—			
450	2.5	2	1.5	—	—				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA5R	42P	12	Horizontal	0	9	9	9	9	8
				100	9	9	9	9	8
				200	9	9	9	9	8
				300	9	9	9	9	8
				400	9	9	9	9	8
				500	9	9	9	8	6.5
				600	9	9	9	6	4
				700	9	9	8	4	2.5
				800	—	7	5	2	1
			900	—	5	3	1	1	
			Vertical	0	2.5	2.5	2.5	—	—
				100	2.5	2.5	2.5	—	—
				200	2.5	2.5	2.5	—	—
				300	2.5	2.5	2.5	—	—
				400	2.5	2.5	2.5	—	—
				500	2.5	2.5	2.5	—	—
				600	2.5	2.5	2.5	—	—
				700	2.5	2	1.5	—	—
		800		—	1	0.5	—	—	
		900	—	—	—	—	—		
		20	Horizontal	0	6.5	6.5	5	5	4
				160	6.5	6.5	5	5	4
				320	6.5	6.5	5	5	4
				480	6.5	6.5	5	5	4
				640	6.5	6.5	5	5	4
				800	6.5	6.5	5	4	3
				960	—	6.5	5	3	2
			Vertical	1120	—	6	3	2	1.5
				1280	—	—	1	1	1
				1440	—	—	1	0.5	—
				0	1	1	1	—	—
				160	1	1	1	—	—
320	1			1	1	—	—		
480	1			1	1	—	—		
640	1	1	1	—	—				
800	1	1	1	—	—				
960	—	1	1	—	—				
1120	—	0.5	0.5	—	—				
1280	—	—	—	—	—				
1440	—	—	—	—	—				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA6R	42P	3	Horizontal	0	25	25	25	25	25
				25	25	25	25	25	25
				50	25	25	25	25	25
				75	25	25	25	25	25
				100	25	25	25	25	25
				125	25	25	25	25	25
				150	25	25	25	25	22.5
				175	25	25	25	20	19
				200	25	25	20	18	12
			225	25	18	16	6	4	
			Vertical	0	12	12	12	—	—
				25	12	12	12	—	—
				50	12	12	12	—	—
				75	12	12	12	—	—
				100	12	12	12	—	—
				125	12	12	12	—	—
				150	12	11	10	—	—
				175	11	9	8	—	—
		200		9	7	6	—	—	
		225	5	3	—	—	—		
		6	Horizontal	0	25	25	20	16	14
				50	25	25	20	16	14
				100	25	25	20	16	14
				150	25	25	20	16	14
				200	25	25	20	16	14
				250	25	25	20	16	14
				300	25	25	20	15	11
				350	25	20	14	12	9
				400	25	16	10	8	6.5
			450	18	12	6	5	2.5	
			Vertical	0	6	6	6	—	—
				50	6	6	6	—	—
				100	6	6	6	—	—
				150	6	6	6	—	—
				200	6	6	6	—	—
				250	6	6	5.5	—	—
300	6			5.5	5	—	—		
350	5.5			4.5	4	—	—		
400	4.5	3.5		3	—	—			
450	2.5	2	1.5	—	—				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA6R	42P	12	Horizontal	0	15	15	12.5	11	10
				00	15	15	12.5	11	10
				200	15	15	12.5	11	10
				300	15	15	12.5	11	10
				400	15	14	11	10	8.5
				500	15	13	10	8	6.5
				600	15	12	9	6	4
				700	12	10	8	4	2.5
				800	10	7	5	2	1
			900	—	4	2	1	—	
			Vertical	0	2.5	2.5	2.5	—	—
				00	2.5	2.5	2.5	—	—
				200	2.5	2.5	2.5	—	—
				300	2.5	2.5	2.5	—	—
				400	2.5	2.5	2.5	—	—
				500	2.5	2.5	2.5	—	—
				600	2.5	2.5	2.5	—	—
				700	2.5	2.5	1.5	—	—
		800		2	1	0.5	—	—	
		900	—	—	—	—	—		
		20	Horizontal	0	10	10	9	7	6
				160	10	10	9	7	6
				320	10	10	9	7	6
				480	10	10	9	7	6
				640	10	10	8	6	5
				800	10	9	6.5	4.5	3
				960	—	8	5	3.5	2
			Vertical	1120	—	6	3	2	1.5
				1280	—	—	1	0.5	0.5
				0	1	1	1	—	—
				160	1	1	1	—	—
				320	1	1	1	—	—
480	1			1	1	—	—		
640	1			1	1	—	—		
800	1	1	1	—	—				
960	—	1	1	—	—				
1120	—	0.5	0.5	—	—				
1280	—	—	—	—	—				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA7R	56P	4	Horizontal	0	45	45	45	40	40
				35	45	45	45	40	40
				70	45	45	45	40	40
				105	45	45	45	40	35
				140	45	45	35	30	25
				175	45	30	16	—	—
				210	40	—	—	—	—
			Vertical	0	25	25	25	—	—
				35	25	25	25	—	—
				70	25	25	25	—	—
				105	22	20	19	—	—
				140	16	14	12	—	—
				175	11	7	5	—	—
				210	4	—	—	—	—
		8	Horizontal	0	45	45	45	40	40
				70	45	45	45	40	40
				140	45	45	40	38	35
				210	45	40	35	30	24
				280	40	30	25	20	15
				350	35	20	9	4	—
				420	25	7	—	—	—
			490	13	—	—	—	—	
			Vertical	0	16	16	16	—	—
				70	16	16	16	—	—
				140	16	16	16	—	—
				210	11	10	9.5	—	—
				280	9	8	7	—	—
				350	7	5	4	—	—
420	5	1		—	—	—			
490	1	—	—	—	—				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.3G	0.5G	0.7G	1.0G
SA7R	56P	16	Horizontal	0	40	40	35	28	27
				140	40	40	35	28	27
				280	40	38	35	25	24
				420	35	25	20	15	10
				560	25	20	15	10	6
				700	20	15	8	5	3
				840	—	6	2	—	—
			Vertical	0	8	8	8	—	—
				140	8	8	8	—	—
				280	8	8	8	—	—
				420	6	5	4.5	—	—
				560	5	4	3	—	—
				700	3	2	1.5	—	—
				840	—	—	—	—	—
		24	Horizontal	0	20	20	18	16	14
				200	20	20	18	16	14
				400	20	20	18	16	14
				600	20	16	15	10	9
				800	16	12	10	6	4
				1000	—	8	4.5	2	1
				Vertical	0	3	3	3	—
			200		3	3	3	—	—
			400		3	3	3	—	—
			600		3	3	3	—	—
			800		—	3	2.5	—	—
			1000		—	1	1	—	—

[When high-output setting for motor straight type is ineffective]

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G
SA5C	42P	3	Horizontal	0	–	16	16	16	16
				25	–	16	16	16	16
				50	–	16	16	16	16
				75	–	16	16	16	14
				100	–	16	16	14	12
				125	–	16	13	11	10
			150	–	16	10	9	8	
			Vertical	0	10	10	10	–	–
				25	10	10	10	–	–
				50	10	10	10	–	–
				75	10	10	10	–	–
				100	10	9	8	–	–
		125		7	6	6	–	–	
		150	5	4.5	3	–	–		
		6	Horizontal	0	–	13	13	13	12
				50	–	13	13	13	12
				100	–	13	13	13	12
				150	–	13	13	13	12
				200	–	13	13	13	12
				250	–	13	10	8	7
			300	–	13	9	5	4	
			Vertical	0	5	5	5	–	–
				50	5	5	5	–	–
				100	5	5	5	–	–
				150	5	5	5	–	–
				200	5	4.5	4	–	–
		250		4	4	3	–	–	
		300	3	2.5	2	–	–		
		12	Horizontal	0	–	8	6	5.5	5
				100	–	8	6	5.5	5
				200	–	8	6	5.5	5
				300	–	8	6	5.5	5
				400	–	8	6	4	3.5
				500	–	7	5	2	1.5
			600	–	5	4	2	1.5	
			Vertical	0	2	2	2	–	–
				100	2	2	2	–	–
				200	2	2	2	–	–
				300	2	2	2	–	–
				400	2	2	1.5	–	–
		500		1.5	1.5	1	–	–	
		600	1	1	0.5	–	–		
		20	Horizontal	0	–	5	4	3	3
				160	–	5	4	3	3
				320	–	5	4	3	3
				480	–	4.5	4	3	3
				640	–	4	3.5	2	2
				800	–	3	2.5	1	1
			960	–	2	2	1	0.5	
			Vertical	0	0.5	0.5	–	–	–
				160	0.5	0.5	–	–	–
				320	0.5	0.5	–	–	–
				480	0.5	0.5	–	–	–
				640	0.5	0.5	–	–	–
		800		0.5	0.5	–	–	–	
		960	–	0.5	–	–	–		

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G
SA6C	42P	3	Horizontal	0	–	19	19	19	19
				25	–	19	19	19	19
				50	–	19	19	19	19
				75	–	19	19	19	19
				100	–	19	16	14	12
				125	–	18	14	11	10
			150	–	16	13	10	9	
			Vertical	0	10	10	10	–	–
				25	10	10	10	–	–
				50	10	10	10	–	–
				75	10	10	10	–	–
				100	10	9	8	–	–
		125		7	6	6	–	–	
		6	Horizontal	150	5	4.5	3	–	–
				0	–	16	15	13	12
				50	–	16	15	13	12
				100	–	16	15	13	12
				150	–	16	15	13	12
				200	–	16	15	13	12
			Vertical	250	–	15	12	10	7
				300	–	13	12	6	4
				0	5	5	5	–	–
				50	5	5	5	–	–
				100	5	5	5	–	–
				150	5	5	5	–	–
		12	Horizontal	200	5	4.5	4	–	–
				250	4	4	3	–	–
				300	3	2.5	2	–	–
				0	–	8.5	8.5	7	6
				100	–	8.5	8.5	7	6
				200	–	8.5	8.5	7	6
			Vertical	300	–	8.5	8.5	7	6
				400	–	8	7	4	3.5
				500	–	7	6	3	2
				600	–	6	6	2	1.5
				0	2	2	2	–	–
				100	2	2	2	–	–
		20	Horizontal	200	2	2	2	–	–
				300	2	2	2	–	–
				400	2	2	1.5	–	–
				500	1.5	1.5	1	–	–
				600	1	1	0.5	–	–
				0	–	6	6	4	4
			Vertical	160	–	6	6	4	4
				320	–	6	6	4	4
				480	–	5	5	3	3
				640	–	4	4	2	2
				800	–	3	3	1	1
960	–			2	2	1	0.5		
0	0.5	0.5	–	–	–				
160	0.5	0.5	–	–	–				
320	0.5	0.5	–	–	–				
480	0.5	0.5	–	–	–				
640	0.5	0.5	–	–	–				
800	0.5	0.5	–	–	–				
960	–	0.5	–	–	–				

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]							
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G		
SA7C	56P	4	Horizontal	0	-	40	-	-	-		
				35	-	40	-	-	-		
				70	-	40	-	-	-		
				105	-	40	-	-	-		
				140	-	40	-	-	-		
			Vertical	0	-	15	-	-	-		
				35	-	15	-	-	-		
				70	-	15	-	-	-		
				105	-	10	-	-	-		
				140	-	5	-	-	-		
				8	Horizontal	0	-	-	40	-	-
						70	-	-	40	-	-
		140	-			-	40	-	-		
		210	-			-	25	-	-		
		280	-			-	10	-	-		
		Vertical	0		-	10	-	-	-		
			70		-	10	-	-	-		
			140		-	7	-	-	-		
			210		-	4	-	-	-		
			280		-	1.5	-	-	-		
			16		Horizontal	0	-	-	35	-	-
						140	-	-	35	-	-
		280		-		-	25	-	-		
		420		-		-	15	-	-		
		560		-		-	7	-	-		
		Vertical		0	-	5	-	-	-		
				140	-	5	-	-	-		
				280	-	3	-	-	-		
				420	-	1.5	-	-	-		
				560	-	0.5	-	-	-		
				24	Horizontal	0	-	-	18	-	-
						200	-	-	18	-	-
		400	-			-	18	-	-		
		600	-			-	10	-	-		
		800	-			-	5	-	-		
		Vertical	1000		-	-	1.5	-	-		
			0		-	2	-	-	-		
			200		-	2	-	-	-		
			400		-	2	-	-	-		
			600		-	1.5	-	-	-		
			800		-	1	-	-	-		
			1000		-	-	-	-	-		

[When high-output setting for motor reversing type is ineffective]

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G
SA5R	42P	3	Horizontal	0	—	16	16	16	16
				25	—	16	16	16	16
				50	—	16	16	16	16
				75	—	16	16	16	14
				100	—	16	16	14	12
				125	—	16	13	11	10
			Vertical	150	—	16	10	9	8
				0	10	10	10	—	—
				25	10	10	10	—	—
				50	10	10	10	—	—
				75	10	10	10	—	—
				100	10	9	8	—	—
		6	Horizontal	125	7	6	6	—	—
				150	5	4.5	3	—	—
				0	—	13	13	13	12
				50	—	13	13	13	12
				100	—	13	13	13	12
				150	—	13	13	13	12
			Vertical	200	—	13	13	13	12
				250	—	13	10	8	7
				300	—	13	9	5	4
				0	5	5	5	—	—
				50	5	5	5	—	—
				100	5	5	5	—	—
6	Vertical	150	5	5	5	—	—		
		200	5	4.5	4	—	—		
		250	4	4	3	—	—		
		300	2.5	2	1.5	—	—		

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G
SA5R	42P	12	Horizontal	0	—	8	6	5.5	5
				100	—	8	6	5.5	5
				200	—	8	6	5.5	5
				300	—	8	6	5.5	5
				400	—	8	6	4	3.5
				500	—	7	5	2	1.5
			600	—	5	4	2	1.5	
			Vertical	0	2	2	2	—	—
				100	2	2	2	—	—
				200	2	2	2	—	—
				300	2	2	2	—	—
				400	2	2	1.5	—	—
		500		1.5	1.5	1	—	—	
		600	1	0.5	0.5	—	—		
		20	Horizontal	0	—	5	4	3	3
				160	—	5	4	3	3
				320	—	5	4	3	3
				480	—	4.5	4	3	3
				640	—	4	3.5	2	2
				800	—	3	2.5	1	1
			960	—	2	2	1	0.5	
			Vertical	0	0.5	0.5	—	—	—
				160	0.5	0.5	—	—	—
				320	0.5	0.5	—	—	—
480	0.5			0.5	—	—	—		
640	0.5			0.5	—	—	—		
800	0.5	0.5		—	—	—			

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G
SA6R	42P	3	Horizontal	0	—	19	19	19	19
				25	—	19	19	19	19
				50	—	19	19	19	19
				75	—	19	19	19	19
				100	—	19	16	14	12
				125	—	18	14	11	10
			Vertical	150	—	16	13	10	9
				0	10	10	10	—	—
				25	10	10	10	—	—
				50	10	10	10	—	—
				75	10	10	10	—	—
				100	10	9	8	—	—
		6	Horizontal	125	7	6	6	—	—
				150	5	4.5	3	—	—
				0	—	16	15	13	12
				50	—	16	15	13	12
				100	—	16	15	13	12
				150	—	16	15	13	12
			Vertical	200	—	16	15	13	12
				250	—	15	12	10	7
				300	—	13	12	6	4
				0	5	5	5	—	—
				50	5	5	5	—	—
				100	5	5	5	—	—
Vertical	150	5	5	5	—	—			
	200	5	4.5	4	—	—			
	250	4	4	3	—	—			
	300	2.5	2	1.5	—	—			

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G
SA6R	42P	12	Horizontal	0	—	8.5	8.5	7	6
				00	—	8.5	8.5	7	6
				200	—	8.5	8.5	7	6
				300	—	8.5	8.5	7	6
				400	—	8	7	4	3.5
				500	—	7	6	3	2
			Vertical	600	—	6	6	2	1.5
				0	2	2	2	—	—
				00	2	2	2	—	—
				200	2	2	2	—	—
				300	2	2	2	—	—
				400	2	2	1.5	—	—
		20	Horizontal	500	1.5	1.5	1	—	—
				600	1	0.5	0.5	—	—
				0	—	6	6	4	4
				160	—	6	6	4	4
				320	—	6	6	4	4
				480	—	5	5	3	3
			Vertical	640	—	4	4	2	2
				800	—	3	3	1	1
				960	—	2	1.5	0.5	—
				0	0.5	0.5	—	—	—
				160	0.5	0.5	—	—	—
				320	0.5	0.5	—	—	—
Vertical	480	0.5	0.5	—	—	—			
	640	0.5	0.5	—	—	—			
	800	0.5	0.5	—	—	—			
	960	—	—	—	—	—			

Type	Motor Type	Lead [mm]	Horizontal / Vertical	Payload capacity by acceleration/deceleration [kg]					
				Velocity [mm/s]	0.1G	0.2G	0.3G	0.5G	0.7G
SA7R	56P	4	Horizontal	0	—	40	—	—	—
				35	—	40	—	—	—
				70	—	40	—	—	—
				105	—	40	—	—	—
				140	—	22	—	—	—
			Vertical	0	—	15	—	—	—
				35	—	15	—	—	—
				70	—	15	—	—	—
				105	—	10	—	—	—
				140	—	3	—	—	—
		8	Horizontal	0	—	—	40	—	—
				70	—	—	40	—	—
				140	—	—	40	—	—
				210	—	—	25	—	—
				280	—	—	6	—	—
			Vertical	0	—	10	—	—	—
				70	—	10	—	—	—
				140	—	7	—	—	—
				210	—	4	—	—	—
				280	—	1	—	—	—
SA7R	56P	16	Horizontal	0	—	—	35	—	—
				140	—	—	35	—	—
				280	—	—	25	—	—
				420	—	—	15	—	—
				560	—	—	4	—	—
			Vertical	0	—	5	—	—	—
				140	—	5	—	—	—
				280	—	3	—	—	—
				420	—	1.5	—	—	—
				560	—	0.5	—	—	—
		24	Horizontal	0	—	—	18	—	—
				200	—	—	18	—	—
				400	—	—	9	—	—
				600	—	—	1	—	—
				0	—	2	—	—	—
			Vertical	200	—	2	—	—	—
				400	—	1.5	—	—	—



Caution: Do not attempt to establish the settings for the acceleration/deceleration above the allowable range. It may cause vibration, malfunction or shortened life. Setting of acceleration/deceleration above the ratings may cause creeping or slippage of the coupling.

1.2.3 Driving System • Position Detector

Type	Motor Type	Lead	No. of Encoder Pulses	Ball Screw Type		
				Type	Diameter	Accuracy
SA5C SA5R	42P	3	800	Rolled	φ10mm	C10
		6				
		12				
		20				
SA6C SA6R	42P	3		Rolled	φ10mm	C10
		6				
		12				
		20				
SA7C SA7R	56P	4		Rolled	φ12mm	C10
		8				
		16				
		24				

1.2.4 Positioning Precision

Type	lead	Item	Tolerance
SA5C SA5R	3, 6, 12	Positioning repeatability	±0.02mm
		Backlash	0.1mm or less
	20	Positioning repeatability	±0.03mm
		Backlash	0.1mm or less
SA6C SA6R	3, 6, 12	Positioning repeatability	±0.02mm
		Backlash	0.1mm or less
	20	Positioning repeatability	±0.03mm
		Backlash	0.1mm or less
SA7C SA7R	4, 8, 16	Positioning repeatability	±0.02mm
		Backlash	0.1mm or less
	24	Positioning repeatability	±0.03mm
		Backlash	0.1mm or less

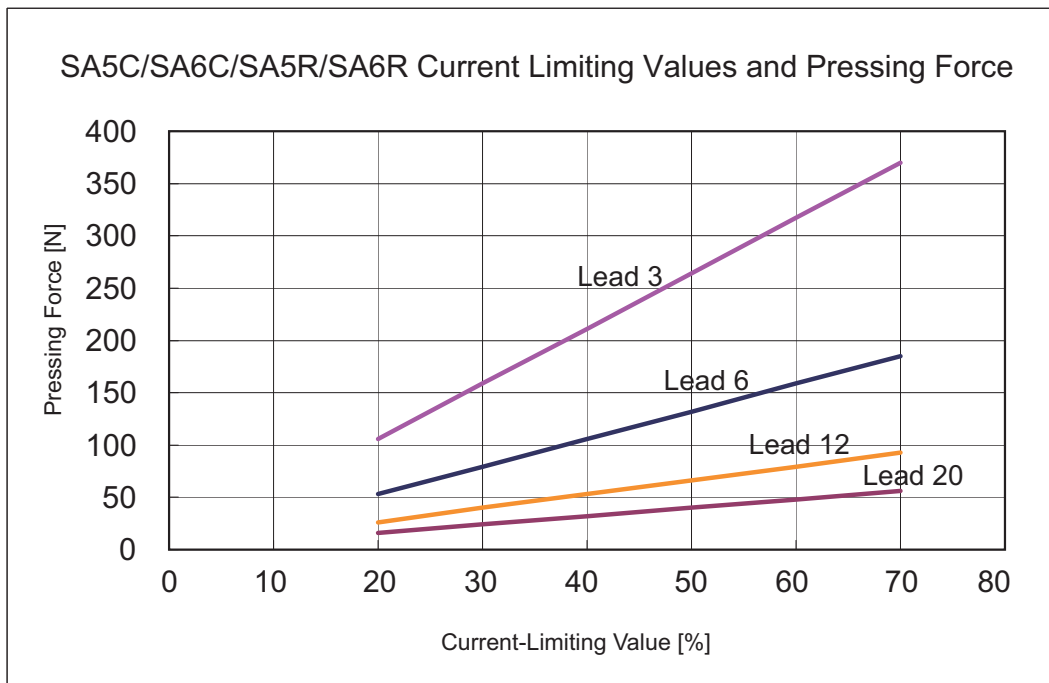
It is the accuracy when product is shipped out from the factory. It does not include the consideration of time-dependent change.

1.2.5 Current Limit Value and Pressing Force

- SA5C, SA6C, SA5R, SA6R

Current Limit Value	Lead 3	Lead 6	Lead 12	Lead 20
20%	106	53	26	16
30%	159	79	40	24
40%	211	106	53	32
50%	264	132	66	40
60%	317	159	79	48
70%	370	185	93	56

* These are the reference values at 20mm/s of pressing speed.

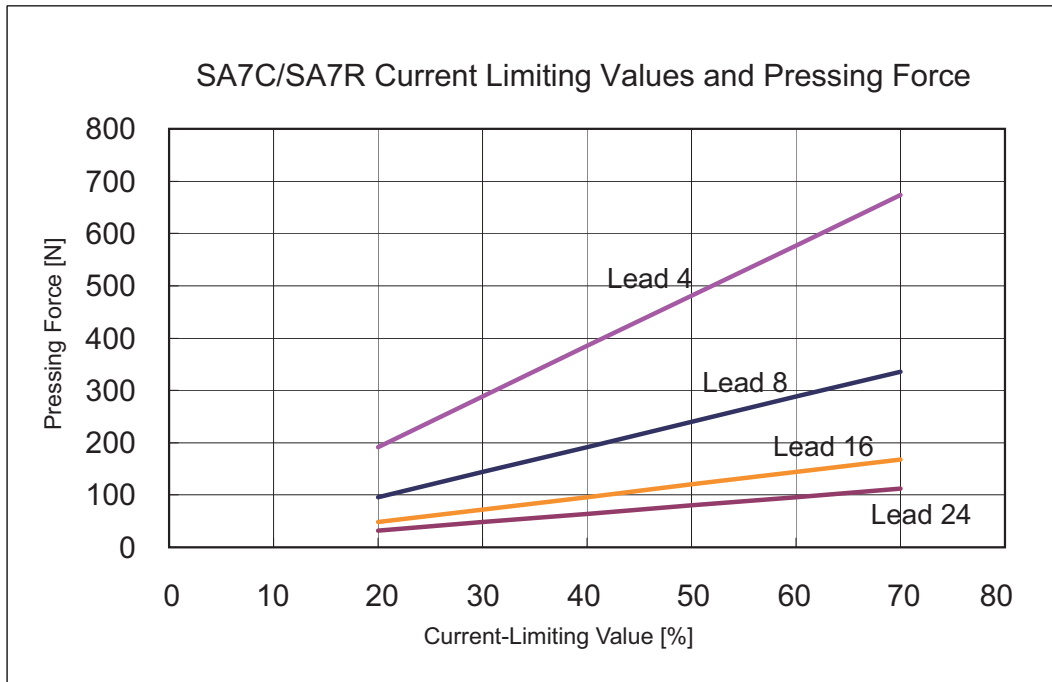


• SA7C, SA7R

[N]

Current Limit Value	Lead 4	Lead 8	Lead 16	Lead 24
20%	192	96	48	32
30%	288	144	72	48
40%	385	192	96	64
50%	481	240	120	80
60%	577	288	144	96
70%	673	336	168	112

* These are the reference values at 20mm/s of pressing speed.

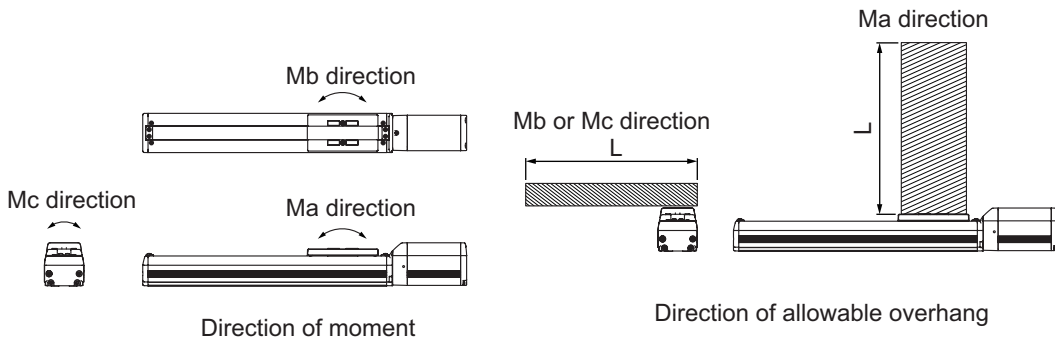


- Caution: (1) The relation of the pressing force and current limiting value is a reference. There will be a little variance in the actual pressing force.
 (2) If the current limiting value is low, the pressing force may largely vary.
 (3) The movement speed at the pressing operation is fixed to 20mm/s.
 The graph shows the values when pressing with 20mm/s, and it differs if the speed changes.

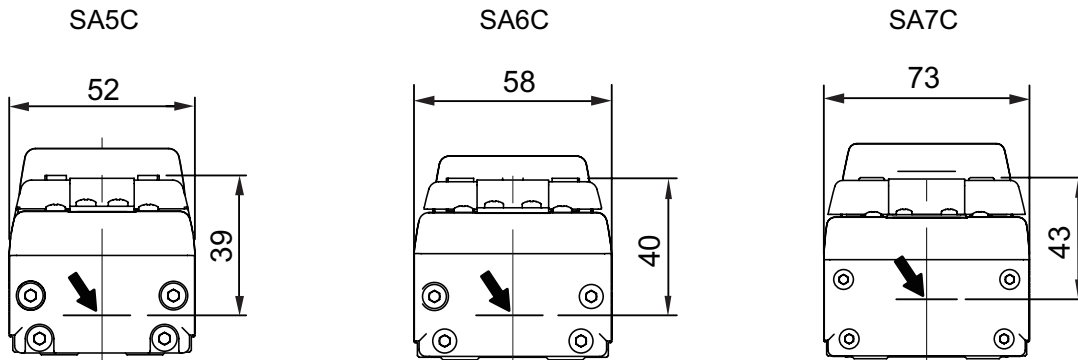
1.2.6 Allowable Load Moment of Actuator

Type	Static load moment [N·m]			Allowable load moment [N·m]			Allowable overhang load [L]
	Ma	Mb	Mc	Ma	Mb	Mc	
SA5C SA5R	18.6	26.6	47.5	4.9	6.8	11.7	Ma direction: 150mm Mb or Mc direction: 150mm
SA6C SA6R	38.3	54.7	81.0	8.9	12.7	18.6	Ma direction: 220mm Mb or Mc direction: 220mm
SA7C SA7R	50.4	71.9	138.0	13.9	19.9	38.3	Ma direction: 230mm Mb or Mc direction: 230mm

For the dynamic allowable load moment, provided under assumption that the operation life is 5,000km. [Refer to 6. Life]



For the calculation of Ma and Mc moments, consider the position indicated with an arrow as the datum point.



⚠ Caution: An operation beyond the allowable moment and overhang load length would not only generate abnormal noise and vibration, but also may shorten the life of actuator extremely.

1.2.7 Duty Ratio in Continuous Operation

Continuous operation is available with the duty ratio 100%.

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

1.3 Options

1.3.1 Brake Type (Model No. : B)

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

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

1.3.2 Reversed-home Specification (Model No. : NM)

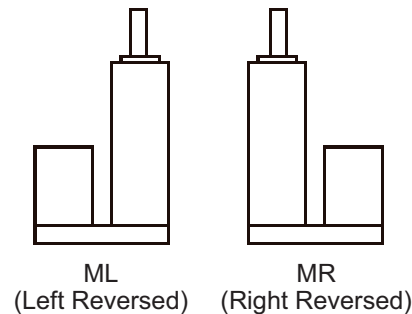
The standard home position is on the motor side. However, the motor position will be reversed if it is desirable in view of the layout of the system, etc.

(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.

1.3.3 Motor Left Reversed, Motor Right Reversed (Model No. : ML, MR)

From the view of the motor side, the type with the motor reversed to the left is ML, and the motor reversed to the right is MR.



1.3.4 Vacuum Joint on Other Side (Model No. : VR)

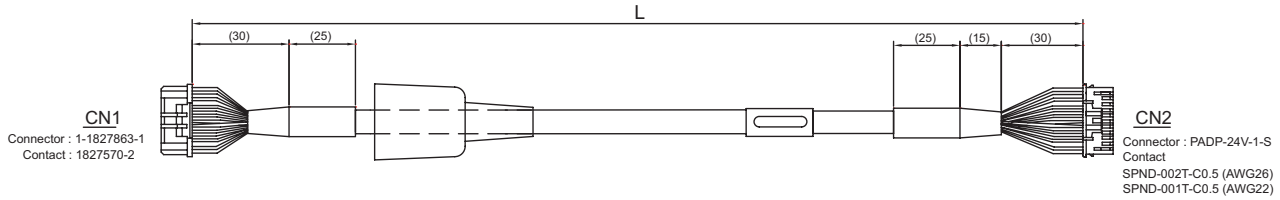
The joints are allocated on the right side of the body from the view of the motor side (which is the other side of the standard type).

For the standard type, the joints are allocated on the left side of the body from the view of the motor side.

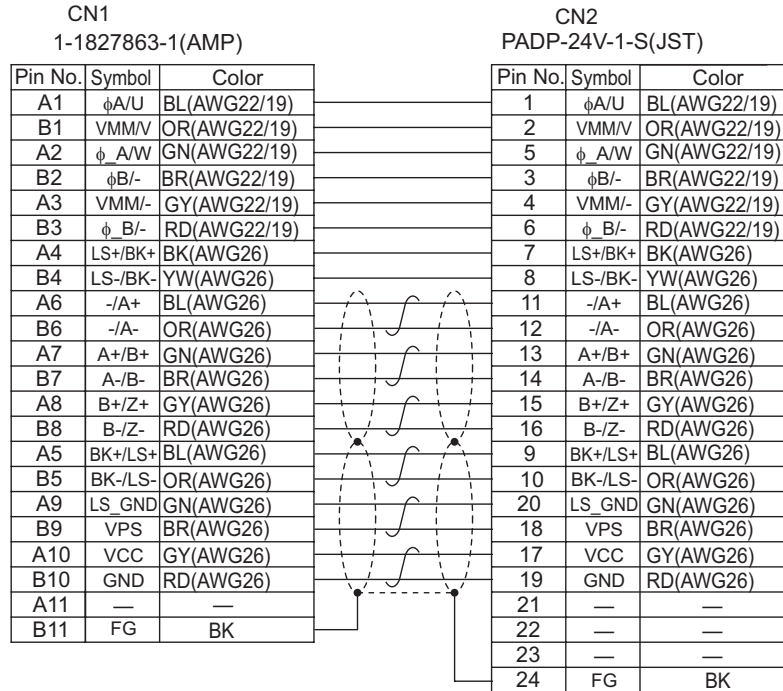
1.4 Motor • Encoder Cables

1.4.1 Motor • Encoder Integrated Cables

CB-CA-MPA□□□



Connection diagram

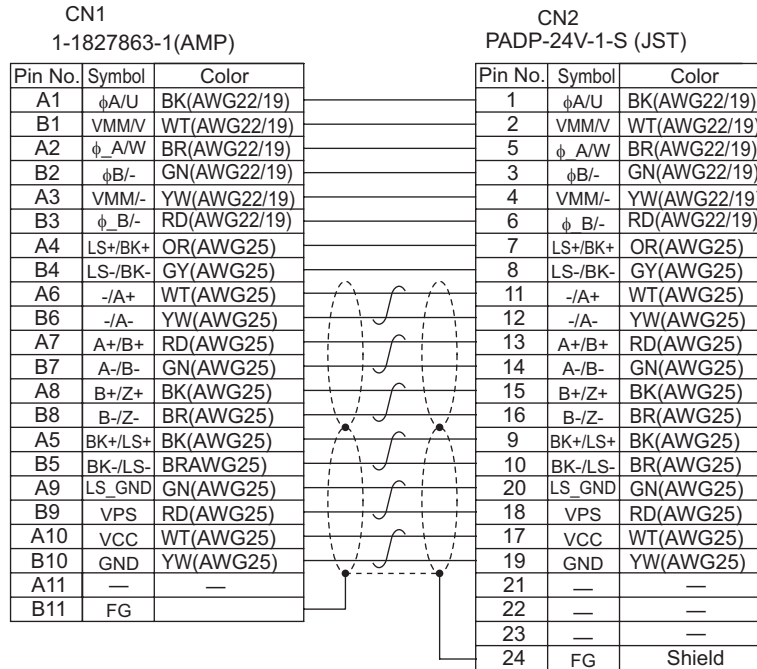


1.4.2 Motor • Encoder Integrated Cables Robot Type

CB-CA-MPA□□□-RB



Connection diagram



2. Installation

2.1 Transportation

[1] Handling of Robot

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

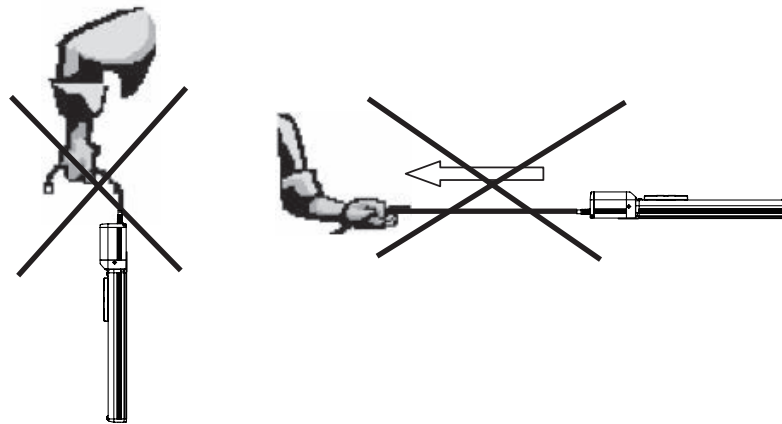
(1) Handling of the Packed Product

Please handle packages carefully during transport to ensure that product is not damaged by bumping or dropping.

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

(2) Handling the Actuator After Unpacking

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




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

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

Never hold an actuator by the stainless sheet.

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

 Warning: Never hold the actuator by the stainless sheet.

Supplement) For the names of each part of the actuator, refer to "Name of the Parts."



[2] Handling in Assembled Condition

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

(1) Shipping from IAI Already Assembled

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

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

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

(2) Handling After Unpacking

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

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

[3] Handling after Assembly with Peripheral Equipment

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

2.2 Installation and Storage • Preservation Environment

[1] Installation Environment

The actuator should be installed in a location other than those specified below.

In general, the installation environment should be one in which an operator can work without protective gear. 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

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

[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 Installation

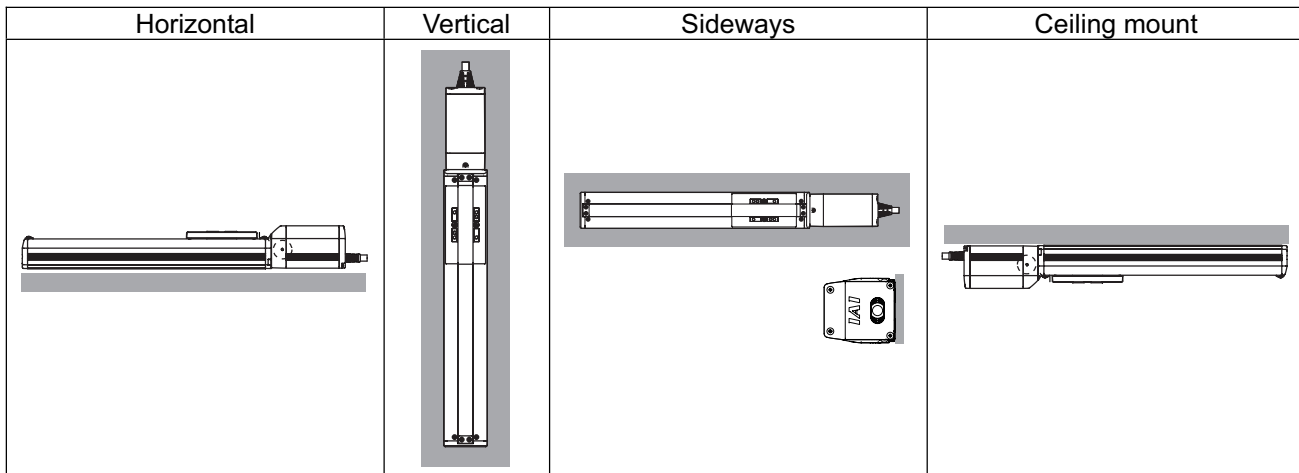
This chapter explains how to install the actuator on your mechanical system.

2.3.1 General Rules on Installation

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

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

Model	Horizontal installation	Vertical installation	Sideways installation	Ceiling mount installation
SA5C, SA6C, SA7C SA5R, SA6R, SA7R	○	○	△	△



Caution:

- When the unit is installed vertically oriented, attempt to put the motor up unless there is a special reason. Putting the motor on the lower side would not cause a problem in an ordinary operation. However, it may rarely cause a problem, when it is not operated for a long period, depending on the surrounding environment (especially high temperature), caused by the grease being separated and the base oil flowing into the motor unit.
- Can be installed sideways or ceiling mount, but the actuators must be checked daily. If the actuator is installed sideways or ceiling mount, the stainless sheet may be slacked or displaced. If the actuator is used continuously while the stainless sheet is slacked or displaced, the stainless sheet may break or other problems may occur. Check the actuator daily and if the stainless sheet is found slacked or displaced, make installation adjustment of the stainless sheet. [Refer to 4.7 Procedure for Stainless Steel Sheet Replacement and Adjustment.]

2.3.2 Installation of Main Unit

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

Also consider enough space necessary for maintenance work such as actuator replacement and inspection.

There are datum surfaces for attachment on the base.

The flatness of the slider movement is designed to be 0.05mm/m at maximum to the datum surface.

On the rear side of the actuator, there are tapped holes and through holes for attachment and reamed hole and oblong hole for positioning. See the appearance drawings for the details of the position and diameters. [Refer to 5. External Dimensions]

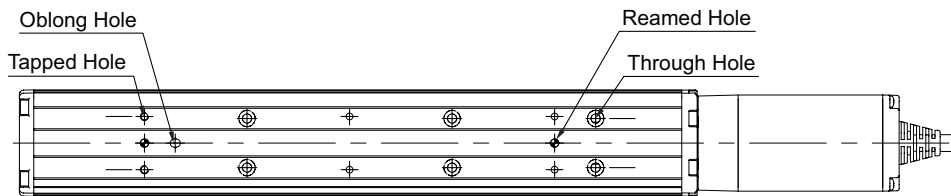
Utilize the reamed holes when repeatability in the attachment after detaching is required. However, when small tunings such as the perpendicularity is required, consider such things like to use one reamed hole.

[1] Using the Tapped Holes on the Bottom of the Base

This actuator has the tapped holes for mounting so it can be fixed from the bottom of the base.

(Note that tapped hole size depends on the model. Please see the diagrams below and 13,1 "External Dimensions.")

Also, there are reamed holes and a slotted hole for positioning pins.



Model Name	Tapped Hole Size	Tapped Holes Depth	Tightening Torque		Reamer Hole [mm]
			In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:	
SA5C SA5R	M4	7mm	3.59N·m (0.37kgf·m)	1.76N·m (0.18kgf·m)	φ4H7 Depth 5.5
SA6C SA6R	M5	9mm	7.27N·m (0.74kgf·m)	3.42N·m (0.35kgf·m)	φ4H7 Depth 5.5
SA7C SA7R	M5	9mm	7.27N·m (0.74kgf·m)	3.42N·m (0.35kgf·m)	φ4H7 Depth 5.5

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] Using the Through Holes on the Top of the Base

There are through holes equipped on the base so the unit can be attached from the top of the base.

Detach the side covers on the sides when installing.

(Remove 4 attachment screws (+) with a Philips screwdriver.)

Attempt not to drop the bolts, tools, etc. on the stainless steel sheet when tightening the bolts. Please avoid making a dent mark or scratches.

Apply the socket head cap screw indicated in the table below suitable for the platform material.

Model Name	Through Holes	Mounting Screw	Tightening Torque
SA5C SA5R	φ4.5 drilled hole, φ8 counter boring depth 4.5	M4	1.76N·m (0.18kgf·m)
SA6C SA6R	φ4.5 drilled hole, φ8 counter boring depth 4.5	M4	1.76N·m (0.18kgf·m)
SA7C SA7R	φ6 drilled hole, φ9.5 counter boring depth 5.5	M5	3.42N·m (0.35kgf·m)

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.
- For the effective engagement length between the bolt and female thread, provide at least the applicable value specified below:

Female thread is made of steel material → Same length as the nominal diameter

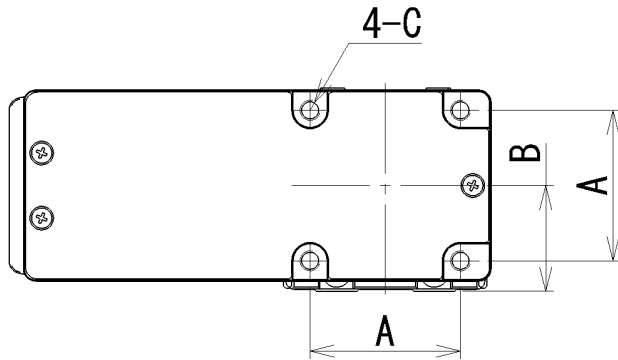
Female thread is made of aluminum → 1.8 times of nominal diameter



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

[3] When Utilizing Attachment Holes on the Bracket for Motor-Reversed Type

There are tapped holes prepared on the reversing bracket. (See the table below for the detailed dimensions.)



	A	B	C
SA5R	37	26	M5 Depth 15
SA6R	37	28	M5 Depth 15
SA7R	48	33	M6 Depth 14

Model Name	Attachment Holes	Attachment Hole Depth	Tightening Torque
SA5R	M5	15mm	3.42N·m (0.35kgf·m)
SA6R	M5	15mm	3.42N·m (0.35kgf·m)
SA7R	M6	14mm	5.36 N·m (0.55kgf·m)

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.
- Make sure to have the effective length of thread engagement at least approximately 1.8 times of the nominal diameter of bolts and screws.

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

[Caution for Installation]

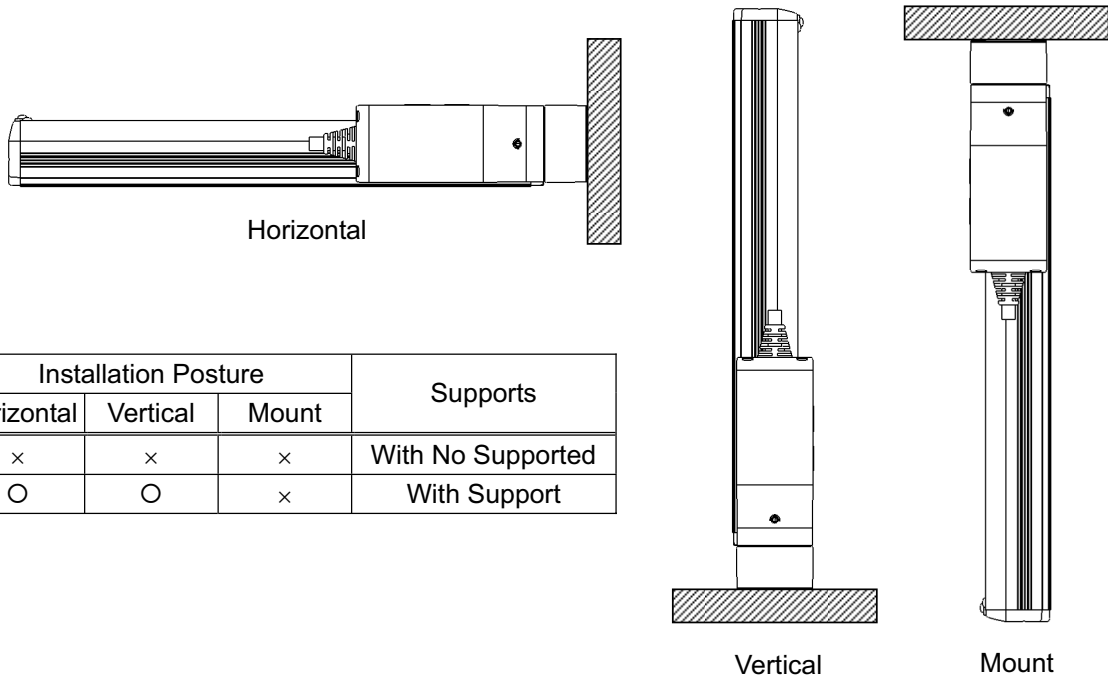
Please note the following caution notes when installing the unit with using the tapped holes on the reversing bracket.

Do not attempt to affix the unit only with the tapped holes on the reversing bracket.

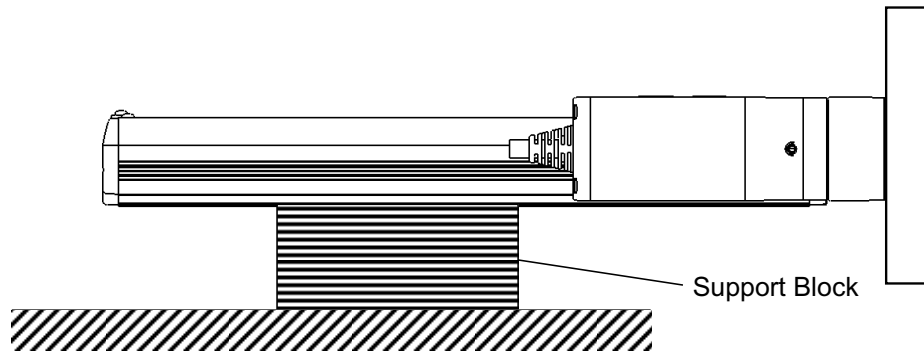
Do not apply external force to the main body.

There may be caused vibration due to the operating condition or installation environment, which may result in operational failures or components malfunction.

Availability of installation for each installation posture is as shown below:

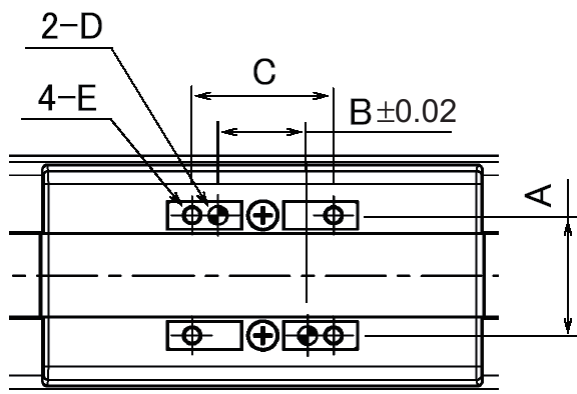


When using the unit in the horizontal or vertical orientation, have a pedestal to support the body to avoid external force being applied to the unit.



[4] Attachment of Transported Object

- There are tapped holes on the top surface of the slider. Affix the work part (transported object) here.
- The way to affix follows the installation of the main unit.
- There are two reamed holes on the top surface of the slider. Use these reamed holes if repeatability of attaching and detaching is required. Also, if small tuning such as perpendicularity is required, use one of the reamed holes for the tuning.
- Refer to the following table for the screwed depth and reamed depth. Screwing further than indicated in the table may destroy the tapped hole or lower the reinforcement of the attachment of the work part, result in the drop of the accuracy or an unexpected accident.



Reamed Hole Pitch Tolerance: ± 0.02

Model Name	A	B	C	D	E	Mounting screw	
						Mounting Screw	Tightening Torque
SA5C SA5R	26	19	30	$\phi 4H7$ depth 6	M4 depth 9	M4	1.76N·m (0.18kgf·m)
SA6C SA6R	31	32	50	$\phi 5H7$ depth 6.5	M5 depth 9	M5	3.42N·m (0.35kgf·m)
SA7C SA7R	39	32	50	$\phi 5H7$ depth 10	M5 depth 10	M5	3.42N·m (0.35kgf·m)

Tightening screws

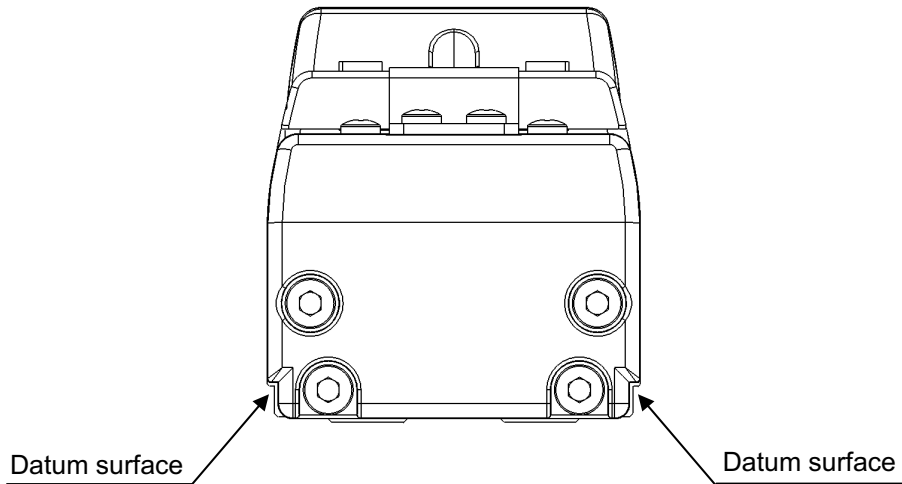
- Use hexagonal socket head bolts for the male threads for installing.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to have the effective length of thread engagement at least approximately 1.8 times of the nominal diameter of bolts and screws.



Caution: Pay attention when selecting the screw length. Selection of inappropriate length of screws may cause a breakage of tapped holes or insufficient strength of attachment for transportation.

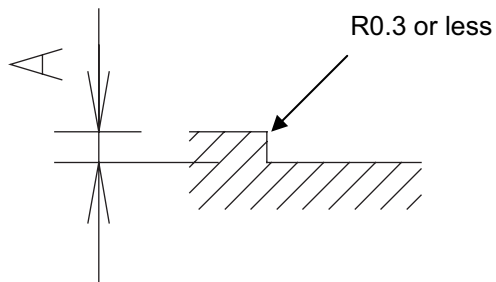
[5] Mounting Surface

- The platform to install the actuator should possess a structure that ensures enough stiffness, and should be free from vibration.
- The surface where the actuator will be mounted should be a machined surface or that with an accuracy equivalent to it, and the flatness should be 0.05mm/m or below.
- Ensure a room for maintenance work.
- The side and bottom surfaces of the base on the actuator work as the datum surfaces for the side of the slider.
- Use these surfaces as the datum surfaces for mounting.



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 these sides when precision is required.

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



Model Name	A Dimensions (mm)
SA5/6	2 to 4 or less
SA7	2 to 5 or less

2.4 Clean-Room Type

- Cleanroom type can have the performance to comply with Cleanroom Class 10 (0.1 μ m) by vacuuming the air at the two vacuum joints. The table below shows the reference of vacuuming capacity at the maximum speed for each model.

Have the pipe layout to make the vacuum performance at the two points get even.

- Have all the base attachment holes at the bottom of the unit closed when using the unit. If there is a through hole on the body, it can drop the cleanliness.

2.4.1 Reference for Vacuuming Capacity

Model	Lead	Vacuumping Capacity
	[mm]	NI/min (L/min)
RCP4CR-SA5C	3	15 (16)
	6	30 (32)
	12	50 (54)
	20	80 (86)
RCP4CR-SA6C	3	15 (16)
	6	30 (32)
	12	50 (54)
	20	80 (86)
RCP4CR-SA7C	4	30 (32)
	8	40 (43)
	16	70 (75)
	24	90 (97)

2.4.2 Vacuum Joint

A quick joint structure is applied to the vacuum joint so an air tube available in the market can be easily joined.

Model	Air Tube Outer Diameter
RCP4CR-SA5C	ϕ 6
RCP4CR-SA6C	
RCP4CR-SA7C	ϕ 8

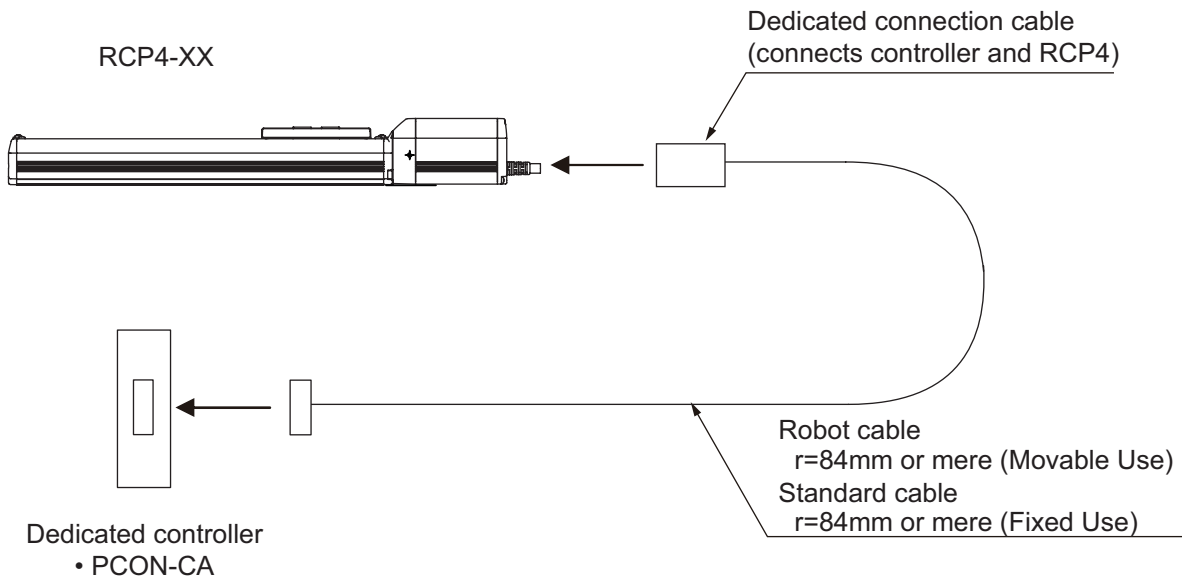
3. Connecting with Controller

As the connection cable for the controller and RCP4 (this actuator), use the IAI-dedicated controller and dedicated connection cable.

This section explains the wiring method for a single axis.

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

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



Dedicated connection cable

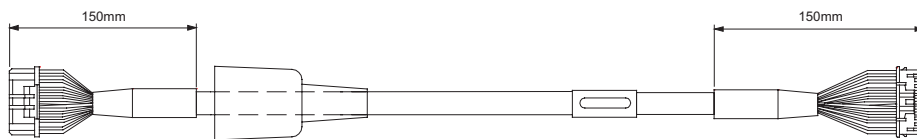
- Motor-encoder cable: CB-CA-MPA□□□
- Motor-encoder cable robot cable: CB-CA-MPA□□□-RB

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

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

- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or re-joint it.
- Hold the dedicated cable to avoid mechanical force being applied to the terminals and connectors.
- Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
- In case a dedicated cable is to be used at a moving part, make sure to lay out the cable without applying any force to pull the connector or extreme bend on the cable. Do not attempt to use the cable with a bending radius below the allowable value.
- Make certain that the connectors are plugged properly. Insufficient connection may cause an operation error, thus it is extremely risky.
- Do not lay out the cables to where the machine runs over them.
- Pay attention to the cable layout so it would not hit peripherals during an operation. In case it does, have an appropriate protection such as a cable track.
- When a cable is used hanging on the ceiling, prevent an environment that the cable swings with acceleration or wind velocity.
- Make sure there is not too much friction inside the cable storage equipment.
- Do not apply radiated heat to power line or cables.
- Do not bend the cable in the area from the connector tip inward to 150mm on both ends.

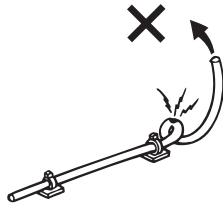
CB-CA-MPA□□□, CB-CA-MPA□□□-RB



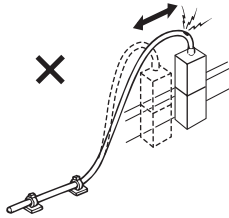
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



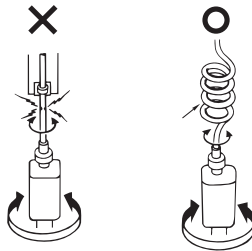
- Do not let the cable bend, kink or twist.



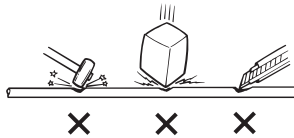
- Do not pull the cable with a strong force.



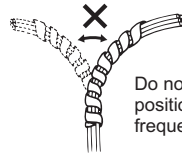
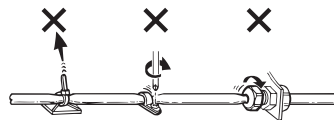
- Pay attention not to concentrate the twisting force to one point on a cable.



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

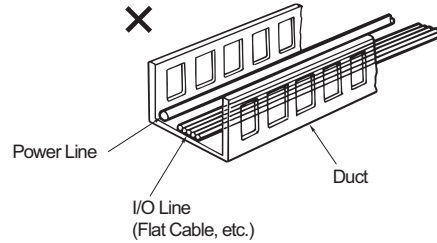


- When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.

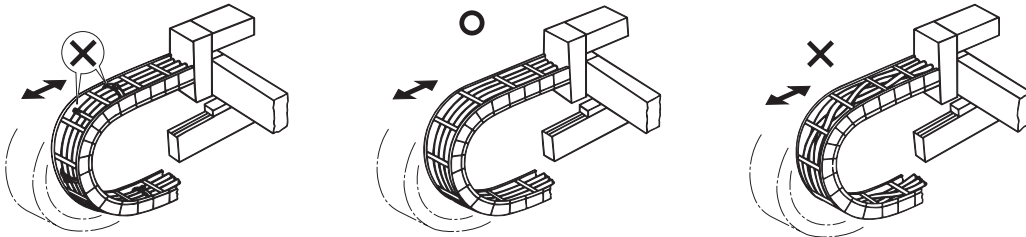


Do not use spiral tube in any position where cables are bent frequently.

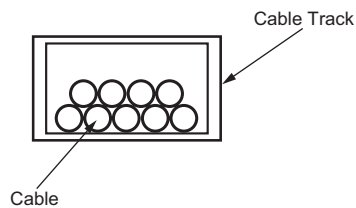
- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



- If using a cable track, arrange the wiring so that there is no entanglement or kink of the cables in the cable carrier or flexible tube, and do not bind the cables so that the cables are relatively free. (Arrange the wiring so the cables are not to be pulled when bent.)



- The occupied volume rate for the cables, etc., inside the cable track should be 60% or less.



4. Maintenance Inspection

4.1 Inspection Items and Schedule

Follow the maintenance inspection schedule below.

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

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

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

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

4.2 External Visual Inspection

An external visual inspection should check the following things.

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

- 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.

4.3 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.

4.4 Internal Inspections

Turn OFF the power, remove the side cover and have a visual inspection. When inspecting the interior, check the following items.

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

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.

- 1) Loosen the screws on the side cover and detach the side cover.
- 2) Check inside.
- 3) After finishing the inspection, assemble back in the reverse order. When attaching the side cover, push up the stainless steel sheet firmly so excess force would not be applied to the stainless steel sheet.



Caution: 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.

Change in the attached condition may cause the sheet to be mounted unevenly or impact the product life. In such cases, please contact IAI Sales Engineer Department.

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

4.5 Internal Cleaning

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

4.6 Grease Supply

4.6.1 What Grease to Use on the Standard Type


[1] What Grease to Use on the Guides

IAI uses the following grease in our plant.

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

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


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

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

[2] What Grease to Use on the Ball Screw

IAI uses the following grease in our plant.

Ball Screw	Kyodo Yushi	Multitemp LRL 3
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 **Warning:** Never use anything other than synthetic poly-olefin grease. Mixing poly-grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

4.6.2 What Grease to Use on the Clean Room Type

On the guide and ball screws, the urea based grease that has great low particle-emission, stable torque characteristics, brilliant lubrication and anti-dust effect equivalent to the lithium based grease is applied. The grease described below is applied when the product is shipped out from our factory.

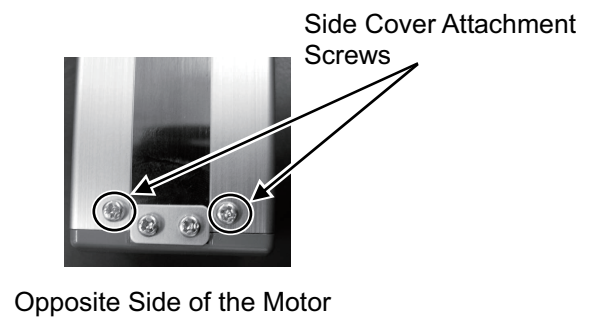
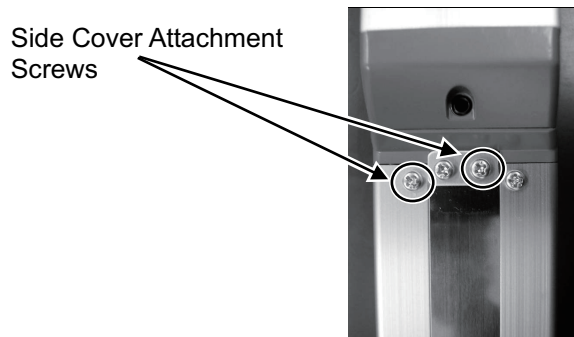
The following grease is applied when the product is shipped out from IAI factory.

Guide, Ball Screw	Kuroda Precision Industries	C Grease
-------------------	-----------------------------	----------

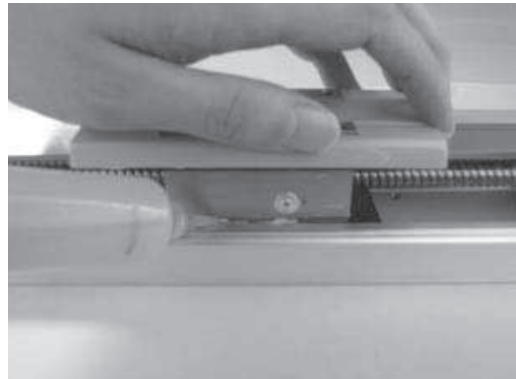
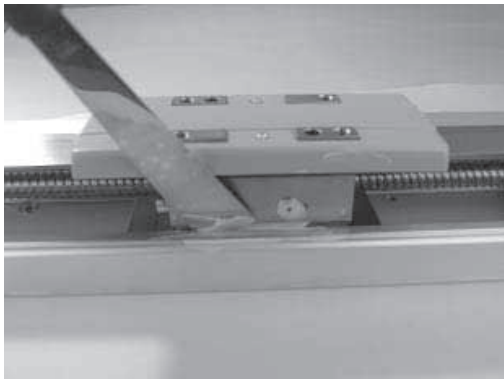
 **Warning:** Never use anything other than synthetic poly-olefin grease. Mixing poly-grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

4.6.3 How to apply grease

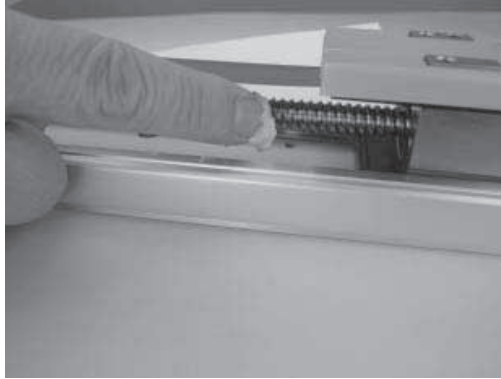
(1) Remove the screws and detach the side covers on both sides.



(2) On the guide part, insert a spatula between the slider and the base or apply grease with a grease injector while moving the slider back and forth. Apply grease on both sides. Wipe off the excess grease at the end.



- (3) To grease ball screws, first clean, then put some grease on your finger and apply while moving the slider back and forth.
In this process, pay attention to the stainless steel sheet so that you would not touch and make it deformed.
When finished, wipe off excess grease.



- (4) Attach the side covers after grease supply is finished.
If you touch the edge of the stainless sheet in the attaching process, the sheet may get damaged or wavy which result in shortening life or earlier wear-out.
To avoid touching the edge of the sheet, insert a spacer (approximately 0.1 to 0.2mm) between the sheet and cover to push up the sheet, and then push in the cover.



- Caution:**
- Do not damage the stainless steel sheet by bending it forcefully during the check inside. Also you may get hurt on the edge of the stainless steel sheet. Wear gloves when you work on it.
The front cover is supporting the ball screw. Do not detach it.
If the front cover loses its tuned condition, it may cause an increase of slider resistance, shorten production life and abnormal noise due to the center of the axis being off the right position.
 - In case the grease got into your eye, immediately go see the doctor to get appropriate care. After finishing the gease supply work, wash your hands carefully with water and soap to rinse the grease off.

4.7 Procedure for Stainless Steel Sheet Replacement and Adjustment

In this section, explains how to replace and adjust the stainless steel sheet.

The screws and other components detached for the replacement will be necessary when rebuild the product. Prepare a storage box beforehand to keep the components in it.

4.7.1 Preparation

(1) Items required for replacing the stainless sheet

- Replacement stainless sheet
- Hex wrench
- Scale

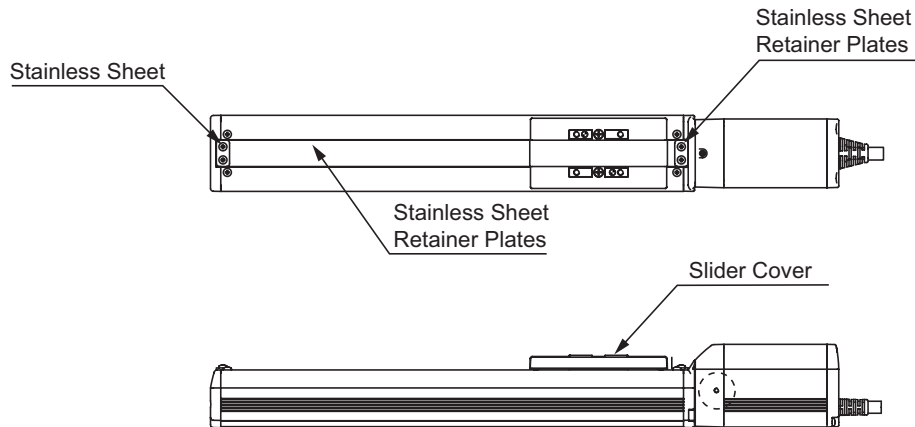
(2) Caution for the stainless steel sheet tension

Degradation and wear-out of the stainless steel sheet relies on its tension of attachment.

If the stainless steel sheet is pulled with a huge force and the gap between the sheet and the slider cover is large, there is a risk of metal fatigue.

On the other hand, if the tensile strength is too low, the stainless steel sheet would interfere with the back side of the slider cover and make dust to be generated. Therefore it is necessary to have the dedicated tuning tool to adjust the tension of the stainless steel sheet to have the appropriate gap between the stainless steel sheet and slider cover.

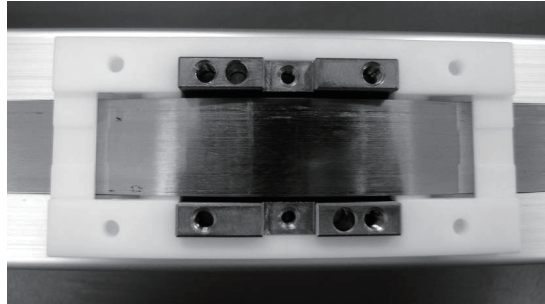
(3) Names of the Parts



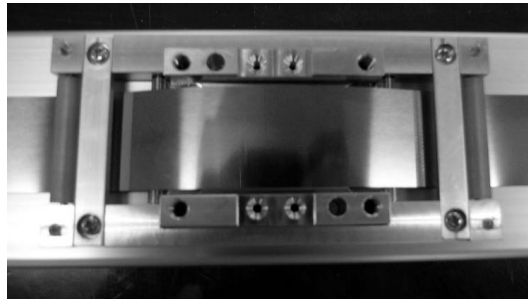
4.7.2 Procedure for Replacement and Tuning

- (1) Move the slider to the middle of the actuator
- (2) Remove the screws affixing the slider cover.
For SA5C and SA5R there is a plate spring. Remove the spring.

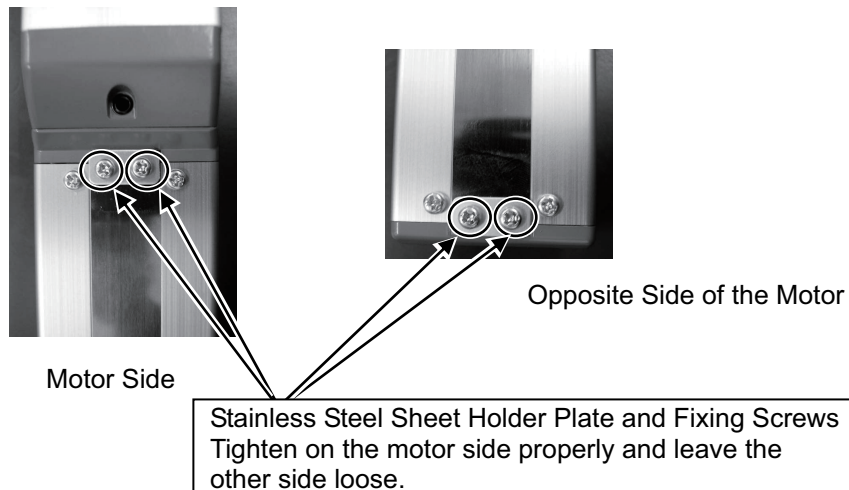
Standard Type (RCP4-SA5C, SA6C, SA7C, SA5R, SA6R, SA7R)
Condition with Slider Covers Detached (the condition that the plate spring is also removed for SA5C and SA5R)



Clean Room Type (RCP4CR-SA5C, SA6C, SA7C)
Condition with Slider Covers Detached

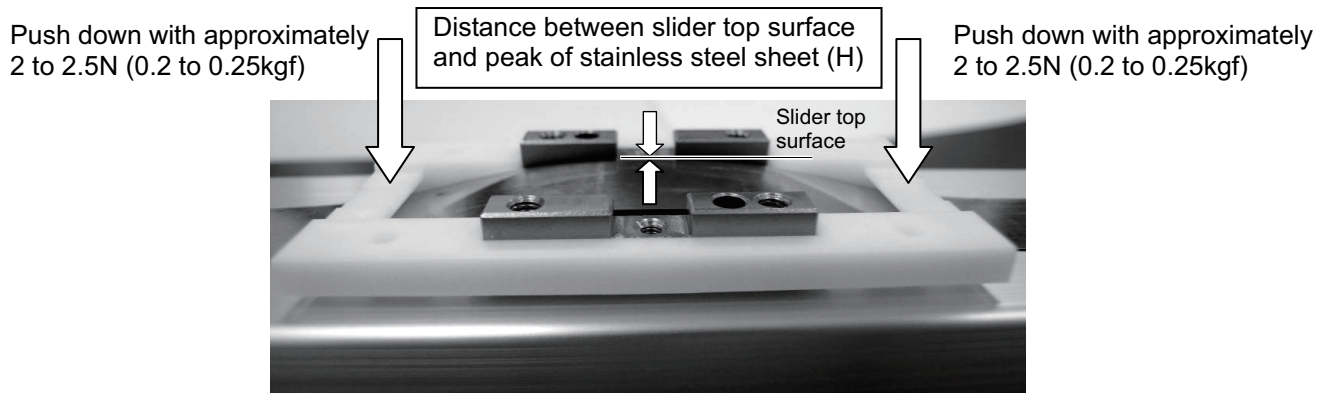


- (3) With a screw driver, remove the 2 screws on each side and detach the holder plate and old stainless steel sheet.
- (4) Hold the new stainless steel sheet with the holder plate and the screws.
At this time, tighten the screws on the motor side properly and leave the other side loose.



(5) Adjust the stainless steel sheet tension.

- 1) Adjust the tension of stainless steel sheet by moving back and forth. For Clean Type, make the roller pressed down to touch the side covers. It is not necessary for Standard Type since there is no roller.
- 2) Tune the tension of the sheet so the distance between the peak of the sheet and the top surface of the slider become as shown in the figure below and temporarily tighten the screws on the opposite side of the motor to hold the stainless steel sheet.



Distance between Peak of Stainless Steel Sheet and Slider Top Surface

	Type	H [mm]
Standard Type	RCP4-SA5C, SA6C	0.5 to 1.0
	RCP4-SA5R, SA6R	
	RCP4-SA7C, SA7R	1.0 to 2.0
Clean Room Type	RCP4CR-SA5C, SA6C	0.5 to 1.0
	RCP4CR-SA7C	2.0 to 3.0

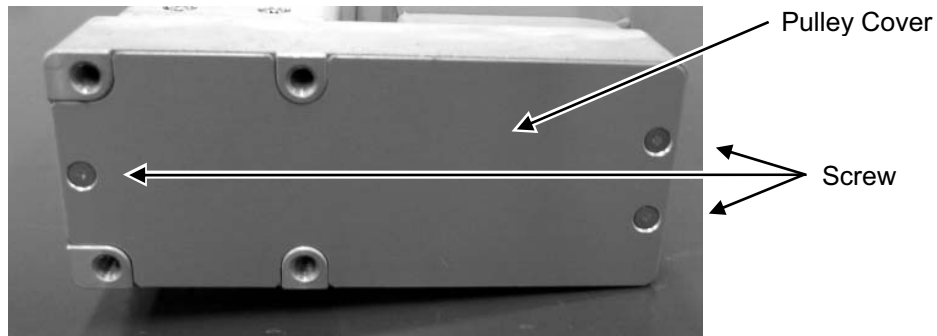
- (6) Slide the slider in the whole range of the stroke for several times to ensure there is no touch of the slider to the stainless steel sheet, and check the tension at the same time.
- For those such as low lead type or brake-equipped type that cannot be moved with hand, turn on the power supply to the controller and move the slider in approximately 20mm/s using either the teaching pendant or PC software.

4.8 Procedure for Belt Replacement and Tuning

Applicable Units : RCP4-SA5R, SA6R, SA7R

4.8.1 Inspection of the Belt

For inspection work, detach the pulley cover with 1.5mm-sized hex wrench and carry it out by visual.



The replacement period cannot be determined in general because the durability of the deceleration belt can be greatly influenced by the conditions of operation.

It generally has life of hundreds of times for bending movement.

The timing belt requires replacement regularly under the following conditions as a reference since degradation such as abrasion proceeds as the time passes for usage.

- When remarkable abrasion is confirmed on the teeth or edges of the belt
- When the belt is swelled for such reasons as oil being attached on
- When damage is confirmed such as crack on the tooth or back of the belt

Also, since it is difficult to confirm the degradation of the core wires to retain the strength of the toothed belt by visual or looseness caused by being elongated, it is recommended to set regular replacement periods in advance in case the product is used under such conditions that gives the core wires great fatigue due to high acceleration and deceleration speed.

4.8.2 Belts to be used

The following belt is applied when the product is shipped out from IAI factory.

SA5R/SA6R	• 60S2M196GB	Rubber	Bare back type (Mitsuboshi Belting Ltd.)
SA7R	• 100S3M237GB	Rubber	Bare back type (Mitsuboshi Belting Ltd.)

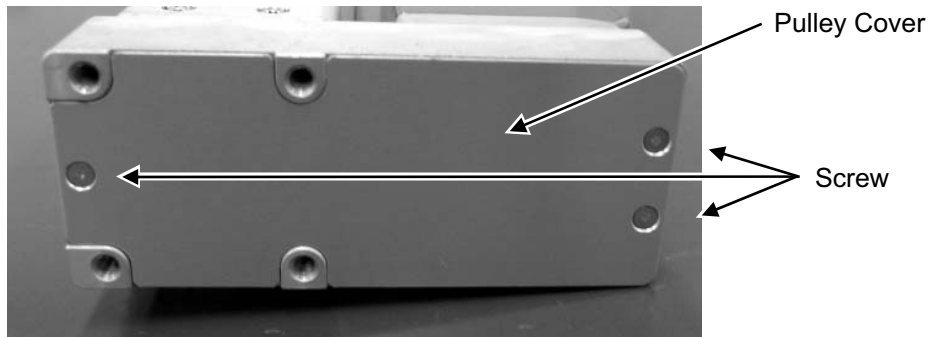
4.8.3 Replacement of the Belt

[Items Required for Replacemet Work]

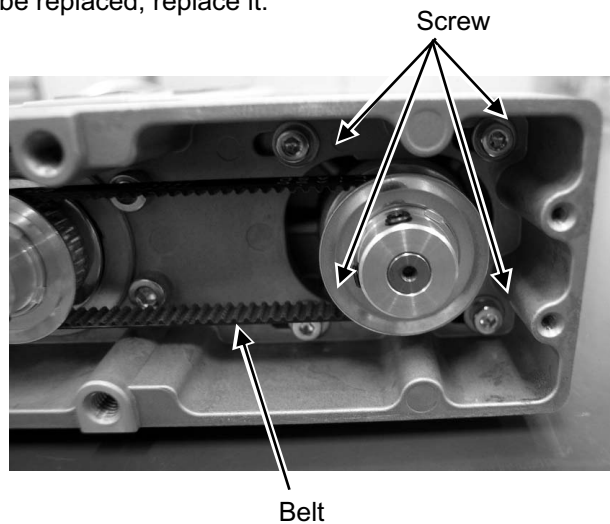
- Belt for Replacement
- Hex wrench
1.5mm, 2.5mm (SA5R/SA6R) or 3mm (SA7R) - sized
- Tension gauge (that is available for pulling with 80N)
- Long cable band (thin string)

[Procedures]

- 1) Remove the three screws holding the pulley cover with a 1.5mm-sized hex wrench to detach the pulley cover.



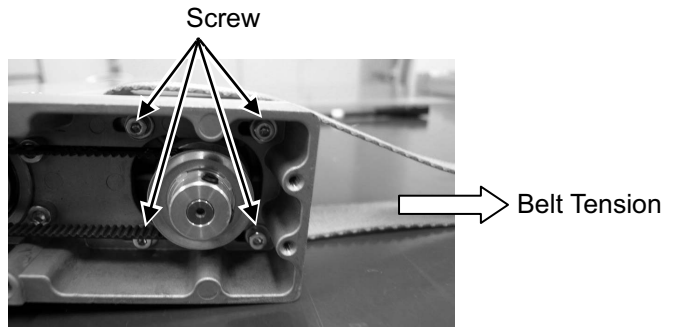
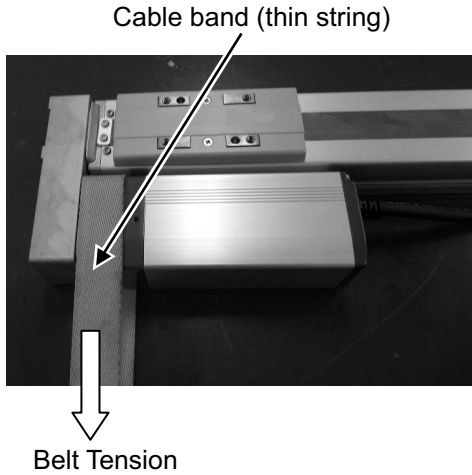
- 2) Loosen the four screws holding the pulley on the motor side with a 2.5mm-sized (SA5R/SA6R) or 3mm-sized (SA7R) hex wrench.
If the belt is required to be replaced, replace it.



3) Adjust the belt tension.

Hand a cable band (thin string) on the edge of the motor unit and pull it on a tension gauge with the specified load (specified value of the belt tension).

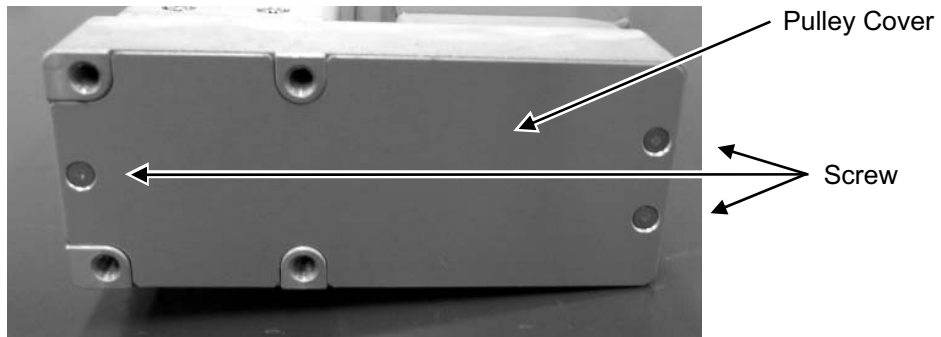
When the load reached the specified, tighten the screws with a 2.5mm-sized (SA5R/SA6R) or 3mm-sized (SA7R) hex wrench to hold the unit in the place.



Belt Tension	
SA5R, SA6R	25 to 30N
SA7R	80 to 90N

SA5R, SA6R	Tightening Torque : 152 N • cm
SA7R	Tightening Torque : 323 N • cm

4) Tighten the three screws to hold the pulley cover with a 1.5mm-sized hex wrench to attach the pulley cover.



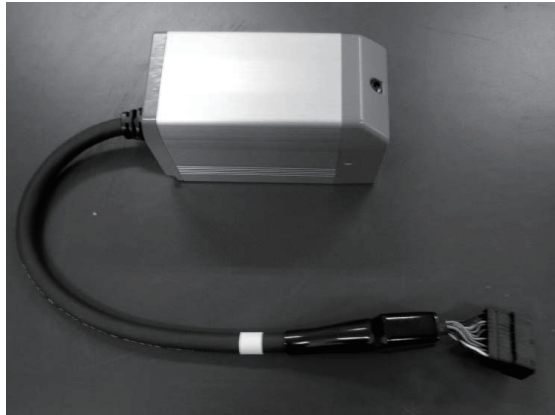
Tightening Torque : 25.4 N • cm

4.9 Motor Replacement Process

4.9.1 RCP4-SA5C, SA6C, SA7C, RCP4CR-SA5C, SA6C, SA7C

[Items required for replacing the motor]

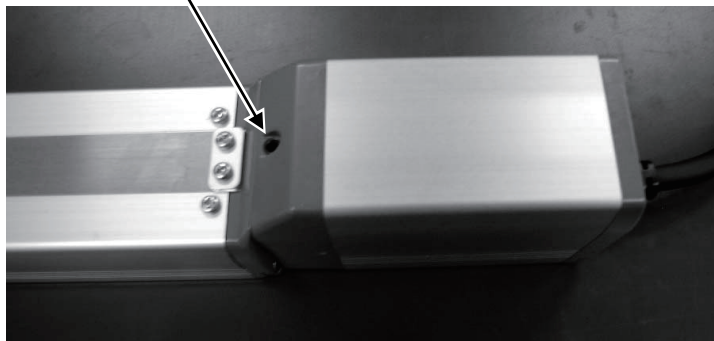
- Motor Unit for Replacement
- Hex wrench set
3mm-sized



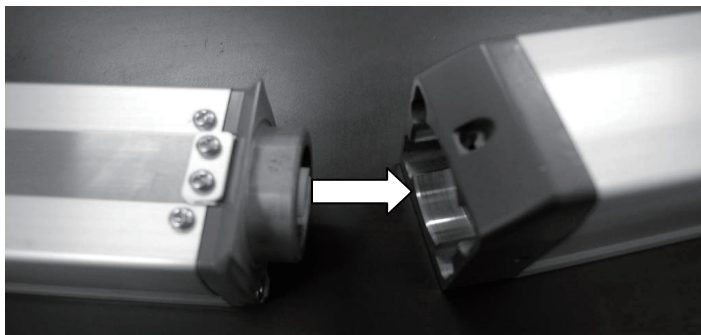
[Procedure]

- 1) Remove the screw affixing the actuator and the motor unit with a 3mm hex wrench.

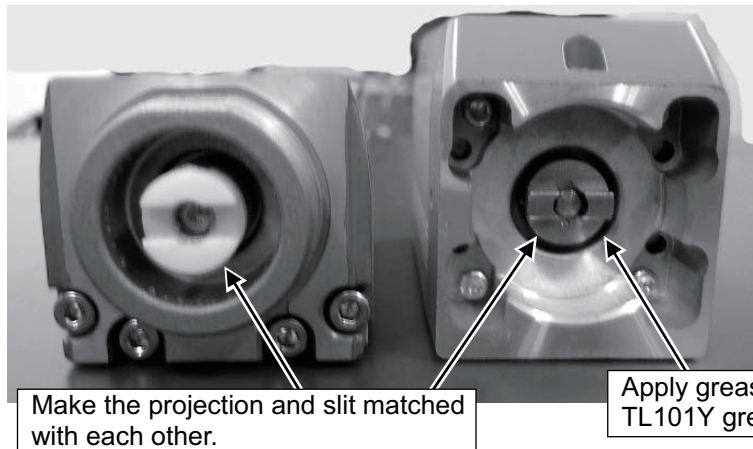
For Fixed screws actuator and Motor Unit



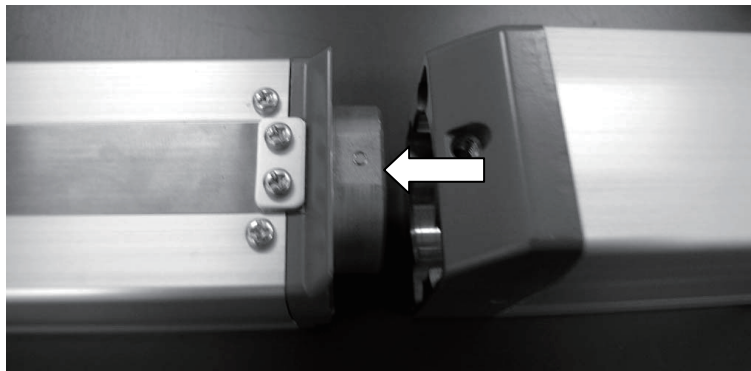
- 2) Detach the motor unit.



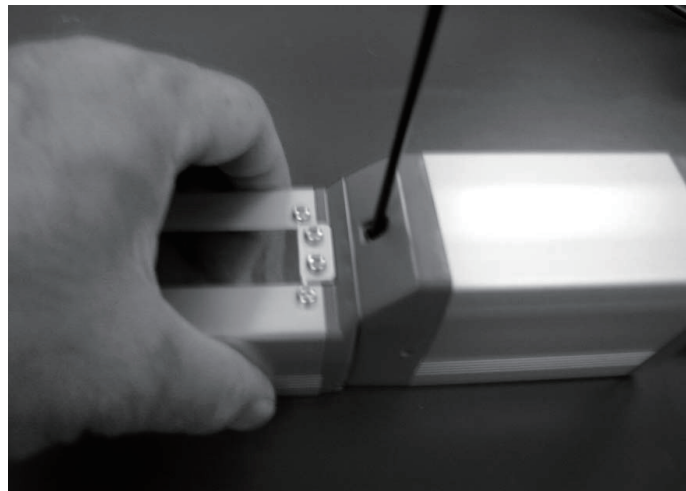
3) Make the profiles on the actuator side and motor unit side aligned so the projection matches to the slit.



4) Attach the motor unit for replacement with the projection being matched with the slit.



5) Tighten the screw to affix the motor unit to the actuator with 3mm hex wrench.



Tightening Torque : 350 N • cm

4.9.2 RCP4-SA5R, SA6R, SA7R

[Items Required for Replacement Work]

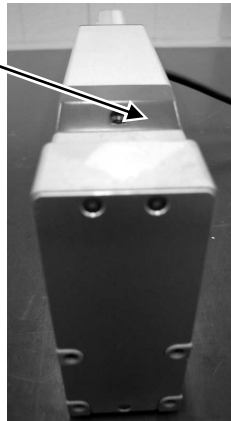
- Motor Unit for Replacement
- Hex Wrench Set
3mm-sized



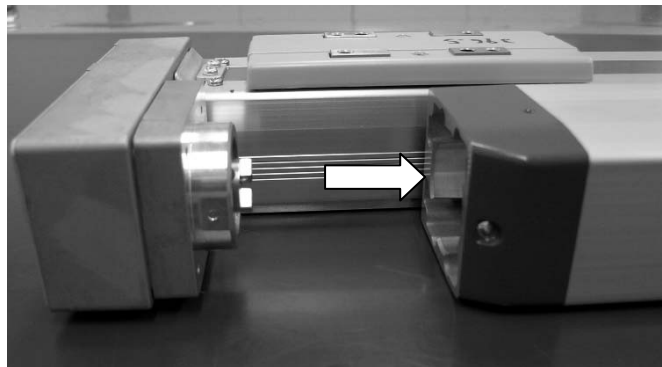
[Procedure]

- 1) Remove the screw affixing the actuator and the motor unit with a 3mm hex wrench.

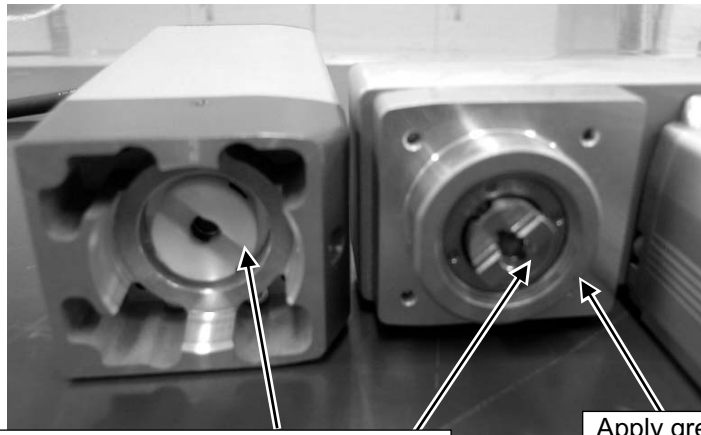
Fixing screw for actuator and motor unit



- 2) Detach the motor unit.



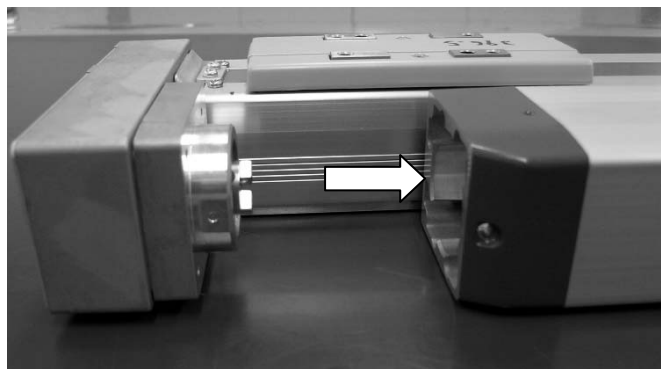
3) Make the profiles on the actuator side and motor unit side aligned so the projection matches to the slit.



Make the projection and slit matched with each other.

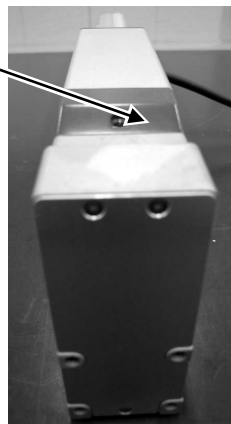
Apply grease to the coupling part.
TL101Y grease made by NOK

4) Attach the motor unit for replacement with the projection being matched with the slit.



5) Tighten the screw to affix the motor unit to the actuator with 3mm hex wrench.

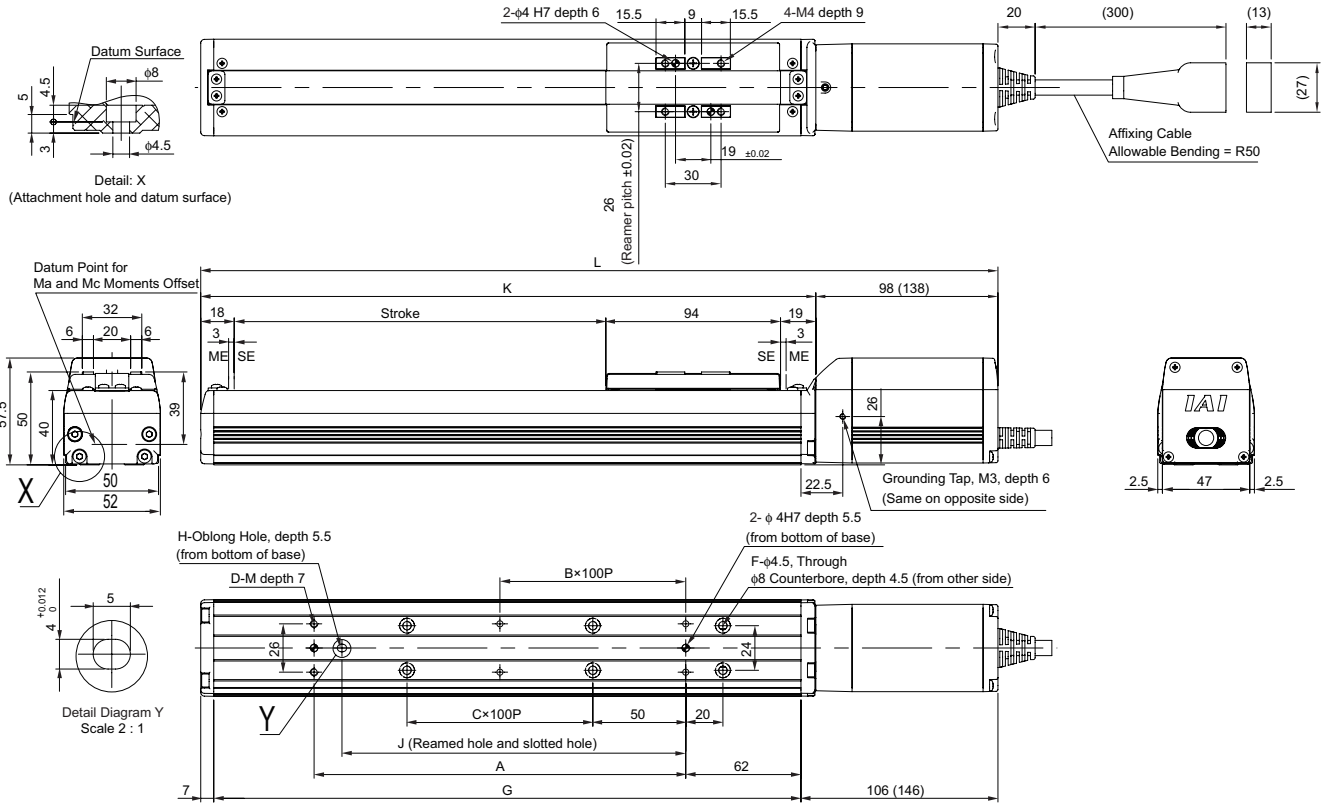
Fixing screw for actuator and motor unit



Tightening Torque : 350 N • cm

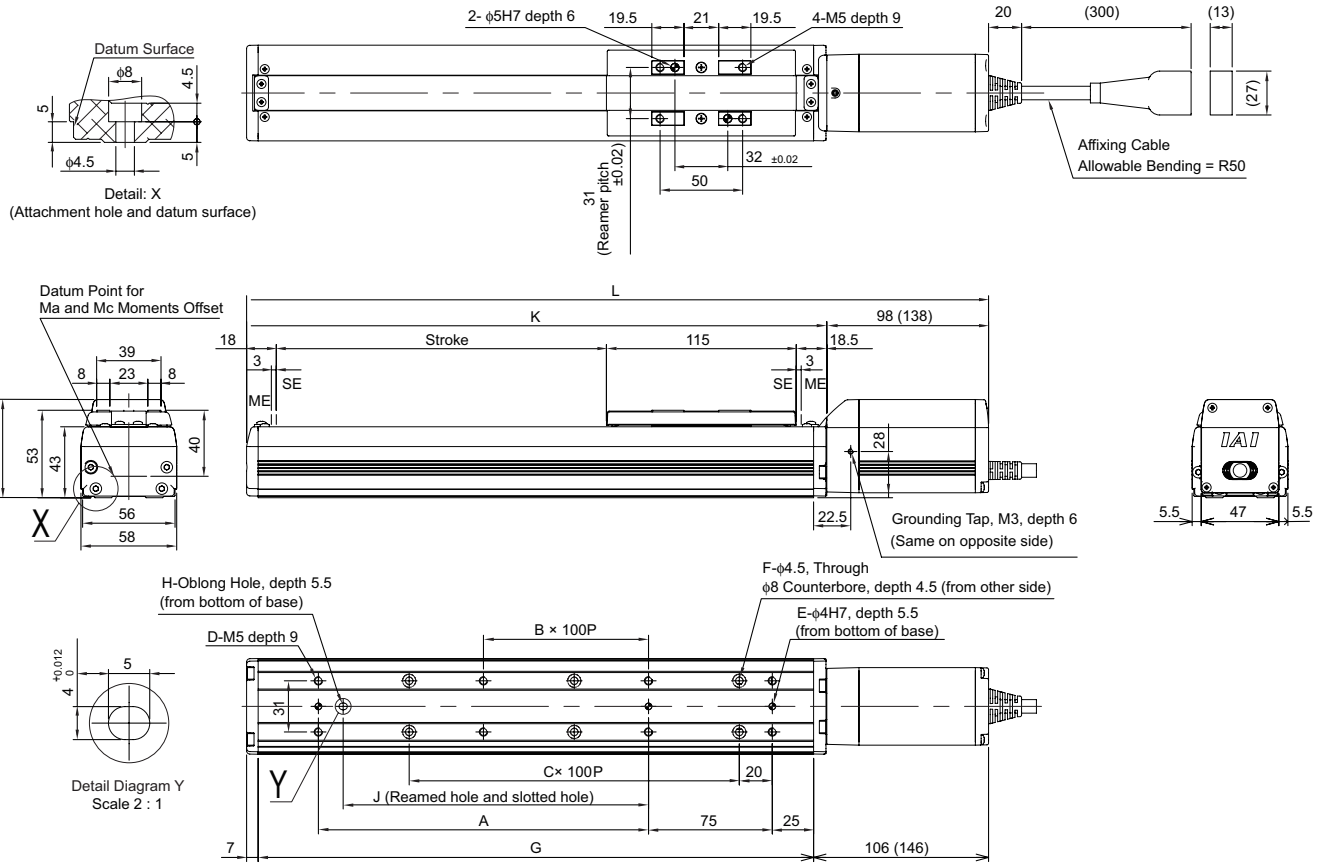
5. External Dimensions

5.1 RCP4-SA5C



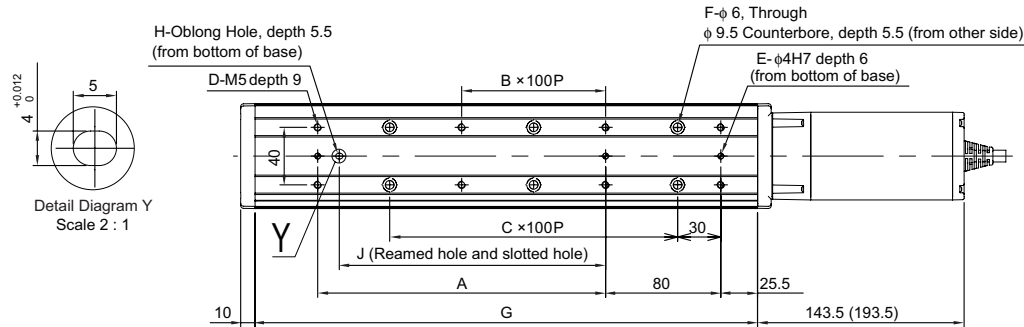
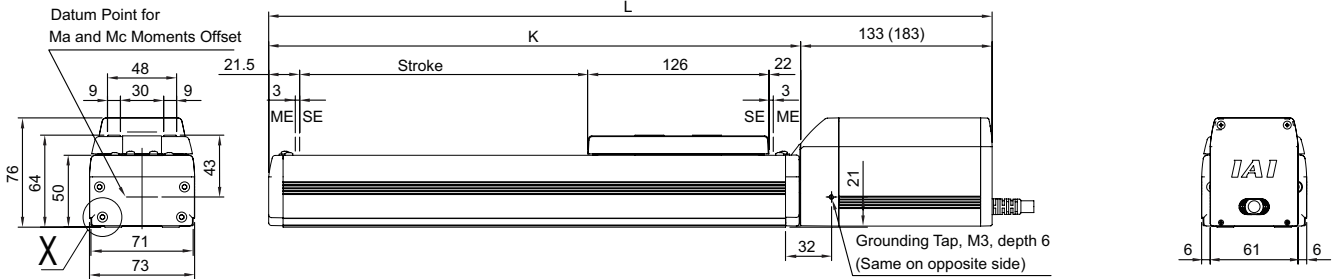
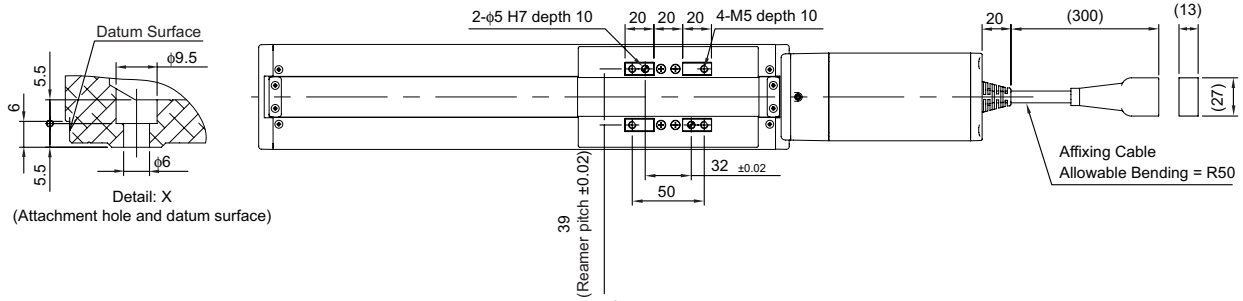
Stroke	L		A	B	C	D	F	G	H	J	K	Mass [kg]	
	w/o Brake	With Brake										w/o Brake	With Brake
50	279	319	73	0	0	4	4	166	0	0	181	1.5	1.7
100	329	359	100	0	0	4	4	216	1	85	231	1.6	1.9
150	379	419	100	0	1	4	6	266	1	85	281	1.8	2.0
200	429	469	200	1	1	5	6	316	1	185	331	1.9	2.1
250	479	519	200	1	2	6	8	366	1	185	381	2.1	2.3
300	529	569	300	2	2	8	8	416	1	285	431	2.2	2.4
350	579	619	300	2	3	8	10	466	1	285	481	2.4	2.6
400	629	669	400	3	3	10	10	516	1	385	531	2.5	2.7
450	679	719	400	3	4	10	12	566	1	385	581	2.6	2.9
500	729	769	500	4	4	12	12	616	1	485	631	2.8	3.0
550	779	819	500	4	5	12	14	666	1	485	681	2.9	3.2
600	829	869	600	5	5	14	14	716	1	585	731	3.1	3.3
650	879	919	600	5	6	14	16	766	1	585	781	3.2	3.5
700	929	969	700	6	6	16	16	816	1	685	831	3.4	3.5
750	979	1019	700	6	7	16	18	866	1	685	881	3.5	3.7
800	1029	1069	800	7	7	18	18	916	1	785	931	3.7	3.9

5.2 RCP4-SA6C



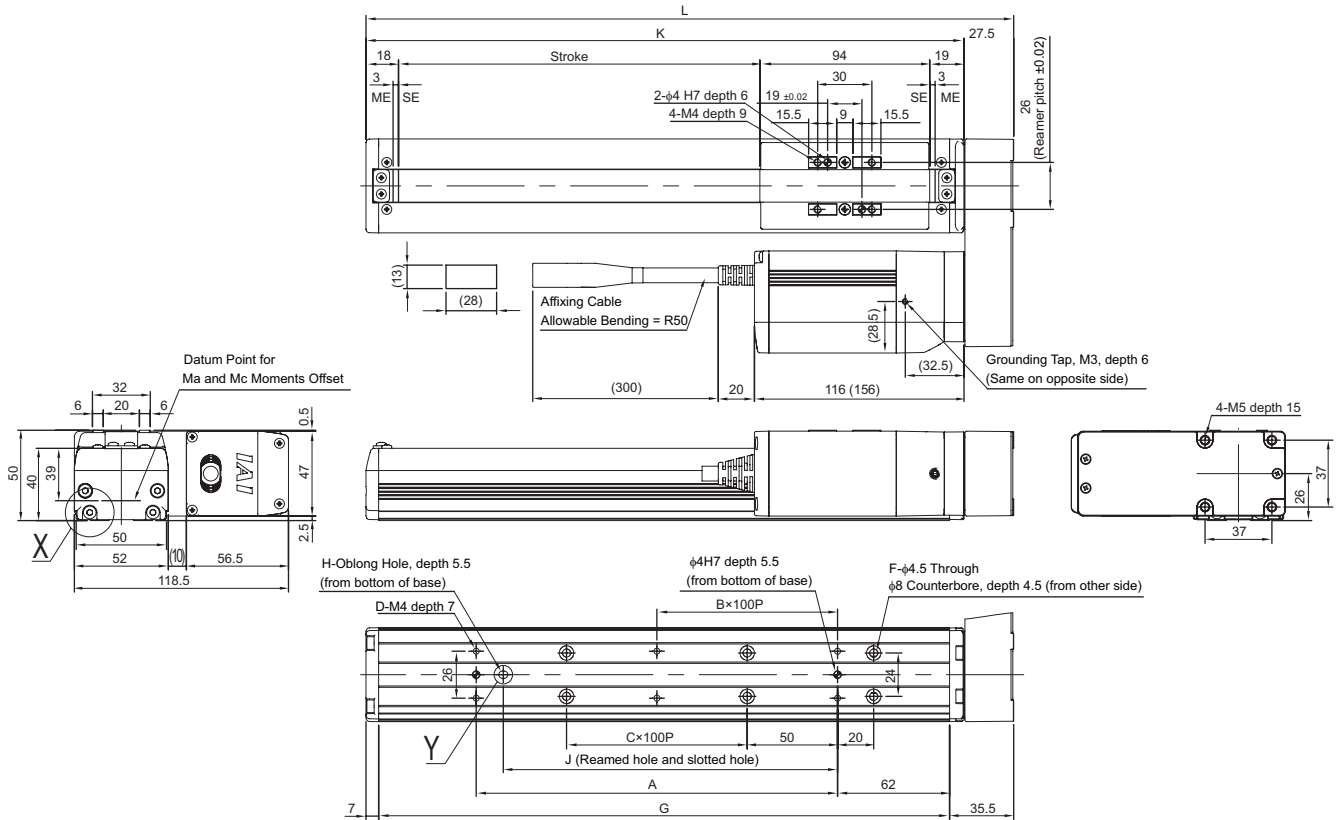
Stroke	L		A	B	C	D	E	F	G	H	J	K	Mass [kg]	
	w/o Brake	With Brake											w/o Brake	With Brake
50	299.5	339.5	0	0	1	4	2	4	186.5	0	0	201.5	2.0	2.2
100	349.5	389.5	100	0	1	6	3	4	236.5	1	85	251.5	2.1	2.3
150	399.5	439.5	100	0	2	6	3	6	286.5	1	85	301.5	2.3	2.5
200	449.5	489.5	200	1	2	8	3	6	336.5	1	185	351.5	2.4	2.6
250	499.5	539.5	200	1	3	8	3	8	386.5	1	185	401.5	2.6	2.8
300	549.5	589.5	300	2	3	10	3	8	436.5	1	285	451.5	2.7	3.0
350	599.5	639.5	300	2	4	10	3	10	486.5	1	285	501.5	2.9	3.1
400	649.5	689.5	400	3	4	12	3	10	536.5	1	385	551.5	3.0	3.3
450	699.5	739.5	400	3	5	12	3	12	586.5	1	385	601.5	3.2	3.4
500	749.5	789.5	500	4	5	14	3	12	636.5	1	485	651.5	3.4	3.6
550	799.5	839.5	500	4	6	14	3	14	686.5	1	485	701.5	3.5	3.7
600	849.5	889.5	600	5	6	16	3	14	736.5	1	585	751.5	3.7	3.9
650	899.5	939.5	600	5	7	16	3	16	786.5	1	585	801.5	3.8	4.1
700	949.5	989.5	700	6	7	18	3	16	836.5	1	685	851.5	4.0	4.2
750	999.5	1039.5	700	6	8	18	3	18	886.5	1	685	901.5	4.1	4.4
800	1049.5	1089.5	800	7	8	20	3	18	936.5	1	785	951.5	4.3	4.5

5.3 RCP4-SA7C



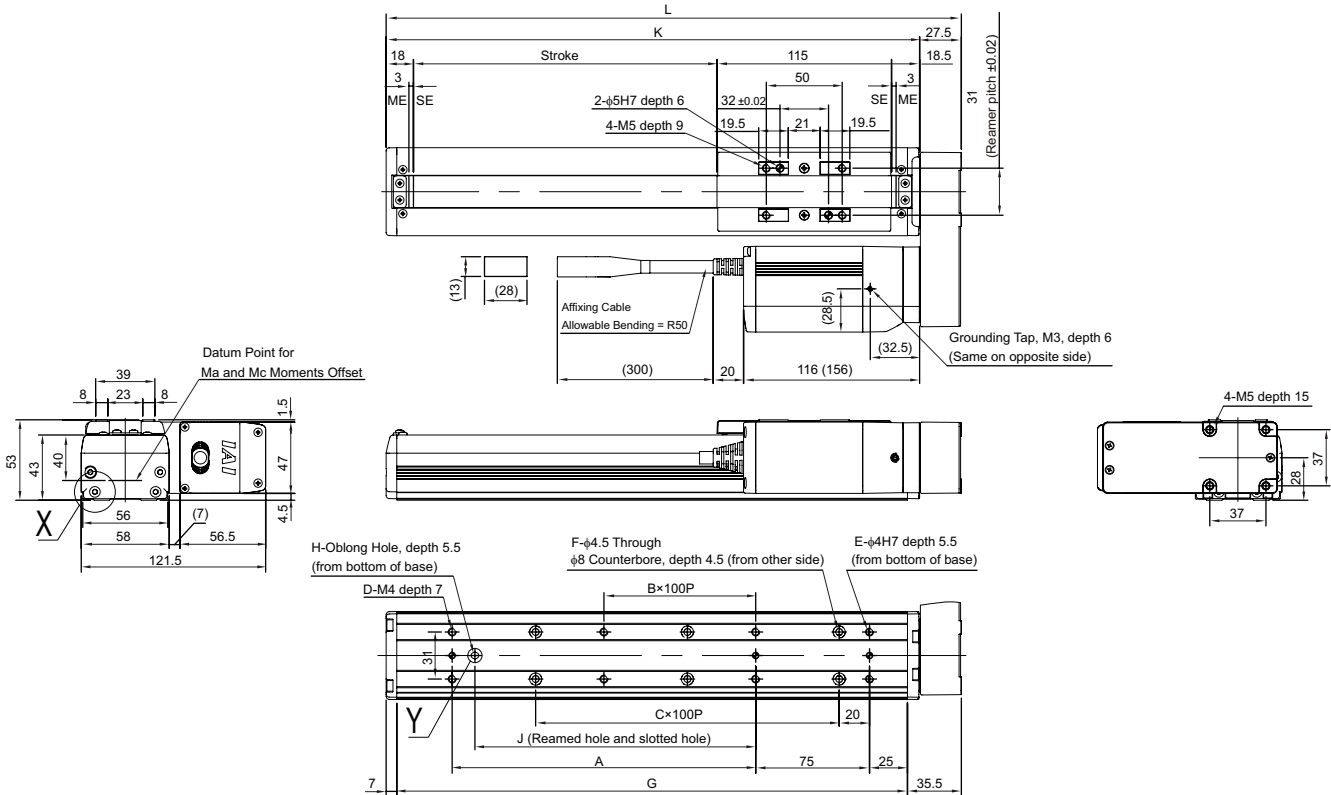
Stroke	L		A	B	C	D	E	F	G	H	J	K	Mass [kg]	
	w/o Brake	With Brake											w/o Brake	With Brake
50	352.5	402.5	0	0	1	4	2	4	199	0	0	219.5	3.4	3.9
100	402.5	452.5	100	0	1	6	3	4	249	1	85	269.5	3.6	4.1
150	452.5	502.5	100	0	2	6	3	6	299	1	85	319.5	3.8	4.3
200	502.5	552.5	200	1	2	8	3	6	349	1	185	369.5	4.1	4.6
250	552.5	602.5	200	1	3	8	3	8	399	1	185	419.5	4.3	4.8
300	602.5	652.5	300	2	3	10	3	8	449	1	285	469.5	4.6	5.1
350	652.5	702.5	300	2	4	10	3	10	499	1	285	519.5	4.8	5.3
400	702.5	752.5	400	3	4	12	3	10	549	1	385	569.5	5.1	5.6
450	752.5	802.5	400	3	5	12	3	12	599	1	385	619.5	5.3	5.8
500	802.5	852.5	500	4	5	14	3	12	649	1	485	669.5	5.6	6.1
550	852.5	902.5	500	4	6	14	3	14	699	1	485	719.5	5.8	6.3
600	902.5	952.5	600	5	6	16	3	14	749	1	585	769.5	6.1	6.5
650	952.5	1002.5	600	5	7	16	3	16	799	1	585	819.5	6.3	6.8
700	1002.5	1052.5	700	6	7	18	3	16	849	1	685	869.5	6.5	7.0
750	1052.5	1102.5	700	6	8	18	3	18	899	1	685	919.5	6.8	7.3
800	1102.5	1152.5	800	7	8	20	3	18	949	1	785	969.5	7.0	7.5

5.4 RCP4-SA5R



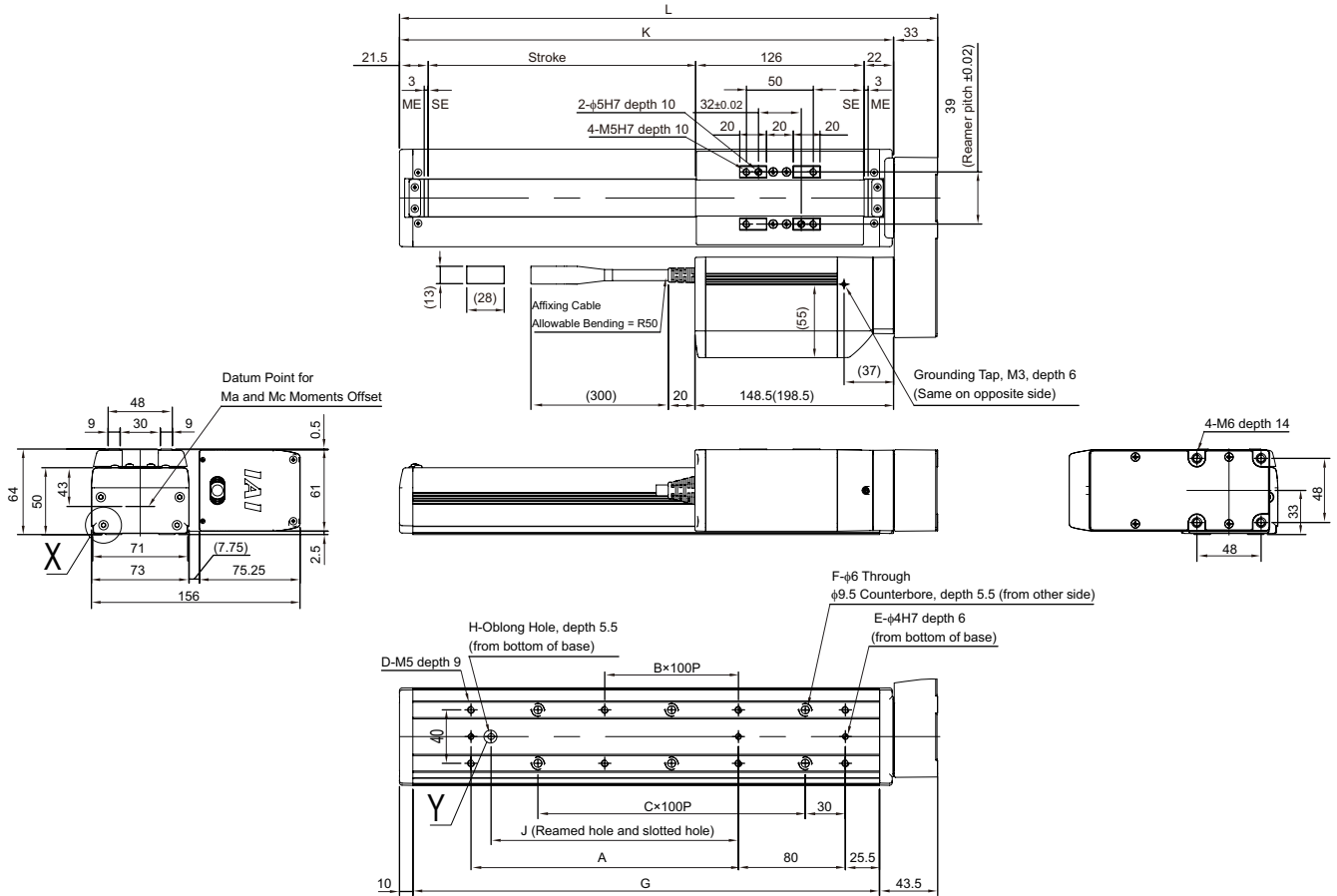
Stroke	L	A	B	C	D	F	G	H	J	K	Mass [kg]	
											w/o Brake	With Brake
50	208.5	73	0	0	4	4	166	0	0	181	1.5	1.7
100	258.5	100	0	0	4	4	216	1	85	231	1.6	1.9
150	308.5	100	0	1	4	6	266	1	85	281	1.8	2.0
200	358.5	200	1	1	6	6	316	1	185	331	1.9	2.1
250	408.5	200	1	2	6	8	366	1	185	381	2.1	2.3
300	458.5	300	2	2	8	8	416	1	285	431	2.2	2.4
350	508.5	300	2	3	8	10	466	1	285	481	2.4	2.6
400	558.5	400	3	3	10	10	516	1	385	531	2.5	2.7
450	608.5	400	3	4	10	12	566	1	385	581	2.6	2.9
500	658.5	500	4	4	12	12	616	1	485	631	2.8	3.0
550	708.5	500	4	5	12	14	666	1	485	681	2.9	3.2
600	758.5	600	5	5	14	14	716	1	585	731	3.1	3.3
650	808.5	600	5	6	14	16	766	1	585	781	3.2	3.5
700	858.5	700	6	6	16	16	816	1	685	831	3.4	3.6
750	908.5	700	6	7	16	18	866	1	685	881	3.5	3.7
800	958.5	800	7	7	18	18	916	1	785	931	3.7	3.9

5.5 RCP4-SA6R



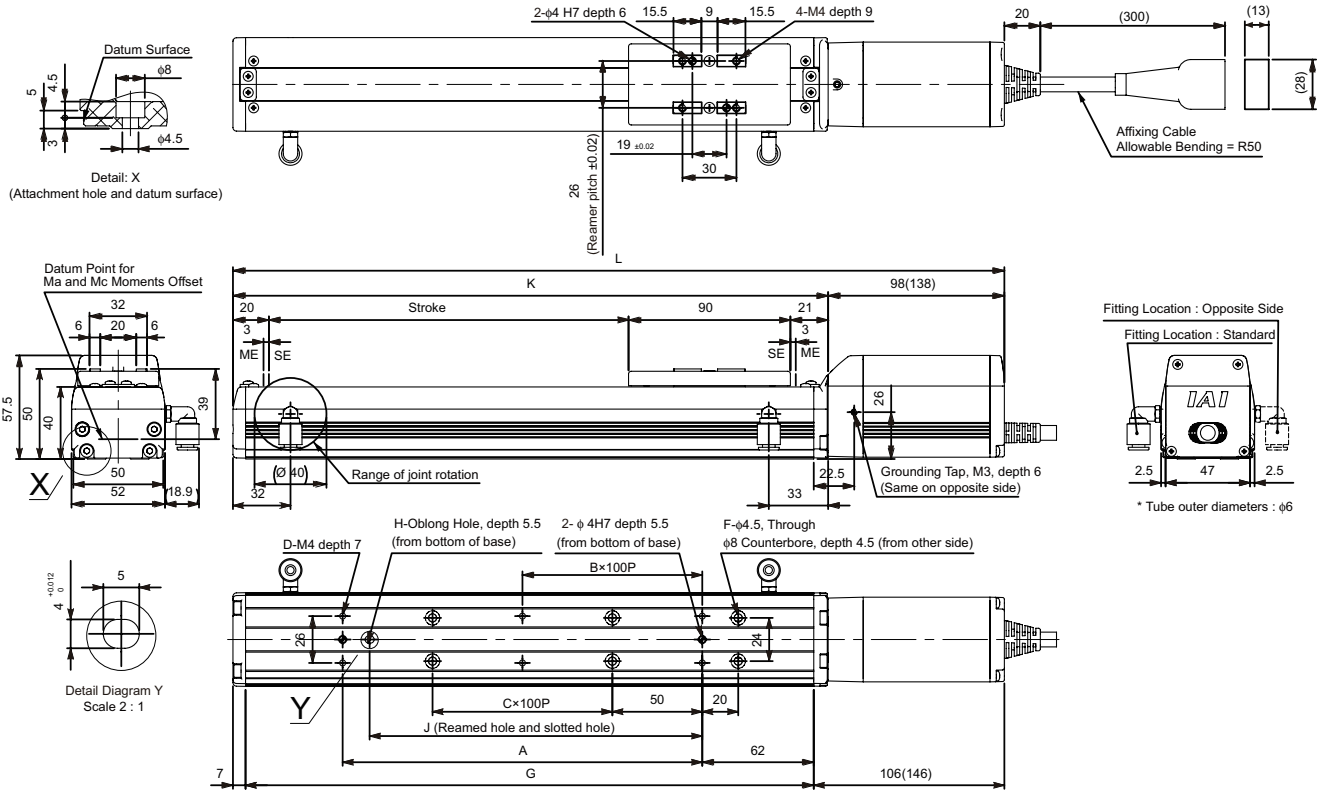
Stroke	L	A	B	C	D	E	F	G	H	J	K	Mass [kg]	
												w/o Brake	With Brake
50	229	0	0	1	4	2	4	186.5	0	0	201.5	2.0	2.2
100	279	100	0	1	6	3	4	236.5	1	85	251.5	2.1	2.3
150	329	100	0	2	6	3	6	286.5	1	85	301.5	2.3	2.5
200	379	200	1	2	8	3	6	336.5	1	185	351.5	2.4	2.6
250	429	200	1	3	8	3	8	386.5	1	185	401.5	2.6	2.8
300	479	300	2	3	10	3	8	436.5	1	285	451.5	2.7	3.0
350	529	300	2	4	10	3	10	486.5	1	285	501.5	2.9	3.1
400	579	400	3	4	12	3	10	536.5	1	385	551.5	3.0	3.3
450	629	400	3	5	12	3	12	586.5	1	385	601.5	3.2	3.4
500	679	500	4	5	14	3	12	636.5	1	485	651.5	3.4	3.6
550	729	500	4	6	14	3	14	686.5	1	485	701.5	3.5	3.7
600	779	600	5	6	16	3	14	736.5	1	585	751.5	3.7	3.9
650	829	600	5	7	16	3	16	786.5	1	585	801.5	3.8	4.1
700	879	700	6	7	18	3	16	836.5	1	685	851.5	4.0	4.2
750	929	700	6	8	18	3	18	886.5	1	685	901.5	4.1	4.4
800	979	800	7	8	20	3	18	936.5	1	785	951.5	4.3	4.5

5.6 RCP4-SA7R



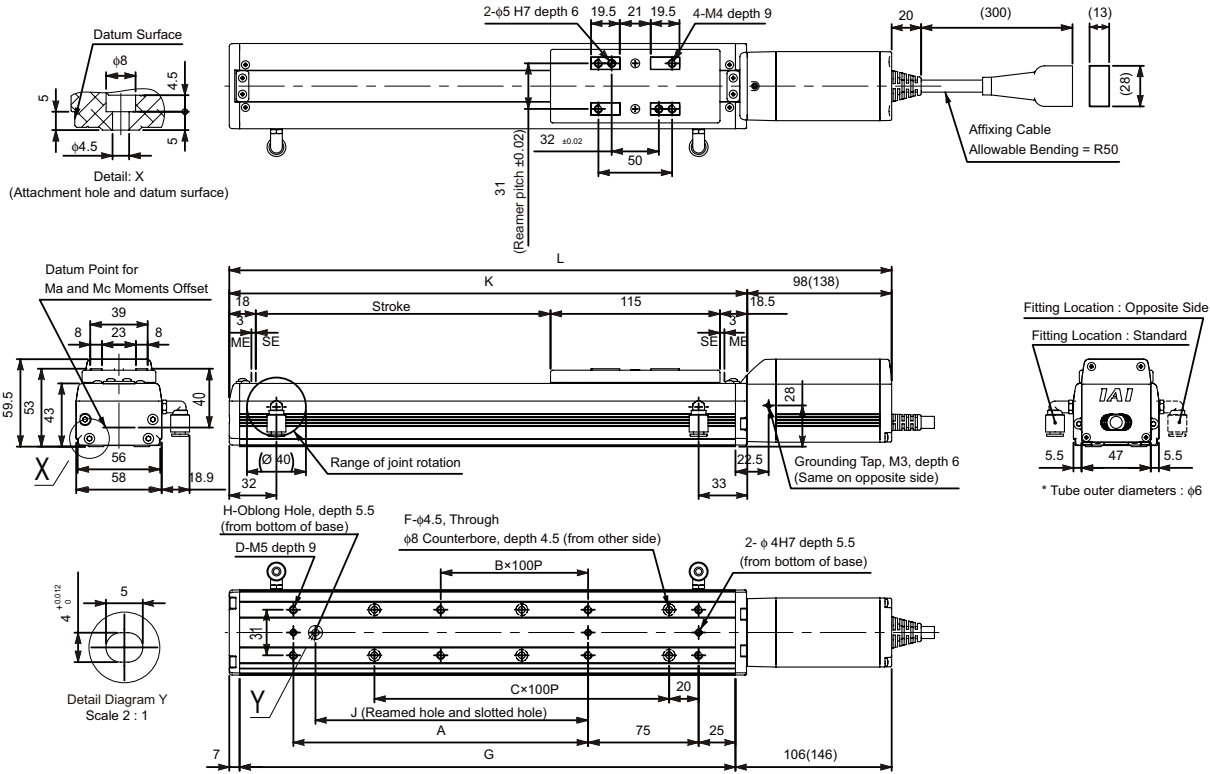
Stroke	L	A	B	C	D	E	F	G	H	J	K	Mass [kg]	
												w/o Brake	With Brake
50	252.5	0	0	1	4	2	4	199	0	0	219.5	3.4	3.9
100	302.5	100	0	1	6	3	4	249	1	85	269.5	3.6	4.1
150	352.5	100	0	2	6	3	6	299	1	85	319.5	3.8	4.3
200	402.5	200	1	2	8	3	6	349	1	185	369.5	4.1	4.6
250	452.5	200	1	3	8	3	8	399	1	185	419.5	4.3	4.8
300	502.5	300	2	3	10	3	8	449	1	285	469.5	4.6	5.1
350	552.5	300	2	4	10	3	10	499	1	285	519.5	4.8	5.3
400	602.5	400	3	4	12	3	10	549	1	385	569.5	5.1	5.6
450	652.5	400	3	5	12	3	12	599	1	385	619.5	5.3	5.8
500	702.5	500	4	5	14	3	12	649	1	485	669.5	5.6	6.1
550	752.5	500	4	6	14	3	14	699	1	485	719.5	5.8	6.3
600	802.5	600	5	6	16	3	14	749	1	585	769.5	6.0	6.5
650	852.5	600	5	7	16	3	16	799	1	585	819.5	6.3	6.8
700	902.5	700	6	7	18	3	16	849	1	685	869.5	6.5	7.0
750	952.5	700	6	8	18	3	18	899	1	685	919.5	6.8	7.3
800	1002.5	800	7	8	20	3	18	949	1	785	969.5	7.0	7.5

5.7 RCP4CR-SA5C



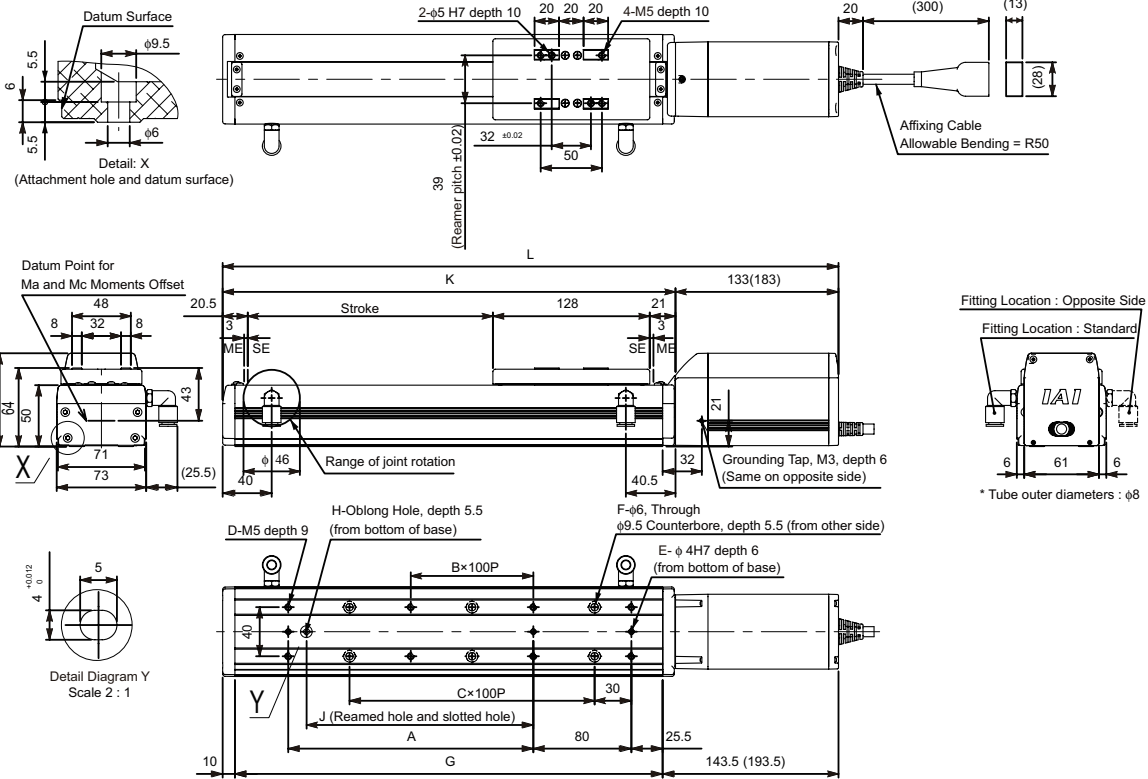
Stroke	L		A	B	C	D	F	G	H	J	K	Mass [kg]	
	w/o Brake	With Brake										w/o Brake	With Brake
50	279	319	73	0	0	4	4	166	0	0	181	1.5	1.7
100	329	369	100	0	0	4	4	216	1	85	231	1.6	1.9
150	379	419	100	0	1	4	6	266	1	85	281	1.8	2.0
200	429	469	200	1	1	6	6	316	1	185	331	1.9	2.1
250	479	519	200	1	2	6	8	366	1	185	381	2.1	2.3
300	529	569	300	2	2	8	8	416	1	285	431	2.2	2.4
350	579	619	300	2	3	8	10	466	1	285	481	2.4	2.6
400	629	669	400	3	3	10	10	516	1	385	531	2.5	2.7
450	679	719	400	3	4	10	12	566	1	385	581	2.6	2.9
500	729	769	500	4	4	12	12	616	1	485	631	2.8	3.0
550	779	819	500	4	5	12	14	666	1	485	681	2.9	3.2
600	829	869	600	5	5	14	14	716	1	585	731	3.1	3.3
650	879	919	600	5	6	14	16	766	1	585	781	3.2	3.5
700	929	969	700	6	6	16	16	816	1	685	831	3.4	3.6
750	979	1019	700	6	7	16	18	866	1	685	881	3.5	3.7
800	1029	1069	800	7	7	18	18	916	1	785	931	3.7	3.9

5.8 RCP4CR-SA6C



Stroke	L		A	B	C	D	E	F	G	H	J	K	Mass [kg]	
	w/o Brake	With Brake											w/o Brake	With Brake
50	299.5	339.5	0	0	1	4	2	4	186.5	0	0	201.5	2.0	2.2
100	349.5	389.5	100	0	1	6	3	4	236.5	1	85	251.5	2.1	2.3
150	399.5	439.5	100	0	2	6	3	6	286.5	1	85	301.5	2.3	2.5
200	449.5	489.5	200	1	2	8	3	6	336.5	1	185	351.5	2.4	2.6
250	499.5	539.5	200	1	3	8	3	8	386.5	1	185	401.5	2.6	2.8
300	549.5	589.5	300	2	3	10	3	8	436.5	1	285	451.5	2.7	3.0
350	599.5	639.5	300	2	4	10	3	10	486.5	1	285	501.5	2.9	3.1
400	649.5	689.5	400	3	4	12	3	10	536.5	1	385	551.5	3.0	3.3
450	699.5	739.5	400	3	5	12	3	12	586.5	1	385	601.5	3.2	3.4
500	749.5	789.5	500	4	5	14	3	12	636.5	1	485	651.5	3.4	3.6
550	799.5	839.5	500	4	6	14	3	14	686.5	1	485	701.5	3.5	3.7
600	849.5	889.5	600	5	6	16	3	14	736.5	1	585	751.5	3.7	3.9
650	899.5	939.5	600	5	7	16	3	16	786.5	1	585	801.5	3.8	4.1
700	949.5	989.5	700	6	7	18	3	16	836.5	1	685	851.5	4.0	4.2
750	999.5	1039.5	700	6	8	18	3	18	886.5	1	685	901.5	4.1	4.4
800	1049.5	1089.5	800	7	8	20	3	18	936.5	1	785	951.5	4.3	4.5

5.9 RCP4CR-SA7C



Stroke	L		A	B	C	D	E	F	G	H	J	K	Mass [kg]	
	w/o Brake	With Brake											w/o Brake	With Brake
50	352.5	402.5	0	0	1	4	2	4	199	0	0	219.5	3.4	3.9
100	402.5	452.5	100	0	1	6	3	4	249	1	85	269.5	3.6	4.1
150	452.5	502.5	100	0	2	6	3	6	299	1	85	319.5	3.8	4.3
200	502.5	552.5	200	1	2	8	3	6	349	1	185	369.5	4.1	4.6
250	552.5	602.5	200	1	3	8	3	8	399	1	185	419.5	4.3	4.8
300	602.5	652.5	300	2	3	10	3	8	449	1	285	469.5	4.6	5.1
350	652.5	702.5	300	2	4	10	3	10	499	1	285	519.5	4.8	5.3
400	702.5	752.5	400	3	4	12	3	10	549	1	385	569.5	5.1	5.6
450	752.5	802.5	400	3	5	12	3	12	599	1	385	619.5	5.3	5.8
500	802.5	852.5	500	4	5	14	3	12	649	1	485	669.5	5.6	6.1
550	852.5	902.5	500	4	6	14	3	14	699	1	485	719.5	5.8	6.3
600	902.5	952.5	600	5	6	16	3	14	749	1	585	769.5	6.0	6.5
650	952.5	1002.5	600	5	7	16	3	16	799	1	585	819.5	6.3	6.8
700	1002.5	1052.5	700	6	7	18	3	16	849	1	685	869.5	6.5	7.0
750	1052.5	1102.5	700	6	8	18	3	18	899	1	685	919.5	6.8	7.3
800	1102.5	1152.5	800	7	8	20	3	18	949	1	785	969.5	7.0	7.5

6. Life

The mechanical life of the actuator is represented by that of the guide receiving the greatest moment load. The “rated load” is one factor that relates to the traveling life.

There are two types of “rated load,” namely “static rated load” and “dynamic rated load.”

- “Static rated load” : Load which, when applied to a stationary actuator, leaves a minor pressure mark on the contact surface.
- “Dynamic rated load” : Load which applies after a specified traveling distance under a load based on a specific probability of survival at which the guide does not break

Guide manufacturers indicate the life of a guide using a dynamic rated load when the provability of survival after 50 km of traveling is 90%.

In the case of general industrial machinery, however, you should understand the specific life also for the purpose of maintenance. Also, the life of a guide has a sufficient allowance relative to a radial load, and receives the greatest impact by a moment load offset from the center of the guide.

The life is designed to ensure a traveling life of 5,000 km under a load corresponding to the allowable load moment and at a load coefficient of 1.2 (safety factor).

[For the dynamic allowable load moment, refer to 2, “Specification”]

The calculation formula for allowable load moment at a traveling life of 5,000 km is shown below:

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

C_{IA} : Allowable load moment
 f_W : Load coefficient (= 1.2)
 M_{50} : Dynamic rated moment when the probability of survival after 50 km of traveling is 50%

The life at the actual moment is calculated by the formula below:

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

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

7. Warranty

7.1 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
- 2,500 hours of operation

7.2 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 or problem in question was caused by a specification defect or problem, or by the poor quality of our product.

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

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

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

7.3 Honoring the Warranty

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

7.4 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.

7.5 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.

7.6 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
September 2011	First edition
November 2011	Second edition Pg. 31 Caution note added regarding cable
January 2012	Third edition Pg. 1, 3, 4 Contents changed in Safety Guide. Caution notes added for when working with two or more persons. Pg. 26 Sideway installation ○ → △ Ceiling mount installation ○ → △
February 2012	Fourth edition Pg. 12 Graph added for stroke and maximum speed limits when high-output setting is ineffective Pg. 19 to 21 Graph added for maximum acceleration and transportable weight when high-output setting is ineffective Pg. 51 to 53 Mass added
March 2012	Fifth edition Pg. 7 Caution note added saying “Do not crash the slider to an obstacle with high speed” Pg. 31 Note added to tell platform should have a structure with enough stiffness Pg. 31, 32 Note changed to 1.8 times more of the nominal diameter for the length of thread engagement on aluminum
August 2012	Sixth edition Revised overall. Contents added in Standard type, Motor reversing type and Clean room type motor straight type.



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