ROBO CYLINDER

ROBO Cylinder
RCP2/RCP2CR Actuators
Slider Type

Operating Manual

Thirteen Edition

Standard type:	Motor coupling type:	RCP2-SA5C, SA6C,SA7C SS7C, SS8C, HS8C
	Motor reversing type:	RCP2-SA5R, SA6R, SA7R SS7R, SS8R, HS8R
Cleanroom type:	Motor coupling type:	RCP2CR-SA5C, SA6C, SA7C SS7C, SS8C, HS8C

IAI America, Inc.

Please Read Before Use

Thank you for purchasing our product.

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

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.
The CD or DVD that comes with the product contains operation manuals for IAI products.
When using the product, refer to the necessary portions of the applicable operation manual by printing them out or displaying them on a PC.

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

[Important]

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

	Note	

Greasing Actuators of Cleanroom Specification

For ROBO Cylinder actuators of cleanroom specification, use grease of low-dust-raising type for cleanroom applications.

The grease specified in the maintenance/inspection sections of the Operating Manual is for actuators of standard specification.
Using the grease for the standard actuators on the cleanroom actuators may generate dust

Recommended grease: C Grease by Kuroda Precision Industries Ltd.

C Grease by Kuroda Precision Industries is applied to the cleanroom actuators before shipment from IAI.

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

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

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

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

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

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

Alert Indication

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

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

Handling Precautions

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

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

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

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

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

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

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

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

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

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

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

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

7. Transporting and Handling

7.1 Handling the Actuator

7.1.1 Handling the Packed Unit

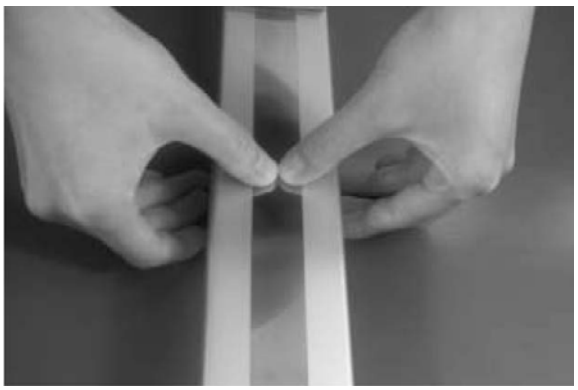
Unless otherwise specified, each actuator (axis) is shipped individually. Please make sure that the shipping box is not dropped or subjected to strong impact during transport.

- Operators should not carry heavy shipping boxes by themselves.
- If the shipping box is left standing, it should be in a horizontal position.
- Do not climb on top of the shipping box.
- Do not place heavy objects which may deform the shipping box or objects with concentrated loads on top of the box.

7.1.2 Handling the Actuator after It is Unpacked

Lift the actuator up by the base to remove it from the packing.

- When carrying the actuator, make sure not to bump it. Take particular care with the front cover and motor cover.
- Do not exert excessive force on any part of the actuator.
- Be careful not to cause the cables to receive a tensile force.
- Be careful when handling the stainless sheet
  The stainless sheet is designed very thin (thickness: 0.1mm) in order to ensure flexibility. Therefore, the stainless sheet is easily dented or scratched. Once dented or scratched, the stainless sheet may break during use.



⚠ Caution: Do not press the sheet directly with hands.

* Please refer to “Name of Parts” for the names of the actuator parts.

7.2 Handling the Actuator Assembly

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

7.2.1 Shipping from IAI Already Assembled

After assembly at IAI, your machine undergoes a shipping inspection, is packed in a crate with skids, and finally shipped.
If any of the combined actuators is a slider, the slider is securely fastened in place to prevent unexpected movement during shipping. Combined units have the ends of their actuators fastened so as to prevent them from moving significantly due to external vibration.

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

7.2.2 Handling After Unpacking

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

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

International Standards Compliances

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

RoHS Directive	CE Marking
○	○

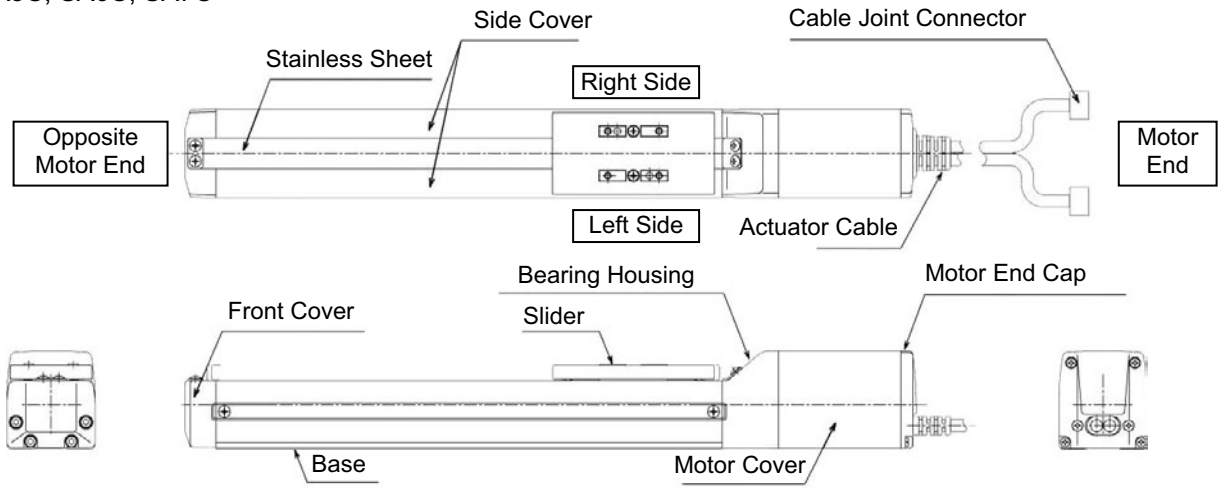
Names of Parts

The names of the actuator parts are indicated below.

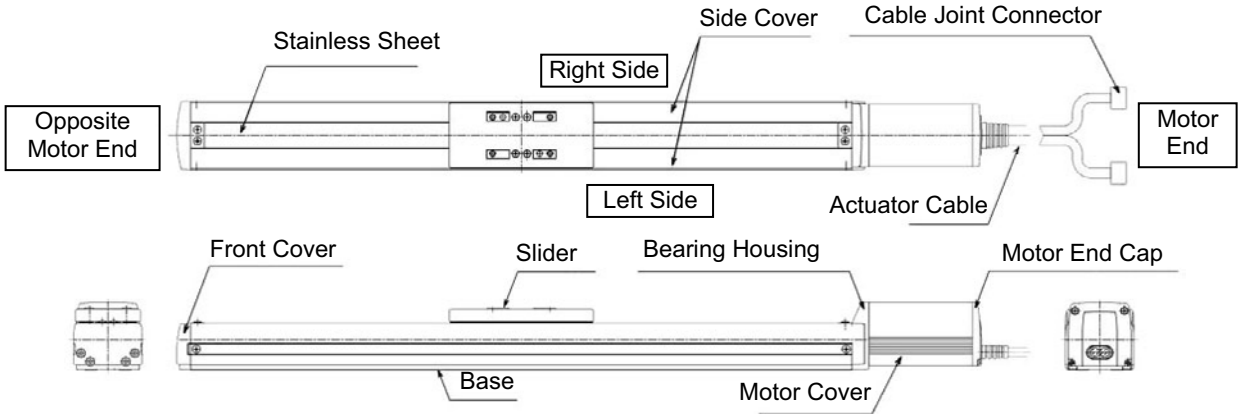
The left and right sides are indicated by looking at the actuator from the motor end with the actuator set down horizontally. Front end means the side opposite the motor end.

1. Motor Coupling Type (Standard) RCP2

●SA5C, SA6C, SA7C



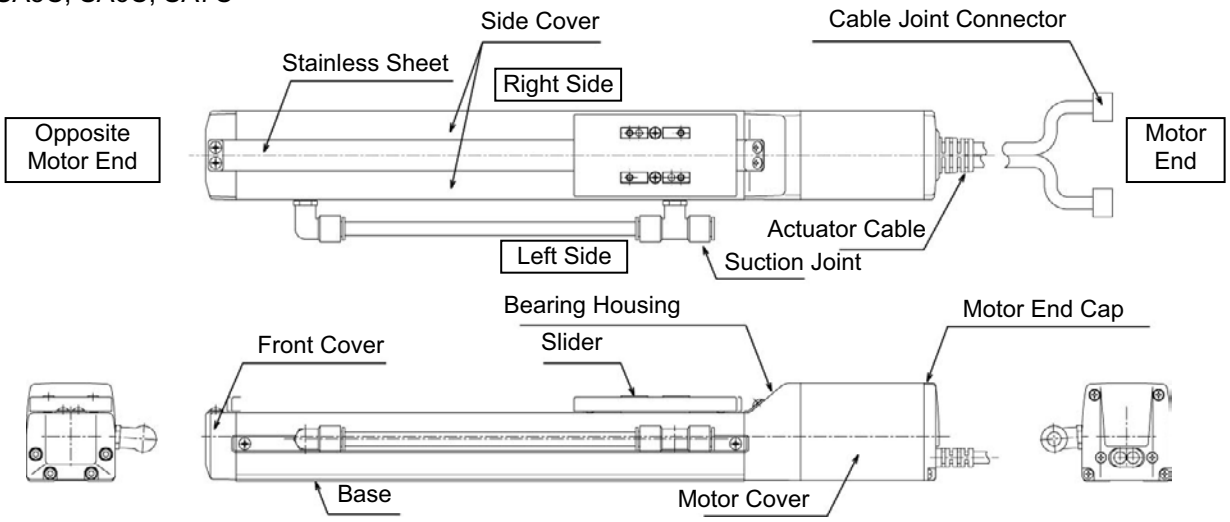
●SS7C, SS8C, HS8C



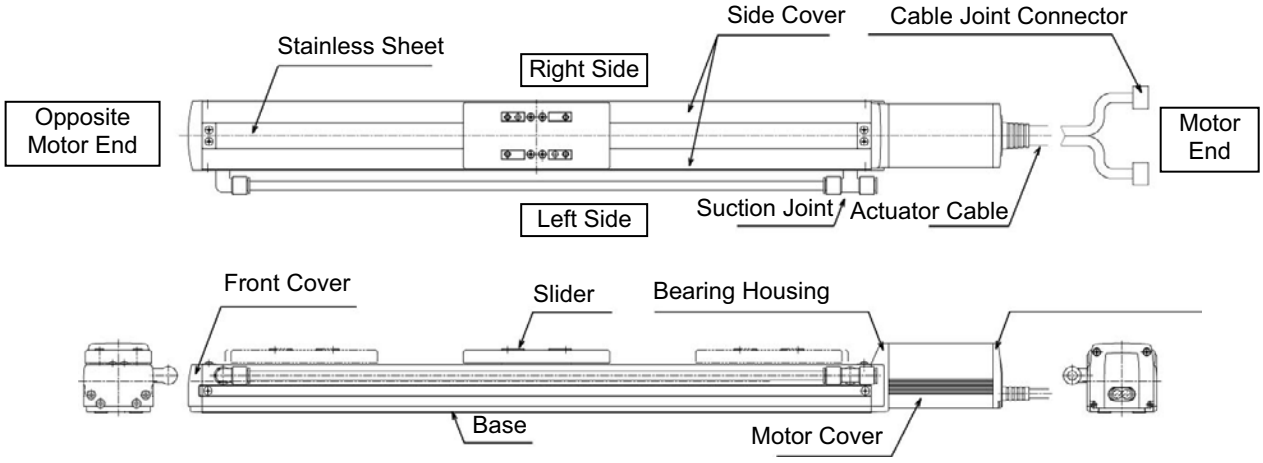
⚠ Caution: The cable directly connected to the actuator is not a robot cable even when ordered with a robot cable option. When designing, please make sure not to give repeated bending loads to this cable.
The robot cable is applicable only to the connecting cables.

2. Motor Coupling Type (Cleanroom Specification) RCP2CR

●SA5C, SA6C, SA7C



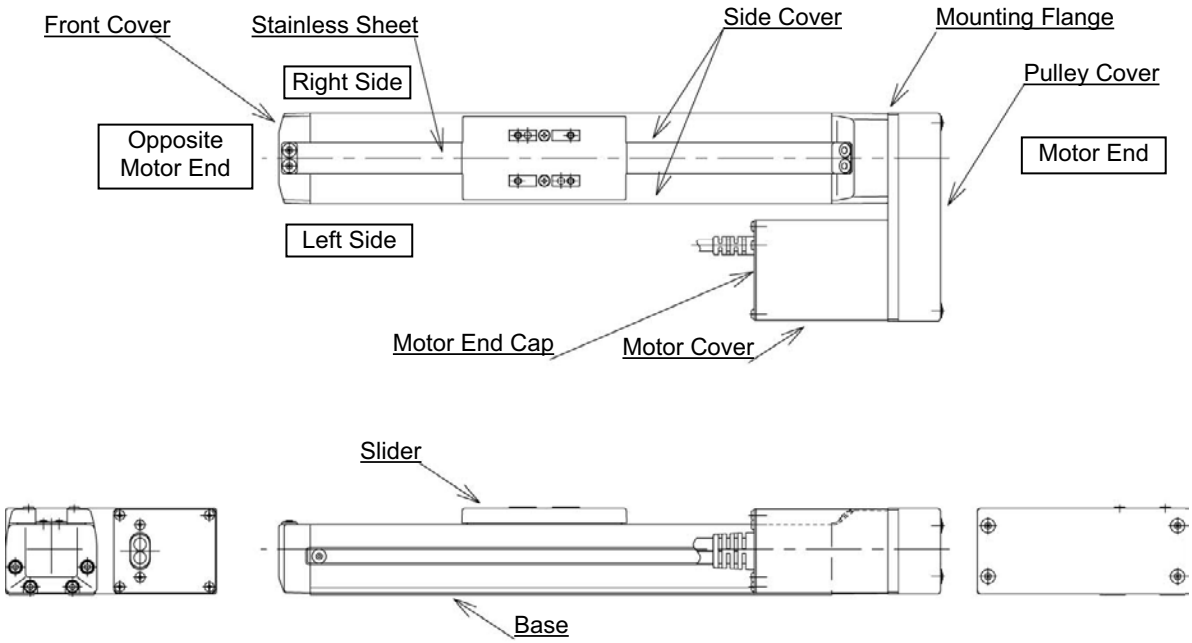
●SS7C, SS8C, HS8C



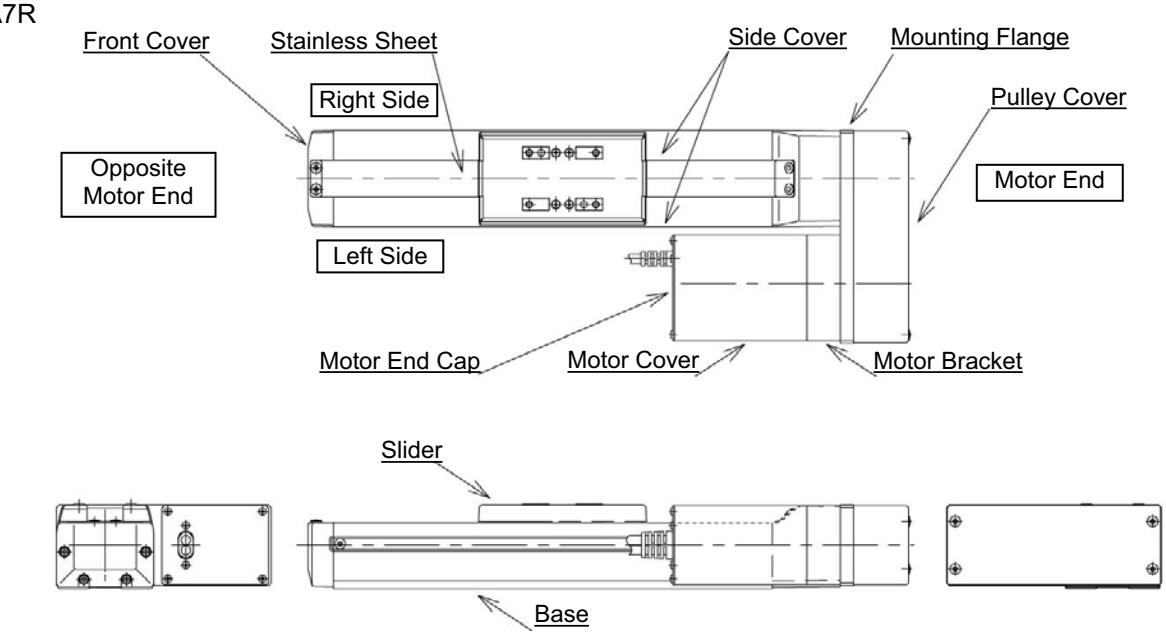
⚠ Caution: The cable directly connected to the actuator is not a robot cable even when ordered with a robot cable option. When designing, please make sure not to give repeated bending loads to this cable.
The robot cable is applicable only to the connecting cables.

3. Motor Reversing Type

●SA5R, SA6R

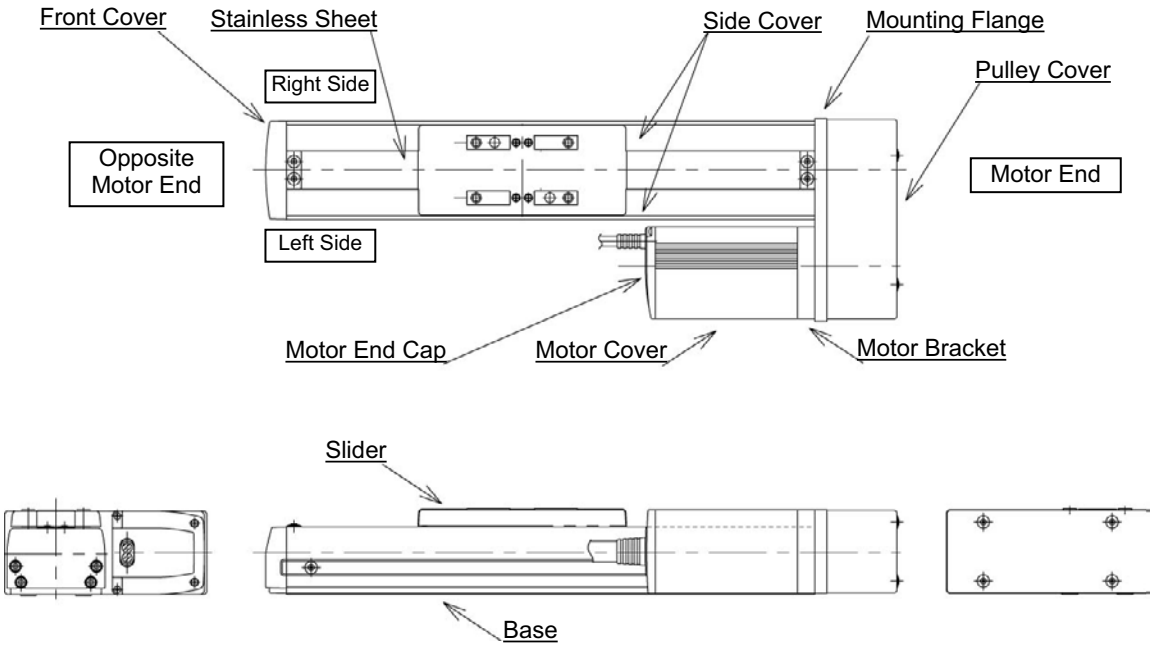


●SA7R



⚠ Caution: The cable directly connected to the actuator is not a robot cable even when ordered with a robot cable option. When designing, please make sure not to give repeated bending loads to this cable.
The robot cable is applicable only to the connecting cables.

●SS7R, SS8R, HS8R



⚠ Caution:	The cable directly connected to the actuator is not a robot cable even when ordered with a robot cable option. When designing, please make sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

1. Checking the Product

If based on a standard configuration, this product consists of the items listed below.

> ⚠ Caution: Check the packed items against the packing specification. Should you find a wrong model number or any missing item, please contact your IAI dealer or IAI.

1.1 Components

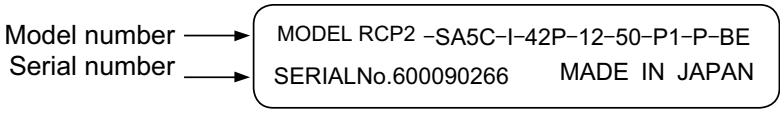
No.	Name	Model number	Remarks
1	Actuator	Refer to “How to Read the Model Nameplate” and “How to Read the Model Number.”	
Accessories			
2	Motor/Encoder Cable*1		
3	Home Making Seals		
4	Quick Step Guide		
5	Operation Manual (CD/DVD)		
6	Safety Guide		

*1 The motor cable and encoder cable that come with the actuator vary depending on the controller used. [Refer to 8, “Motor/Encoder Cables.”]

1.2 Operation Manuals for Controllers Supported by This Product

No.	Name	Control No.
1	Operation Manual for PSEL Controller	ME0172
2	Operation Manual for PCON-C/CG/CF Controller	ME0170
3	Operation Manual for PCON-CY Controller	ME0156
4	Operation Manual for PCON-SE Controller	ME0163
5	Operation Manual for PCON-PL/PO Controller	ME0164
6	Operation Manual for MEC Controller	ME0245
7	Operation Manual for PSEP/ASEP Controller	ME0216
8	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
9	Operation Manual for PC Software RCM-101-MW/RCM-101-USB	ME0155
10	Operation Manual for MEC PC Software	ME0248
11	Operation Manual for Teaching Pendant SEL-T/TD	ME0183
12	Operation Manual for Teaching Pendant CON-T/TG	ME0178
13	Operation Manual for Touch Panel Teaching Pendant CON-PT/PD/PG	ME0227
14	Operation Manual for Touch Panel Teaching Pendant SEP-PT	ME0217
15	Operation Manual for Simple Teaching Pendant RCM-E	ME0174
16	Operation Manual for Data Setter RCM-P	ME0175
17	Operation Manual for Touch Panel Display RCM-PM-01	ME0182

1.3 How to Read Model Nameplate



1.4 How to Read Model Number

RCP2-SA5C-I-42P-12-50-P1-P-BE

<Series>
Standard type
RCP2
Cleanroom type
RCP2CR

<Type>
Aluminum base
SA5C, SA6C, SA7C
Iron base
SS7C, SS8C
Iron base, high-speed type
HS8C
Aluminum base Motor reversing
SA5R, SA6R, SA7R
Iron base Motor reversing
SS7R, SS8R
Iron base, high-speed type, motor reversing
HS8R

<Encoder type>
I: Incremental

<Motor type>
42P: 42 square
56P: 56 square
86P: 86 square

<Lead>
3: 3 mm 10: 10 mm
4: 4 mm 12: 12 mm
5: 5 mm 16: 16 mm
6: 6 mm 20: 20 mm
8: 8 mm 30: 30 mm

<Stroke>

<Controller>
P1: PSEL
PCON-C/CG
PCON-CY
PCON-SE
PCON-PL/PO
P3: PMEC
PSEP

<Cable length>
N: None
P: 1 m
S: 3 m
M: 5 m
X□□: Length specification
R□□: Robot cable

<Options>
B: Brake
BE: Brake
(Wirings taken out from end)
BL: Brake
(Wirings taken out from left)
BR: Brake
(Wirings taken out from right)
NM: Reversed-home specification
ML: Motor reversing at left
MR: Motor reversing at right
SR Slider roller specification
VR: Suction joint on opposite side

2. Specification

(1) Maximum speed

The maximum speed of the actuator is limited to prevent resonance of the ball screw shaft and also in consideration of the restrictions on motor speed.
Observe the maximum speed limits specified below.

Strokes and maximum speed limits (unit: mm/sec)

Mode	Motor type	Lead (mm)	Stroke (mm)															
			50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
SA5C SA5R	42P	3												135	115	100	90	75
		6	295											270	230	200	180	150
		12	300	460										540	460	400	360	300
SA5C	42P	20	380	540	660	770	860	940	1000					980	850	740	650	580
			380	540	660	770	800 (stroke 250 to 600, installed vertically)									740	650	580
SA6C SA6R	42P	3	150											135	115	100	90	75
		6	295	300										270	230	200	180	150
		12	300	460	600									540	460	400	360	300
SA6C	42P	20	380	540	660	770	860	940						980	850	740	650	580
			380	540	660	770	800 (stroke 250 to 600, installed vertically)									740	650	580
SA7C SA7R	56P	4	133															120
		8	266															240
		16	380	533														480

⚠ Caution: Do not set any speed or acceleration/deceleration exceeding the rated speed or acceleration/deceleration. Doing so may result in vibration, failure or shorter life. When combining multiple axes and synchronizing their operations, the speed and acceleration/deceleration to be set should correspond to the highest speed and largest acceleration/deceleration among those of the combined axes. In particular, exercise caution because setting an acceleration/deceleration exceeding the rated acceleration/deceleration may cause the actuator to suffer creep or the coupling to slip.

(2) Acceleration and payload capacity

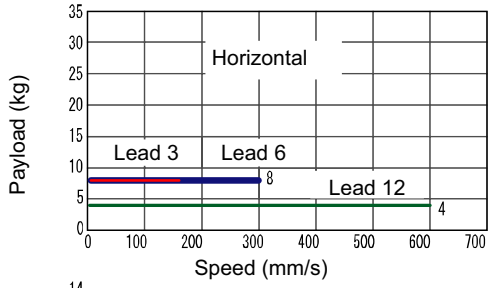
> ⚠ Caution: 1. The payload capacities at different accelerations, other than those at the rated accelerations of 0.2 G and 0.3 G, are provided for reference purposes only. Use these values only as a rough guide, as they are not guaranteed.
> 2. Even when the acceleration is below the rated acceleration, the payload capacity will not exceed beyond the value at the rated acceleration.

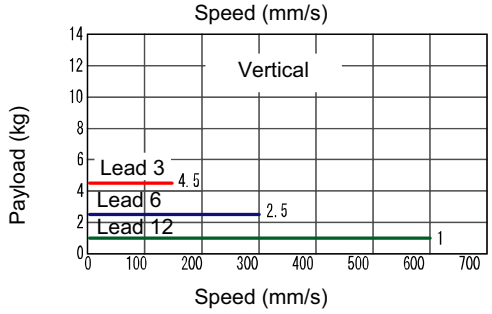
[Controller (without "H" at the end of the model number)]

(Note) With the SA5C type and SA6C type (except for models of lead 20), the specific performance varies depending on the controller.

RCP2(CR)-SA5C

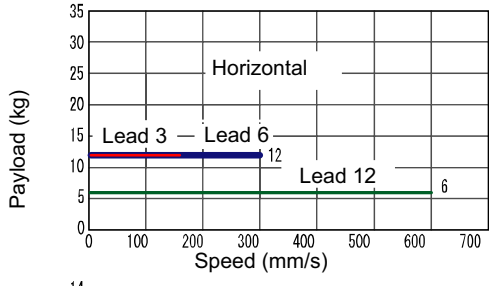
It is the payload when operating with the rated acceleration below:
Lead 3
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 6
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 12
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

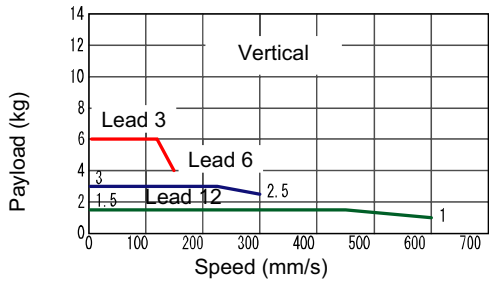




RCP2(CR)-SA6C

It is the payload when operating with the rated acceleration below:
Lead 3
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 6
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 12
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

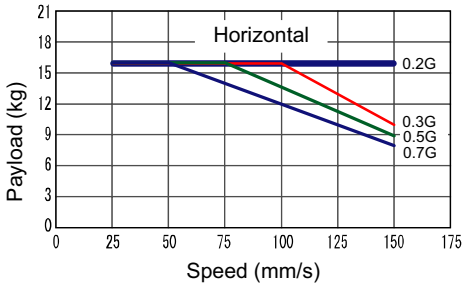


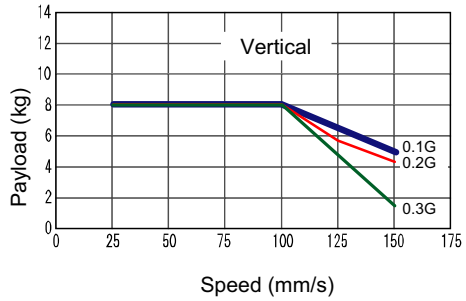


[Controller (with “H” at the end of the model number)]

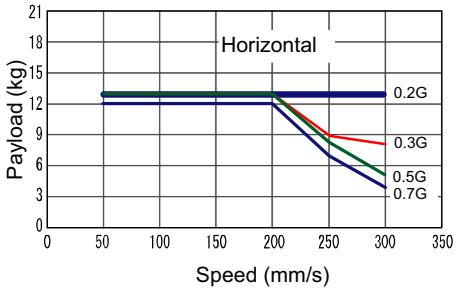
(Note) With the SA5C type and SA6C type (except for models of lead 20), the specific performance varies depending on the controller.

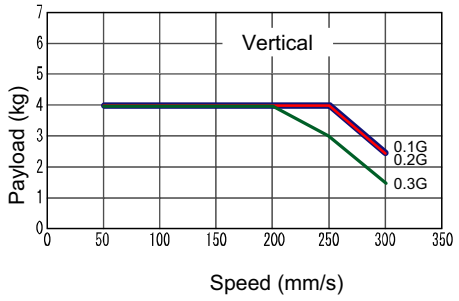
RCP2 (CR)-SA5C
Lead 3
Rated acceleration: 0.2 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G, when horizontal,
0.3 G when vertical



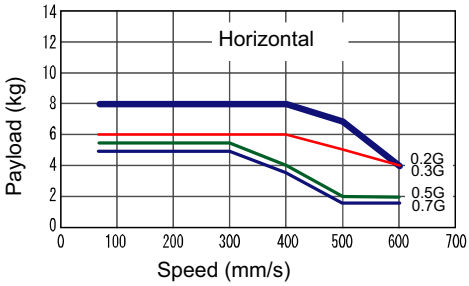


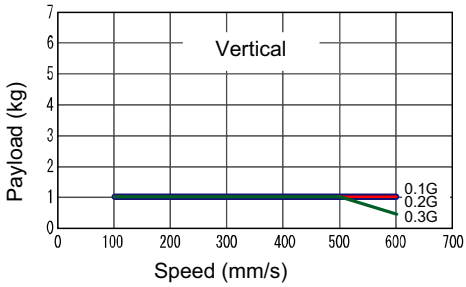
Lead 6
Rated acceleration: 0.2 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G, when horizontal,
0.3 G when vertical



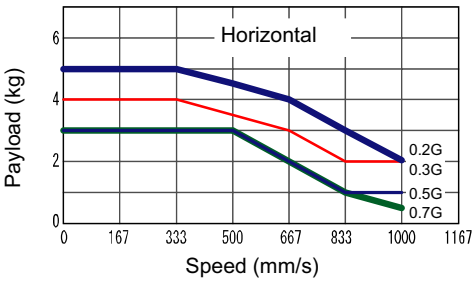


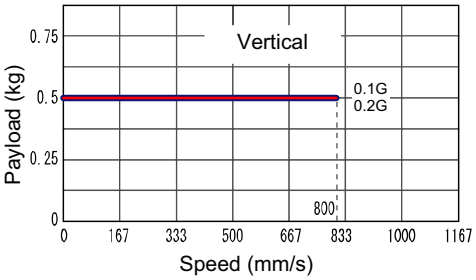
Lead 12
Rated acceleration: 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G, when horizontal,
0.3 G when vertical





Lead 20
Rated acceleration: 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G, when horizontal,
0.2 G when vertical

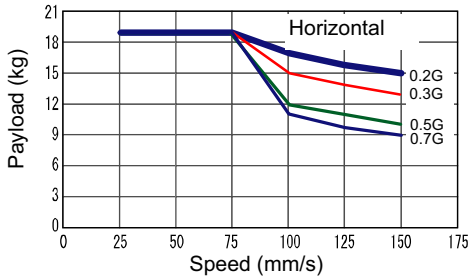


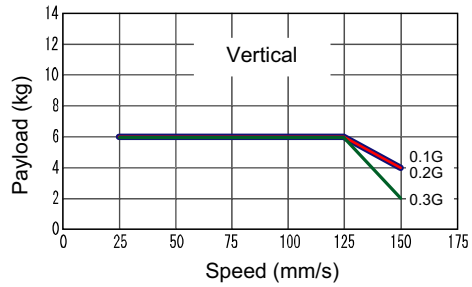


[Controller (with “H” at the end of the model number)]

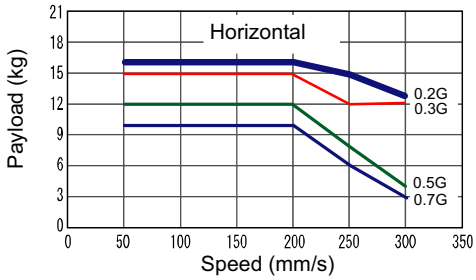
(Note) With the SA5C type and SA6C type (except for models of lead 20), the specific performance varies depending on the controller.

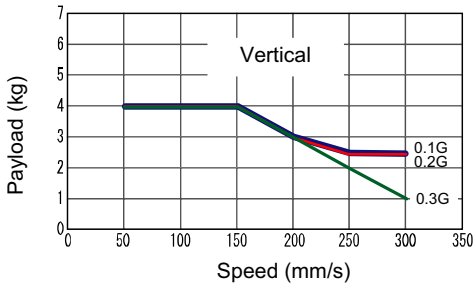
RCP2 (CR)-SA6C
Lead 3
Rated acceleration: 0.2 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G, when horizontal,
0.3 G when vertical



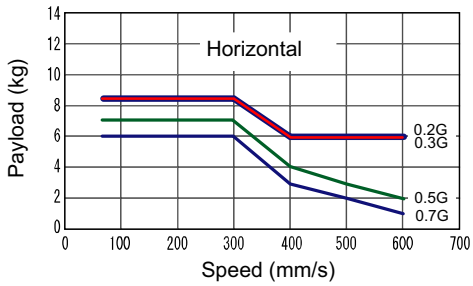


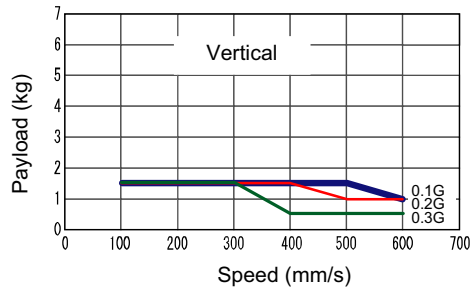
Lead 6
Rated acceleration: 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G, when horizontal,
0.3 G when vertical



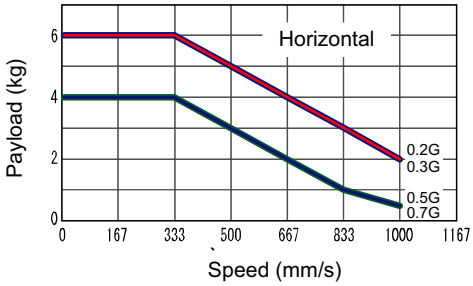


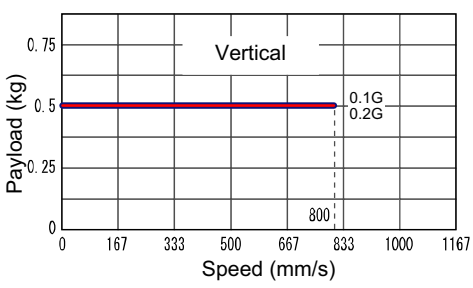
Lead 12
Rated acceleration: 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G, when horizontal,
0.3 G when vertical





Lead 20
Rated acceleration: 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration: 0.7 G
when horizontal, 0.2 G when vertical

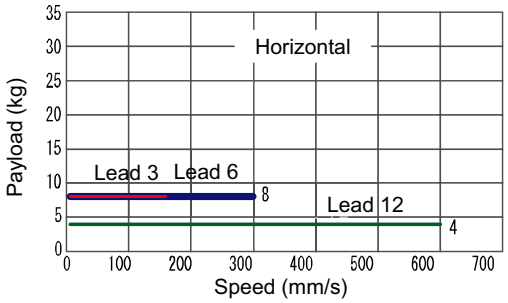


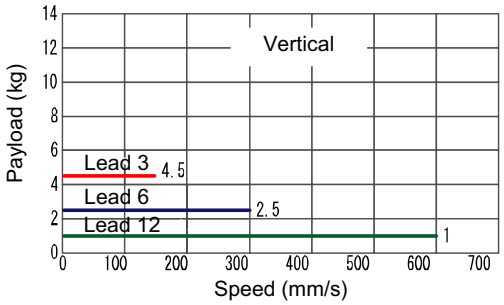


[Controller (with “H” at the end of the model number)]

RCP2−SA5R

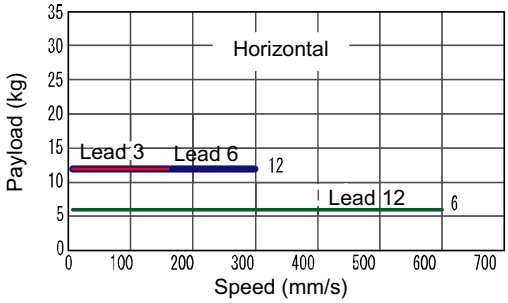
It is the payload when operating with the rated acceleration below:
Lead 3
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 6
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 12
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

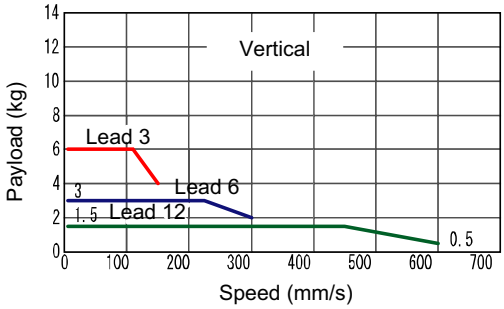




RCP2−SA6R

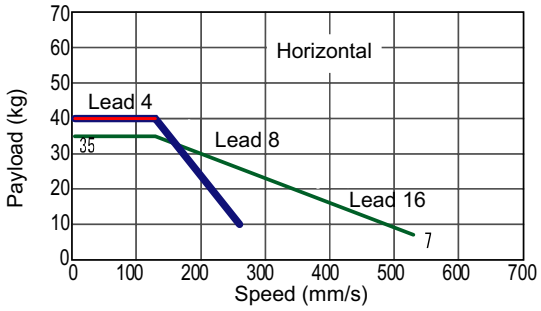
It is the payload when operating with the rated acceleration below:
Lead 3
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 6
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 12
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

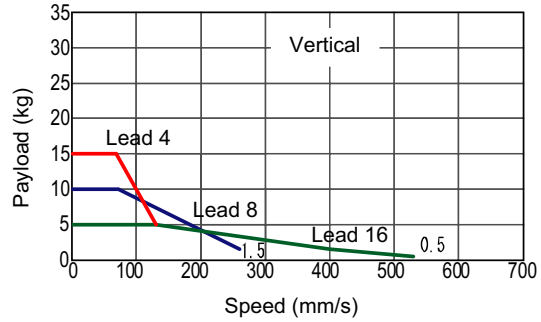




RCP2(CR)-SA7C

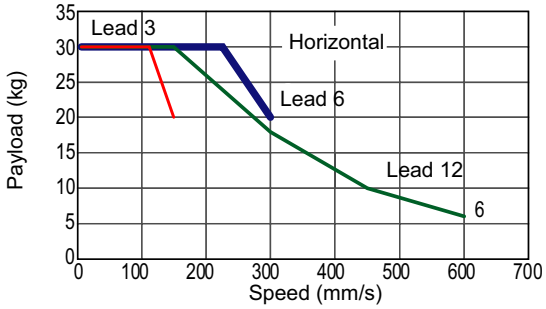
It is the payload when operating with the rated acceleration below:
Lead 4
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 8
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 16
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

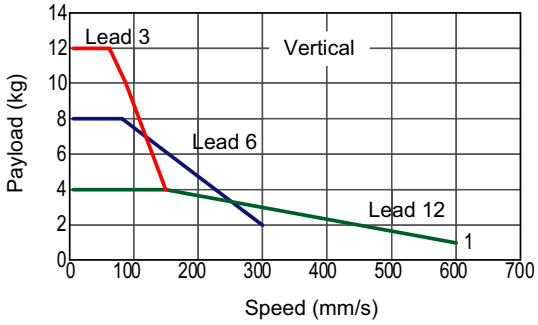




RCP2(CR)-SS7C

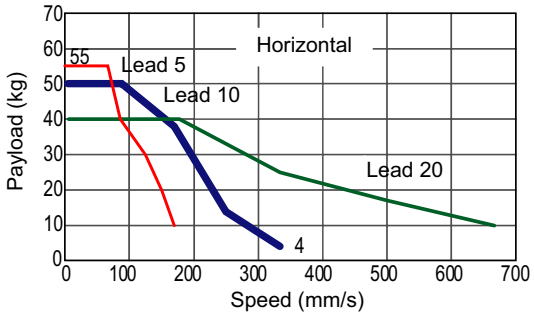
It is the payload when operating with the rated acceleration below:
Lead 3
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 6
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 12
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

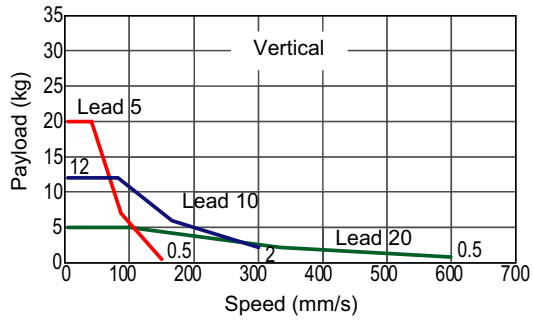




RCP2(CR)-SS8C

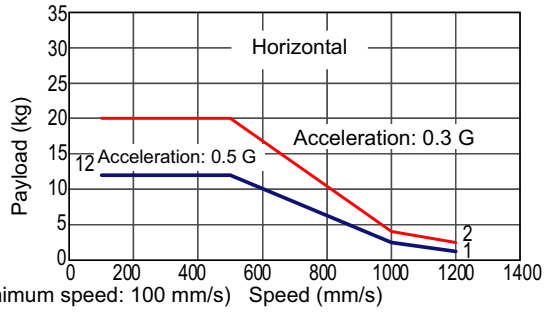
It is the payload when operating with the rated acceleration below:
Lead 5
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 10
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 20
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

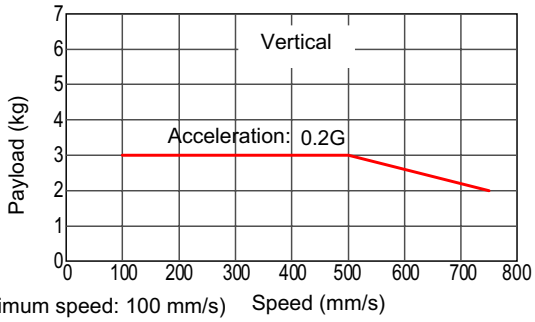




RCP2(CR)-HS8C

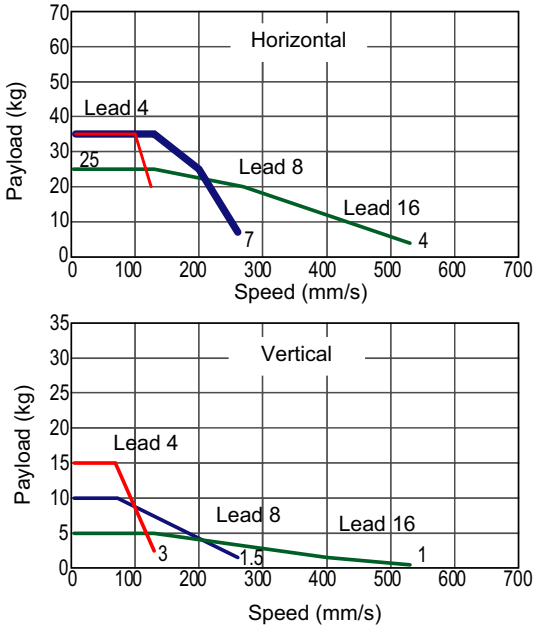
It is the payload when operating with the rated acceleration and maximum acceleration below:
Lead 3
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration : 0.5 G, when horizontal,
0.2 G when vertical





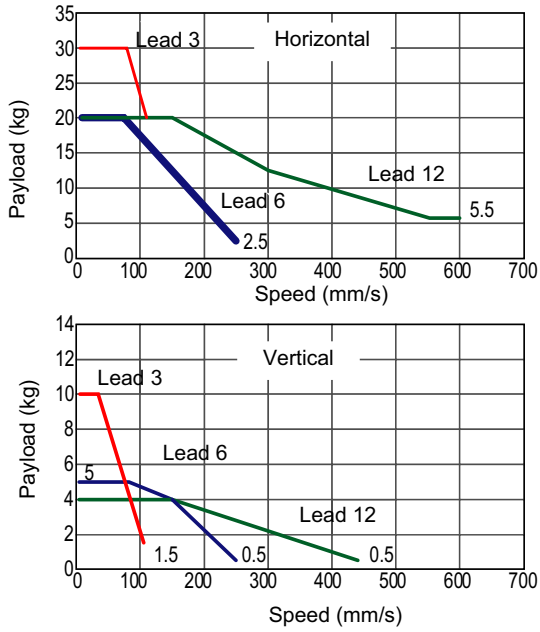
RCP2-SA7R

It is the payload when operating with the rated acceleration below:
Lead 4
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 8
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 16
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical



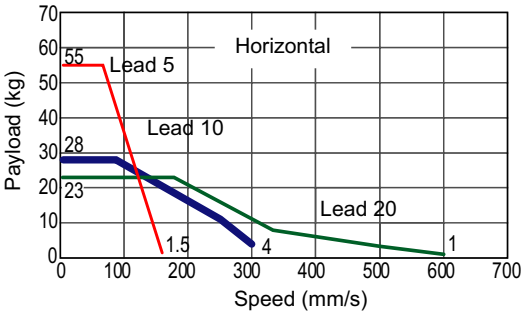
RCP2-SS7R

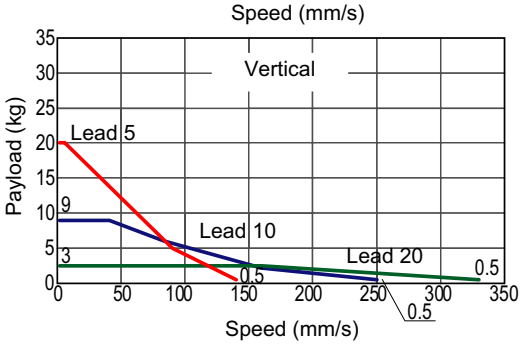
It is the payload when operating with the rated acceleration below:
Lead 3
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 6
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 12
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical



RCP2-SS8R

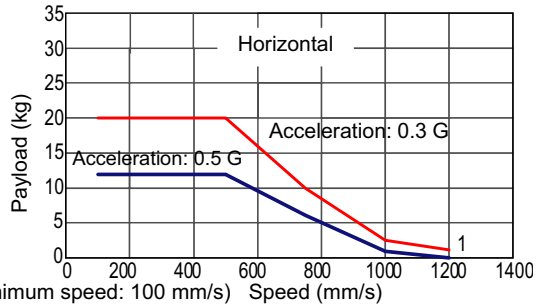
It is the payload when operating with the rated acceleration below:
Lead 5
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 10
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 20
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

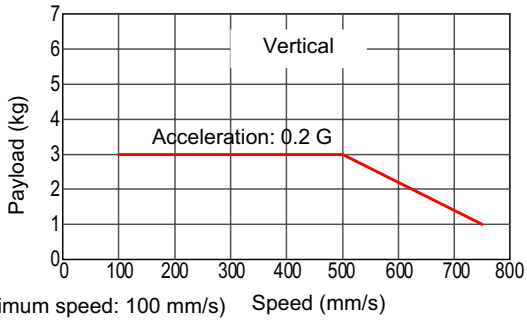




RCP2-HS8R

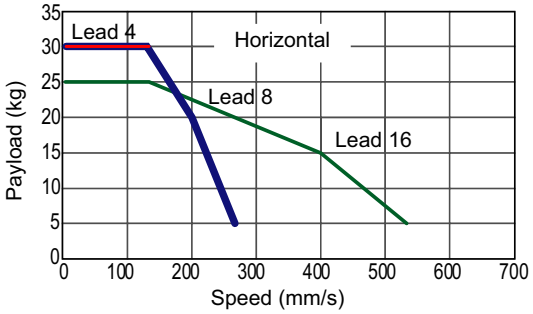
It is the payload when operating with the rated acceleration and maximum acceleration below:
Lead 30
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration : 0.5 G, when horizontal,
0.2 G when vertical

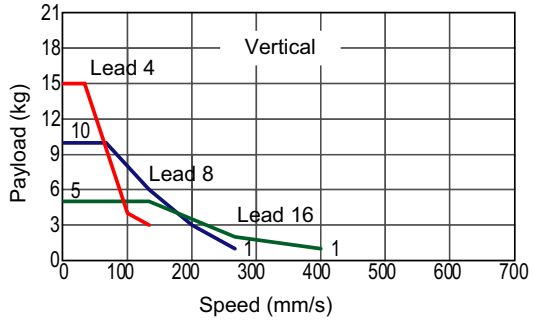




RCP2CR-SA7C

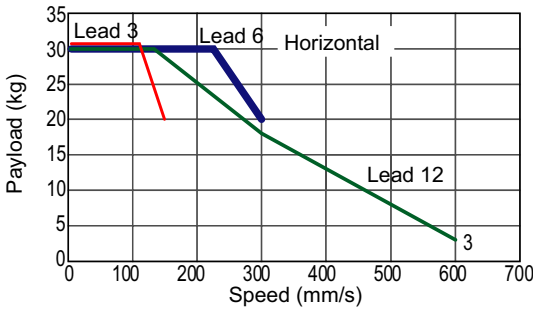
It is the payload when operating with the rated acceleration below:
Lead 4
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 8
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 16
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

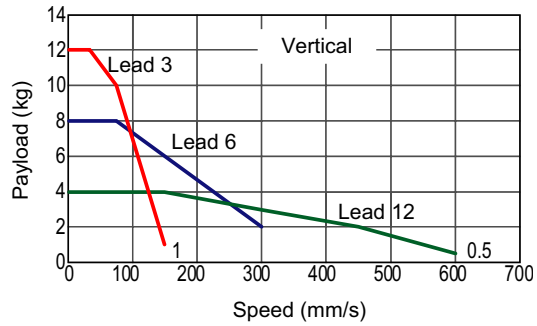




RCP2CR-SS7C

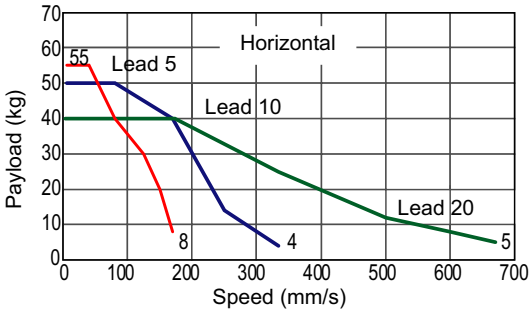
It is the payload when operating with the rated acceleration below:
Lead 3
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 6
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 12
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

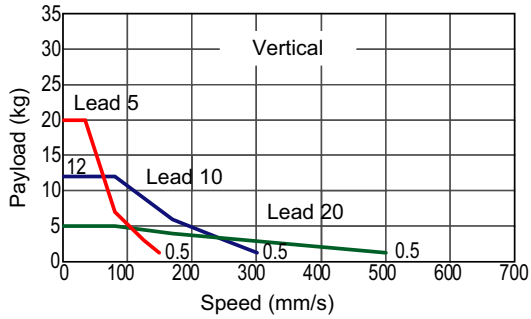




RCP2CR-SS8C

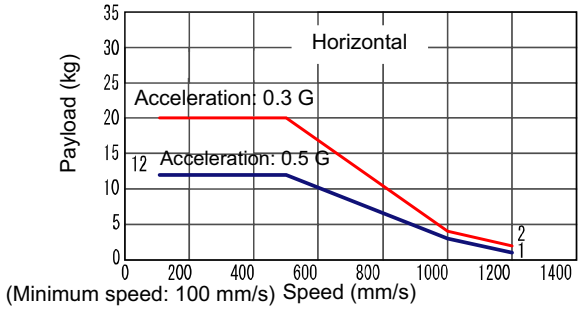
It is the payload when operating with the rated acceleration below:
Lead 5
Rated acceleration : 0.2 G, when horizontal,
0.2 G when vertical
Lead 10
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Lead 20
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical

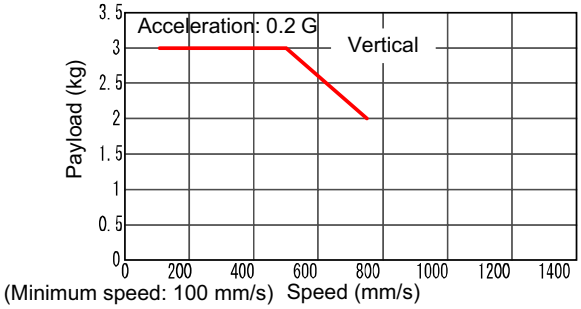




RCP2CR-HS8C

It is the payload when operating with the rated acceleration and maximum acceleration below:
Lead 30
Rated acceleration : 0.3 G, when horizontal,
0.2 G when vertical
Maximum acceleration : 0.5 G, when horizontal,
0.2 G when vertical





(3) Driving method

Type	Motor type	Lead [mm]	Encoder pulses*1	Driving method	
SA5C, SA5R	42P	2.5	800	Ball screw ∅10 mm	Rolled, C10
		5			
		10			
SA5C	42P	20		Ball screw ∅10 mm	Rolled, C10
SA6C, SA6R	42P	3		Ball screw ∅10 mm	Rolled, C10
		6			
		12			
SA6C	42P	20		Ball screw ∅10 mm	Rolled, C10
SA7C, SA7R	56P	4		Ball screw ∅10 mm	Rolled, C10
		8			
		16			
SA7C, SS7R	42P	3		Ball screw ∅10 mm	Rolled, C10
		6			
		12			
SS8C, SS8R	56P	5		Ball screw ∅16 mm	Rolled, C10
		10			
		20			
HS8C, HS8R	86P	30		Ball screw ∅16 mm	Rolled, C10

*1. Number of pulses input to the controller.

(4) Cleanliness class of Cleanroom type RCP2CR

Item	Specification
Cleanliness class	Class 10 (1 μm) when air is suctioned from the suction joint at an appropriate rate of suction

(5) Common specifications

Item	Specification	
	SA5C or SA6C, lead other than 20 mm	SA5C or SA6C, lead 20 mm
Positioning repeatability*1	±0.02 mm	±0.03 mm
Backlash	0.1 mm or less	0.1 mm or less

*1. Default value

(6) Load on the Actuator

Do not exceed the load shown in the load specification column. Please note the slider moment, allowable overhang length and the load weight.

Dynamic allowable load moments

Model	Ma	Mb	Mc
SA5C, R	4.9 N• m (0.5 kgf•m)	6.8 N• m (0.7 kgf•m)	11.7 N• m (1.2 kgf•m)
SA6C, R	8.9 N• m (0.9 kgf•m)	12.7 N• m (1.3 kgf•m)	18.6 N• m (1.9 kgf•m)
SA7C, R	13.9 N• m (1.4 kgf•m)	19.9 N• m (2.0 kgf•m)	38.3 N• m (3.9 kgf•m)
SS7C, R	14.7 N• m (1.5 kgf•m)	14.7 N• m (1.5 kgf•m)	33.3 N• m (3.4 kgf•m)
SS8C, R	36.3 N• m (3.7 kgf•m)	36.3 N• m (3.7 kgf•m)	77.4 N• m (7.9 kgf•m)
HS8C, R	36.3 N• m (3.7 kgf•m)	36.3 N• m (3.7 kgf•m)	77.4 N• m (7.9 kgf•m)

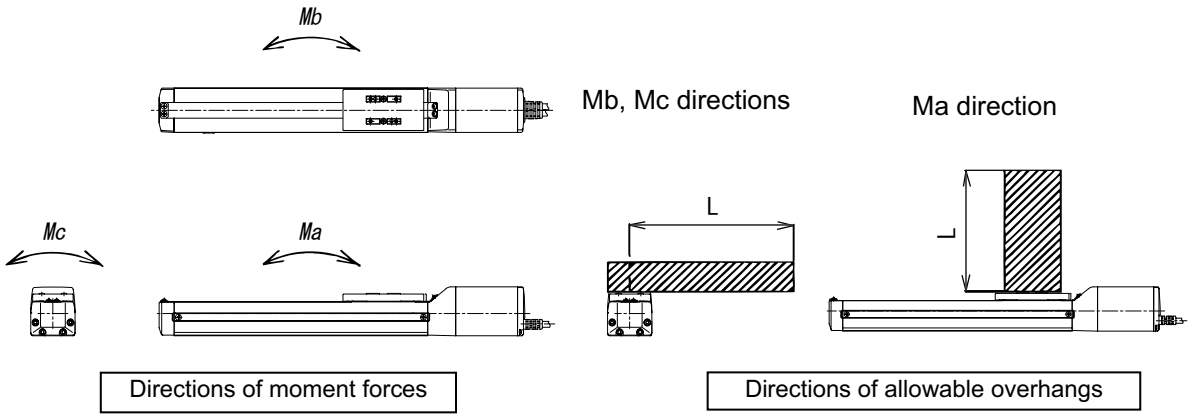
Dynamic allowable load moments

Model	Ma	Mb	Mc
SA5C, R	18.6 N• m (1.9 kgf•m)	26.6 N• m (2.7 kgf•m)	47.5 N• m (4.8 kgf•m)
SA6C, R	38.3 N• m (3.9 kgf•m)	54.7 N• m (5.6 kgf•m)	81.0 N• m (8.3 kgf•m)
SA7C, R	50.4 N• m (5.1 kgf•m)	71.9 N• m (7.3 kgf•m)	138.0 N• m (14.1 kgf•m)
SS7C, R	79.4 N• m (8.1 kgf•m)	79.4 N• m (8.1 kgf•m)	172.9 N• m (17.6 kgf•m)
SS8C, R	198.9 N• m (20.3 kgf•m)	198.9 N• m (20.3 kgf•m)	416.7 N• m (42.5 kgf•m)
HS8C, R	198.9 N• m (20.3 kgf•m)	198.9 N• m (20.3 kgf•m)	416.7 N• m (42.5 kgf•m)

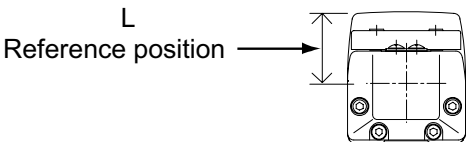
Dynamic allowable load moments

Model	Ma	Mb	Mc
SA5C, R	150 mm or less	150 mm or less	150 mm or less
SA6C, R	220 mm or less	220 mm or less	220 mm or less
SA7C, R	230 mm or less	230 mm or less	230 mm or less
SS7C, R	300 mm or less	300 mm or less	300 mm or less
SS8C, R	450 mm or less	450 mm or less	450 mm or less
HS8C, R	450 mm or less	450 mm or less	450 mm or less

- The allowable overhang values are based on a configuration where the center of gravity of the load mounted on the actuator corresponds to 1/2 of the overhang length.



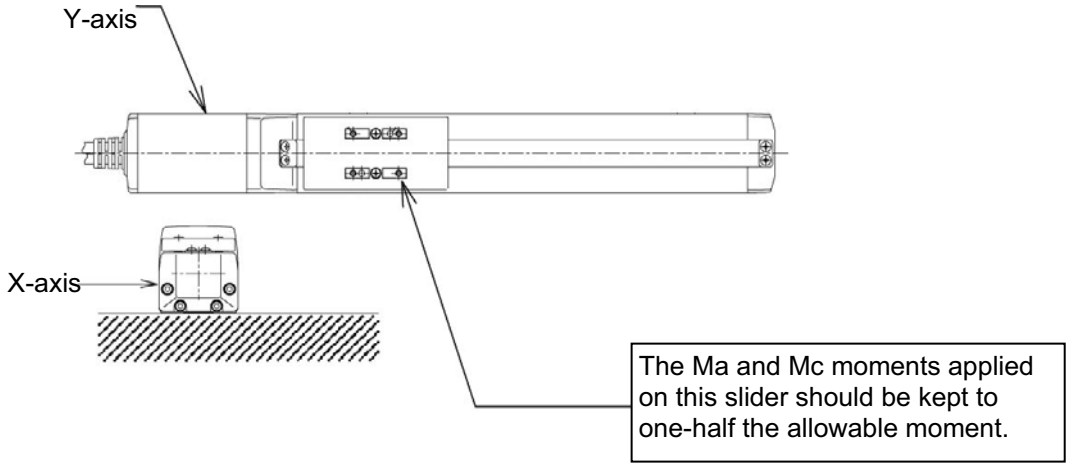
(Note) To calculate the moments in Ma and Mc directions, offset the reference position by L mm from the top surface of the slider, as shown in the figure below.



	L
SA5C, R	39 mm
SA6C, R	40 mm
SA7C, R	43 mm
SS7C, R	36 mm
SS8C, R	48 mm
HS8C, R	48 mm

⚠ Caution: Make sure the length of the load installed on the actuator does not exceed the allowable overhang load length (L). If the allowable overhang load length is exceeded, vibration may generate or the settling time may become longer. If the actuator is used at load moments exceeding the allowable values, not only the life of the guide will become shorter, but other undesirable effect may occur, as well, such as vibration or longer settling time.

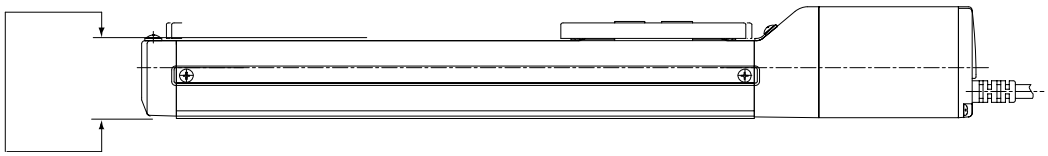
The body of the base warps easily when the actuator is used as the Y-axis in an X-Y overhang setup. In this case, use the actuator so that the Ma and Mc moments are kept to one-half the allowable moment or less (see the figure below).



⚠ Caution: Allowing the slider to receive an excessive load moment will shorten the service life of the guides. If the allowable overhang length is exceeded, vibration may generate or the service life of the guides may be reduced.

(7) Actuator Precision

[1] Actuator installation surface
Parallelism of the actuator installation surface (bottom surface of the base) and load installation surface (top surface) at an arbitrary stroke position: 0.1 mm or less



[2] Traveling parallelism when the actuator is installed (affixed on a flat, smooth surface*1): 0.05 mm/m or less

Condition: The above values have been measured at 20°C. *1 Parallelism: 0.05 mm/m or less

3. Life

One factor that affects the traveling life of an actuator is “Rated Load.”
There are two types of rated loads: “Static Rated Load” and “Dynamic Rated Load.”

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

Manufacturers of guides indicate the life of each guide by a dynamic rated load based on a probability of survival (no damage to the guide) of 90% after 50 km of traveling.
With industrial equipment, however, dynamic rated loads must be defined based on longer traveling distance of 5,000 km to 10,000 km given the moving speed, operating ratios and other operating conditions of these equipment.
Also note that guides are generally designed with a sufficient life against radial loads. Moment loads that are applied at positions away from the guide center are most damaging to guides.

The traveling life is calculated by assuming that the actuator travels 5,000 km or 10,000 km while receiving the allowable load moment, based on a load coefficient of 1.2.
[For the allowable dynamic load moment, refer to 2, “Specifications.”]

- Models with traveling life of 5,000 km
  RCP2- SA5C, SA6C, SA7C, SA5R, SA6R, SA7R
  RCP2CR-SA5C, SA6C, SA7C
- Models with traveling life of 10,000 km
  RCP2-SS7C, SS8C, HS8C
  RCP2CR-SS7C, SS8C, HS8C

The formula for calculating the allowable dynamic load moment corresponding to a traveling life of 5,000 km is shown below. If the traveling life is 10,000 km, replace “5000 km” in the formula with “10000 km”:

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

C_{IA} : Allowable dynamic load moment
fw : Load coefficient (= 1.2)
M_{50} : Dynamic rated moment based on 50 km of traveling and probability of survival of 50%

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

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

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

4. Installation and Storage/Preservation Environment

4.1 Installation Environment

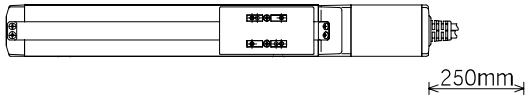
The actuator should be set up in an environment, which meets the following criteria:

- Avoid direct sunlight.
- Avoid radiant heat from strong heat sources such as a furnace.
- Ambient temperature should be 0 ~ 40˚C.
- The humidity should be less than 85% and there should be no condensation.
- Avoid exposure to corrosive or combustible gases.
- The area should have very little dust and be suitable for normal assembly operations.
- Avoid exposure to oil mist or fluids used in cutting.
- The unit should not be subject to impacts or vibrations.
- Avoid extreme electromagnetic waves, ultraviolet rays and radiation.
- This product is not intended to be used in a chemical environment.

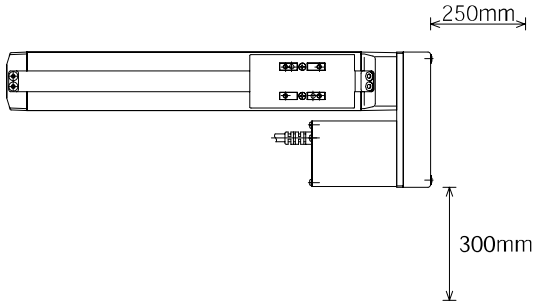
In general, the environment should be one in which an operator can work without protective gear.

Work space needed for maintenance/inspection

[Motor coupling type]



[Motor reversing type]



4.2 Storage/Preservation Environment

The storage/preservation environment should be similar to the installation environment. In addition, you must take precautions against condensation if the unit is to be stored for a long period of time. Unless there are special instructions, we do not include moisture absorption agents when shipping the unit. If you are storing the unit where condensation might occur, then you must treat the entire package or treat the unit itself after it is unpacked to prevent condensation. The unit can withstand up to 60°C during a short storage/preservation interval but only up to 50°C if the storage/preservation period is longer than one month.

5. Installation

The method to install your actuator in a mechanical system is explained.

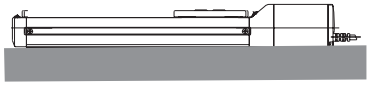
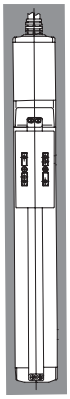
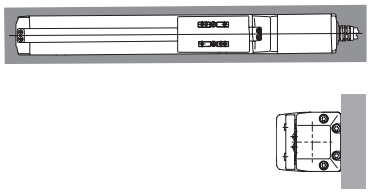
5.1 Installation

Install the actuator as explained below, as a rule.
Pay attention to these items when installing the actuator (except for custom-order models).

○: Installable △: Daily inspection is required x: Not installable

Horizontal installation	Vertical installation	Sideway installation	Ceiling mount installation
○	○	△	△

Installation postures

Horizontal	Vertical	Sideway	Ceiling mount
			

⚠ Caution: 1. When the unit is installed vertically oriented, attempt to put the motor up unless there is a special reason. Putting the motor on the lower side would not cause a problem in an ordinary operation. However, it may rarely cause a problem, when it is not operated for a long period, depending on the surrounding environment (especially high temperature), caused by the grease being separated and the base oil flowing into the motor unit.

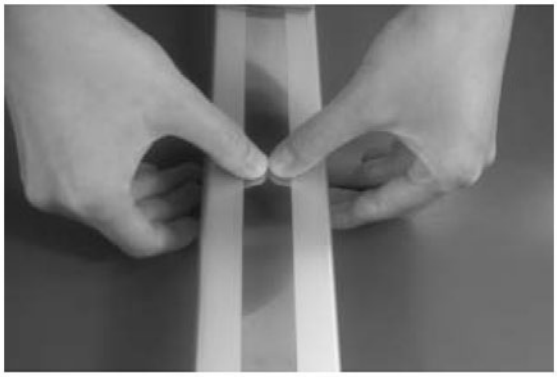
2. The clean room types listed below cannot be guaranteed to meet Cleanliness Class 10 if they are installed in the vertical orientation, the horizontally wall mounted orientation or in the ceiling mounted orientation since they do not possess a structure to grip the stainless steel sheet from the side cover.
Please contact us if it is necessary to install the following models in an orientation other than the horizontal orientation.
Actuator Model : RCP2CR-SA5C, RCP2CR-SA6C

3. 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 9,8 “Replacing/Adjusting the Stainless Sheet.”]

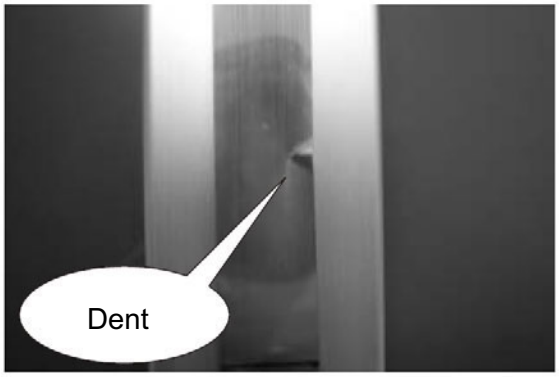
5.2 Notes on Installation

The stainless sheet is designed very thin (thickness: approx. 0.1 mm) in order to ensure flexibility. Therefore, the stainless sheet is easily dented or scratched. Once dented or scratched, the stainless sheet may break during use.
When installing the stainless sheet, pay attention to the following points:

1. Do not press the sheet directly with hands



2. Protect the sheet from dents by paying attention not to drop tools and work parts onto the sheet.



3. Do not allow powder dust or iron powder to generate around the stainless sheet.
   If generation of powder dust/iron powder cannot be fully prevented, wipe the stainless sheet after the operation to remove all particles attached to the sheet.
   If the actuator is operated with the stainless sheet carrying foreign particles, the particles may enter the slider and damage the sheet or cause the sheet to deform, lift or present other problems.
   The stainless sheet is held in place by means of magnets. If ambient air contains iron powder or other magnetic substances, they may attach to the magnets and cause problems. Pay attention to the surrounding environment and take appropriate measures, if necessary.

5.3 Installing the Main Body

Mount the actuator to a machined surface or one of the flat surfaces of comparable precision.

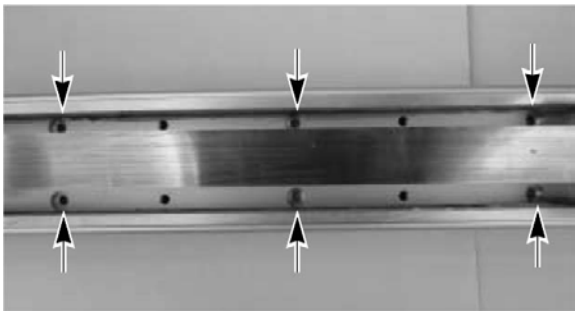
The side faces and lower surface of the base run parallel with the guides. When traveling precision is required, use these as the reference planes for mounting.

5.3.1 Using the Tapped Holes at Back of the Base (All Types)

Tapped holes are provided on the back of the base for mounting the actuator. Install the actuator using these tapped holes. The effective depths of base mounting screws are listed below. Be careful not to let the ends of bolts project from the holes. If necessary, use the additional reamed holes that are provided for positioning purposes.

Type	Tap Size	Screw Effective Depth	Reamed Hole
SA5C	M4	4mm or more and 7mm or less	∅4H7, depth 5 mm or less
SA6C	M5	5mm or more and 9mm or less	∅4H7, depth 5 mm or less
SA7C	M5	5mm or more and 9mm or less	∅4H7, depth 5 mm or less
SS7C	M5	5mm or more and 8mm or less	∅4H7, depth 5 mm or less
SS8C	M8	8mm or more and 10mm or less	∅5H7, depth 5 mm or less
HS8C	M8	8mm or more and 10mm or less	∅5H7, depth 5 mm or less

5.3.2 Using the Mounting Holes on Top of the Base (SA5C, SA6C, SA7C)



Through holes are provided in the base for installing the actuator on its top face.
When installing the actuator, remove the side covers.
(Remove the two thin-head screws [M3 x 6 mm] for mounting the cover using an Allen wrench of 1. 5 mm across flats.)
When securing with bolts, protect the stainless sheet from dents or damage by making sure not to drop bolts or tools onto the stainless sheet or contact them with it.

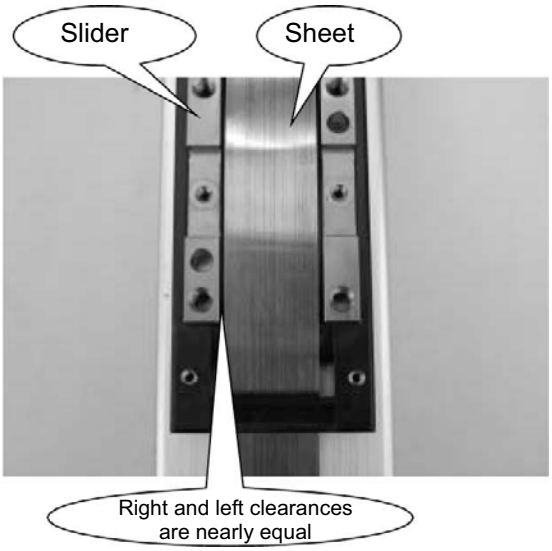
As for mounting bolts, use hexagon socket-head bolts conforming to the applicable specification in the table below in accordance with the machine frame material.

Type	When the mating material is steel	When the mating material is aluminum	Mounting Hole (Reference)
SA5C	M4 × 10	M4 × 15	∅4.5 drill, ∅8 counterbore depth 4.5
SA6C	M4 × 10	M4 × 15	∅4.5 drill, ∅8 counterbore depth 4.5
SA7C	M5 × 10	M4 × 15	∅6 drill, ∅9.5 counterbore depth 5.5

⚠ Note: When reinstalling the side covers, do not let them contact the end faces of the stainless sheet. This may damage or bend the stainless sheet, causing the sheet to deteriorate or wear quickly. Therefore, install the side covers and check for bending according to the procedure below.

[1] To prevent the side covers from contacting the end faces of the sheet, insert a shim (approx. 0.1 to 0.2 mm) between the sheet and each cover to provide a slight allowance, and gently push in the cover.

[2] Remove the slider covers and check to see that the right and left clearances between the slider and sheet are nearly equal and no bending is created.



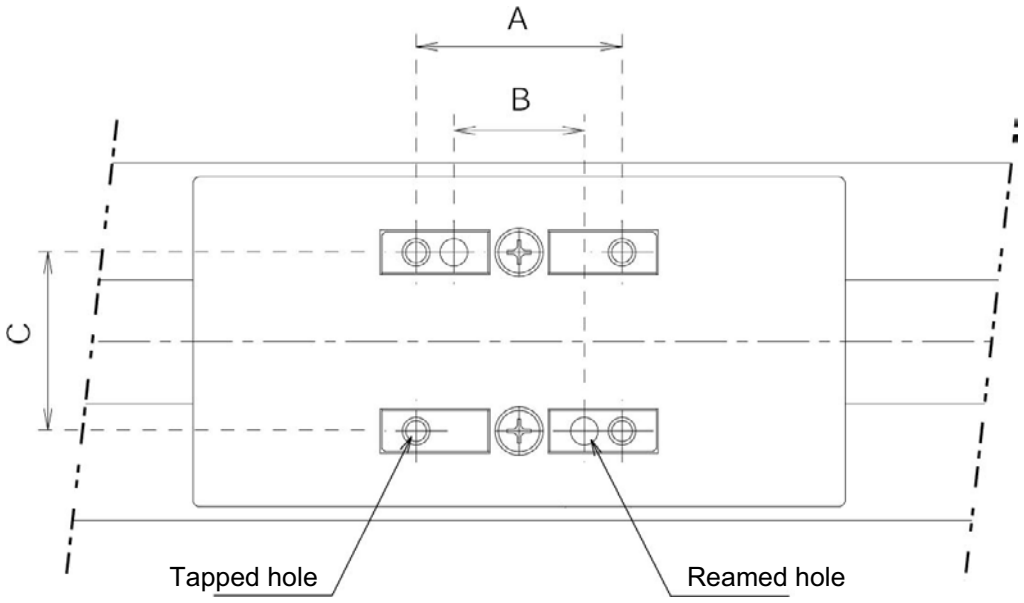
[3] Finally, move the slider back and forth several times along the entire stroke to check that the slider does not contact the sheet.

5.4 Installing the Load to the Slider

- Tapped holes are provided on the slider for installing the load. The method of clamping varies according to how to mount the main body.
- In case of moving the main body with the slider secured, use the same tapped holes on the slider.
- Please use two reamed holes on the slider when repeatability of mounting and dismounting is required. When fine adjustment of the squareness is necessary, use only one reamed hole to allow adjustment.

Sizes and depths of tapped holes and reamed holes on slider

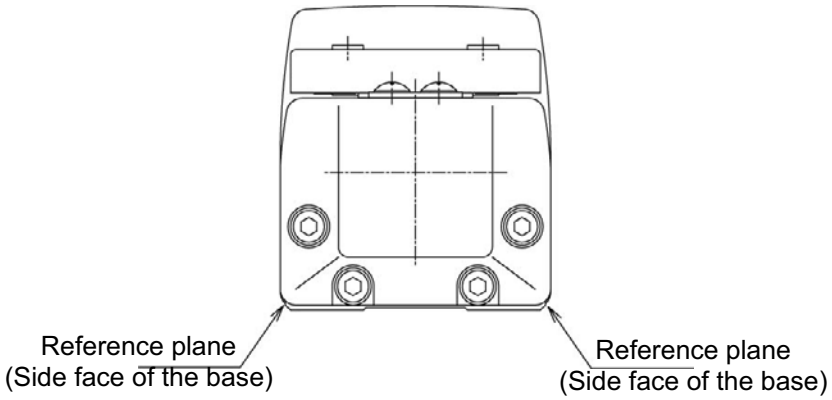
Model	Tap size	Depth of thread	A	B	C	Reamed hole size
SA5C	M4	9 mm	30 mm	19 mm	26 mm	∅4H7, depth 6 mm
SA6C	M5	9 mm	50 mm	32 mm	31 mm	∅5H7, depth 6 mm
SA7C	M5	10 mm	50 mm	32 mm	39 mm	∅5H7, depth 10 mm
SS7C	M5	10 mm	50 mm	32 mm	32 mm	∅5H7, depth 10 mm
SS8C	M8	10 mm	75 mm	45 mm	45 mm	∅8H7, depth 10 mm
HS8C	M8	10 mm	75 mm	45 mm	45 mm	∅8H7, depth 10 mm



⚠ Caution: When installing the load, do not allow adhesives, paints or other viscous substances to attach to the stainless sheet. Also, avoid applying a concentrated force that will dent the sheet. It may cause the slider to malfunction or damage the sheet.

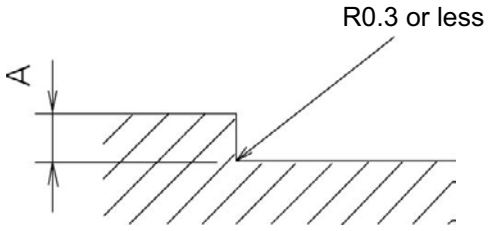
5.5 Reference Surface and Mounting Surface

- The mounting table should have sufficient rigidity to avoid generating vibration.
- The surface where the actuator will be mounted should be machined or be equally level and the flatness tolerance between the actuator and the table should be within 0.05 mm.
- Provide sufficient space around the actuator to permit maintenance work to be performed.
- The side and bottom faces of the actuator base provide the reference planes for slider travel.
- When traveling precision is required, use these surfaces as the reference planes for mounting.



> ⚠ Caution: As shown above, the side faces of the base provide the reference planes for slider travel. When precision is required, use these surfaces as the reference planes for mounting.

When using the base as the reference planes for mounting the actuator to the machine frame, follow the machining dimensions shown below.



Model	Dimension A (mm)
SA5C	2 to 3.5
SA6C	2 to 3.5
SA7C	2 to 5
SS7C	2 to 5
SS8C	2 to 5
HS8C	2 to 5

5.6 Clamp Screws

- The male screws for mounting the base should be M4 for SA5C, M5 for SS7C/SA6C/SA7C, and M8 for SS8C/HS8C. (Use hexagon socket-head bolts.)
- For the bolts, we recommend high strength bolts of ISO-10.9 or higher.
- When using a foot base to attach to a mounting table, use the special washer made for high strength bolts that comes with the actuator if the bolt is M8 or larger. This is unnecessary for M6 or smaller bolts. Do not use a common spring washer.

- The recommended screw torque is given below.

Screw Nominal Diameter	Screw Torque	
	When the bolt seating surface is steel	When the bolt seating surface is aluminum
M4	3.6 N·m (0.38 kgf·m)	1.8 N·m (0.18 kgf·m)
M5	7.3 N·m (0.74 kgf·m)	3.4 N·m (0.35 kgf·m)
M6	30.0 N·m (3.1 kgf·m)	11.5 N·m (1.17 kgf·m)

5.7 Cleanroom Specification

This actuator can deliver performance which ensures its operation in conformance with the requirements of cleanliness class 10 (0.1μm) by suctioning air into the suction joint. The recommended suction rate of each model at the maximum speed is specified below.

⚠ Caution: The clean room types listed below cannot be guaranteed to meet Cleanliness Class 10 if they are installed in the vertical orientation, the horizontally wall mounted orientation or in the ceiling mounted orientation since they do not possess a structure to grip the stainless steel sheet from the side cover.
Please contact us if it is necessary to install the following models in an orientation other than the horizontal orientation.
Actuator Model : RCP2CR-SA5C, RCP2CR-SA6C

5.7.1 Recommended Suction Rate

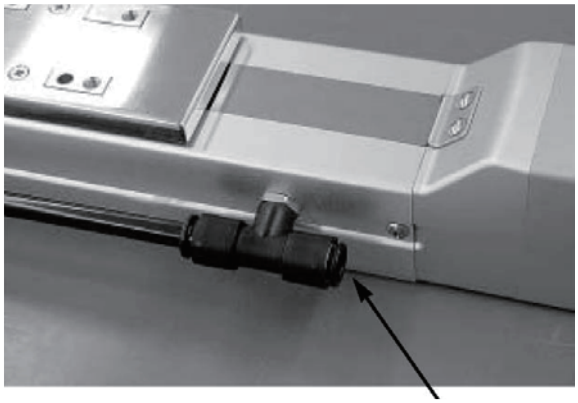
Model	Maximum speed	Suction rate (Nl/min)	Model	Maximum speed	Suction rate (Nl/min)
SA5C, lead 20 mm	1000 mm/s	80	SA7C, lead 16 mm	533 mm/s	40
SA5C, lead 12 mm	600 mm/s	50	SA7C, lead 8 mm	266 mm/s	70
SA5C, lead 6 mm	300 mm/s	30	SA7C, lead 4 mm	133 mm/s	30
SA5C, lead 3 mm	150 mm/s	15	SS7C, lead 12 mm	600 mm/s	50
SA6C, lead 20 mm	1000 mm/s	80	SS7C, lead 6 mm	300 mm/s	30
SA6C, lead 12 mm	600 mm/s	50	SS7C, lead 3 mm	150 mm/s	15
SA6C, lead 6 mm	300 mm/s	30	SS8C, lead 20 mm	666 mm/s	80
SA6C, lead 3 mm	150 mm/s	15	SS8C, lead 10 mm	333 mm/s	40
			SS8C, lead 5 mm	165 mm/s	20
			HS8C	1200mm/s	180

- If there is suction equipment, check its capacity. If there is no suction equipment, select suction equipment such as a vacuum pump and blower by referring to the values above.

5.7.2 Suction Joint

- As for the suction joint, a one-touch type is employed and its structure allows the joint to be easily connected with a commercial air tube.

Model	Joint type	Tube outer diameter
SA5C	KAT08-U01 (SMC)	∅**8**
SA6C		
SA7C		
SS7C		
SS8C	KAT12-U03 (SMC)	∅**12**
HS8C		



Air tube connecting port

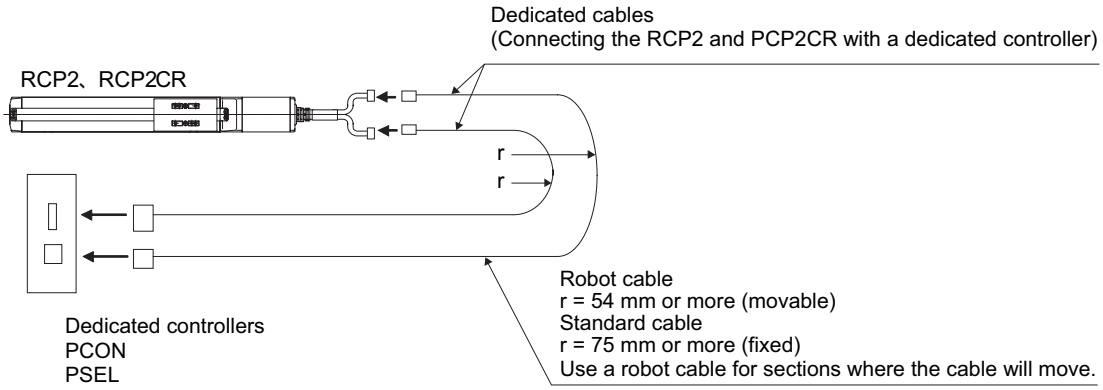
6. Connection with Controllers

6.1 Wiring

- In an application where the cable cannot be anchored, try to place the cable so that it sags only under its own weight or use self-standing type cable as large radial wire duct to limit the load on the cable.
- Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length.
- The cables supplied with the actuator offer excellent flexibility, but they are not robot cables.
- If the cables are to be stored in a movable cable duct (cable track, etc.), use robot cables.

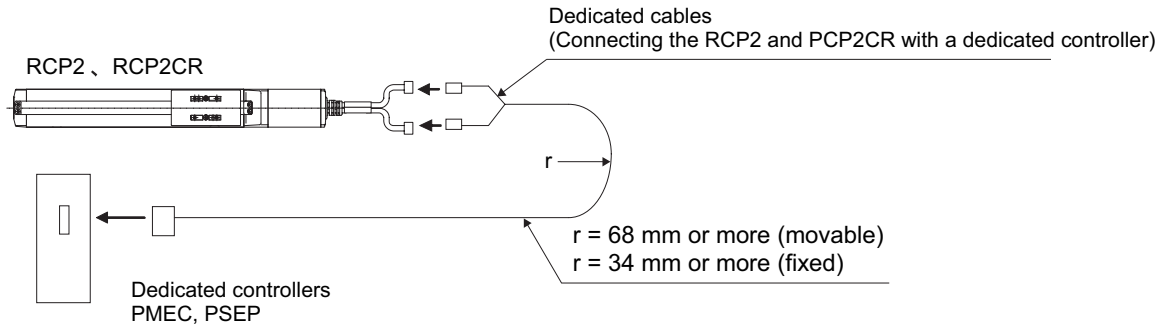
For cable modification, please contact your IAI sales representative.

[Connection with PCON/PSEL Controllers]



Dedicated cables
- Motor cable (Robot cable) CB-RCC-MA
- For RCP2-HS8C, HS8R and RCP2CR-HS8C Motor cable CB-RFA-MA***
  Encoder cable CB-RCS2-PB*** / Encoder cable • Robot cable CB-RCP2-PB***-RB
- For RCP2-HS8C, HS8R and RCP2CR-HS8C
  Encoder cable CB-RFA-PA*** / Encoder cable • Robot cable CB-RFA-PA***-RB
  *** indicates the cable length. A desired length up to 20 m can be specified.
  Example) 080 = 8 m

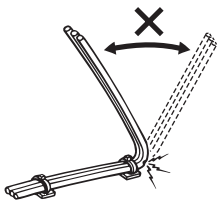
[Connection with PMEC/PSEP Controllers]

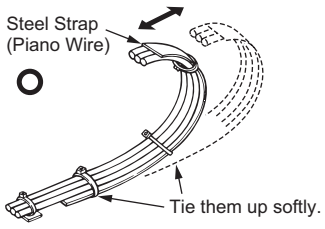


Dedicated cables
- Motor encoder cable CB-PSEP-MPA***
  *** indicates the cable length. A desired length up to 20 m can be specified.
  Example) 080 = 8 m

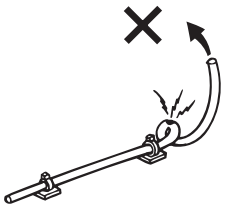
Warning: For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure,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

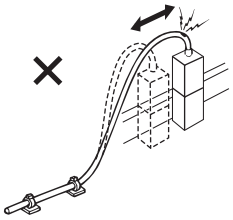




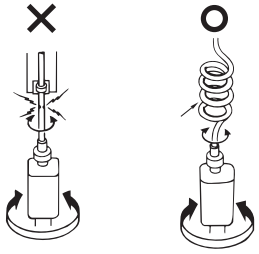
- Do not let the cable bend, kink or twist.



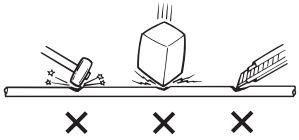
- Do not pull the cable with a strong force.



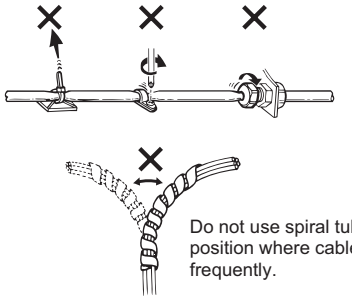
- Pay attention not to concentrate the twisting force to one point on a cable.



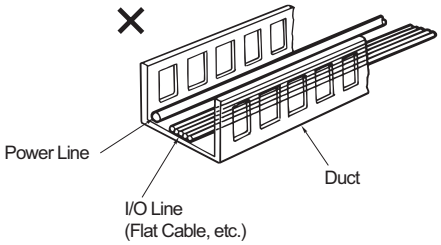
- Do not pinch, drop a heavy object onto or cut the cable.



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

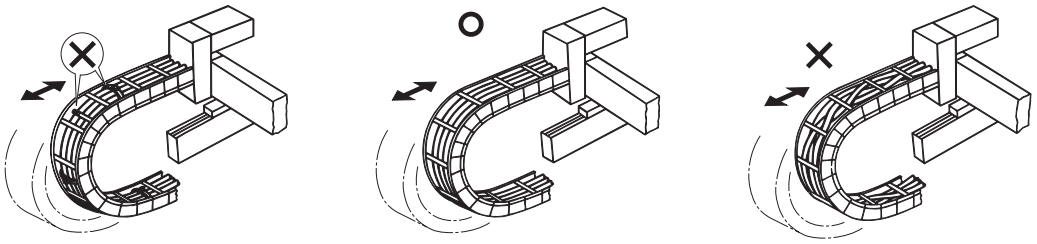


- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable track.

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



7. Options

7.1 Brake

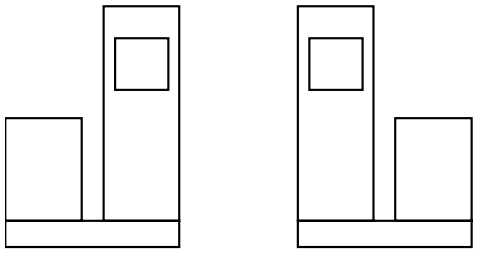
The brake is a retention mechanism that prevents the slider, when installed vertically, from dropping and thereby damaging the attached load when the power or servo is turned off.
The brake option must be selected for every axis that will be used vertically.
The model number for this option is “B,” “BE,” “BL” or “BR.”

7.2 Reversed Home Specification

When the reversed home specification is selected, the home is set on the front side. The model number for this option is “NM.” To change the direction of home on the delivered actuator, the moving direction parameter, etc., must be adjusted. Consult IAI for details.

7.3 Motor Reversing at Left, Motor Reversing at Right

“ML” indicates that the motor reverses on the left side as viewed from the motor, while “MR” indicates that the motor reverses on the right side.
These options can be specified for motor reversing types such as the SA5R, SA6R, SA7R, SS7R, SS8R and HS8R.



7.4 Slider Roller Specification

The slider structure is changed to the same roller structure adopted by the clean room specification.
The model number for this option is “SR.”

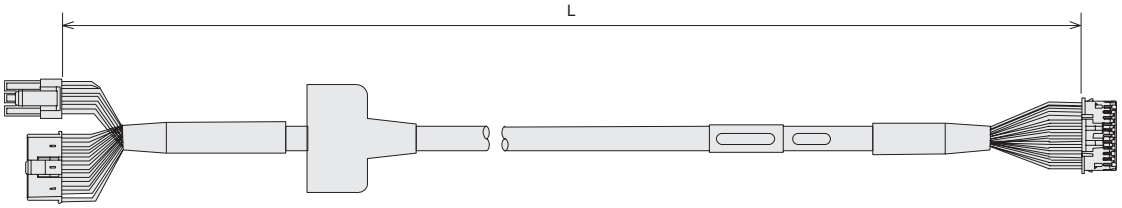
7.5 Suction Joint on Opposite Side

Standard clean room actuators come with a suction joint set on the left side as viewed from the motor. With this option, this joint is set on the front (opposite) side.
The model number for this option is “VR.”

8. Motor/Encoder Cable

8.1 PMEC/PSEP Controller Cables

[1] Integrated motor/encoder cable CB-PSEP-MPA***



Mechanical end

Controller end

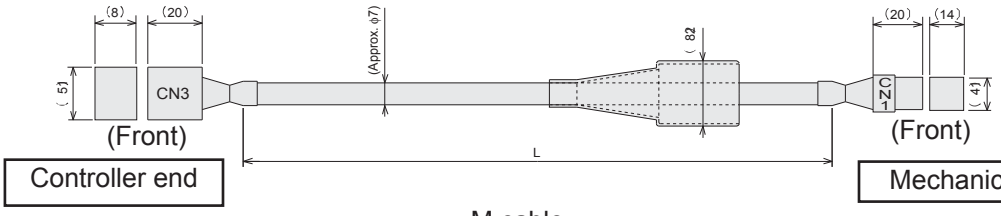
Mechanical end Terminal number		Controller side Terminal number
1	Black [ΦA]	1
2	White[VMM]	2
4	Red [ΦB]	3
5	Green [VMM]	4
3	Brown [Φ/A]	5
6	Yellow [Φ/B]	6
16	Orange[BK+]	9
17	Gray [BK-]	10
5	NC	11
6	NC	12
13	Black [LS+]	7
14	Brown [LS-]	8
1	White [A+]	13
2	Yellow [A-]	14
3	Red [B+]	15
4	Green [B-]	16
10	White (identification tape) [VCC]	17
11	Yellow (identification tape) [VPS]	18
9	Red (identification tape) [GND]	19
12	Green (identification tape) [(Spare)]	20
15	NC	21
7	NC	22
8	NC	23
18	Shield[FG]	24

* **** indicates the cable length.
Max. 20m.

Example) 080 = 8 m
[Minimum bending radius]
Movable: 84 mm
Fixed: 42 mm

8.2 PCON/PSEL Controller Cables

[1] Motor cable CB-RCP2-MA***



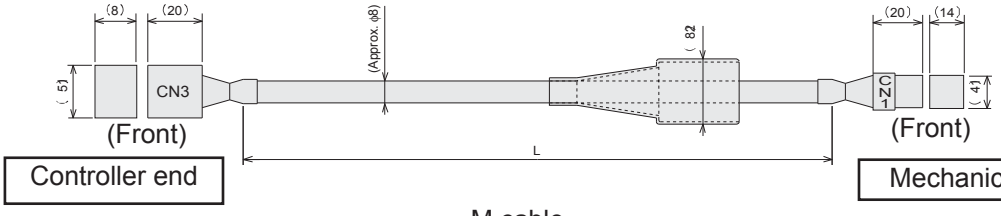
CN3 M cable CN1

I-1318119-3 (AMP)	Orange	$\overline{A}$	A1	1	A	Yellow	SLP-06V (JST)
	Gray	VMM	A2	2	VMM	Gray	
	White	$\overline{B}$	A3	3	$\overline{A}$	Orange	
	Yellow	A	B1	4	B	Yellow (Green)	
	Pink	VMM	B2	5	VMM	Pink	
	Yellow (Green)	B	B3	6	$\overline{B}$	White	

* *** indicates the cable length.
Max. 20m.

Example) 080 = 8 m
[Minimum bending radius]
Movable: 42 mm
Fixed: 28 mm

[2] Motor cable CB-RFA-MA***
(for RCP2-HS8C, HS8R and RCP2CR-HS8C)



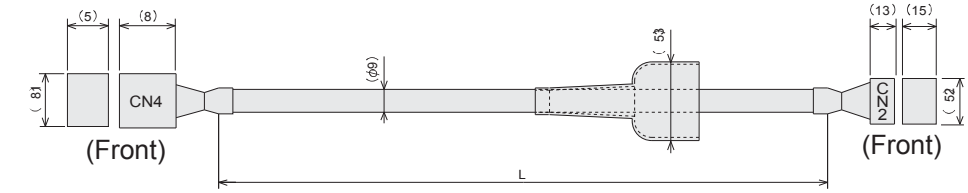
CN3 M cable CN1

I-1318119-3 (AMP)	Orange	$\overline{A}$	A1	1	A	Yellow	SLP-06V (JST)
	Gray	VMM	A2	2	VMM	Gray	
	White	$\overline{B}$	A3	3	$\overline{A}$	Orange	
	Yellow	A	B1	4	B	Yellow (Green)	
	Pink	VMM	B2	5	VMM	Pink	
	Yellow (Green)	B	B3	6	$\overline{B}$	White	

* *** indicates the cable length.
Max. 20m.

Example) 080 = 8 m
[Minimum bending radius]
Movable: 47 mm
Fixed: 31 mm

[3] Encoder cable CB-RCP2-PB ***
Encoder robot cable CB-RCP2-PB ***-RB



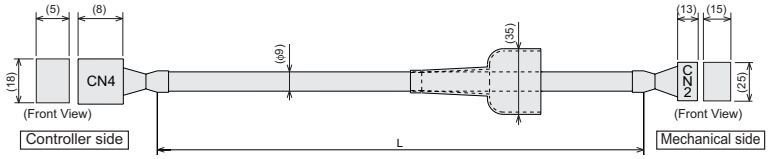
CN4	Cable color		Signal code	Pin No.
	Standard cable	Robot cable		
SV61-RDHP (JST)	Blue (red1)	Orange (Black 2)	LS +	16
	White	Orange (Red 2)	LS −	15
	Red	Orange (Black 1)	BK +	14
	Gray	Orange (Red 1)	BK −	13
	Brown	Light Gray (Black 1)	ENA	12
	Green	Light Gray (Red 1)	ENA	11
	Purple	White (Black 1)	ENB	10
	Pink	Orange (Red 1)	ENB	9
	—	—	—	8
	Yellow	Yellow (Black 1)	VPS	7
	Orange	Pink(Red 1)	VBB	6
	Blue	Pink(Black 1)	GND	5
	—	—	(N.C)	4
	—	—	(N.C)	3
	—	—	(N.C)	2
	Ground	Ground	F.G	1

Shield cable
Ground wire

Pin No.	Signal code	Cable color		CN2
		Standard cable	Robotcable	
1	ENA	Brown	Light Gray (Black 1)	V81-PMX (JST)
2	$\overline{ENA}$	Green	Light Gray (Red 1)	
3	ENB	Brown	White(Black 1)	
4	$\overline{ENB}$	Pink	White(Red1)	
5	—	—	—	
6	—	—	—	
7	—	—	—	
8	—	—	—	
9	GND	Blue	Pink(Black 1)	
10	VBB	Orange	Pink(Red1)	
11	VPS	Yellow	Yellow(Black 1)	
12	—	—	—	
13	LS +	Blue(Red1)	Orange (Black 2)	
14	LS −	Yellow	Orange (Red2)	
15	—	—	—	
16	BK +	Red	Orange (Black 2)	
17	BK −	Gray	Orange (Red2)	
18	F.G	Ground	Ground	

* *** indicates the cable length.
Max. 20m.
Example) 080 = 8 m
[Minimum bending radius]
Robot cable
Movable: 54 mm
Standard cable
Fixed: 75 mm

[4] Encoder cable CB-RFA-PA***
Encoder Robot Cable CB-RFA-PA***-RB
(for RCP2-HS8C, HS8R and RCP2CR-HS8C)



CN2

Cable Color		Signal Name	Pin Name
Robot Cable	Standard Cable		
—	—	(Reserved)	16
—	—	(Reserved)	15
OR(BK1)	RD	BK+	14
OR(RD1)	GY	BK–	13
LGY(BK1)	BR	ENA	12
LGY(RD1)	GN	$\overline{ENA}$	11
WT(BK1)	PL	ENB	10
WT(RD1)	PK	$\overline{ENB}$	9
—	—	(Reserved)	8
YW(BK1)	YW	VPS	7
—	—	—	6
PK(BK1)	BL	GND	5
PK(RD1)	OR	5V	4
—	—	—	3
—	—	—	2
Drain	Drain	F.G	1

Housing : PHDR-16VS (J.S.T. Mfg.)
Contact : SPHD-001T-P0.5

CN1

Pin Name	Signal Name	Cable Color	
		Standard Cable	Robot Cable
1	ENA	BR	LGY(BK1)
2	$\overline{ENA}$	GN	LGY(RD1)
3	ENB	PL	WT(BK1)
4	$\overline{ENB}$	PK	WT(RD1)
5	–	—	—
6	–	—	—
7	–	—	—
8	–	—	—
9	GND	BL	PK(BK1)
10	–	—	—
11	VPS	YW	YW(BK1)
12	5V	OR	PK(RD1)
13	–	—	—
14	–	—	—
15	–	—	—
16	BK+	RD	OR(BK1)
17	BK–	GY	OR(RD1)
18	F.G	Drain	Drain

Housing : XMP-18V (J.S.T. Mfg.)
Contact : BXA-001T-P0.6
Retainer : MS-09V

* *** indicates the cable length.
Max. 20m.
Example) 080 = 8m
[Minimum bendable radius]
Robot Cable
Movable Use : 54mm
Standard Cable
Fixed Use : 75mm

9. Maintenance and Inspection

9.1 Inspection Items and Schedule

Perform maintenance work according to the schedule below.

The schedule is set assuming eight hours of operation a day. When the operation time is long such as 24-hour operation, shorten the maintenance intervals as needed.

	Visual inspection	Check interior	Grease supply*2
Start of operation	○		
After 1 month of operation	○		
After 6 months of operation	○	○	○*1
After 1 year of operation	○	○	○
Every 6 months thereafter	○		
Every 1 year	○	○	○

*1 If grease is found degraded as a result of interior check, add grease.
*2 If continuous back-and-forth operations are performed over a distance of 30 mm or less, grease film may be broken. As a guide, operate the actuator back and forth five times or so over a distance of 50 mm or more after every 5,000 to 10,000 cycles.

9.2 Visual Inspection of the Machine Exterior

Check the following items when carrying out visual inspection.

Body	Loose mounting bolts?
Cables	Damage to cables or connection to connector box?
Stainless sheet	Damage, foreign deposit or slacks?
General	Unusual noise or vibrations?

- If the stainless sheet is slacked, make adjustment as deemed necessary to remove the slacks.
- As a rough guide, the stainless sheet will last for 5,000 km of traveled distance.
  However, the stainless sheet should be replaced earlier depending on the condition of use.
  The stainless sheet must be replaced at an IAI site (the actuator must be brought to IAI) or at the customer's site by IAI's service personnel, as a rule.
- If the actuator is fixed vertically, grease applied to the guide may drip depending on the environment. If this happens, clean and add grease as necessary.

9.3 Cleaning

- Clean the exterior as needed.
- Wipe off dirt with a soft cloth.
- Do not use strong compressed air on the actuator as this may force dust into the crevices.
- Do not use petroleum-based solvent on plastic parts or painted surfaces.
- If the unit is badly soiled, apply a neutral detergent or alcohol to a soft cloth, and wipe gently.

9.4 Adjusting the Stainless Sheet

If the actuator stroke is 400 mm or more, check the stainless sheet for slacking, etc., as needed. If the sheet is found slacked, adjust the stainless sheet.
[For the procedure to adjust the stainless sheet, refer to 9.8, “Replacing/Adjusting the Stainless Sheet.”]

9.5 Interior Inspection

Turn off the power, remove the side covers, and then visually inspect the interior.
Check the following items during interior inspection.

Body	Loose mounting bolts?
Guides	Lubrication appropriate? Soiling?
Ball screw	Lubrication appropriate? Soiling?

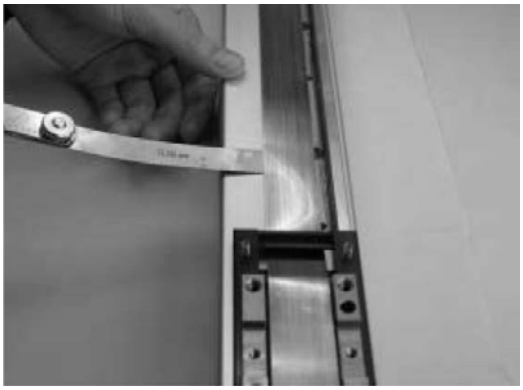
How to inspect the interior:

1) Remove both side covers.
   Use an Allen wrench of 1.5mm across flats for SA5C/SA6C/SA7C/SS7C or an Allen wrench of 2.00mm across flats for SS8C/HS8C.

Make a visual check of the interior to see if there is any dust or foreign matter in the unit and check the lubrication. Even if the grease you see around the parts is brown, the lubrication is fine as long as the traveling surface appears shiny.

2) If the grease becomes dirty and dull or if the grease has worn away due to extended operating time, lubricate the parts after cleaning them.

3) When the inspection/maintenance work is complete, install the side covers.
   Tightening torque: SA5C/SA6C/SA7C/SS7C: Thin-head screw M3 × 6 - 87.2 N·cm (8.90 kgf·cm)
   SS8C/HS8C: Thin-head screw M4 × 6 - 204 N·cm (20.8 kgf·cm)



When installing the side covers, do not let them contact the end faces of the stainless sheet. This may damage or bend the stainless sheet, causing the sheet to deteriorate or wear quickly. To prevent this problem, insert a shim (approx. 0.1 to 0.2mm) between the sheet and each cover between the sheet and each cover to provide a slight allowance, and gently push in the cover.

⚠ Caution: When checking the interior, be careful not to bend or scratch the stainless sheet. Wear protective gloves when handling the stainless sheet, because it has sharp edges that may cause accidental cuts.
The front cover is supporting the ball screw; so do not disassemble the front cover.
If the front cover is misaligned, the shaft centers may become offset, thus increasing the traveling resistance, reducing the service life of each part, or generating noise.

9.6 Internal Cleaning

- Wipe off dirt with a soft cloth.
- Do not use strong compressed air on the actuator as this may force dust into the crevices.
- Do not use petroleum-based solvent, neutral detergent or alcohol.

> ⚠ Caution: Do not use flushing oil, molybdenum grease or anti-rust lubricant.
> When grease is soiled with a large amount of foreign substances, wipe off the dirty grease and then apply new grease.

9.7 Adding Grease

9.7.1 Applicable Grease

[Other than Cleanroom Specification]

1) What Grease to Use on the Guides

The following grease is used when we ship the unit.

Idemitsu Kosan	Daphne Eponex Grease No.2

Other companies also sell a grease similar to this. If ordering from another maker, give the name of this product and request something comparable. Comparable products include the following:

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

(2) What Grease to Use on the Ball Screw

The following grease is used when we ship the unit.
This grease offers excellent properties such as low heat generation, and is suitable for lubricating ball screws.

Kyodo Yushi	Multemp LRL3

> ⚠ Caution: Never use any fluorine-based grease. It will cause a chemical reaction when mixed with a lithium-based grease and may cause damage to the actuator.

[Cleanroom Specification]

(1) What Grease to Use on the Guide and Ball Screw

For guides and ball screw, a urea-based grease of low-dust-raising type which has stable torque characteristics and superior lubrication performance as well as the anti-rust effect equivalent to that of a lithium-based grease is used. The following grease is used when we ship the unit:

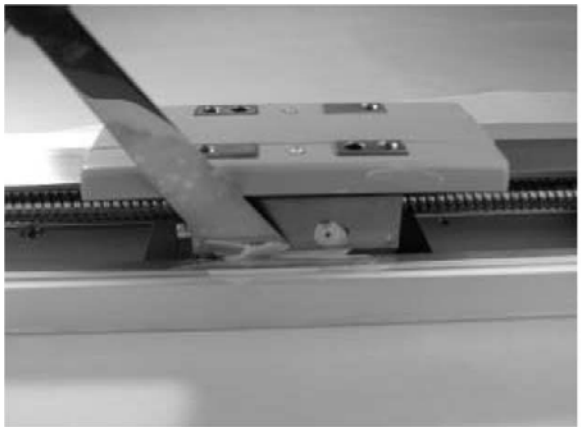
Kuroda Precision Industries	C Grease

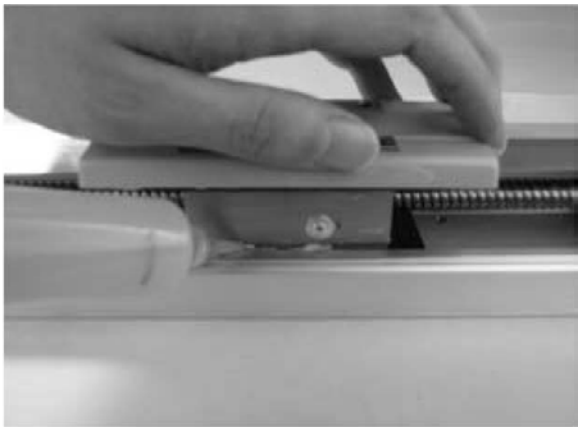
⚠ Warring: Never use any fluorine-based or lithium-based grease. It will cause the grease to lose its lubrication performance and may damage the actuator or reduce cleanliness performance when mixed with an urea-based grease.

⚠ Caution: Never use grease for the standard specification. It may allow dust to generate.

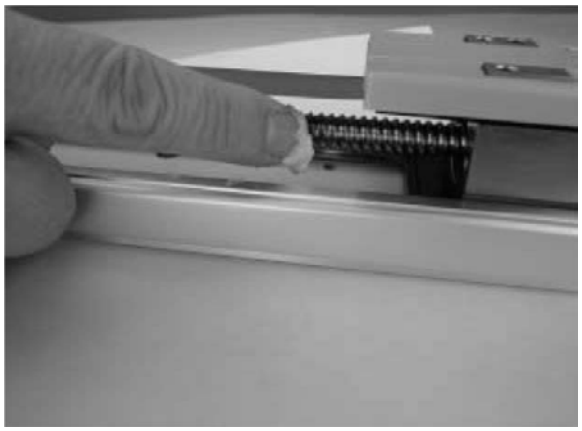
9.7.2 How to Apply Grease

1) When greasing the guide, use a spatula or grease applicator to squeeze or inject grease into the space between the slider and base, and then move the slider back and forth several times to let grease spread evenly.
   Apply grease on the guides on both sides.
   Remove excess grease.





2) When greasing the ball screw, clean the ball screw, apply grease using a finger, and then move the slider back and forth several times to let the grease spread evenly.
   At this time, be careful not to deform the stainless sheet by accidentally touching the sheet.
   Remove excess grease.



3) Install the side covers.

Tightening torque:	SA5C/SA6C/SA7C/SS7C:	Thin-head screw M3 × 6	87.2 N•cm (8.90 kgf•cm)
	SS8C/HS8C:	Thin-head screw M4 × 6	204 N•cm (20.8 kgf•cm)

   Refer to 3) in 9.5, “Interior Inspection,” for notes on installing the side covers.

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

9.8 Replacing/Adjusting the Stainless Sheet

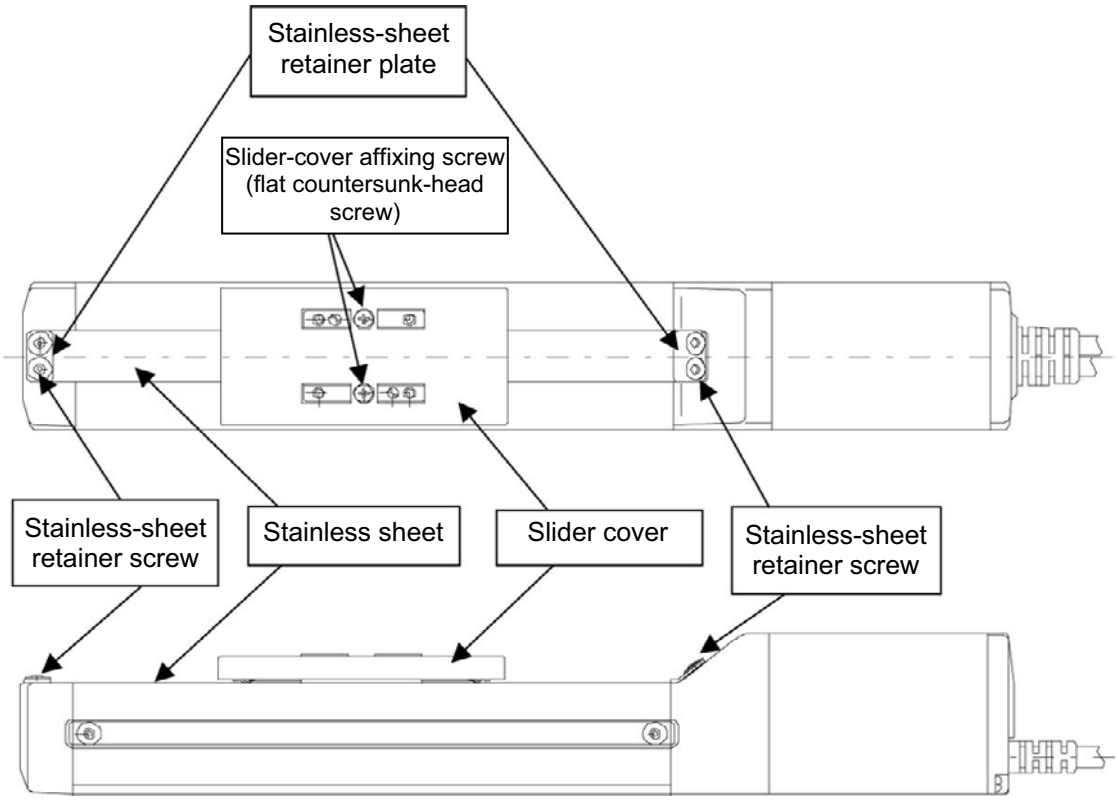
[Items Required for Replacement]

- Replacement stainless sheet
- Clearance-checking tool (a regular slider cover with holes)
  (This tool is available from IAI's Sales Engineering Section. If you are replacing the stainless sheet, please contact us to make a rental arrangement or purchase the tool.)
- Allen wrench set • Phillips screwdriver • Scale

[Note on Stainless Sheet Tension]

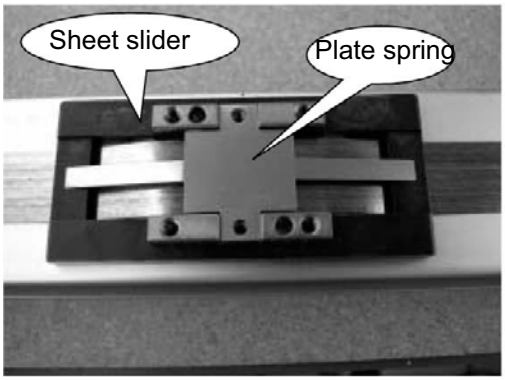
Deterioration and wear of the stainless sheet is affected by its tension.
If the stainless sheet is too tight, excessive clearances will be created between the sheet and slider covers and the sheet may undergo a fatigue failure.
If the stainless sheet is too loose, the sheet will contact the back of the slider covers and generate shaving.
Therefore, use a dedicated adjustment tool to properly adjust the tension of the stainless sheet so that the clearances between the stainless sheet and slider covers conform to the specified dimension.

[Names of Each Part]

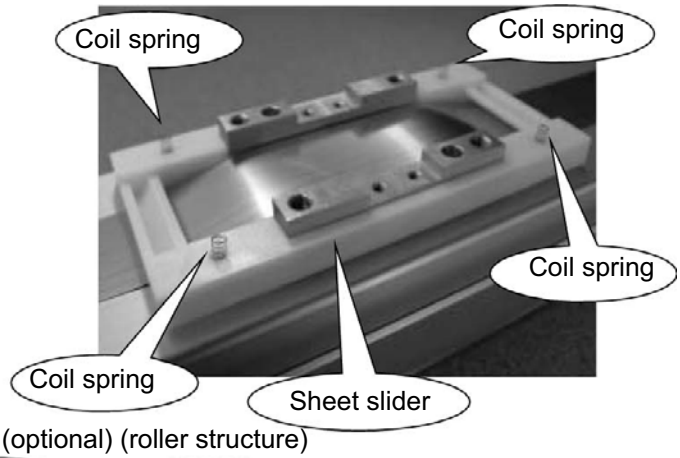


[Procedure]
1) Remove the slider-cover affixing screws and remove the covers.
   After the slider covers have been removed

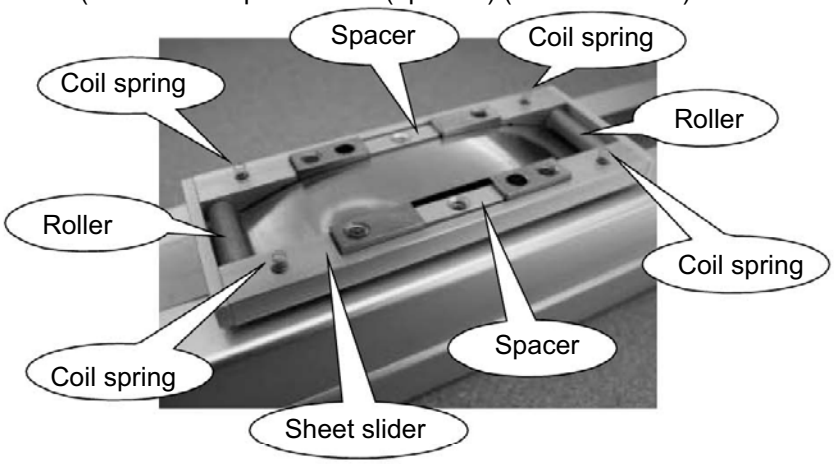
[1] Standard specification (slider structure)
• SA5C/SA6C



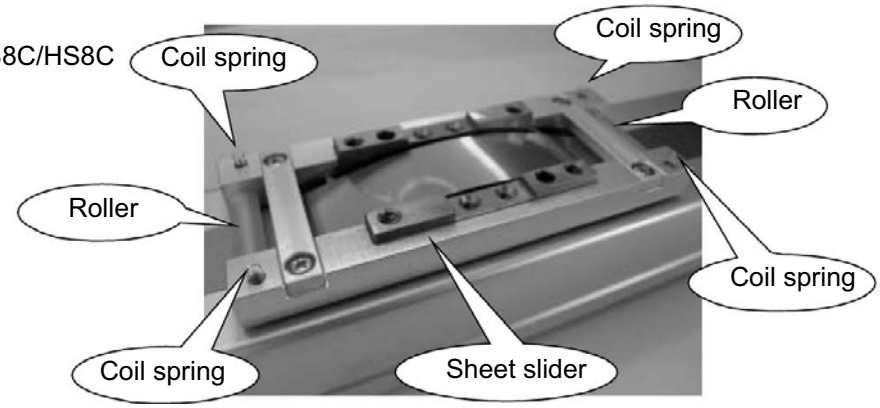
• SA7C/SS7C/SS8C/HS8C



[2] Cleanroom specification (Slider roller specification (optional) (roller structure)
• SA5C/SA6C

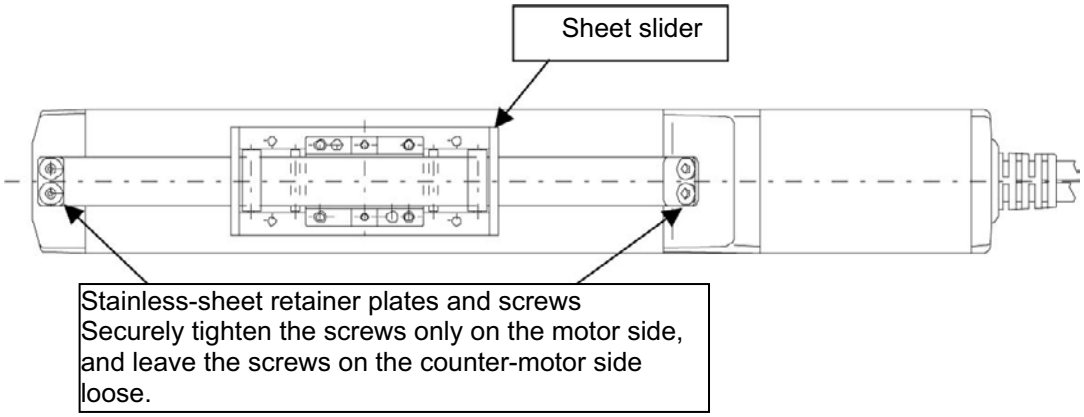


• SA7C/SS7C/SS8C/HS8C

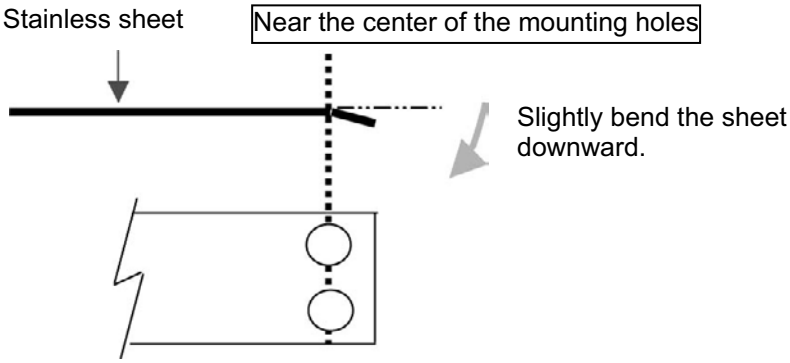


⚠ Caution:	Remove the slider covers slowly and gently. If the actuator is installed on the ceiling or oriented vertically or horizontally on its side, place a plastic bag, etc., underneath the slider covers so as not to lose the coil springs and spacers in case they drop off.

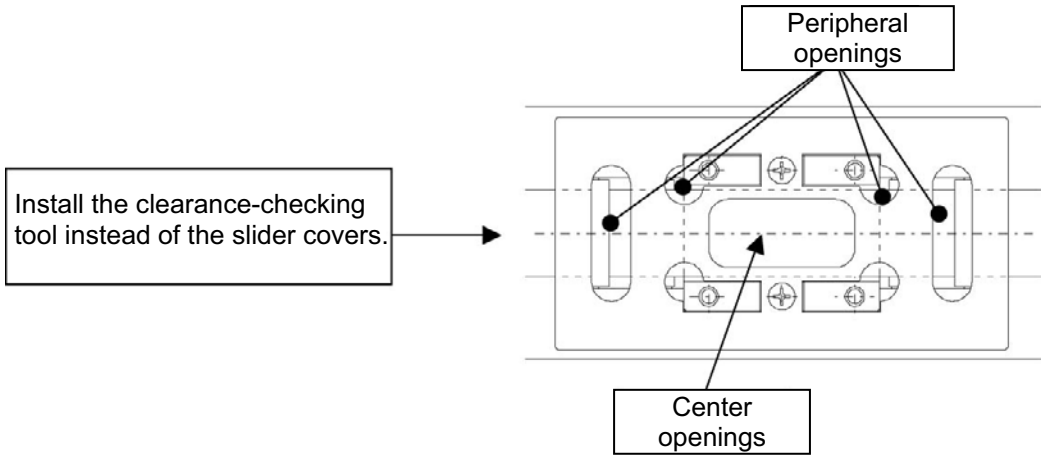
2) Remove the stainless-sheet retainer screws on both sides and pull out the stainless sheet.
3) Guide a new stainless sheet into the slider.
4) Hold the stainless sheet in place, and affix the retainer plates and screws.
   At this time, securely tighten the screws only on the motor side, and leave the screws on the counter-motor side loose.



●How to prevent the stainless sheet from lifting (SA5C/SA6C/SA7C)
Slightly bend the stainless sheet downward near the center of the mounting holes so that the sheet can be held securely.

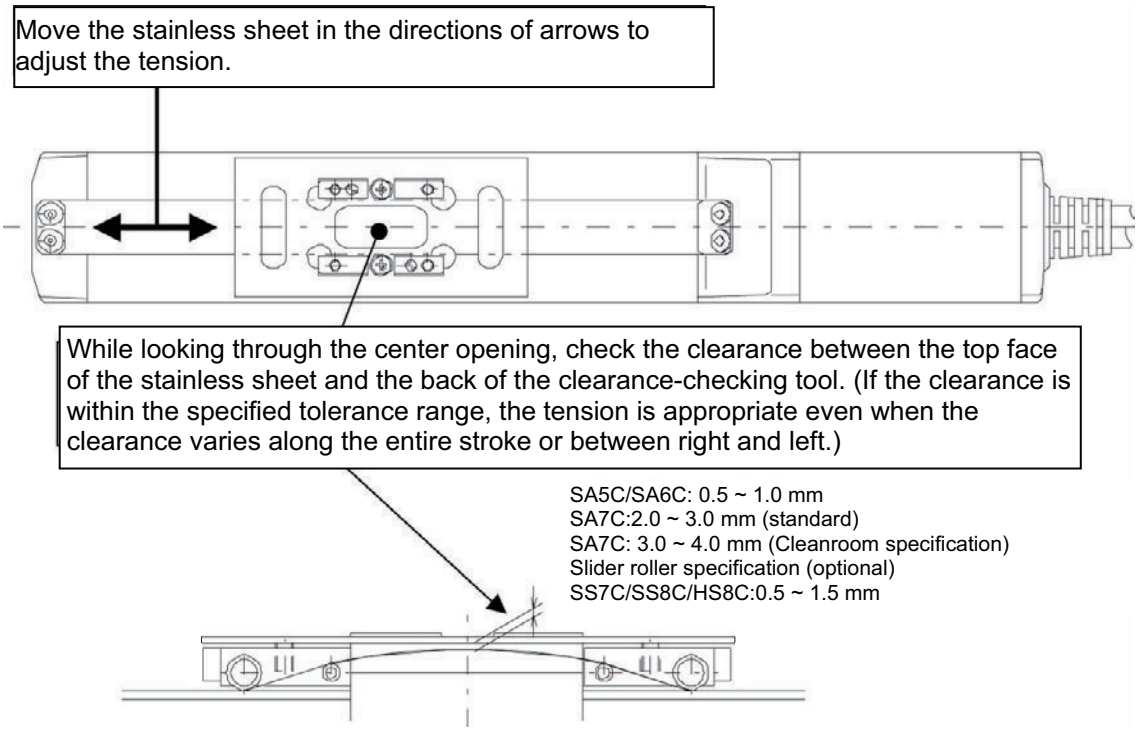


5) Install the clearance-checking tool.



6) Adjust the tension of the stainless sheet.

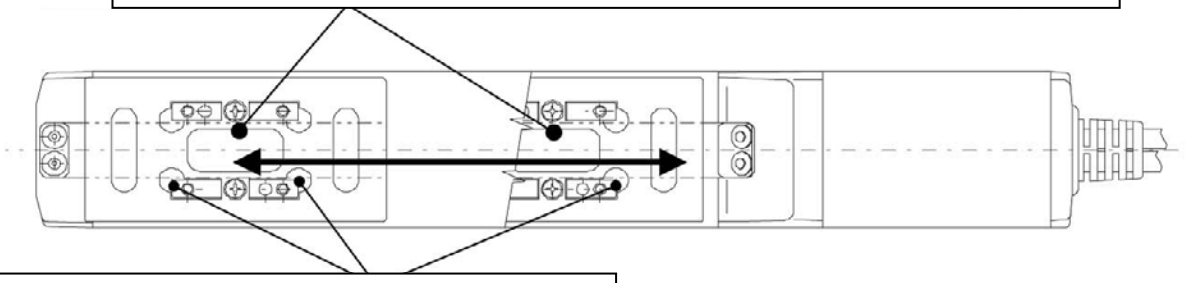
[1] While looking through the center opening in the clearance-checking tool, move the stainless sheet on the loose end in the directions of arrows until the clearance between the top face of the stainless sheet and the back of the clearance-checking tool falls within the specified range.



[2] When the stainless sheet has been properly positioned, tighten the screws on the loose end to a level that the stainless sheet no longer moves.

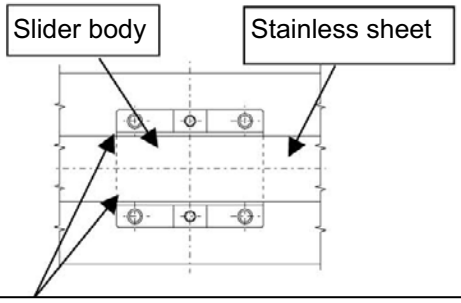
[3] Move the slider and check the tension of the stainless sheet along the entire stroke.

Checkpoint 1:
Check if the clearance between the top face of the stainless sheet and the back of the clearance-checking tool falls within the specified range along the entire stroke.



Checkpoint 2:
Look through the peripheral openings and confirm that the stainless sheet edges do not contact the slider body.
Move the slider back and forth at least three times over the entire stroke to ensure the edges do not contact the slider.
The sheet may move during the slider strokes, but slight movement is acceptable as long as the offset does not increase and the sheet does not contact the slider.
If the stainless sheet contacts the slider, repeat the adjustment from [1].

The stainless sheet is not perfectly straight, but it bends to the right and left slightly.
It is impossible to adjust the right and left clearances perfectly uniform.
Slight variation in clearance in the stroke direction or between the right and left is acceptable, as long as the stainless sheet edges do not contact the slider body over the entire stroke.

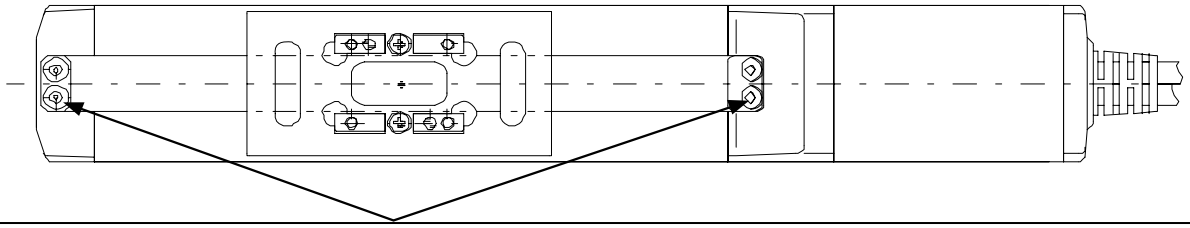


Clearances between stainless sheet edges and slider body

If the conditions in Checkpoints 1 and 2 are not satisfied, loosen the screws and readjust the position and tension of the stainless sheet again from [1].

⚠ Caution If the condition in Checkpoint 2 cannot be met after the readjustment, try installing the stainless sheet in the reverse direction or placing it upside down. If the stainless sheet is still not adjusted properly, replace it with a new sheet.

[4] When proper clearances are obtained between the slider body and stainless sheet and an absence of contact between the two is confirmed, tighten the two screws on the loose end alternately, and then finally tighten all screws to a uniform torque to securely affix the stainless sheet. If the screws are not tightened uniformly, the sheet may meander or lift.



Apply additional torque to the screws on both ends until the stainless sheet no longer moves.

Tightening torque:	SA5C/SA6C/SA7C/SS7C:	87.2 N·cm (8.90 kgf·cm)	(Standard)
		45.5 N·cm (4.64 kgf·cm)	(Cleanroom specification, Slider roller specification (optional)) [Reference value]
	SS8C/HS8C:	204 N·cm (20.8 kgf·cm)	(Standard)
		106 N·cm (10.8 kgf·cm)	(Cleanroom specification, Slider roller specification (optional)) [Reference value]

[5] Remove the clearance-checking tool and install the slider covers.

⚠ Caution: Again, make sure not to lose the coil springs and spacers.

9.9 Reduction Belt [Motor Reversing Type]:

SA5R, SA6R, SA7R, SS7R, SS8R, HS8R

9.9.1 Inspecting the Belt

Remove the pulley cover and visually inspect the belt.
Durability of the reduction belt is affected significantly by the operating condition, and there is no standard guideline as to when the belt should be replaced.
Generally, the belt is designed to withstand several millions of flexing loads.
As a practical guideline, replace the reduction belt when any of the conditions listed below are observed:

- The teeth and end faces of the belt have worn significantly.
- The belt has swollen due to deposits of oil, etc.
- Cracks and other damages are found on the teeth or back of the belt.
- The belt has broken.

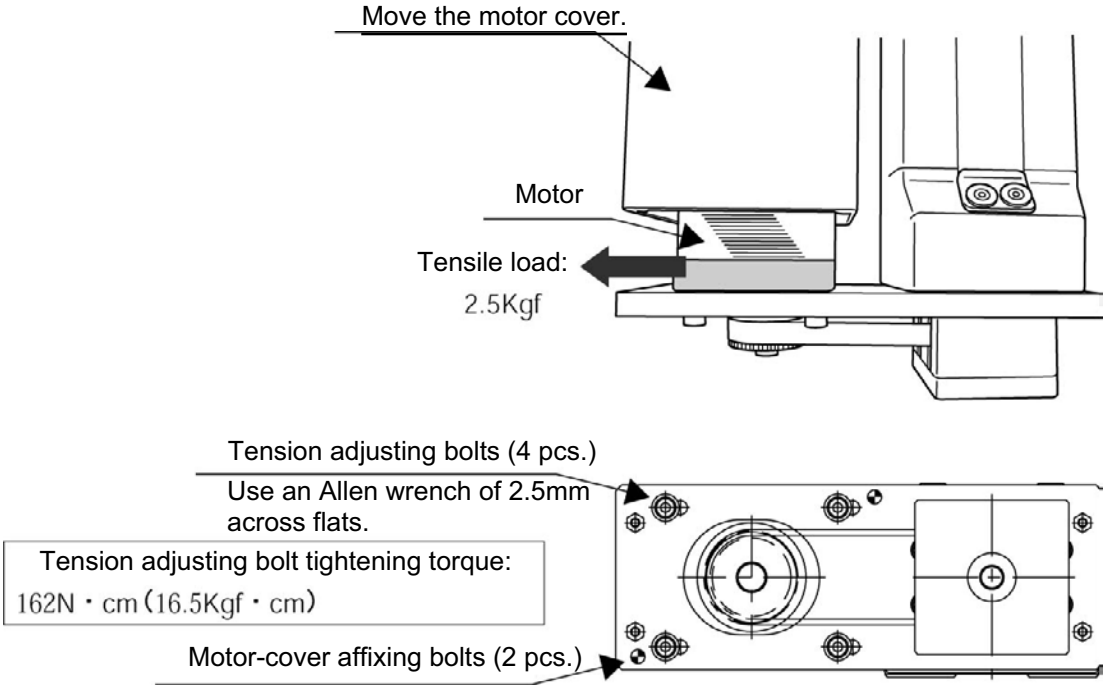
9.9.2 Applicable Belt

Manufacturer: Bando Chemical Industries
Model number: 60S2M184R: 6mm wide, Rubber STS cleanroom type specification (SA5R/SA6R)
150S3M255U: 15mm wide, Polyurethane rubber specification (SA7R)
100S3M219U: 10mm wide, Polyurethane rubber specification (SS7R)
150S3M252U: 15mm wide, Polyurethane rubber specification (SS8R/HS8R)

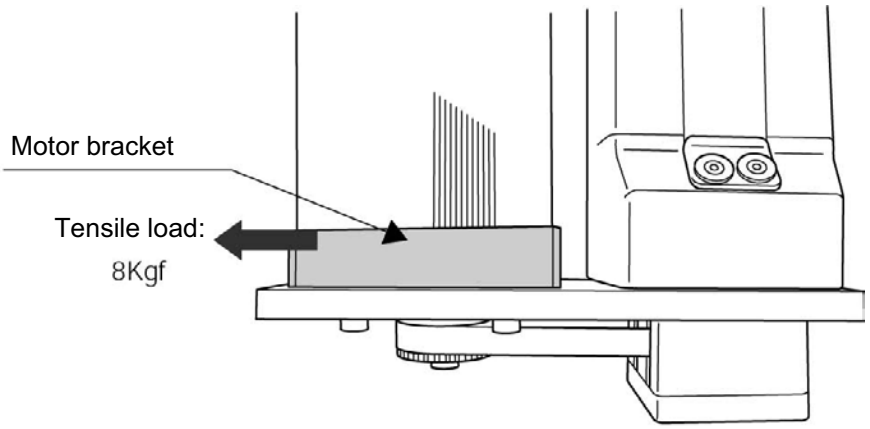
9.9.3 Adjusting the Belt Tension

Remove the pulley cover and loosen the four tension adjusting bolts. Apply a tensile load to the belt by moving the motor to the left and tighten the tension adjusting bolts.

●SA5R, SA6R

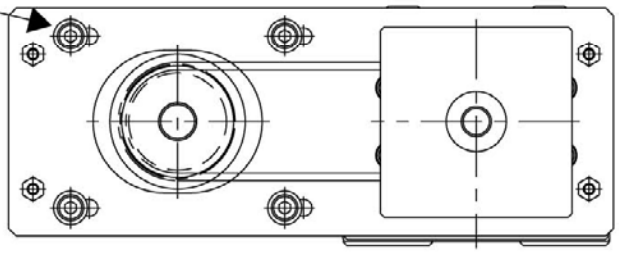


●SA7R



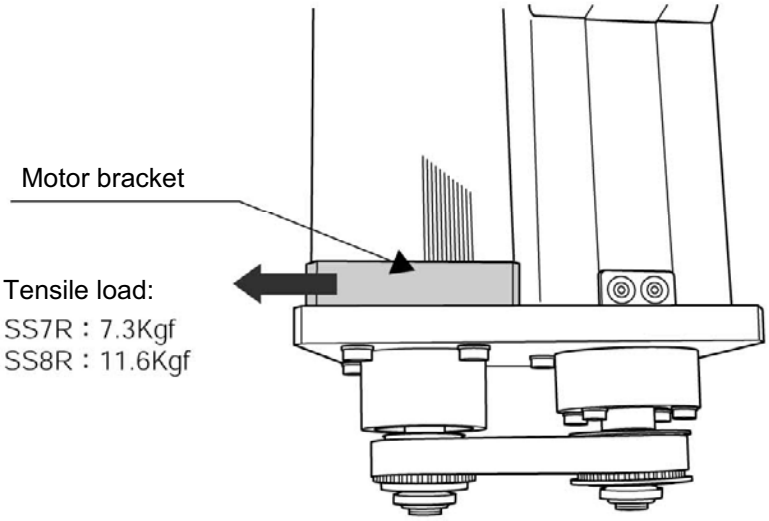
Tension adjusting bolts (4 pcs.)

Use an Allen wrench of 3mm across flats.



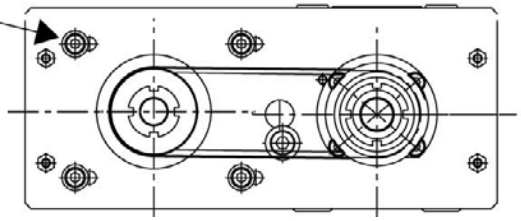
Tension adjusting bolt tightening torque:
323N・cm (33Kgf・cm)

●SS7R, SS8R, HS8R



Tension adjusting bolts (4 pcs.)

Use an Allen wrench of 3mm across flats.



Tension adjusting bolt tightening torque:
323N・cm (33Kgf・cm)

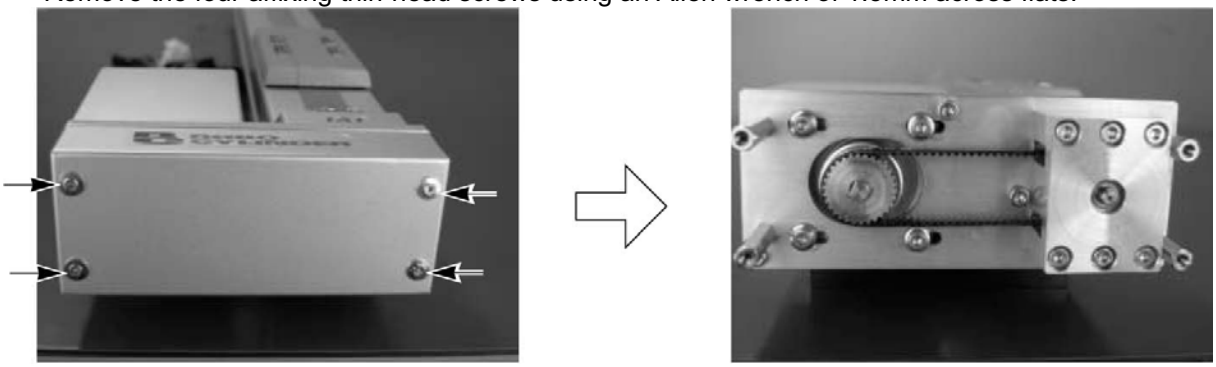
9.9.4 Replacing the Belt : SA5R, SA6R, SA7R, SS7R, SS8R, HS8R

●SA5R, SA6R

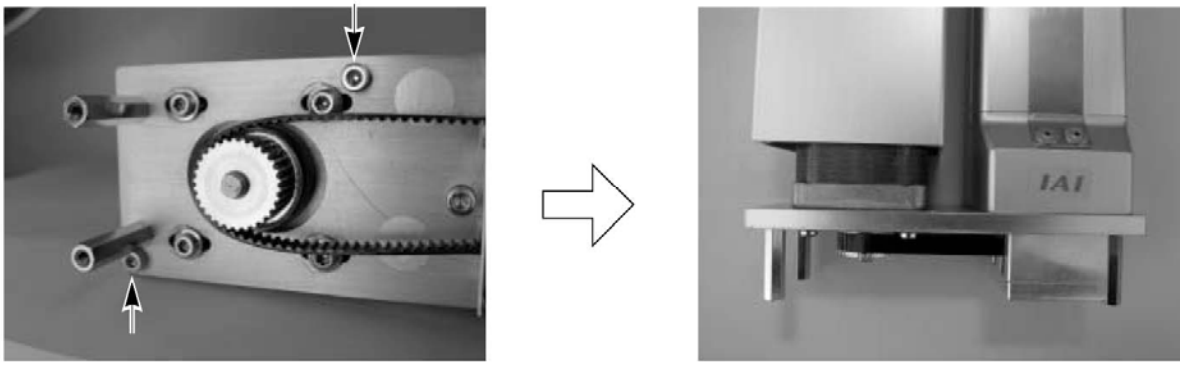
[Items Required for Replacement]
- Replacement reduction belt
- Allen wrench set
- Tension gauge (Capable of tensioning to 3kgf or greater)
- Strong string, looped (or long tie-band)

[Procedure]

1) Remove the pulley cover.
Remove the four affixing thin-head screws using an Allen wrench of 1.5mm across flats.

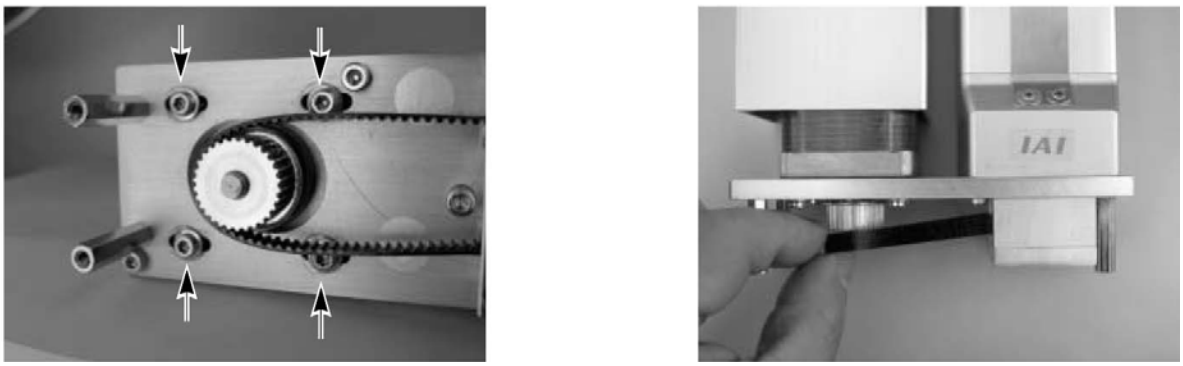


2) Pull out the two motor-cover affixing bolts and move the motor cover approx. 20mm.
(Use an Allen wrench of 2.5mm across flats.)

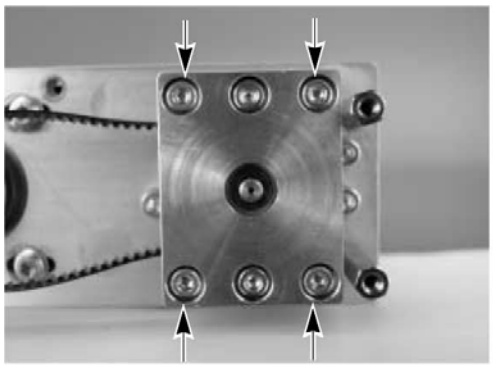


3) Loosen the four tension adjusting bolts to loosen the belt.

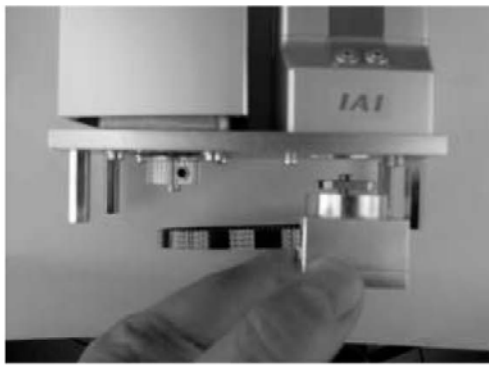
4) Remove the belt from the pulleys.
(Use an Allen wrench of 2.5mm across flats.)



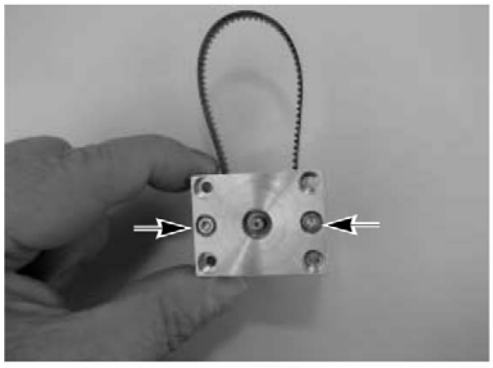
5) Remove the pulley assembly.
· Remove the four affixing bolts using an Allen wrench of 2.5mm across flats.

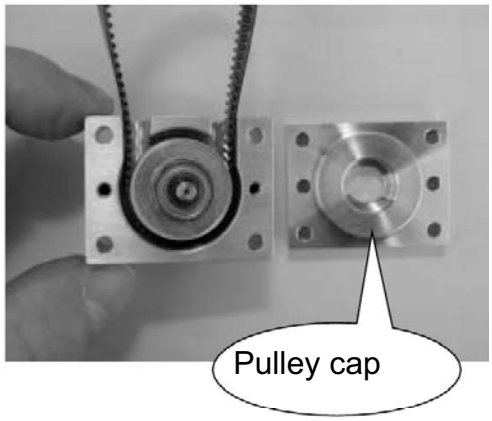


· Pull out the assembly by hand.

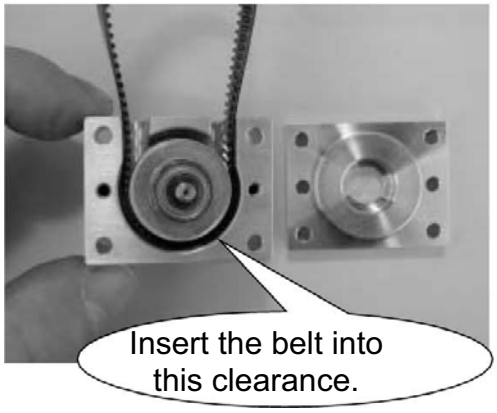


6) Remove the pulley cap.
· Remove the two affixing bolts using an Allen wrench of 2.5mm across flats.





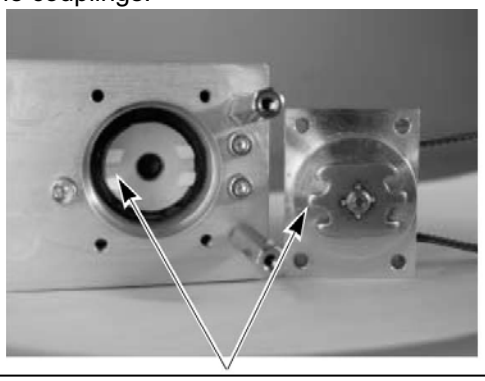
7) Pull out the belt and insert a new belt.



8) Attach the pulley cap.
Tighten the hexagon socket-head bolts (M3 x 8mm, 2 pcs.) using an Allen wrench of 2.5mm across flats.

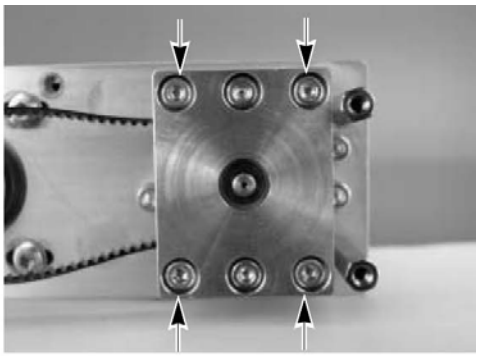
Tightening torque: 83 N·cm (8.47 kgf·cm)

9) Install the pulley assembly.
・Align the angles of projections and depressions on the couplings.



Align the angles of projections and depressions.

• Tighten the hexagon socket-head screws (M3 × 22, 4 pcs.) using an Allen wrench of 2.5 mm across flats.



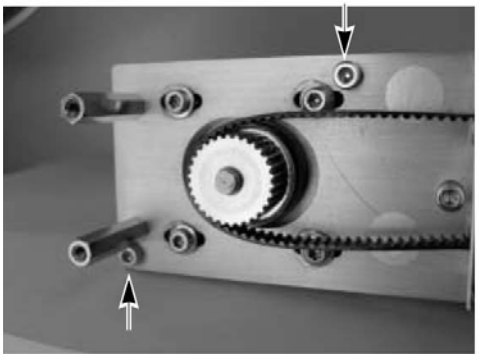
Tightening torque: 83 N·cm (8.47 kgf·cm)

10) Loop the belt over the pulleys.

11) Pass a looped strong string (or long tie-band) around the motor-end flange and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the adjusting bolts (hexagon socket-head bolts: M3 × 10, 4 pcs.).
(Use an Allen wrench of 2.5 mm across flats.)

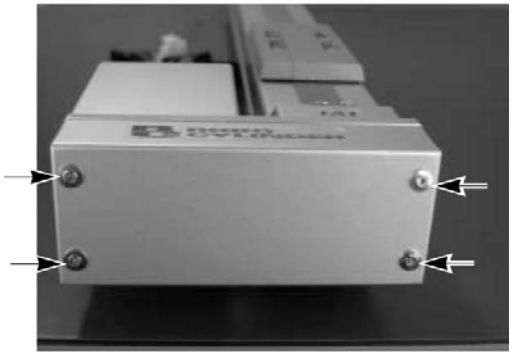
Tension: 2.5 kgf
Adjusting bolt tightening torque:
162 N·cm (16.5 kgf·cm)

12) Install the motor cover.
Tighten the hexagon socket-head screws (M3 × 12, 2 pcs.) using an Allen wrench of 2.5 mm across flats.



Tightening torque: 83 N·cm (8.47 kgf·cm)

13) Install the pulley cover.
Tighten the thin-head screws (M3 × 6, 4 pcs.) using an Allen wrench of 1.5 mm across flats.



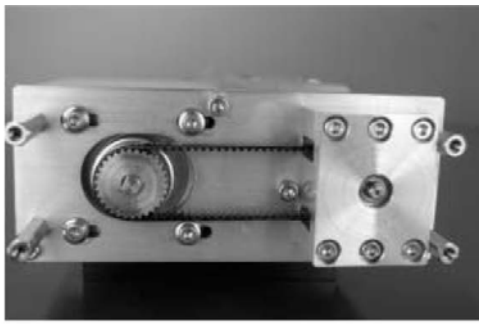
Tightening torque: 87.2 N·cm (8.90 kgf·cm)

●SA7R

[Items Required for Replacement]
- Replacement reduction belt
- Allen wrench set
- Tension gauge (Capable of tensioning to 8kgf or greater)
- Strong string, looped (or long tie-band)

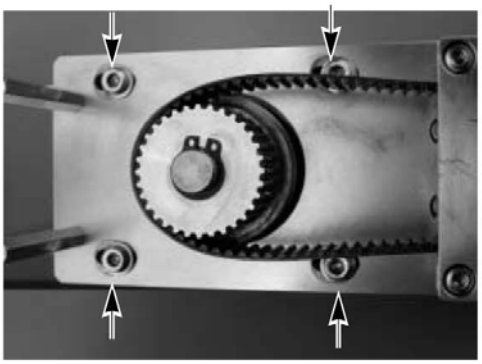
[Procedure]

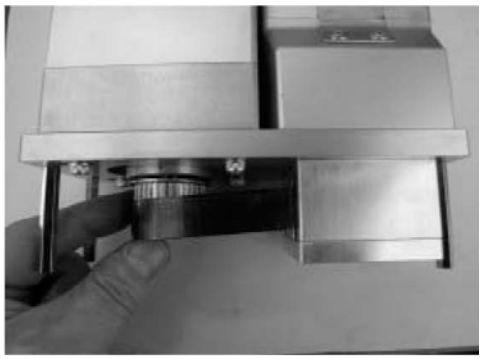
1) Remove the pulley cover.
Remove the four affixing thin-head screws using an Allen wrench of 1.5 mm across flats.



2) Loosen the four tension adjusting bolts to loosen the belt.
(Use an Allen wrench of 3 mm across flats.)

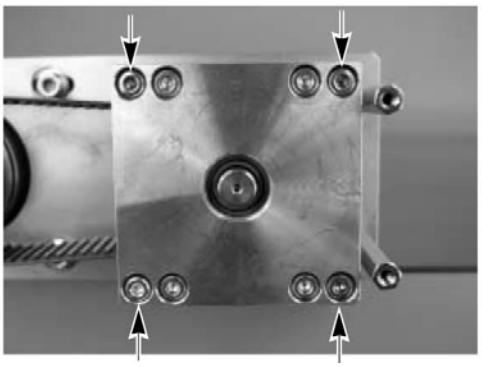
3) Remove the belt from the pulleys.

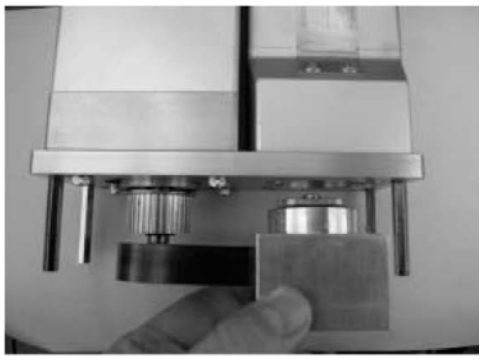




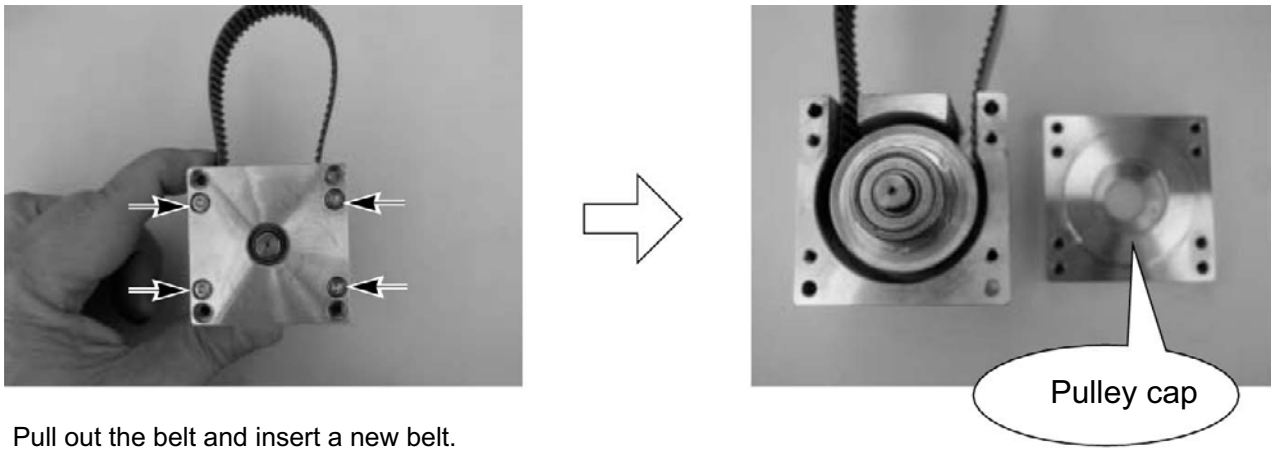
4) Remove the pulley assembly.
· Remove the four affixing bolts using an Allen wrench of 2.5 mm across flats.

· Pull out the assembly by hand.

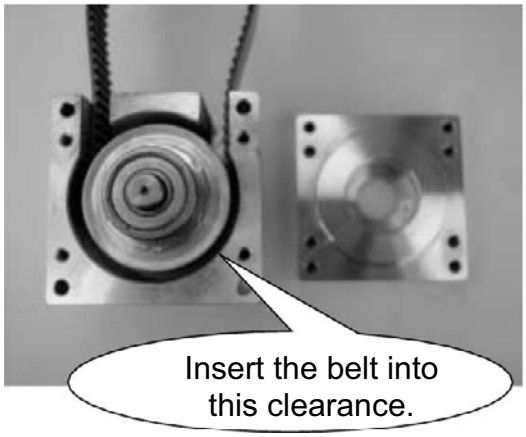




5) Remove the pulley assembly.
   • Remove the four affixing bolts using an Allen wrench of 2.5 mm across flats.



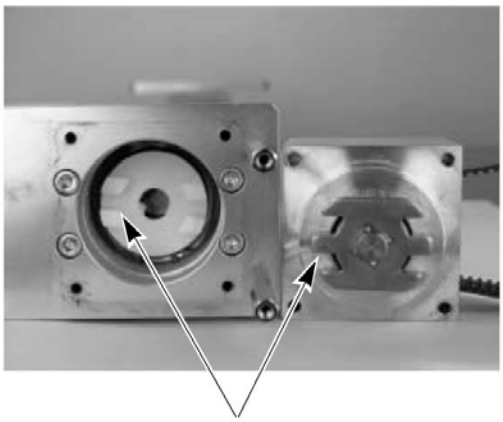
6) Pull out the belt and insert a new belt.



7) Install the pulley cap.
   Tighten the hexagon socket-head bolts (M3 × 10, 4 pcs.) using an Allen wrench of 2.5 mm across flats.

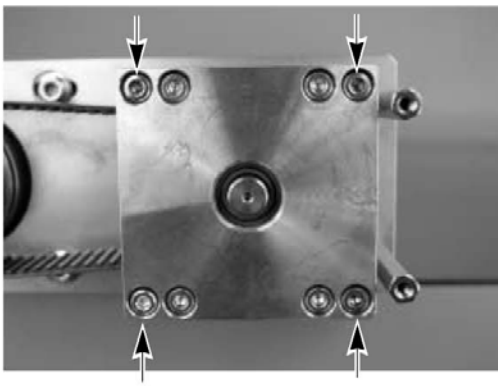
Tightening torque: 83 N·cm (8.47 kgf·cm)

8) Install the pulley assembly.
· Align the angles of projections and depressions on the couplings.



Align the angles of projections and depressions.

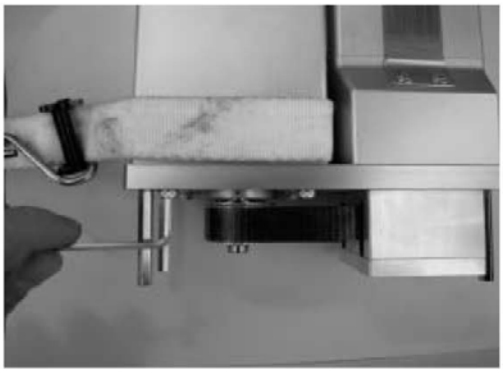
• Tighten the hexagon socket-head screws (M3 × 40, 4 pcs.) using an Allen wrench of 2.5 mm across flats.



Tightening torque: 83 N·cm (8.47 kgf·cm)

9) Loop the belt over the pulleys.

10) Pass a looped strong string (or long tie-band) around the motor bracket and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the adjusting bolts (hexagon socket-head bolts: M4 × 20, 4 pcs.).
(Use an Allen wrench of 3 mm across flats.)



Tension: 8 kgf
Adjusting bolt tightening torque:
323 N·cm (33 kgf·cm)

11) Install the pulley cover.
Tighten the thin-head screws (M3 × 6, 4 pcs.) using an Allen wrench of 1.5 mm across flats.

Tightening torque: 87.2 N·cm (8.90 kgf·cm)

●SS7R, SS8R, HS8R

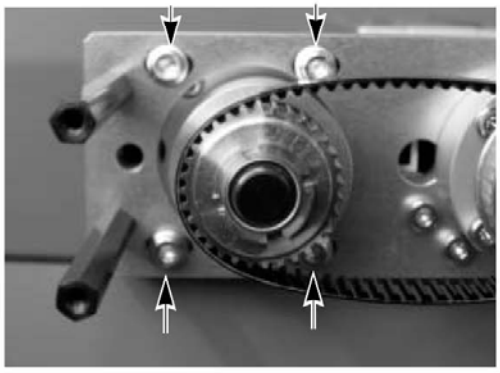
[Items Required for Replacement]
- Replacement reduction belt
- Allen wrench set
- Tension gauge (Capable of tensioning to 12kgf or greater)
- Strong string, looped (or long tie-band)

[Procedure]

1) Remove the pulley cover.
Remove the four affixing thin-head screws using an Allen wrench of 2 mm across flats.

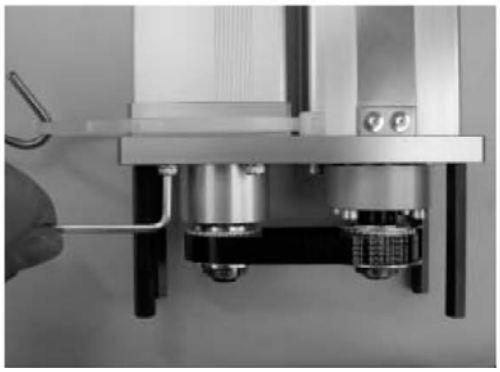
2) Loosen the four tension adjusting bolts to loosen the belt.
(Use an Allen wrench of 3 mm across flats.)

3) Remove the belt from the pulleys.



4) Loop a new belt over both pulleys.

5) Pass a looped strong string (or long tie-band) around the motor bracket and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the adjusting bolts (hexagon socket-head bolts: M4 × 20, 4 pcs.).



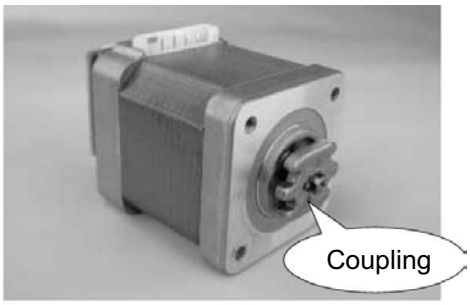
Tension:	SS7R:	7.3 kgf
	SS8R/HS8R:	11.6 kgf
Adjusting bolt tightening torque:		
	323 N·cm (33 kgf·cm)	

6) Install the pulley cover.
Tighten the thin-head screws (M4 × 6, 4 pcs.) using an Allen wrench of 2 mm across flats.

Tightening torque: 204 N·cm (20.8 kgf·cm)

9.10 Replacing the Motor

9.10.1 Motor Coupling Type



●SA5C, SA6C

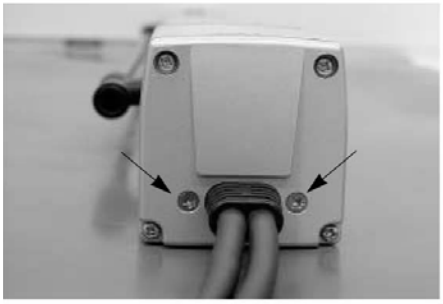
[Items Required for Replacement]

- Replacement motor NRC42* (with a coupling on the motor shaft: see the photograph at the right)
- Allen wrench set
- Phillips screwdriver
- Grease (Kyodo Yushi's Multemp LRL3 or equivalent)

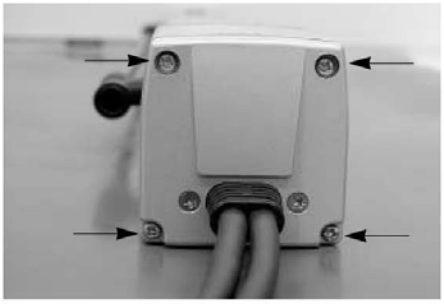
[Procedure]

1) After removing the flat countersunk-head screws (M3 × 8, 2 pcs.) affixing the cable ends on the motor-end cap, remove the pan-head screws affixing the motor-end cap.

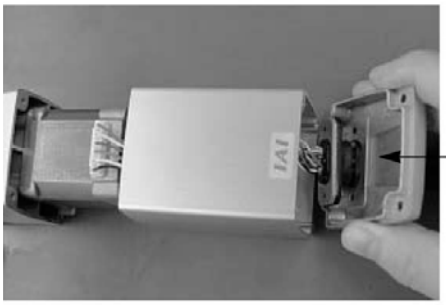
• Flat countersunk-head screws (M3 × 8, 2 pcs.)



• Pan-head screws (M3 × 80, 4 pcs.)

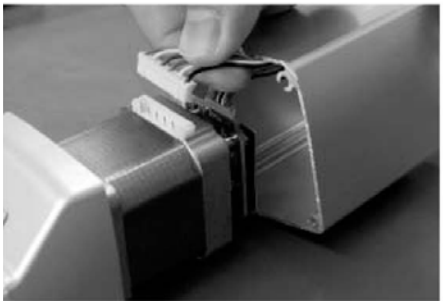


2) Push in the cable-end molding to create a slack along the inner cable

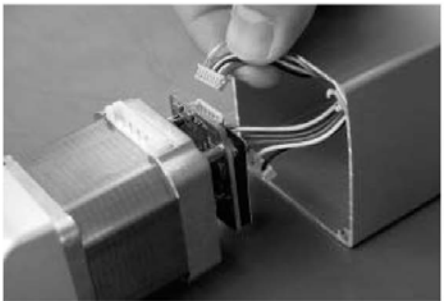


Push in the molding as far as possible

3) Pull out the motor connector.



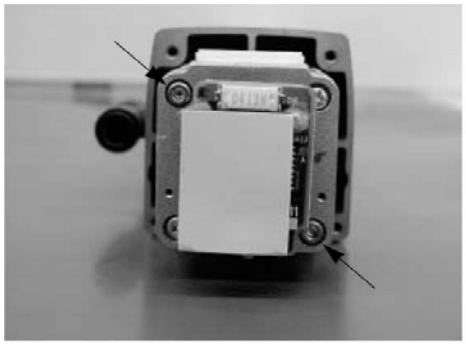
4) Pull out the encoder connector.



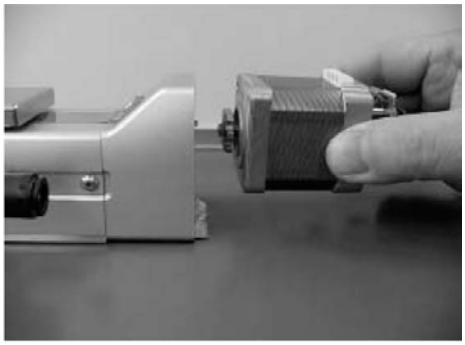
⚠ Caution: Do not apply a force to the encoder by touching it directly..

5) Remove the motor.

· Remove the affixing bolts (M3 × 50, 2 pcs.) using an Allen wrench of 2.5 mm across flats.

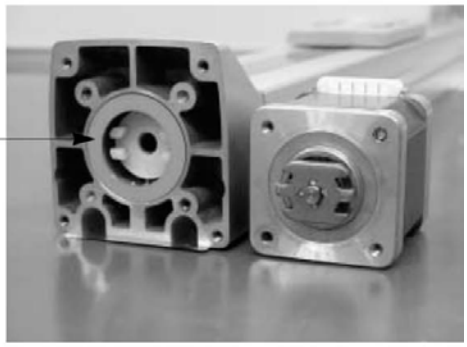


• Pull out the motor by hand.

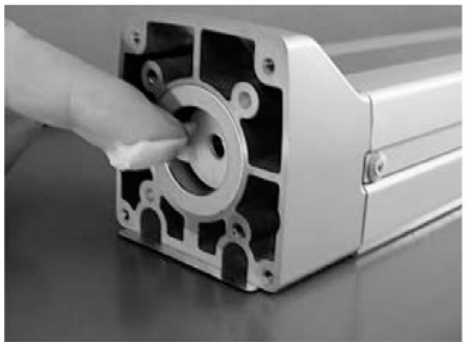


• Decoupled motor

Pilot alignment metal
If this metal is attached on the decoupled motor, put it back to the pilot on the actuator side.



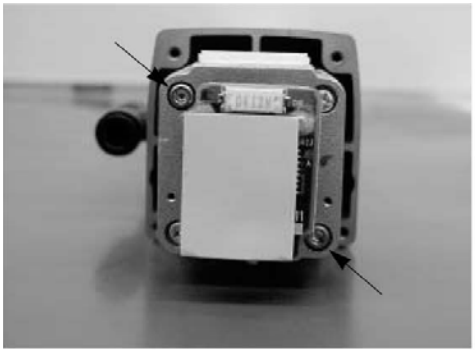
6) Apply grease to the coupling on the actuator side.



Kyodo Yushi's Multemp LRL3 has been applied before shipment.

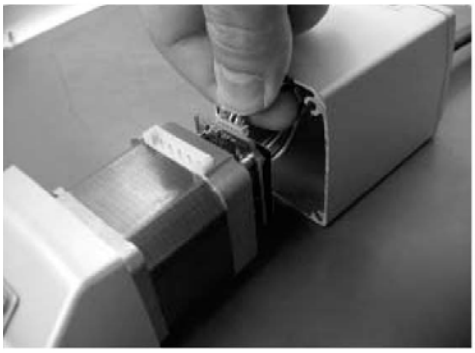
> ⚠ Warning: Never use any fluorine-based grease.It will chemically react with lithium-based grease and damage the actuator.

7) Install a new motor.
- After confirming that the angles of projections and depressions on the couplings are aligned, tighten the affixing bolts (M3 × 50, 2 pcs.).
  (Use an Allen wrench of 2.5 mm across flats.)



Tightening torque: 59 N·cm (6 kgf·cm)

8) Connect the encoder connector.

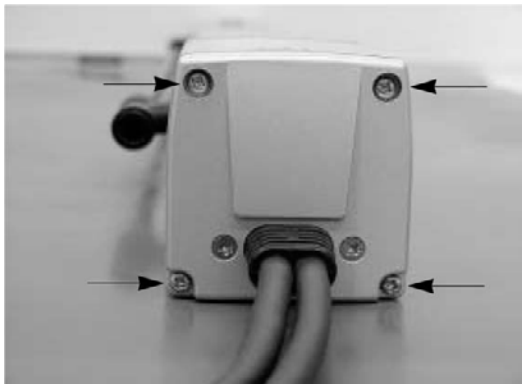


9) Connect the motor connector.

⚠ Caution: Do not apply a force to the encoder by touching it directly

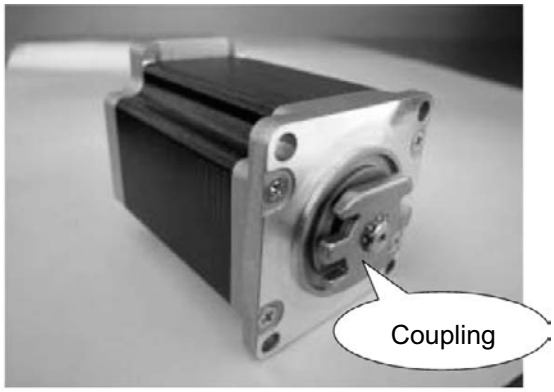
10) Replace the cable-end molding in the original position, and affix it with the flat countersunk-head screws (M3 × 8, 2 pcs.).

11) Affix the motor end cap with the pan-head screws (M3 × 80, 4 pcs.).
At this time, make sure not to pinch the cables.



Tightening torque: 61.5 N·cm (6.3 kgf·cm)

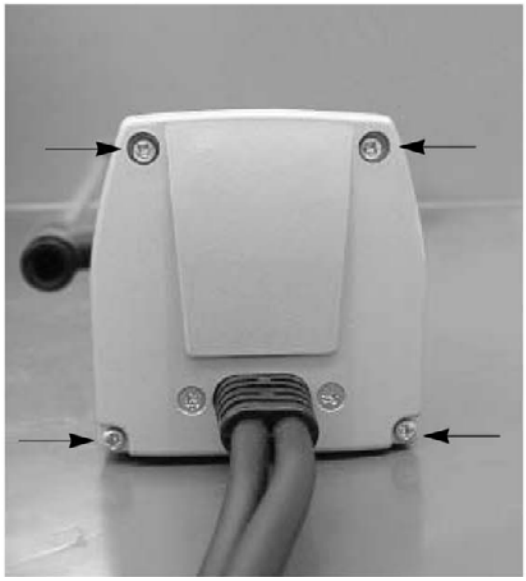
●SA7C
[Items Required for Replacement]
• Replacement motor NRC56-* (with a coupling on the motor shaft; see the photograph below.)
• Allen wrench set • Phillips screwdriver
• Grease (Kyodo Yushi's Multemp LRL3 or equivalent)



[Procedure]
1) After removing the flat countersunk-head screws (M3 × 8, 2 pcs.) affixing the cable ends on the motor end cap, remove the pan-head screws (M3 × 105, 4 pcs.) affixing the motor end cap.

• Flat countersunk-head screws (M3 × 8, 2 pcs.)

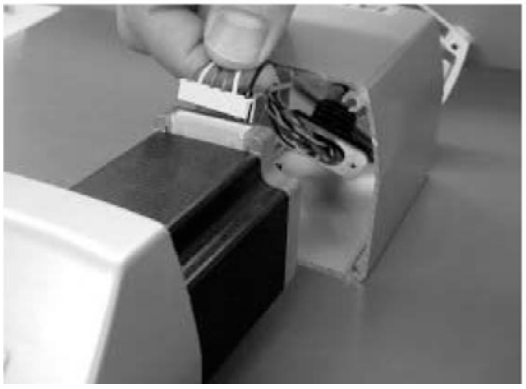
• Pan-head screws (M3 × 105, 4 pcs.)



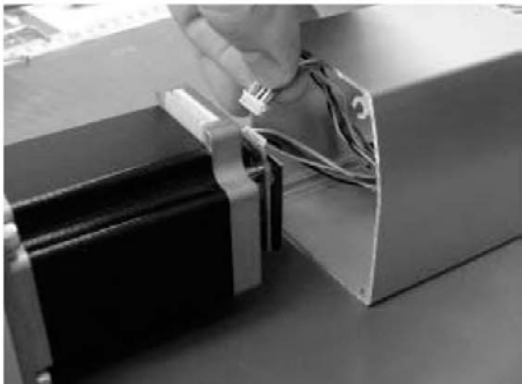
2) Push in the cable-end molding to create a slack along the inner cable.

Push in the molding as far as possible.

3) Pull out the motor connector.

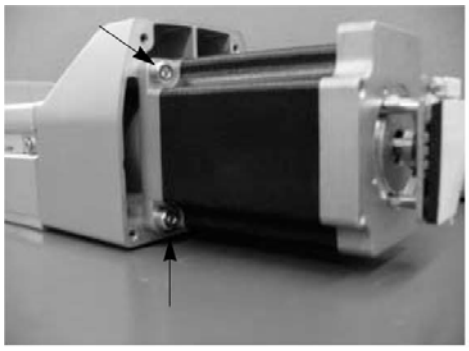


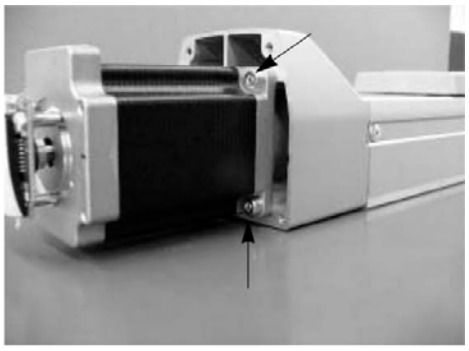
4) Pull out the encoder connector.



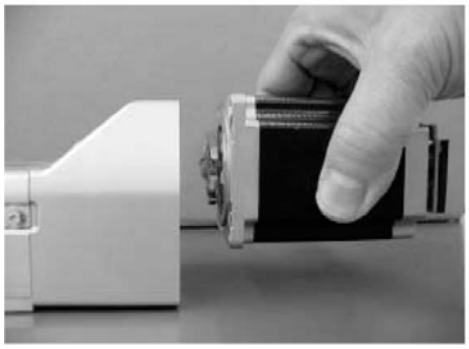
⚠ Caution: Do not apply a force to the encoder by touching it directly.

5) Remove the motor.
・Remove the affixing bolts (M4 × 15, 4 pcs.) using an Allen wrench of 3 mm across flats.





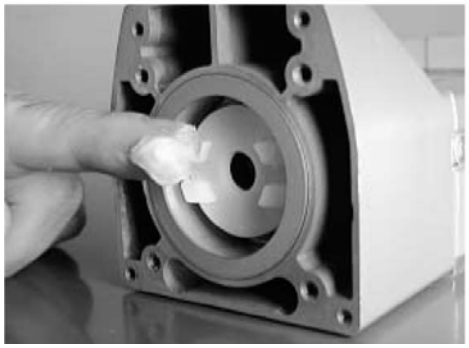
• Pull out the motor by hand.



• Decoupled motor

Pilot alignment metal
If this metal is attached on the decoupled motor, put it back to the pilot on the actuator side.

6) Apply grease to the coupling on the actuator side.

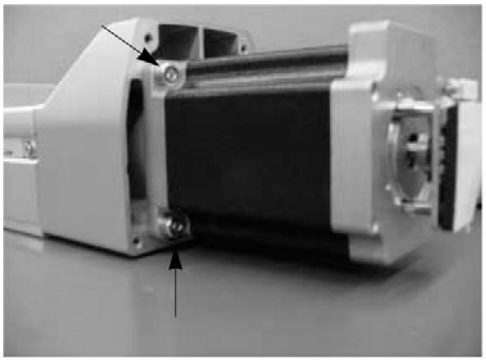


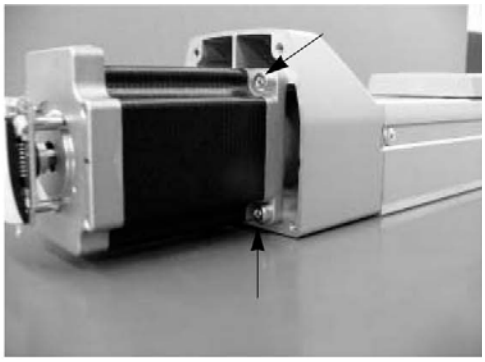
Kyodo Yushi's Multemp LRL3 has been applied before shipment.

⚠ Warning: Never use any fluorine-based grease. It will chemically react with lithium-based grease and damage the actuator

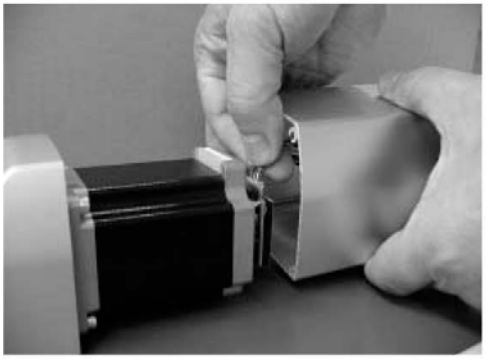
7) Install a new motor.
• After confirming that the angles of projections and depressions on the couplings are aligned, tighten the affixing bolts (M4 × 15, 4 pcs.).
(Use an Allen wrench of 3 mm across flats.)

Tightening torque: 176 N·cm (18 kgf·cm)





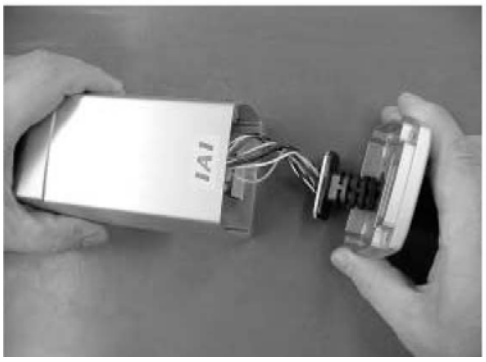
8) Connect the encoder connector.



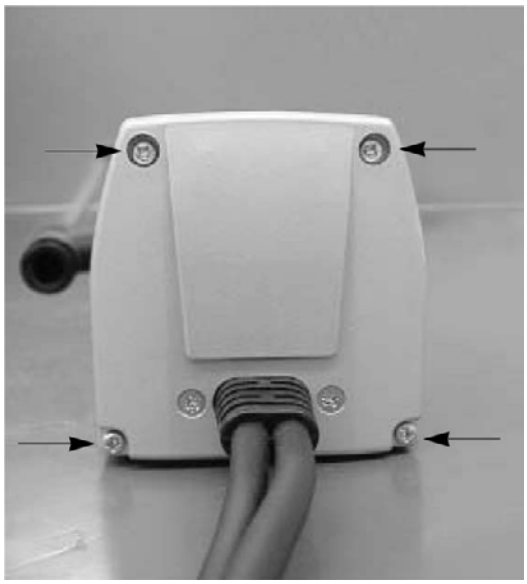
9) Connect the motor connector.

⚠ Caution: Do not apply a force to the encoder by touching it directly.

10) Replace the cable-end molding in the original position, and affix it with the flat countersunk-head screws (M3 × 8, 2 pcs.).

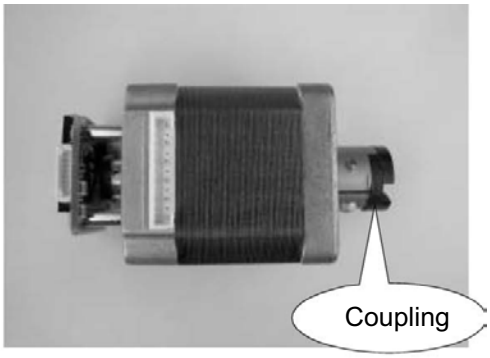


11) Affix the motor end cap with the pan-head screws (M3 × 105, 4 pcs.).
At this time, make sure not to pinch the cables.



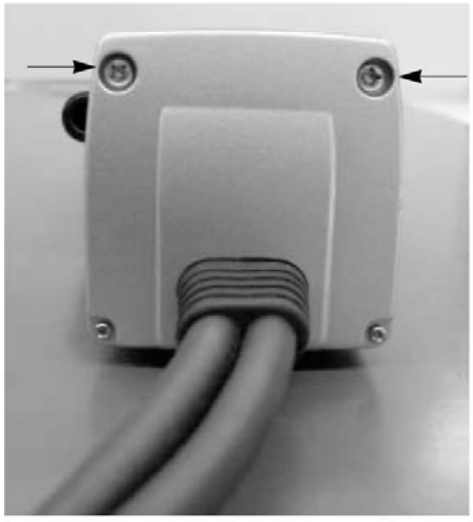
Tightening torque: 61.5 N·cm (6.3 kgf·cm)

●SS7C
[Items Required for Replacement]
• Replacement motor SSM42-* (with a coupling on the motor shaft; see the photograph below.)
• Allen wrench set • Phillips screwdriver
• Plastic hammer

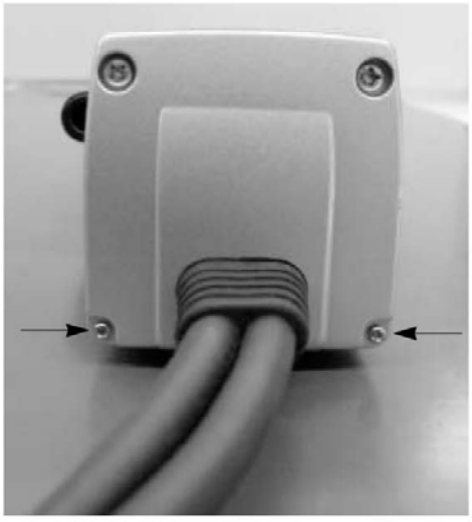


[Procedure]
1) Remove the pan-head screws affixing the motor-end cap.

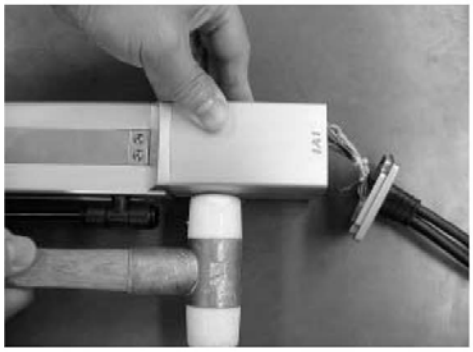
• Pan-head screws (M3 × 95, 2 pcs.)

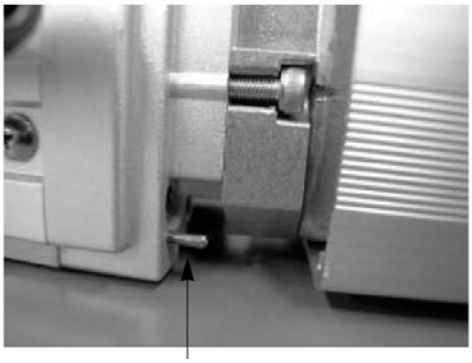


• Pan-head screws (M2 × 10, 2 pcs.)



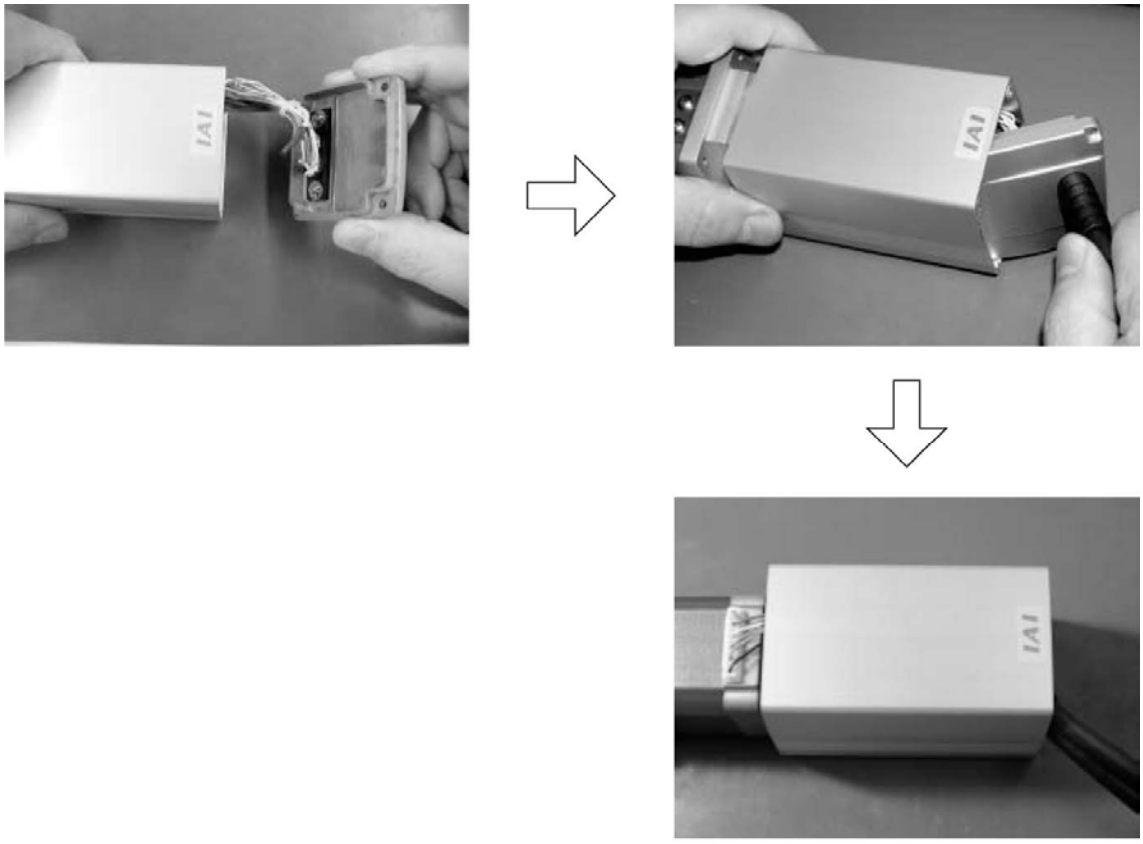
2) Remove the motor cover.
The motor cover is engaged with a positioning pin. If the cover does not come off easily, use a plastic hammer to gently tap the motor cover from the side, and pull out the cover.



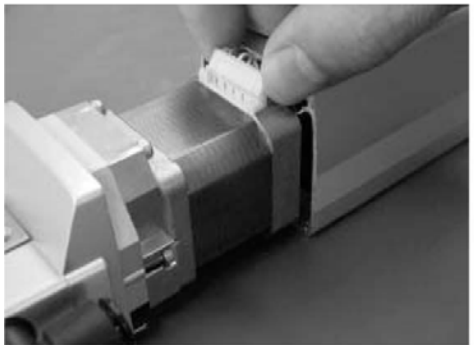


Positioning pin

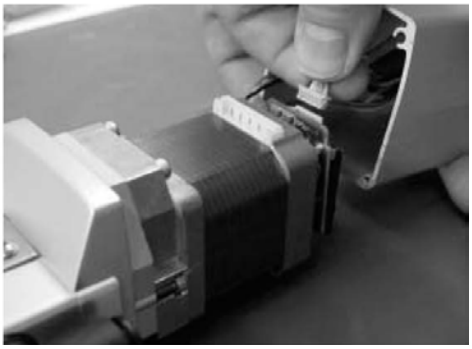
3) Push in the motor-end cap into the motor cover.



4) Pull out the motor connector.



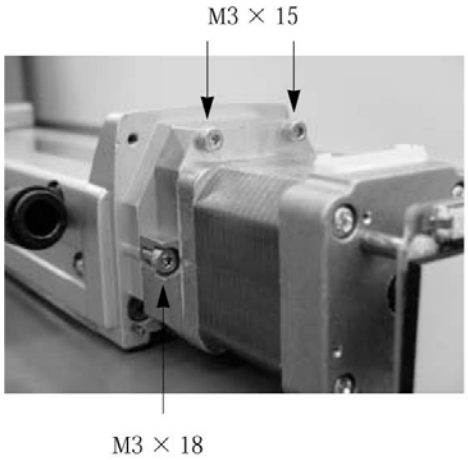
5) Pull out the encoder connector.

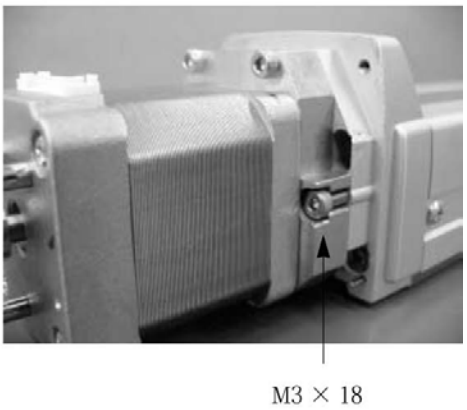


> ⚠ Caution: Do not apply a force to the encoder by touching it directly.

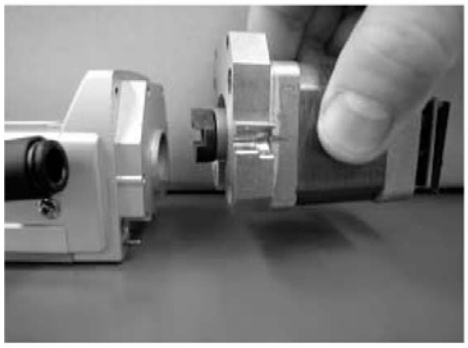
6) Remove the motor.

· Remove the affixing bolts (M3 × 15, 2 pcs./M3 × 18, 2 pcs.) using an Allen wrench of 2.5 mm across flats.

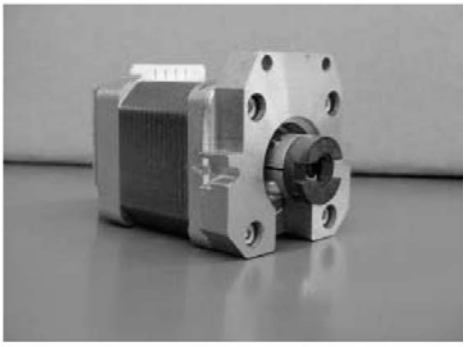




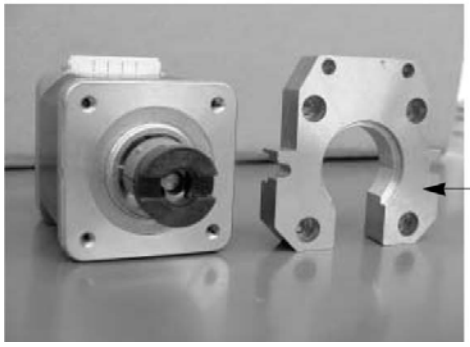
• Pull out the motor by hand.



• Decoupled motor

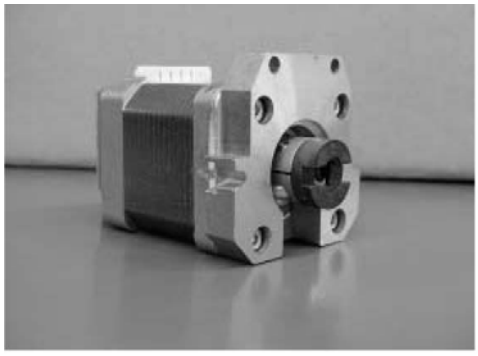


• Remove the motor flange.
Remove the affixing bolts (M3 × 8, 4 pcs.) using an Allen wrench of 2.5 mm across flats.

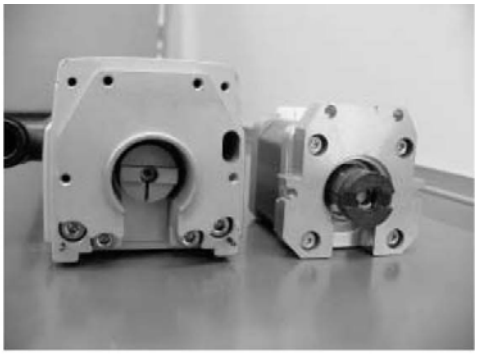


7) Install a new motor.

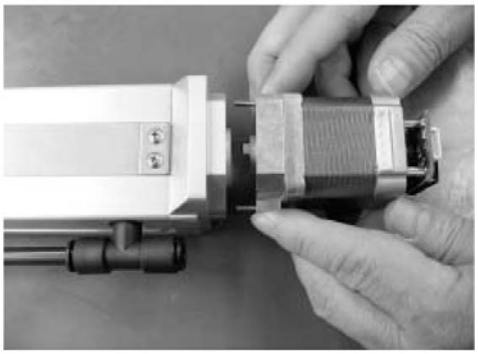
- Tighten the motor flange with the affixing bolts (M3 × 8, 4 pcs.).



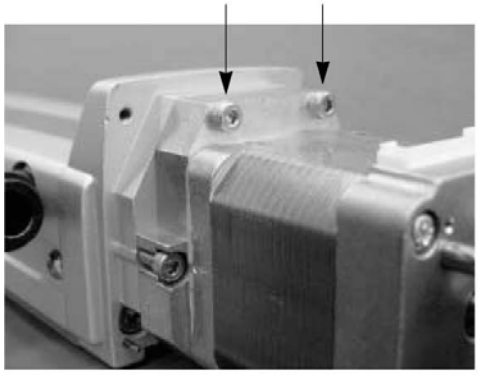
- Confirm that the angles of projections and depressions on the couplings are aligned.



- First, tighten the right and left affixing bolts (M3 × 18, 2 pcs.) uniformly.

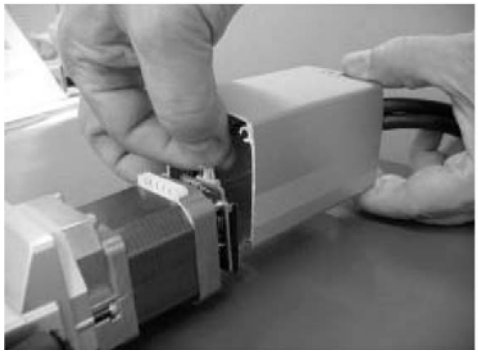


- Next, tighten the upper affixing bolts (M3 × 15, 2 pcs.) uniformly.

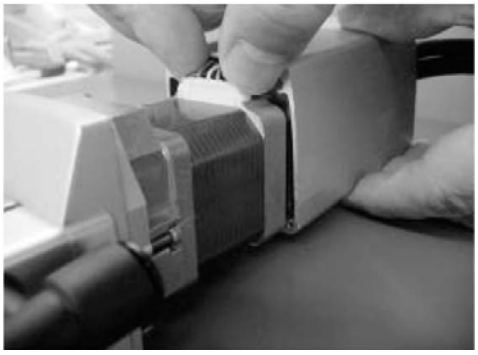


Tightening torque of M3 bolt: 83 N·cm (8.5 kgf·cm)

8) Connect the encoder connector.



9) Connect the motor connector.

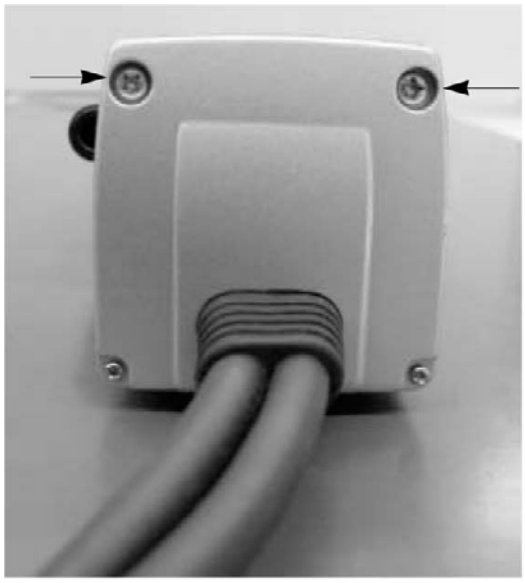


⚠ Caution: Do not apply a force to the encoder by touching it directly.

10) Pull out the motor-end cap from the motor cover and affix it with the pan-head screws. At this time, make sure not to pinch the cables.

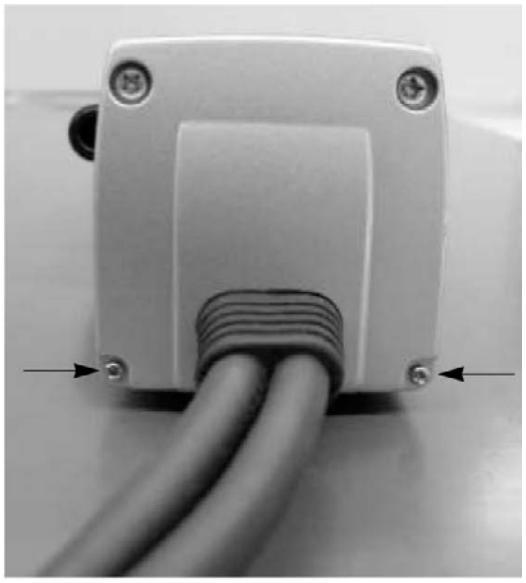
• Pan-head screws (M3 × 105, 2 pcs.)

Tightening torque: 61.5 N·cm (6.3 kgf·cm)



• Pan-head screws (M2 x 10, 2 pcs.)

Tightening torque: 16.9 N·cm (1.7 kgf·cm)

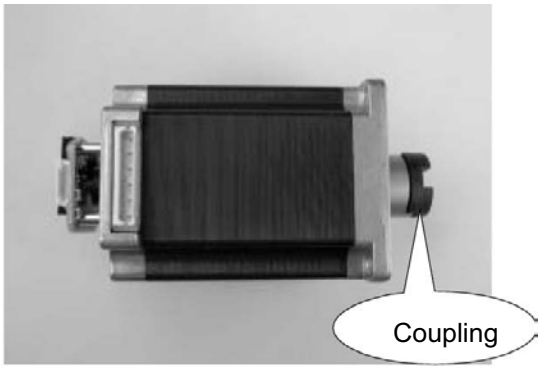


11) Affix the motor cover.
• If the positioning pin does not go in smoothly, gently tap the motor-end cap using a plastic hammer to push in the pin.

●SS8C, HS8C

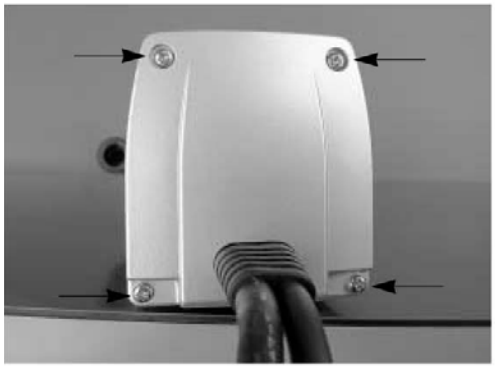
[Items Required for Replacement]

- Replacement motor SSM56-* (for SS8C), HSM (for HS8C) (with a coupling on the motor shaft; see the photograph below.)
- Allen wrench set • Phillips screwdriver
- Plastic hammer



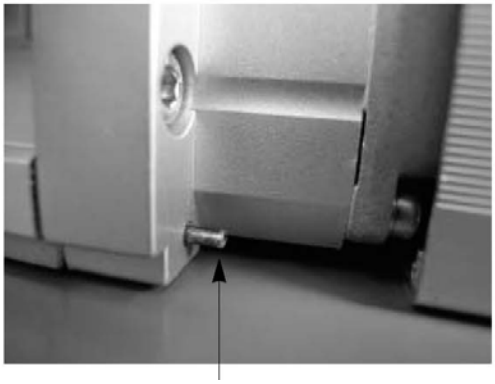
[Procedure]

1) Remove the pan-head screws (M3 × 10, 4 pcs.) affixing the motor-end cap.

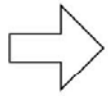


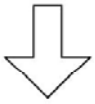
2) Remove the pan-head screws (M3 × 10, 2 pcs.) affixing the motor cover.

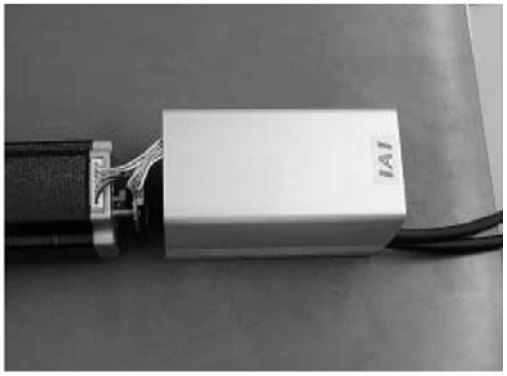
3) Remove the motor cover.
The motor cover is engaged with a positioning pin. If the cover does not come off easily, use a plastic hammer to gently tap the motor cover from the side, and pull out the cover.



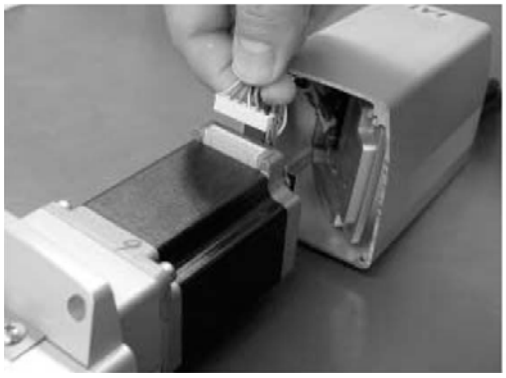
4) Push in the motor-end cap into the motor cover.



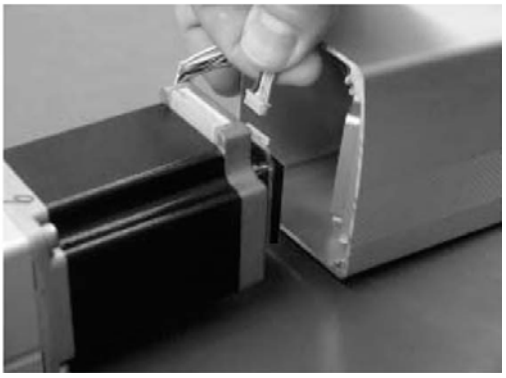




5) Pull out the motor connector.

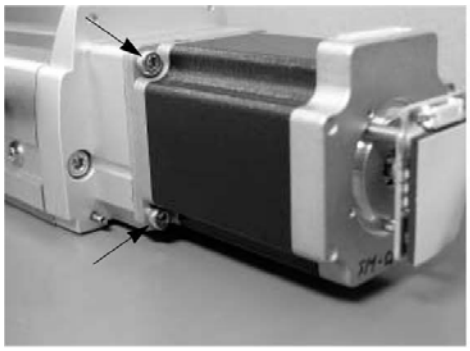


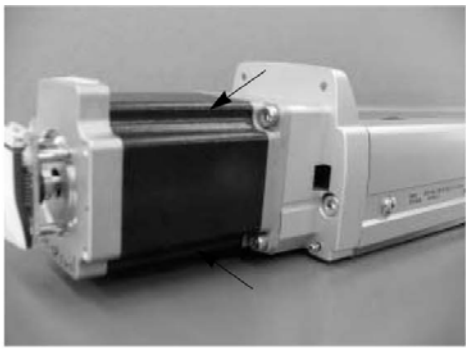
6) Pull out the encoder connector.



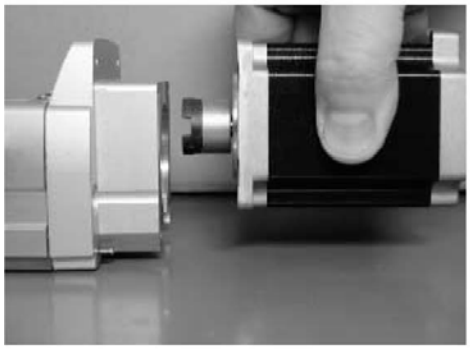
⚠ Caution: Do not apply a force to the encoder by touching it directly.

7) Remove the motor.
· Remove the affixing bolts (M4 × 15, 4 pcs.) using an Allen wrench of 3 mm across flats.

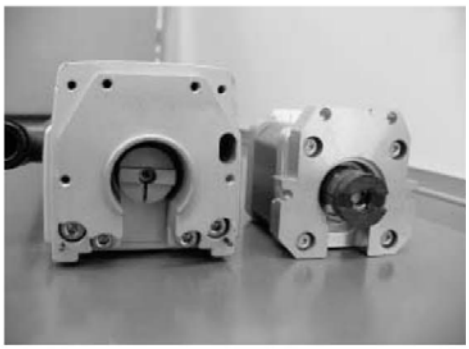




• Pull out the motor by hand.



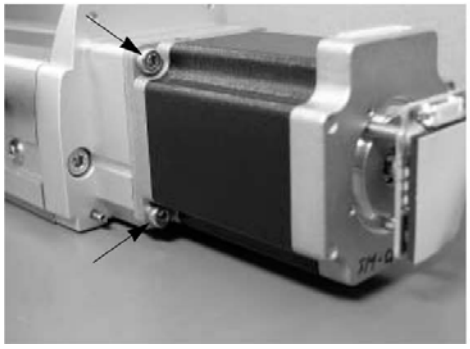
• Decoupled motor

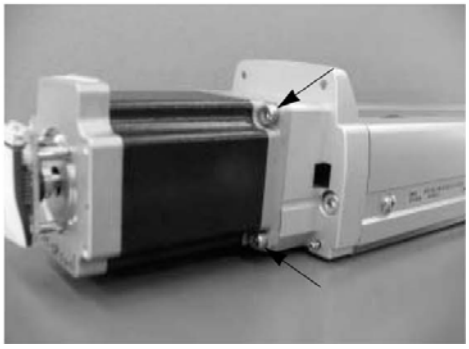


8) Install a new motor.

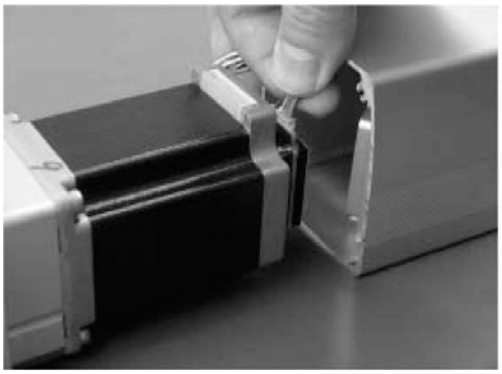
• After confirming that the angles of projections and depressions on the couplings are aligned, tighten the affixing bolts (M4 × 15, 4 pcs.).
(Use an Allen wrench of 3 mm across flats.)

Tightening torque: 176 N·cm (18 kgf·cm)

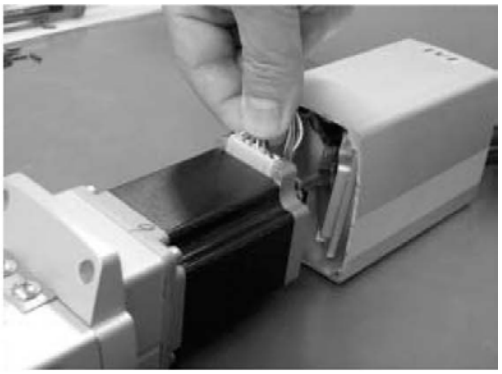




9) Connect the encoder connector.

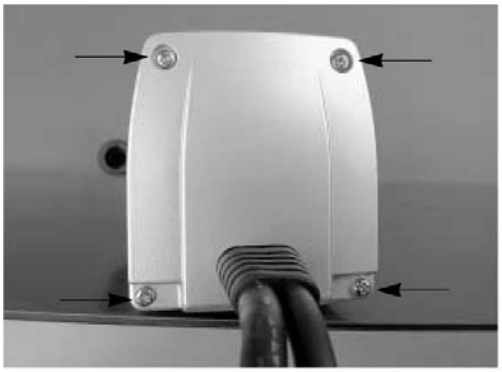


10) Connect the motor connector.



> ⚠ Caution: Do not apply a force to the encoder by touching it directly.

11) Pull out the motor-end cap from the motor cover and affix it with the pan-head screws (M3 × 105, 4 pcs.). At this time, make sure not to pinch the cables.

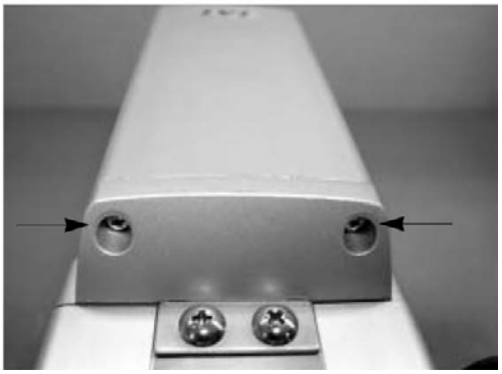


Tightening torque: 61.5 N·cm (6.3 kgf·cm)

12) Affix the motor cover.
- If the positioning pin does not go in smoothly, gently tap the motor-end cap using a plastic hammer to push in the pin.

- Tighten the pan-head screws (M3 x 10, 2 pcs.)

Tightening torque: 61.5 N·cm (6.3 kgf·cm)

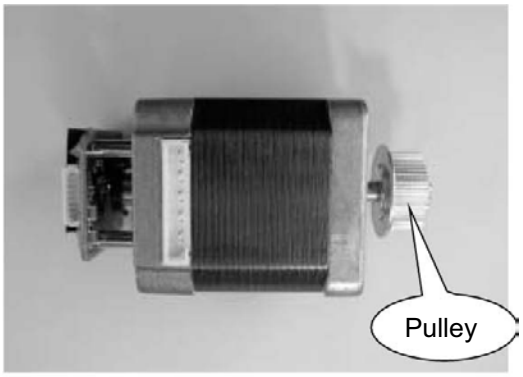


9.10.2 Motor Reversing Type

●SA5R, SA6R

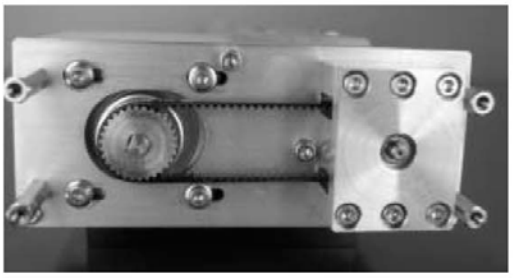
[Items Required for Replacement]

- Replacement motor NRC423* (with a coupling on the motor shaft; see the photograph at the right)
- Allen wrench set • Phillips screwdriver
- Tension gauge (capable of tensioning to 3 kgf or greater)
- Strong string, looped (or long tie-band)



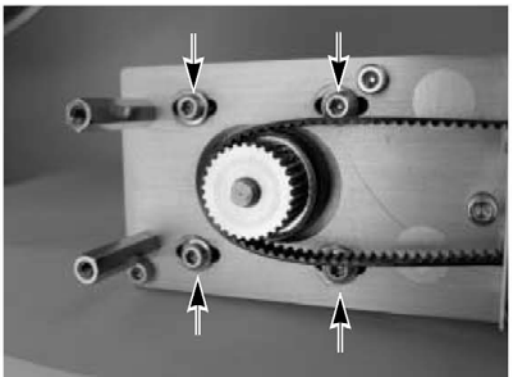
[Procedure]

1) Remove the pulley cover.
   Remove the four affixing thin-head screws using an Allen wrench of 1.5 mm across flats.

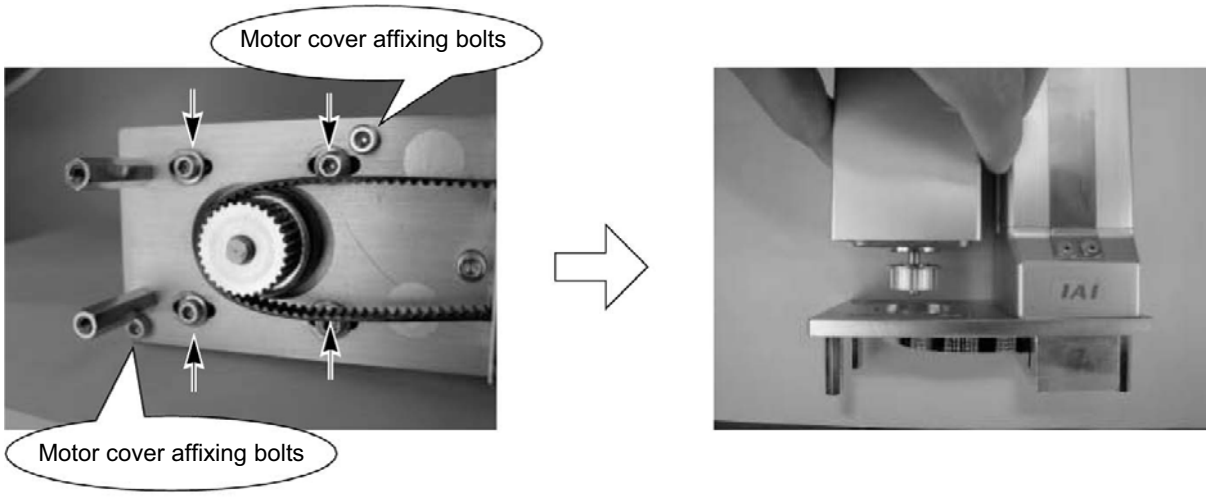


2) Loosen the four tension adjusting bolts to loosen the belt. (Use an Allen wrench of 2.5 mm across flats.)

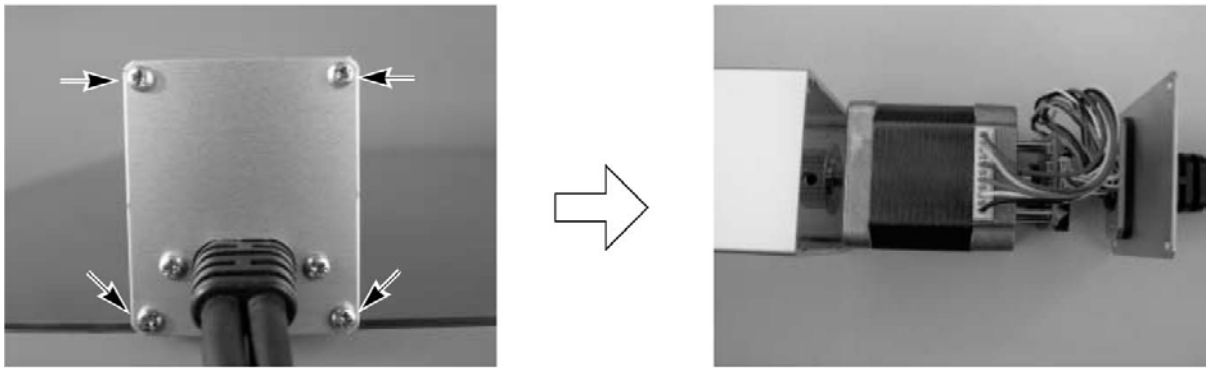
3) Remove the belt from the pulleys.



4) Pull out the four tension adjusting bolts and two motor cover affixing bolts, and remove the motor unit.

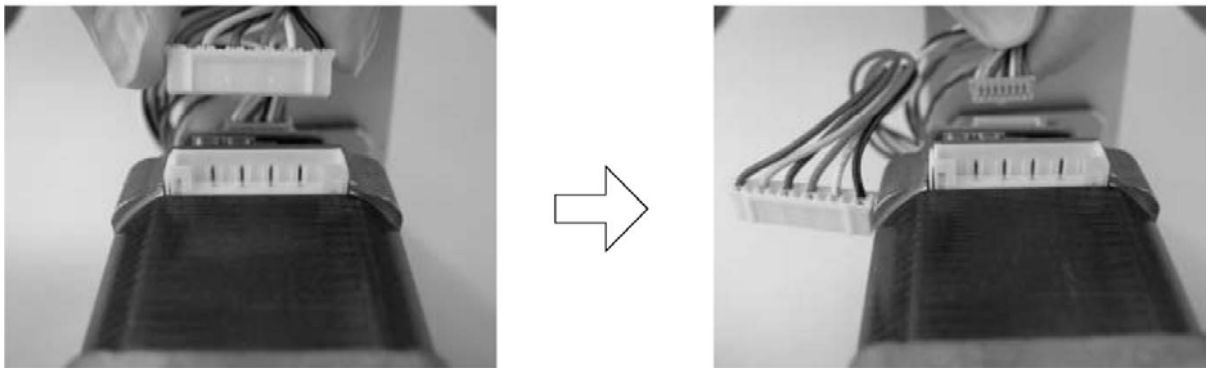


5) Remove the four pan-head screws affixing the motor-end cap of the motor unit, and pull out the motor.



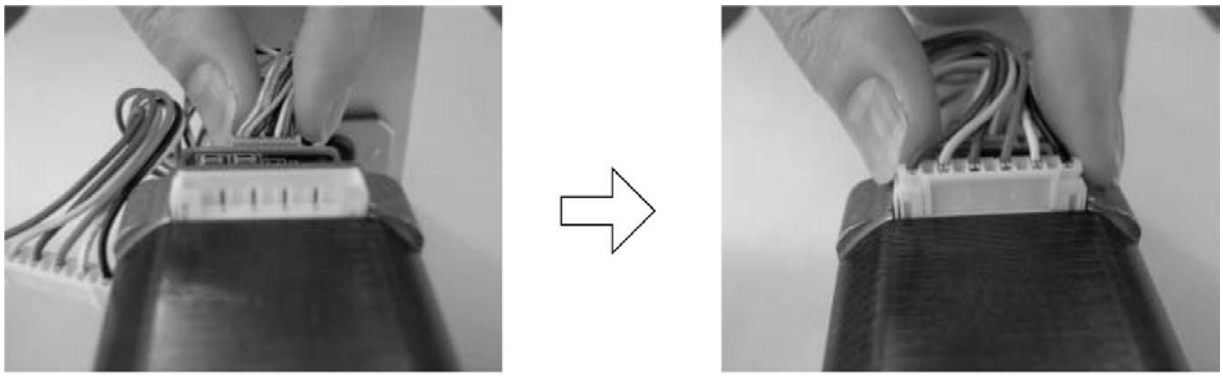
6) Pull out the motor connector.

7) Pull out the encoder connector.



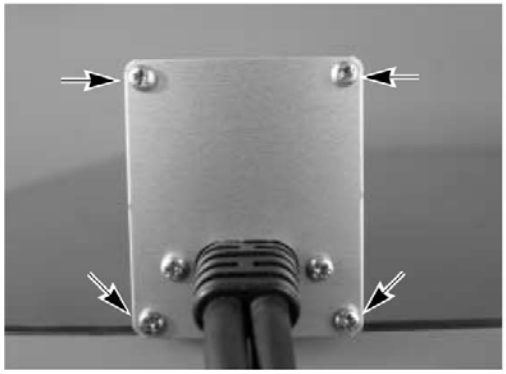
⚠ Caution: Do not apply a force to the encoder by touching it directly.

8) Connect the encoder connector and motor connector to a new motor.
- Connection of the encoder connector
- Connection of the motor connector



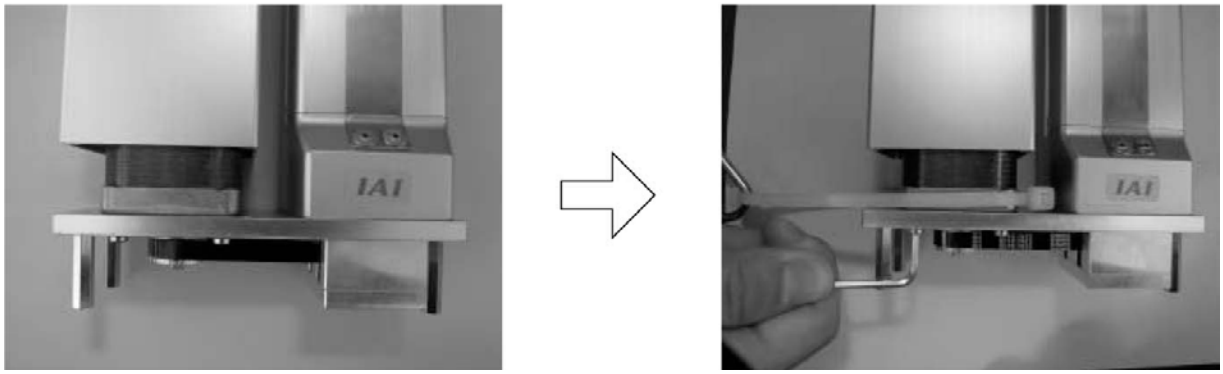
⚠ Caution: Do not apply a force to the encoder by touching it directly.

9) Couple the motor cover to the motor end cap with the affixing pan-head screws (M3 × 6, 4 pcs.). At this time, make sure not to pinch the cables.



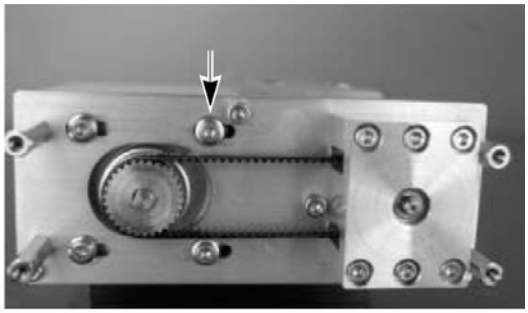
Tightening torque of M3 bolt:
61.5 N·cm (6.27 kgf·cm)

10) Temporarily tighten the motor with the tension adjusting bolts (hexagon socket-head screws: M3 × 10, 4 pcs.) and loop the belt. In this condition, pass a looped strong string (or long tie-band) around the motor-end flange, pull it with a tension gauge to the specified tension, and uniformly tighten the adjusting bolts (hexagon socket-head bolts: M3 × 10, 4 pcs.).
(Use an Allen wrench of 2.5 mm across flats.)



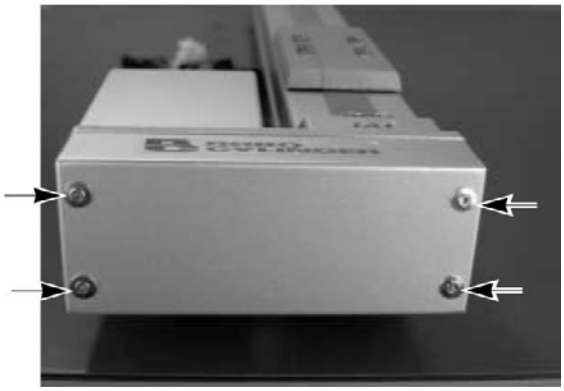
Tension: 2.5 kgf
Adjusting bolt tightening torque:
162 N·cm (16.5 kgf·cm)

11) Install the motor cover.
Tighten the hexagon socket-head screws (M3 × 12, 2 pcs.) using an Allen wrench of 2.5 mm across flats.



Tightening torque: 83 N·cm (8.47 kgf·cm)

12) Install the pulley cover.
Tighten the thin-head screws (M3 × 6, 4 pcs.) using an Allen wrench of 1.5 mm across flats.



Tightening torque: 87.2 N·cm (8.90 kgf·cm)

●SA7R

[Items Required for Replacement]

- Replacement motor unit SSM561

* (See the photograph at the right.)

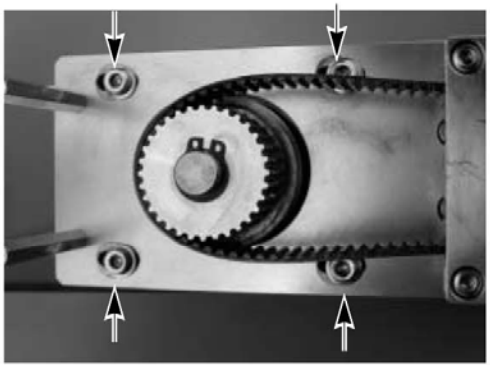
- Allen wrench set
- Tension gauge (capable of tensioning to 8kgf or greater)
- Strong string, looped (or long tie-band)

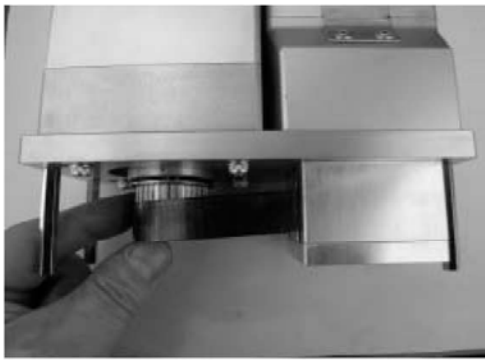
[Procedure]

1) Remove the pulley cover.
   Remove the four affixing thin-head screws using an Allen wrench of 1.5 mm across flats.

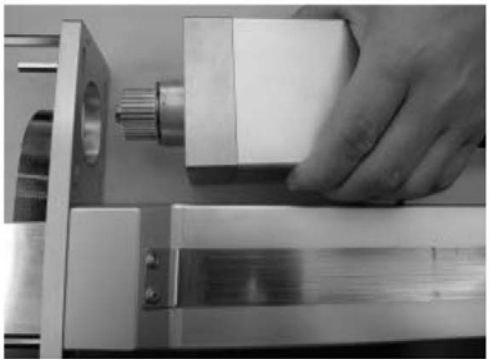
2) Loosen the four tension adjusting bolts to loosen the belt. (Use an Allen wrench of 3 mm across flats.)

3) Remove the belt from the pulleys.



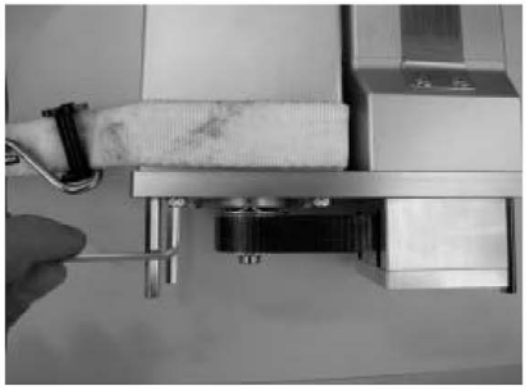


4) Pull out the tension adjusting bolts and remove the motor unit.



5) Install a new motor unit and temporarily tighten it with the tension adjusting bolts (hexagon socket-head screws: M4 × 20, 4 pcs.).
In this condition, loop the reduction belt over the pulleys.

6) Pass a looped strong string (or long tie-band) around the motor bracket and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the adjusting bolts.



Tension: 8 kgf
Adjusting bolt tightening torque:
323 N·cm (33 kgf·cm)

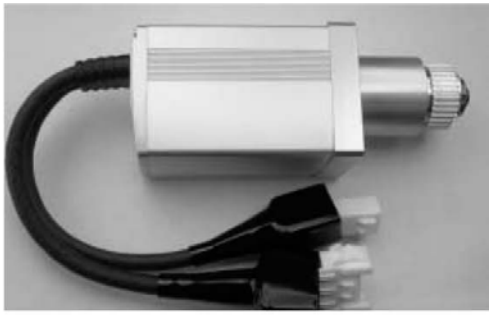
7) Tighten the thin-head screws (M3 × 6, 4 pcs.) using an Allen wrench of 1.5 mm across flats.

Tightening torque: 87.2 N·cm (8.90 kgf·cm)

●SS7R, SS8R, HS8R

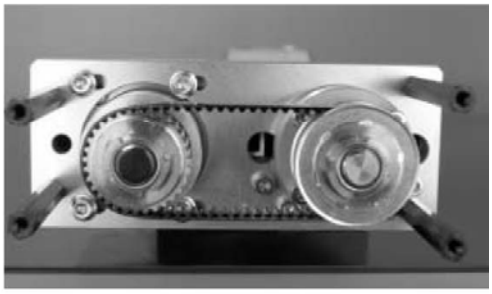
[Items Required for Replacement]

- Replacement motor unit SSM42-* (for SS7R), SSM561 * (for SS8R), HSM (for HS8R) (See the photograph at the right.)
- Allen wrench set
- Tension gauge (capable of tensioning to 12kgf or greater)
- Strong string, looped (or long tie-band)



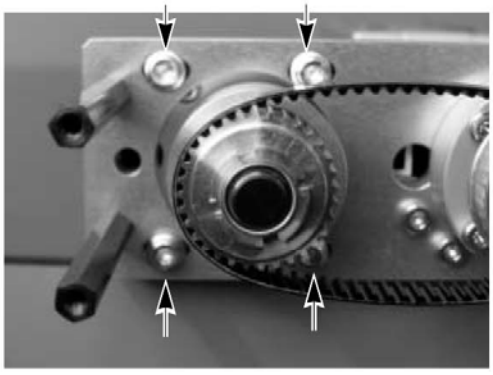
[Procedure]

1) Remove the pulley cover.
   Remove the four affixing thin-head screws using an Allen wrench of 2 mm across flats.

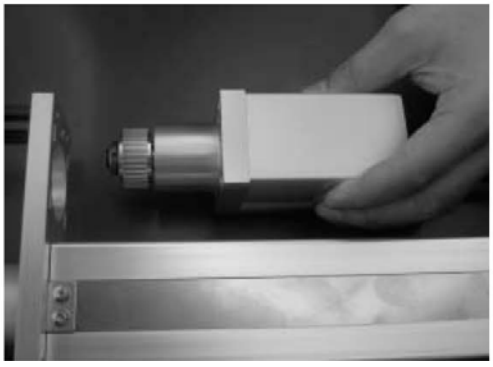


2) Loosen the four tension adjusting bolts to loosen the belt. (Use an Allen wrench of 3 mm across flats.)

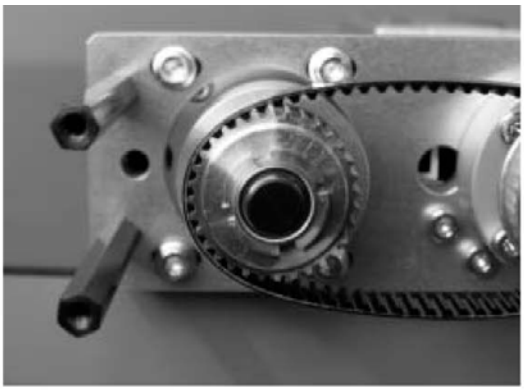
3) Remove the belt from the pulleys.



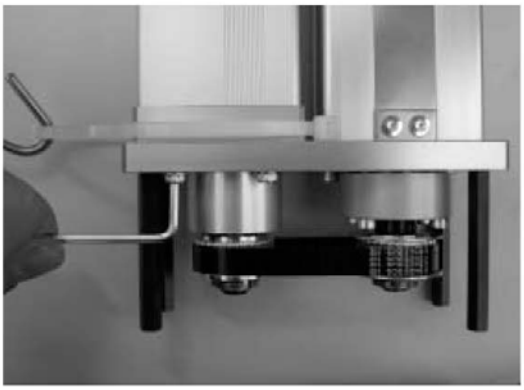
4) Pull out the tension adjusting bolts and remove the motor unit.



5) Install a new motor unit and temporarily tighten it with the tension adjusting bolts (hexagon socket-head screws: M4 × 20, 4 pcs.).
In this condition, loop the reduction belt over the pulleys.



6) Pass a looped strong string (or long tie-band) around the motor bracket and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the adjusting bolts.



Tension: SS7R 7.3 kgf, SS8R/HS8R 11.6 kgf
Adjusting bolt tightening torque:
323 N·cm (33 kgf·cm)

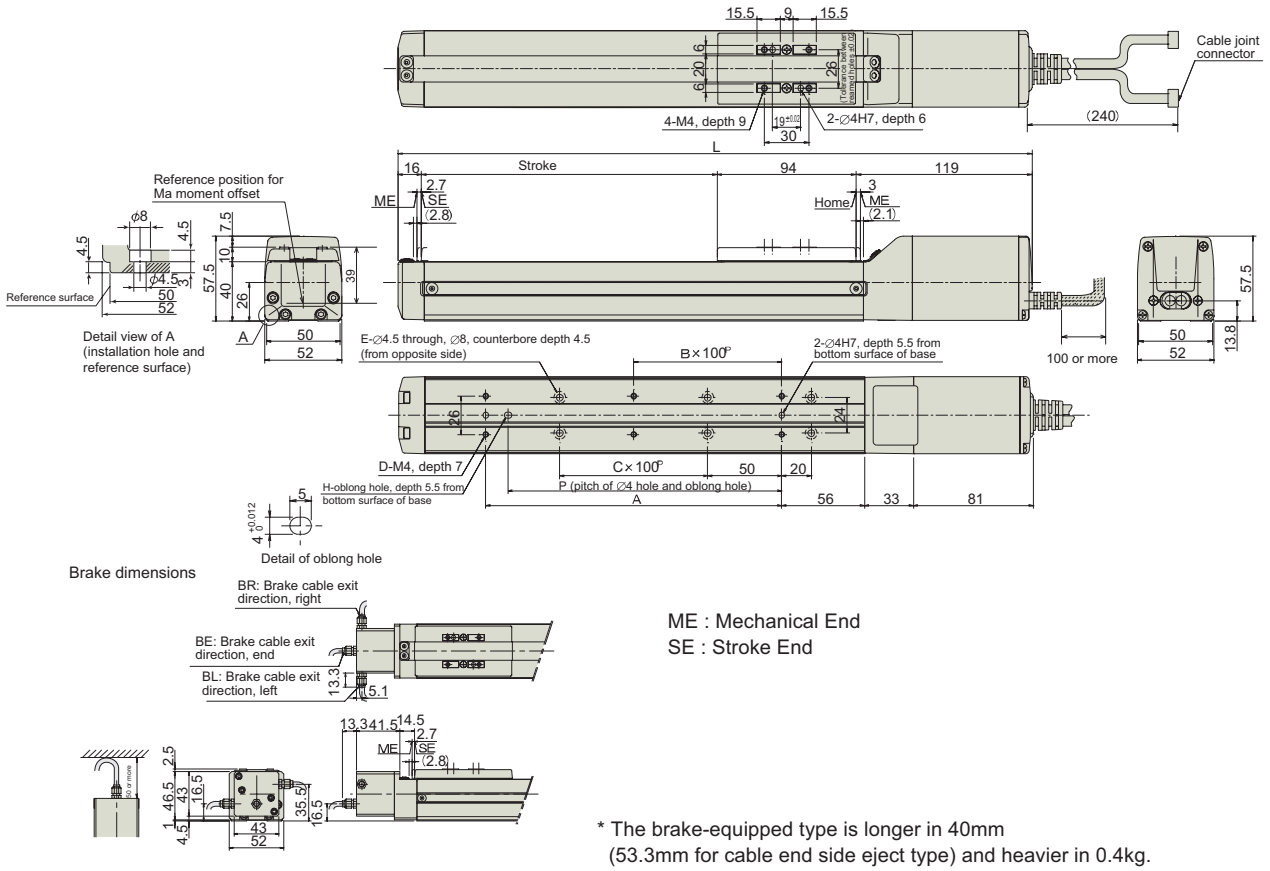
7) Install the pulley cover.
Tighten the thin-head screws (M4 × 6, 4 pcs.) using an Allen wrench of 2 mm across flats.

Tightening torque: 204 N·cm (20.8 kgf·cm)

10. Appendix

10.1 External Dimensions

10.1.1 RCP2-SA5C

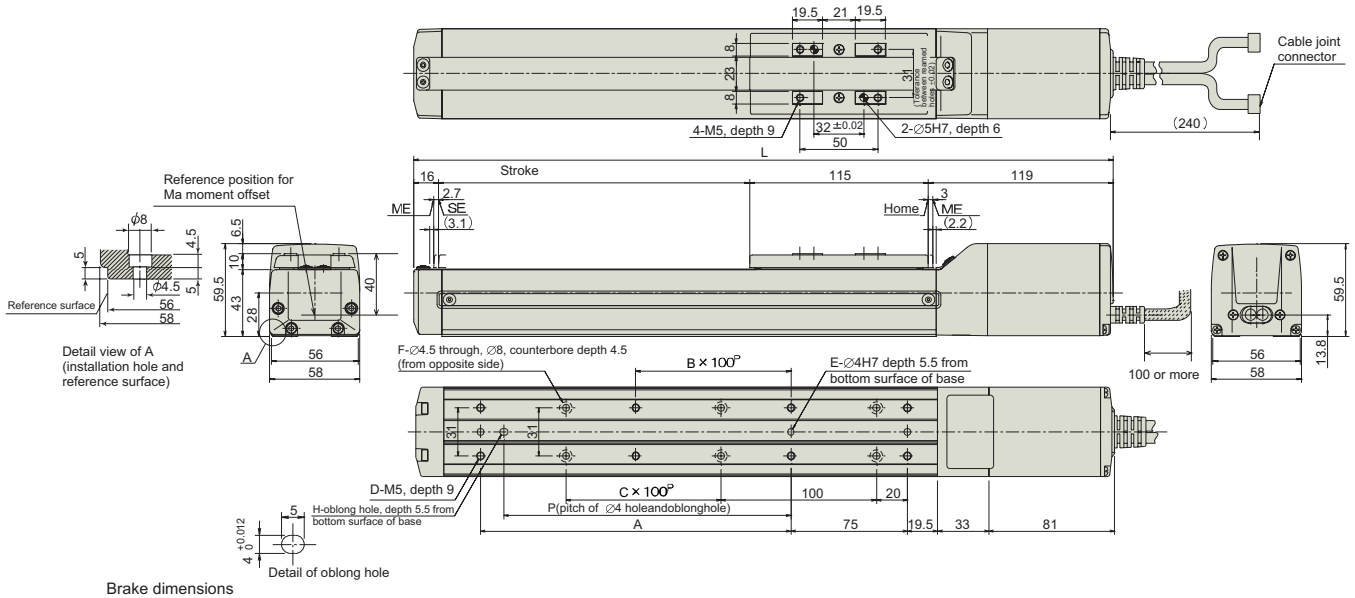


ME : Mechanical End
SE : Stroke End

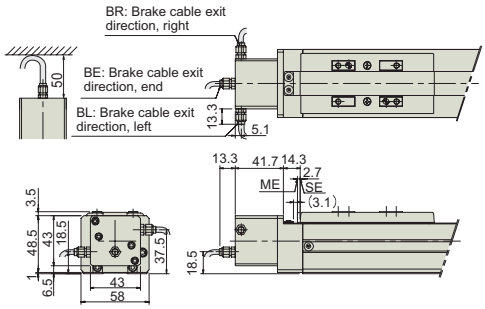
* The brake-equipped type is longer in 40mm (53.3mm for cable end side eject type) and heavier in 0.4kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	279	329	379	429	479	529	579	629	679	729	779	829	879	929	979	1029
A	73	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
D	4	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18
E	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.2

10.1.2 RCP2-SA6C



Brake dimensions

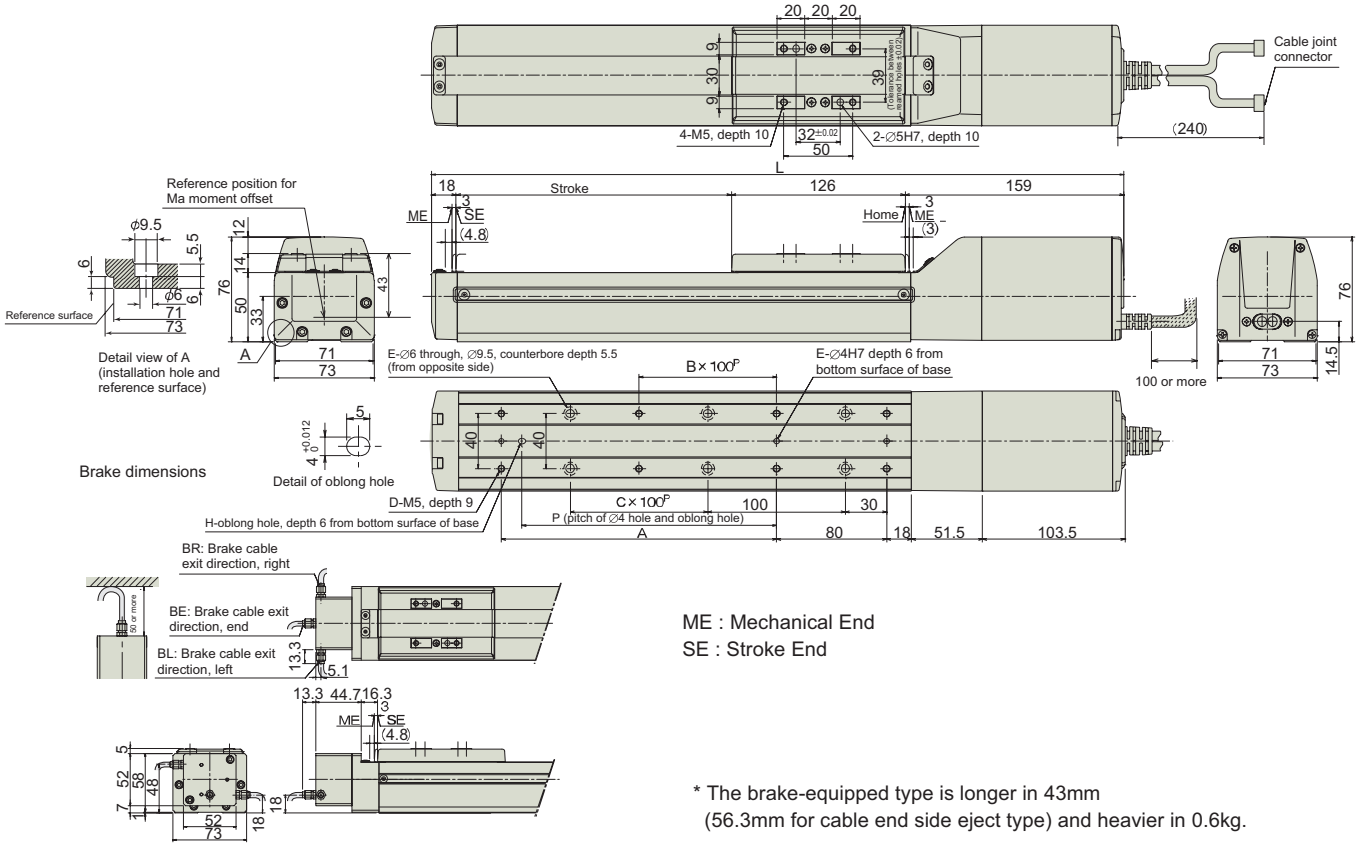


ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer in 40mm (53.3mm for cable end side eject type) and heavier in 0.4kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050
A	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
D	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
E	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
F	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	1.8	2.0	2.1	2.2	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9

10.1.3 RCP2-SA7C

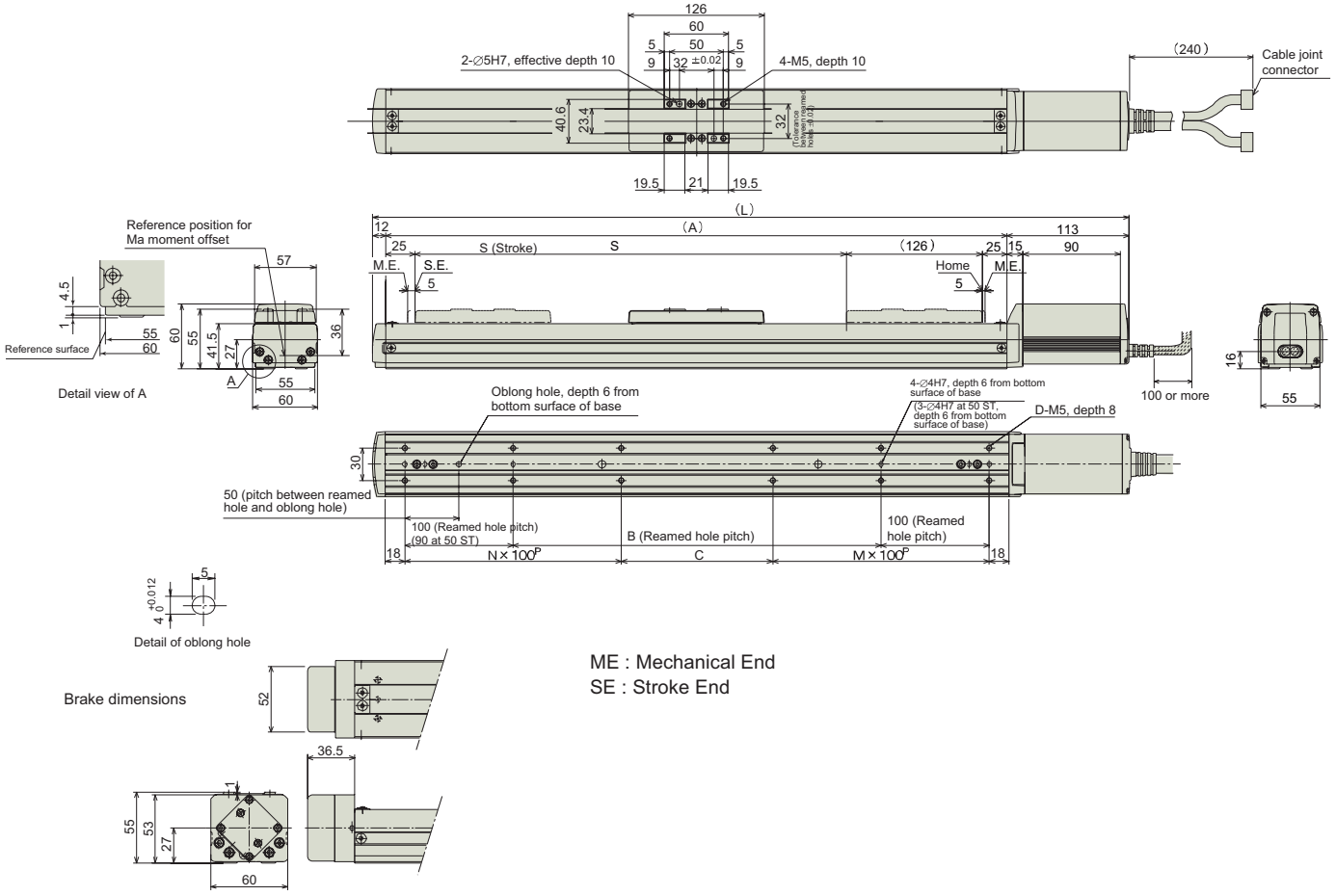


ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer in 43mm (56.3mm for cable end side eject type) and heavier in 0.6kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	353	403	453	503	553	603	653	703	753	803	853	903	953	1003	1053	1103
A	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
D	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
E	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
F	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	3.1	3.3	3.6	3.8	4.0	4.2	4.5	4.7	4.9	5.1	5.4	5.6	5.8	6.0	6.3	6.5

10.1.4 RCP2-SS7C

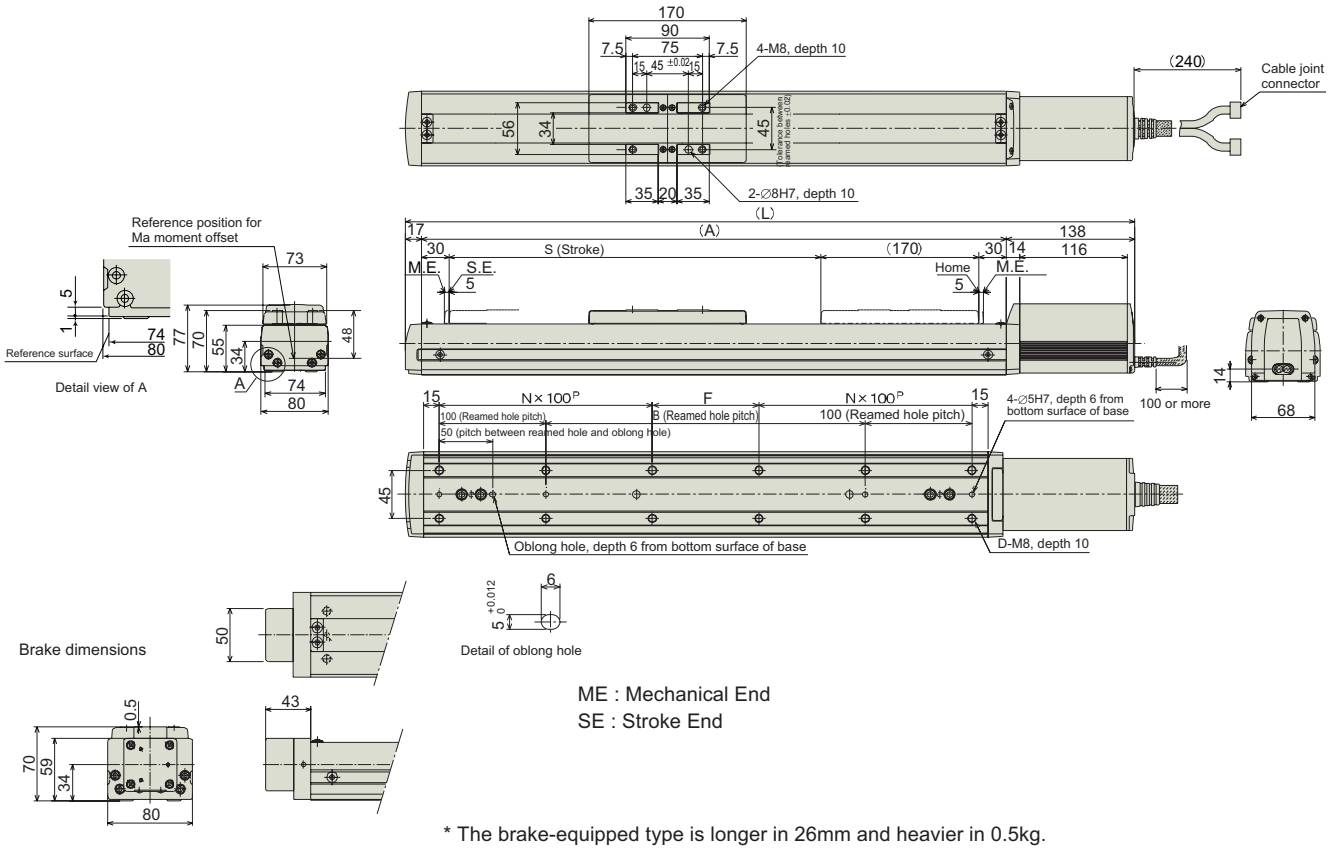


ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer in 24.5mm and heavier in 0.3kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600
L	351	401	451	501	551	601	651	701	751	801	851	901
A	226	276	326	376	426	476	526	576	626	676	726	776
B	0	40	90	140	190	240	290	340	390	440	490	540
C	90	40	90	140	190	40	90	140	190	40	90	140
D	6	8	8	8	8	12	12	12	12	16	16	16
M	1	1	1	1	1	2	2	2	2	3	3	3
N	0	1	1	1	1	2	2	2	2	3	3	3
Weight [kg]	3.1	3.4	3.7	4.0	4.3	4.7	5.0	5.4	5.7	6.1	6.4	6.7

10.1.5 RCP2-SS8C



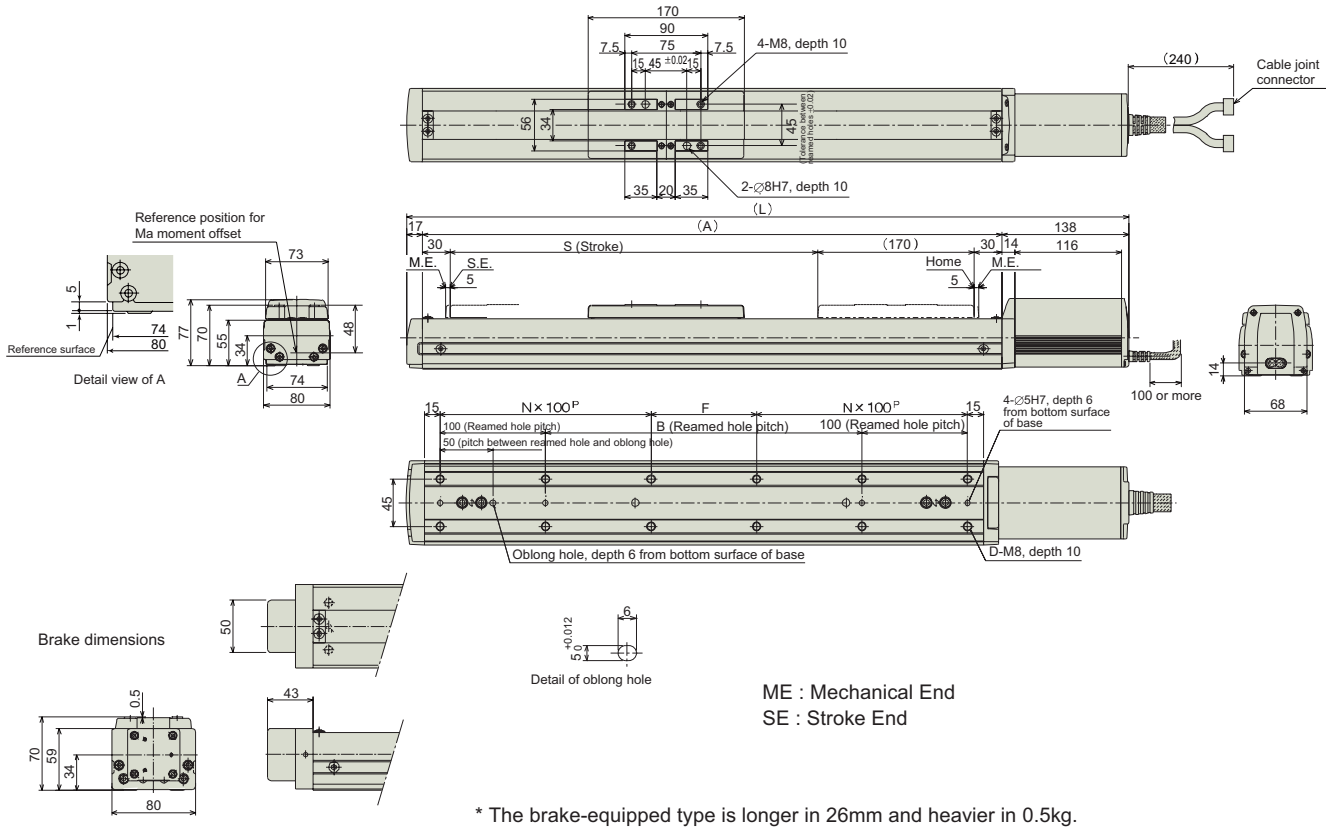
ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer in 26mm and heavier in 0.5kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	435	485	535	585	635	685	735	785	835	885	935	985	1035	1085	1135	1185
A	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
B	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
D	8	8	8	10	12	12	12	14	16	16	16	18	20	20	20	22
F	50	100	150	0	50	100	150	0	50	100	150	0	50	100	150	0
N	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5
Weight [kg]	6.6	7.1	7.6	8.1	8.6	9.2	9.7	10.2	10.7	11.3	11.7	12.3	12.8	13.4	13.9	14.5

Stroke	850	900	950	1000
L	1235	1285	1335	1385
A	1080	1130	1180	1230
B	850	900	950	1000
D	24	24	24	26
F	50	100	150	0
N	5	5	5	6
Weight [kg]	15.0	15.5	16.1	16.6

10.1.6 RCP2-HS8C



ME : Mechanical End
SE : Stroke End

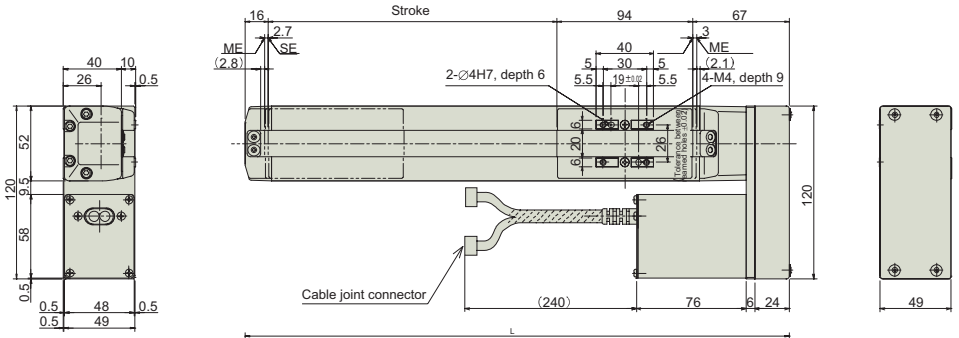
* The brake-equipped type is longer in 26mm and heavier in 0.5kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	435	485	535	585	635	685	735	785	835	885	935	985	1035	1085	1135	1185
A	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
B	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
D	8	8	8	10	12	12	12	14	16	16	16	18	20	20	20	22
F	50	100	150	0	50	100	150	0	50	100	150	0	50	100	150	0
N	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5
Weight [kg]	6.6	7.1	7.6	8.1	8.6	9.2	9.7	10.2	10.7	11.3	11.7	12.3	12.8	13.4	13.9	14.5

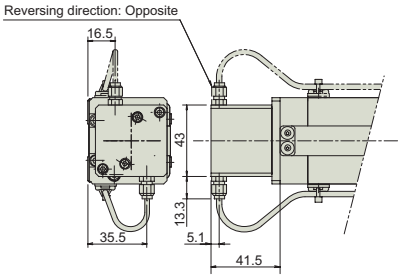
Stroke	850	900	950	1000
L	1235	1285	1335	1385
A	1080	1130	1180	1230
B	850	900	950	1000
D	24	24	24	26
F	50	100	150	0
N	5	5	5	6
Weight [kg]	15.0	15.5	16.1	16.6

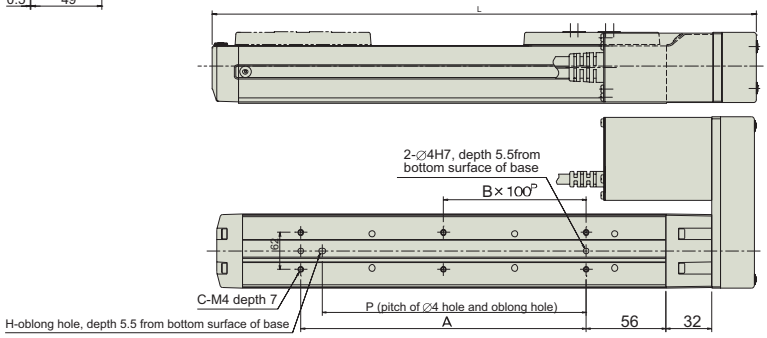
10.1.7 RCP2-SA5R

ME : Mechanical End
SE : Stroke End



Brake dimensions





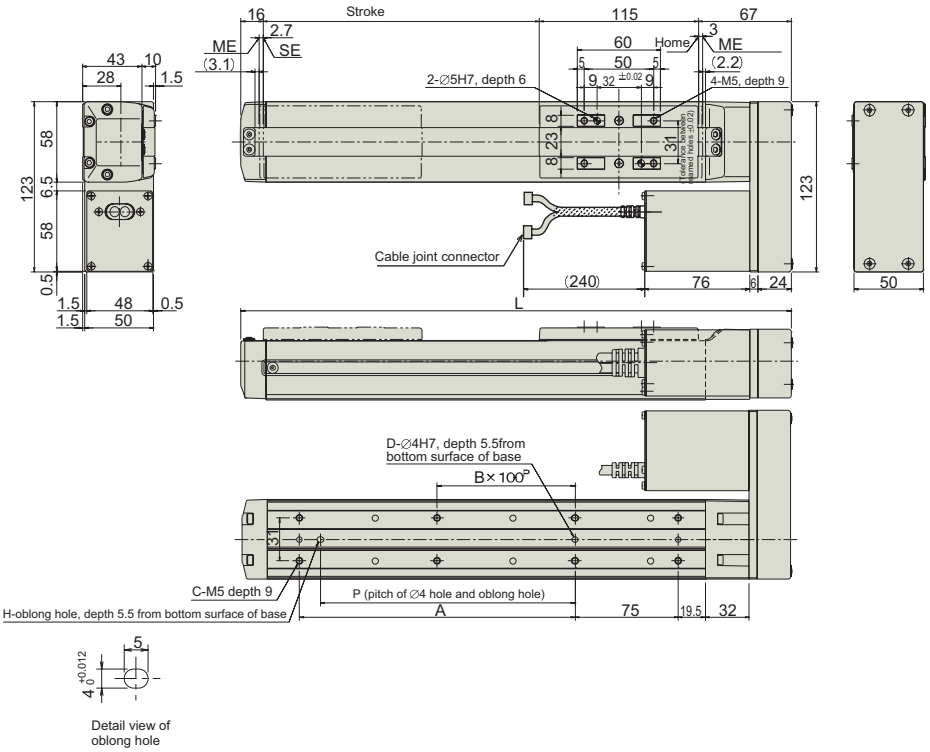
Detail view of oblong hole

* The brake-equipped type is longer in 40mm and heavier in 0.4kg.

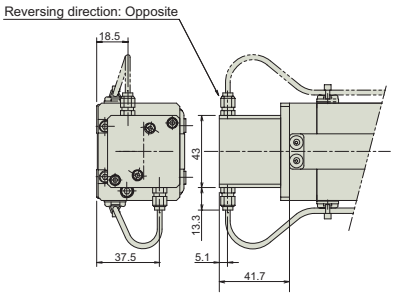
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	227	277	327	377	427	477	527	577	627	677	727	777	827	877	927	977
A	73	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	4	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.0	3.1	3.3	3.4	3.5	3.6	3.7

10.1.8 RCP2-SA6R

ME : Mechanical End
SE : Stroke End



Brake dimensions

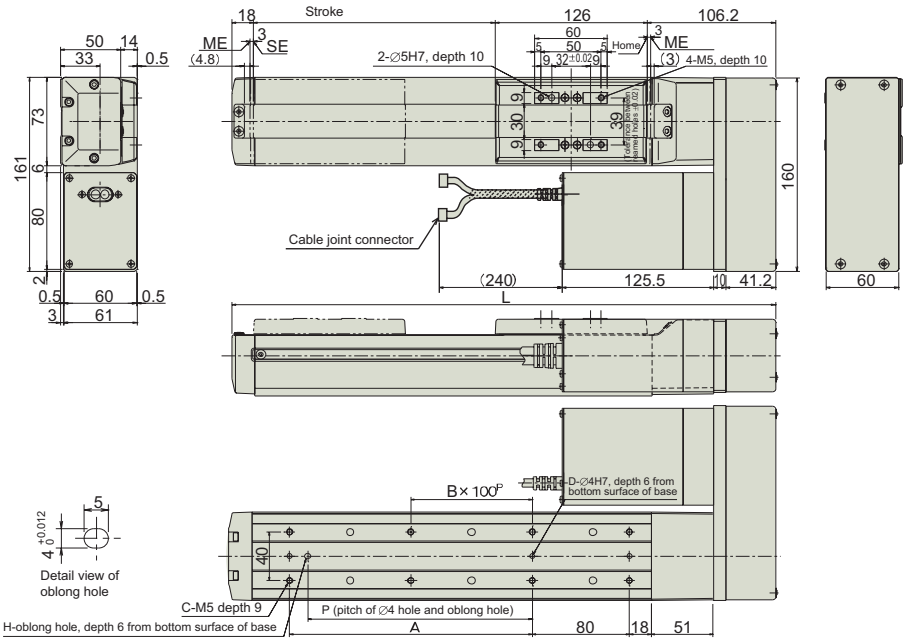


* The brake-equipped type is longer in 40mm and heavier in 0.4kg.

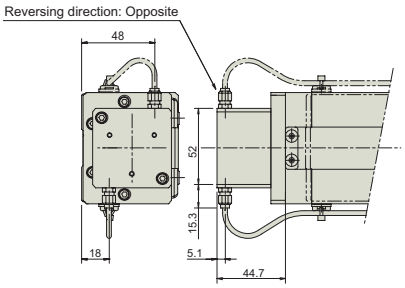
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	248	298	348	398	448	498	548	598	648	698	748	798	848	898	948	998
A	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
D	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	2.3	2.5	2.6	2.7	2.9	3.0	3.2	3.3	3.4	3.6	3.7	3.9	4.0	4.1	4.3	4.4

10.1.9 RCP2-SA7R

ME : Mechanical End
SE : Stroke End



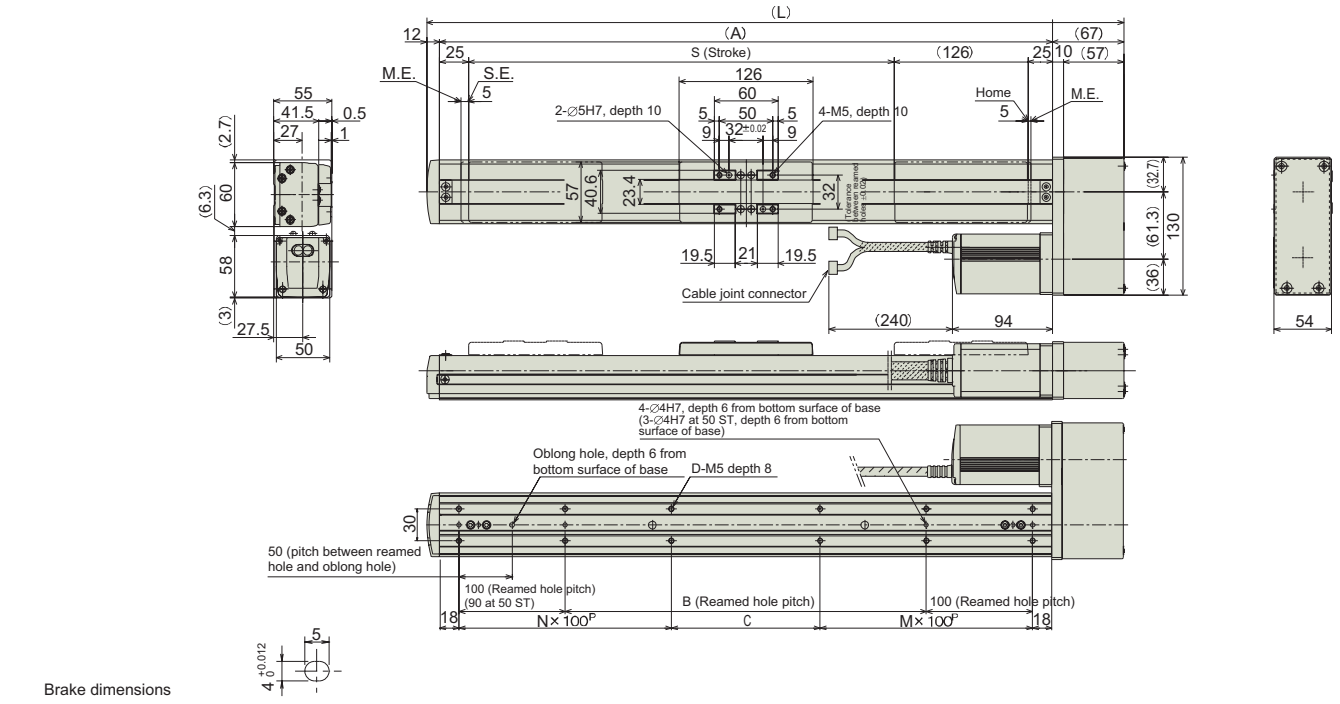
Brake dimensions



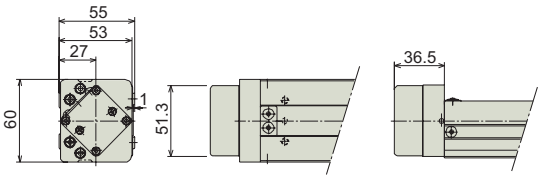
* The brake-equipped type is longer in 43mm and heavier in 0.6kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	300.2	350.2	400.2	450.2	500.2	550.2	600.2	650.2	700.2	750.2	800.2	850.2	900.2	950.2	1000.2	1050.2
A	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
D	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	4.5	4.7	5.0	5.2	5.4	5.6	5.9	6.1	6.3	6.5	6.8	7.0	7.2	7.4	7.7	7.9

10.1.10 RCP2-SS7R



Brake dimensions



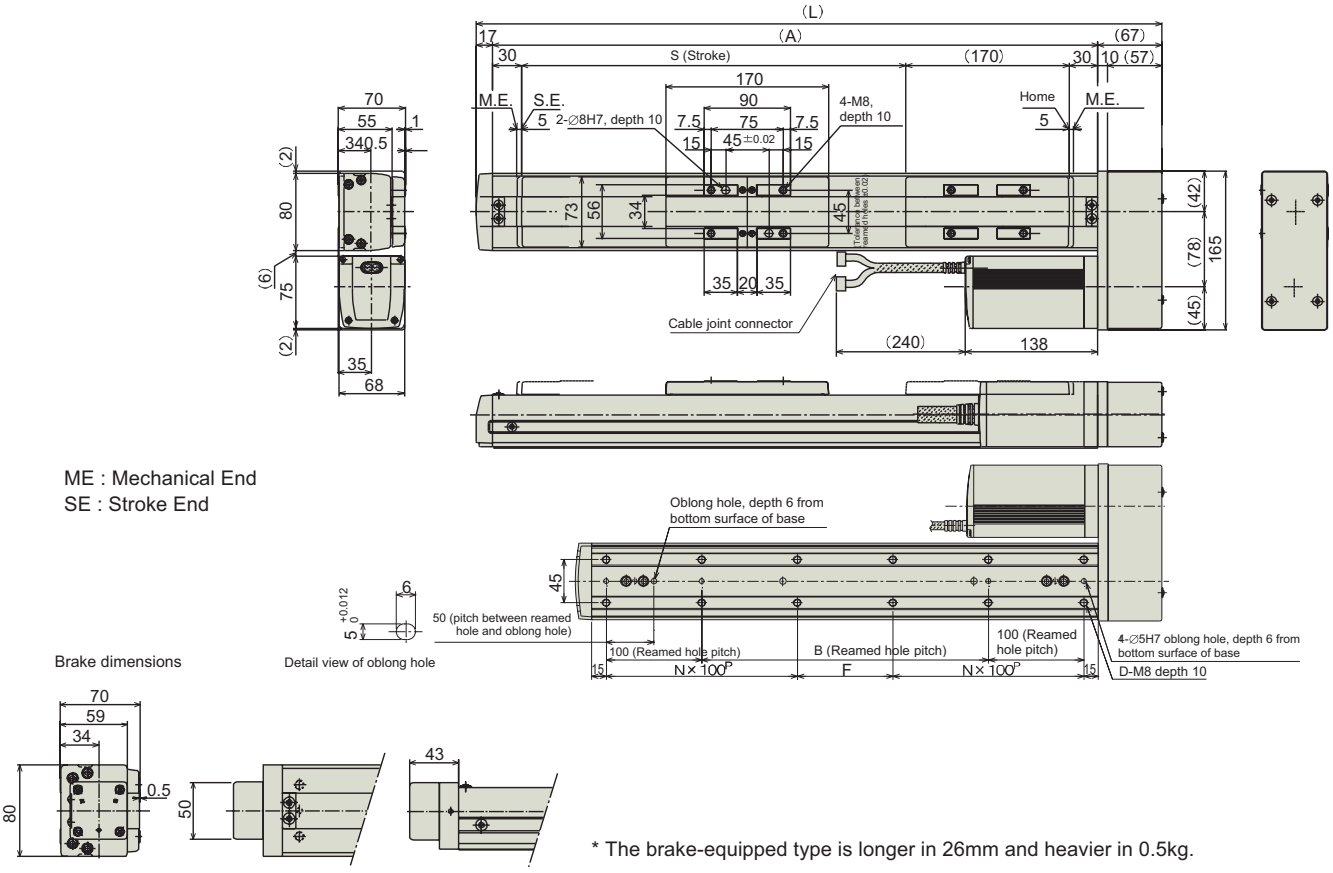
Detail view of oblong hole

ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer in 24.5mm and heavier in 0.3kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600
L	305	355	405	455	505	555	605	655	705	755	805	855
A	226	276	326	376	426	476	526	576	626	676	726	776
B	0	40	90	140	190	240	290	340	390	440	490	540
C	90	40	90	140	190	40	90	140	190	40	90	140
D	6	8	8	8	8	12	12	12	12	16	16	16
M	1	1	1	1	1	2	2	2	2	3	3	3
N	0	1	1	1	1	2	2	2	2	3	3	3
Weight [kg]	3.8	4.1	4.4	4.7	5.1	5.4	5.8	6.1	6.4	6.7	7.1	7.4

10.1.11 RCP2-SS8R

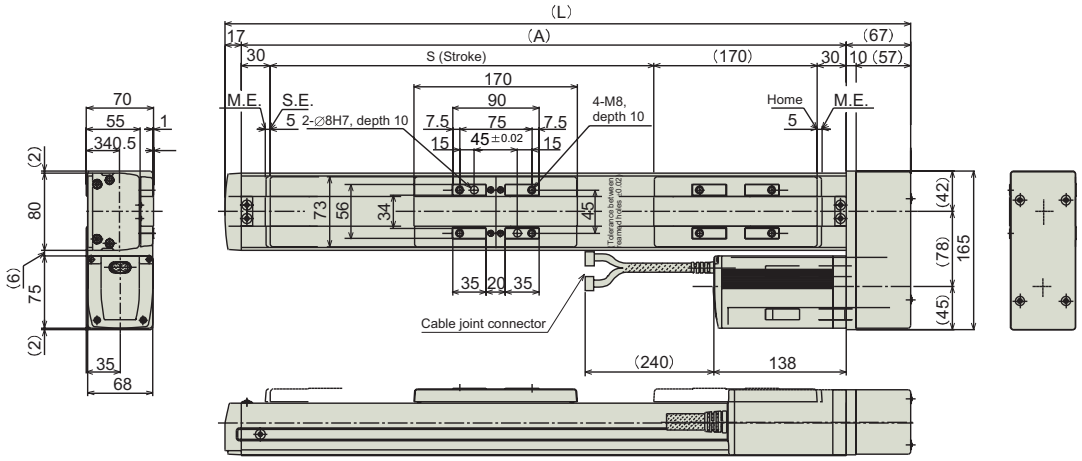


* The brake-equipped type is longer in 26mm and heavier in 0.5kg.

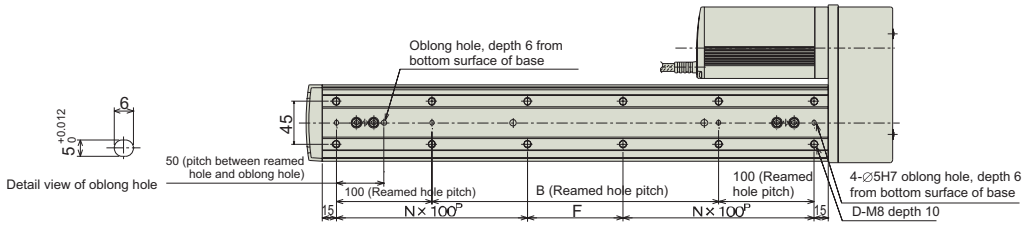
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	364	414	464	514	564	614	664	714	764	814	864	914	964	1014	1064	1114
A	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
B	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
D	8	8	8	10	12	12	12	14	16	16	16	18	20	20	20	22
F	50	100	150	0	50	100	150	0	50	100	150	0	50	100	150	0
N	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5
Weight [kg]	7.4	7.9	8.5	9.0	9.5	10	10.5	11.1	11.6	12.1	12.7	13.2	13.7	14.3	14.8	15.3

Stroke	850	900	950	1000
L	1164	1214	1264	1314
A	1080	1130	1180	1230
B	850	900	950	1000
D	24	24	24	26
F	50	100	150	0
N	5	5	5	6
Weight [kg]	15.8	16.4	16.9	17.4

10.1.12 RCP2-HS8R

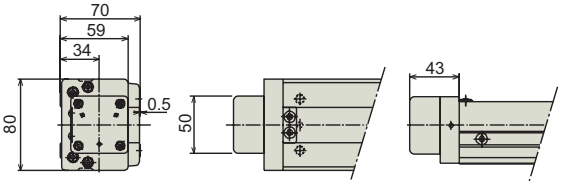


ME : Mechanical End
SE : Stroke End



Brake dimensions

Detail view of oblong hole

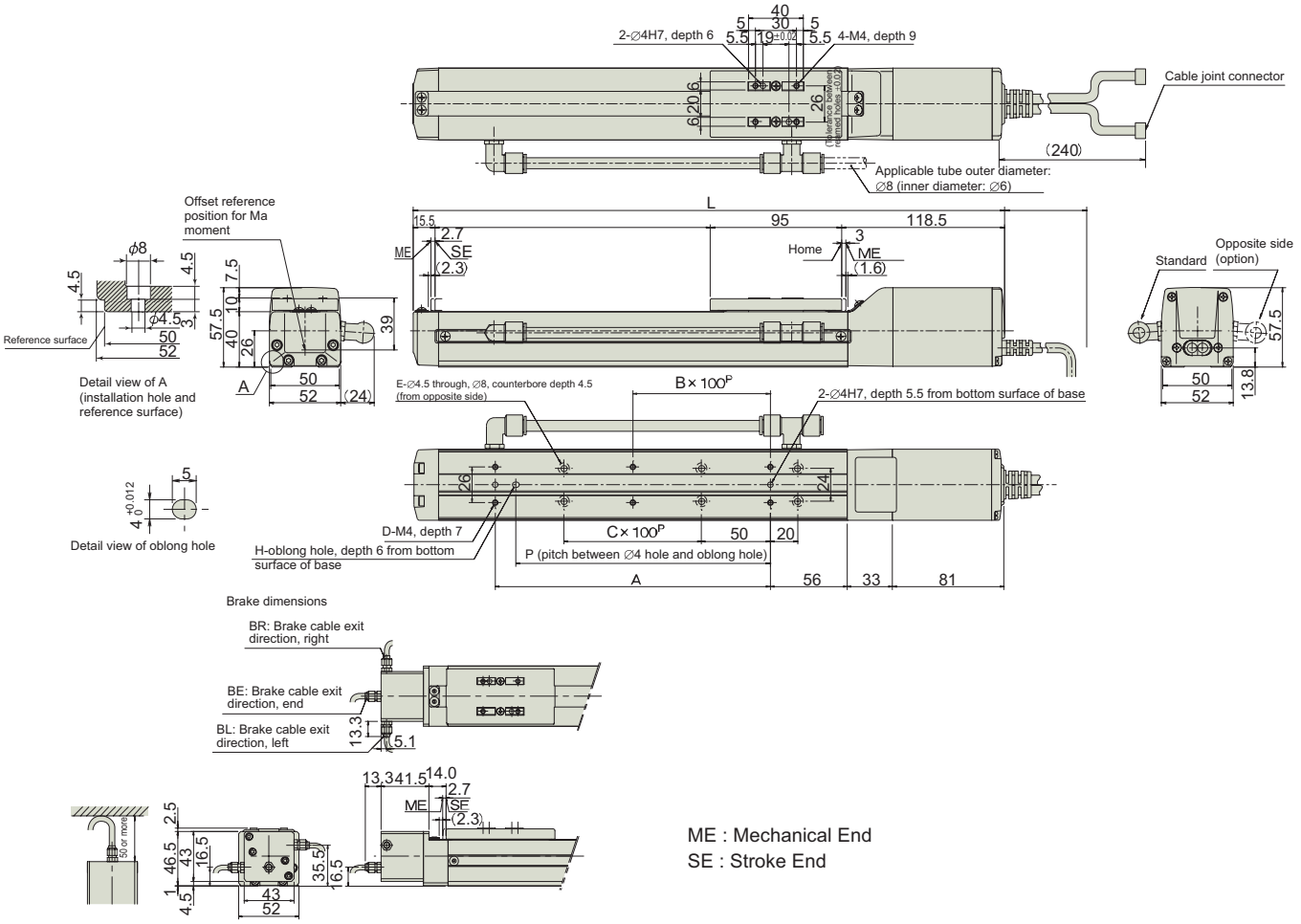


* The brake-equipped type is longer in 26mm and heavier in 0.5kg.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	364	414	464	514	564	614	664	714	764	814	864	914	964	1014	1064	1114
A	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
B	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
D	8	8	8	10	12	12	12	14	16	16	16	18	20	20	20	22
F	50	100	150	0	50	100	150	0	50	100	150	0	50	100	150	0
N	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5
Weight [kg]	7.4	7.9	8.5	9.0	9.5	10	10.5	11.1	11.6	12.1	12.7	13.2	13.7	14.3	14.8	15.3

Stroke	850	900	950	1000
L	1164	1214	1264	1314
A	1080	1130	1180	1230
B	850	900	950	1000
D	24	24	24	26
F	50	100	150	0
N	5	5	5	6
Weight [kg]	15.8	16.4	16.9	17.4

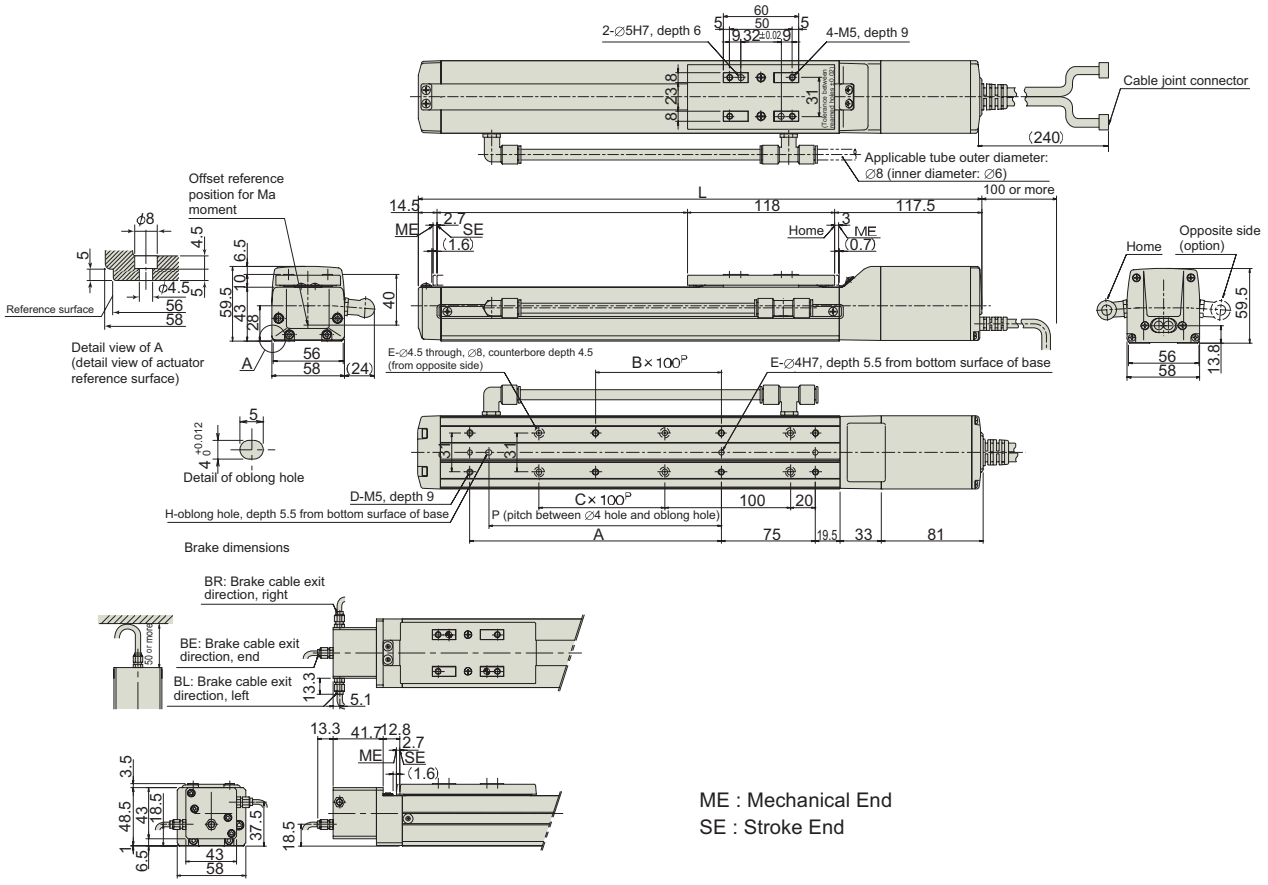
10.1.13 RCP2CR-SA5C



* The brake-equipped type is longer than the standard type in 40mm.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	279	329	379	429	479	529	579	629	679	729	779	829	879	929	979	1029
A	73	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
D	4	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18
E	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	1.7	1.8	1.9	2.0	2.1	2.3	2.4	2.5	2.6	2.7	2.8	3.0	3.1	3.2	3.3	3.4

10.1.14 RCP2CR-SA6C

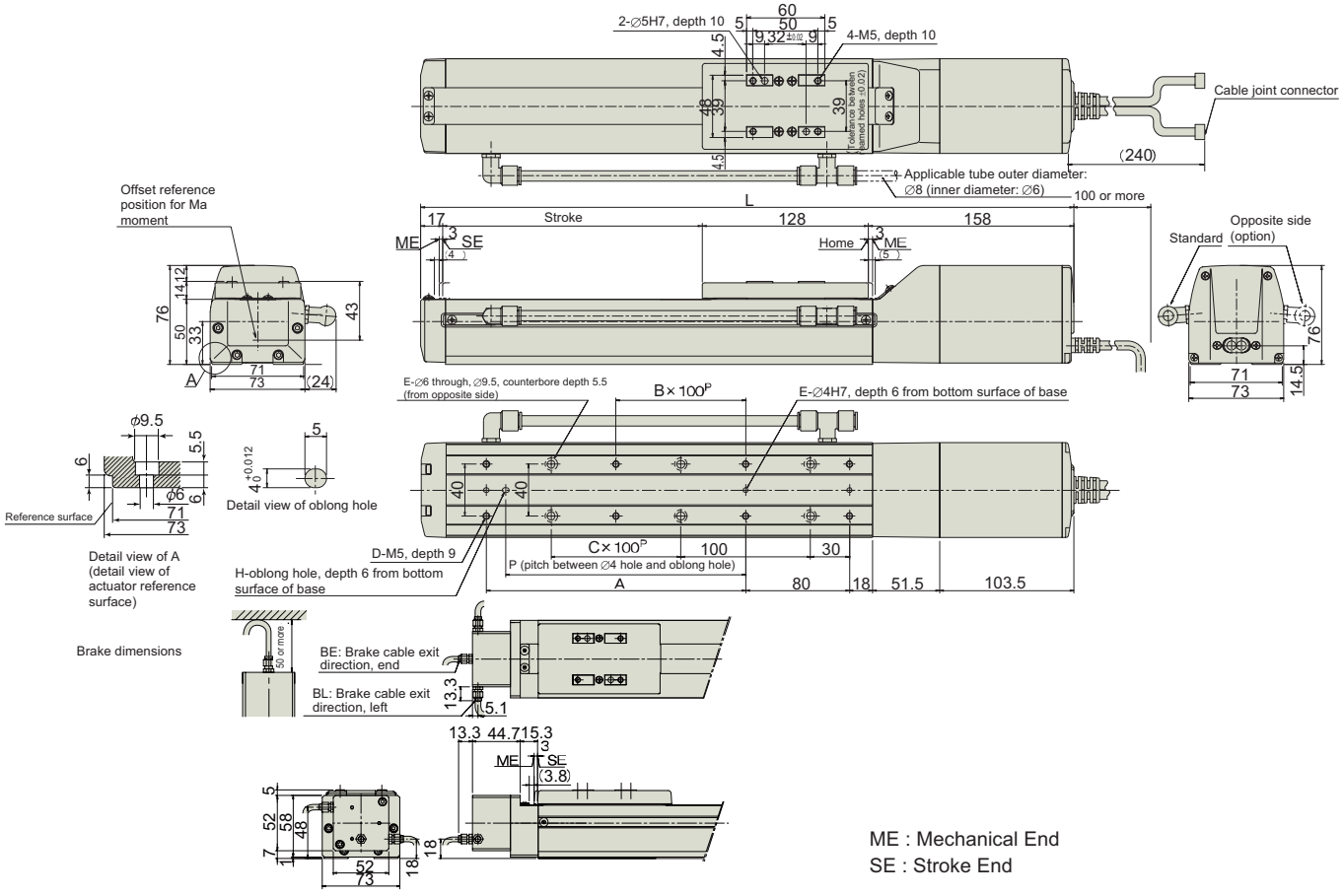


ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer than the standard type in 40mm.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050
A	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
D	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
E	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
F	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	2.0	2.2	2.3	2.4	2.6	2.7	2.9	3.0	3.1	3.3	3.4	3.6	3.7	3.8	4.0	4.1

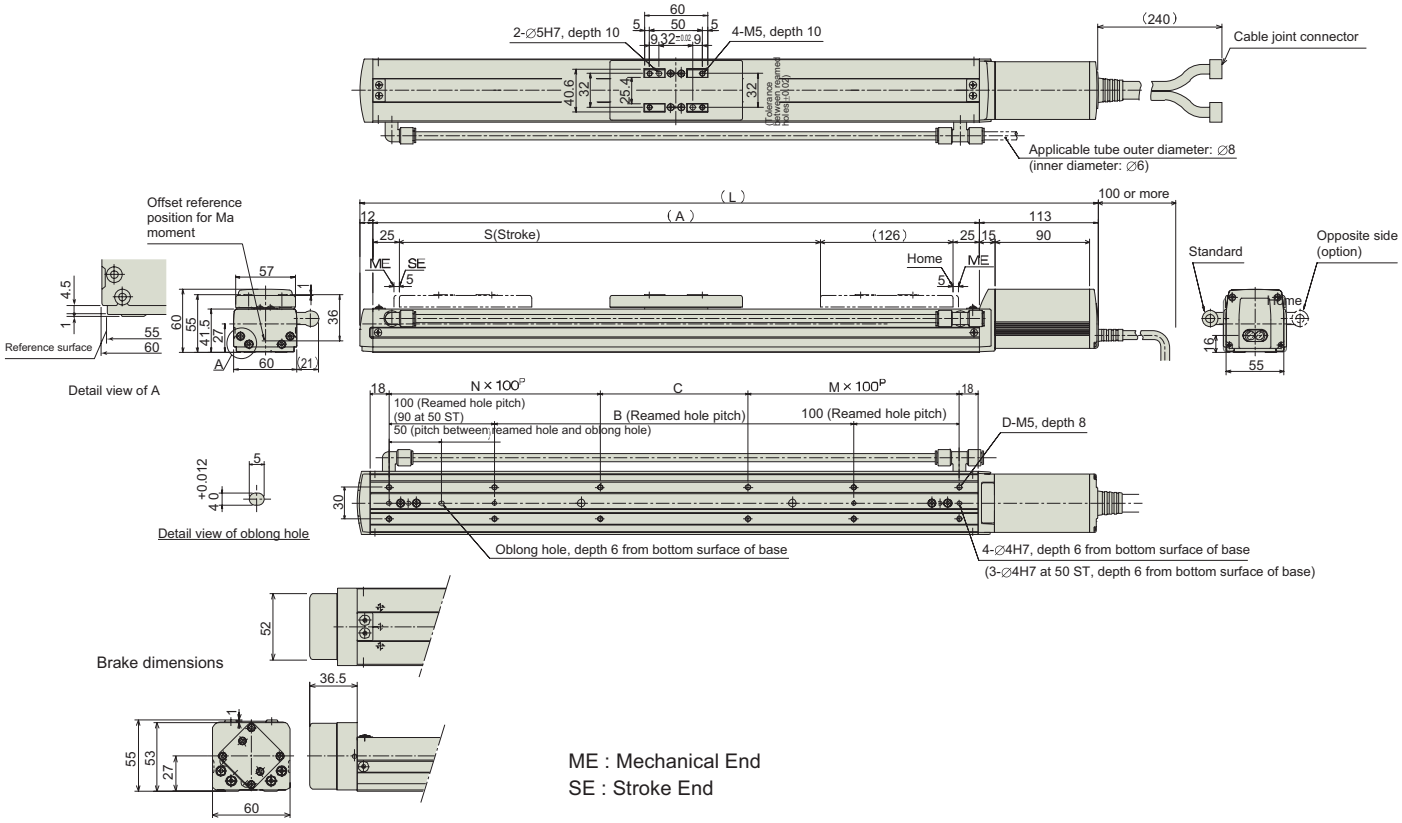
10.1.15 RCP2CR-SA7C



* The brake-equipped type is longer than the standard type in 43mm.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	353	403	453	503	553	603	653	703	753	803	853	903	953	1003	1053	1103
A	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800
B	0	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7
C	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
D	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
E	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
F	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
H	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
Weight [kg]	3.3	3.5	3.8	4.0	4.2	4.4	4.7	4.9	5.1	5.3	5.6	5.8	6.0	6.2	6.5	6.7

10.1.16 RCP2CR-SS7C

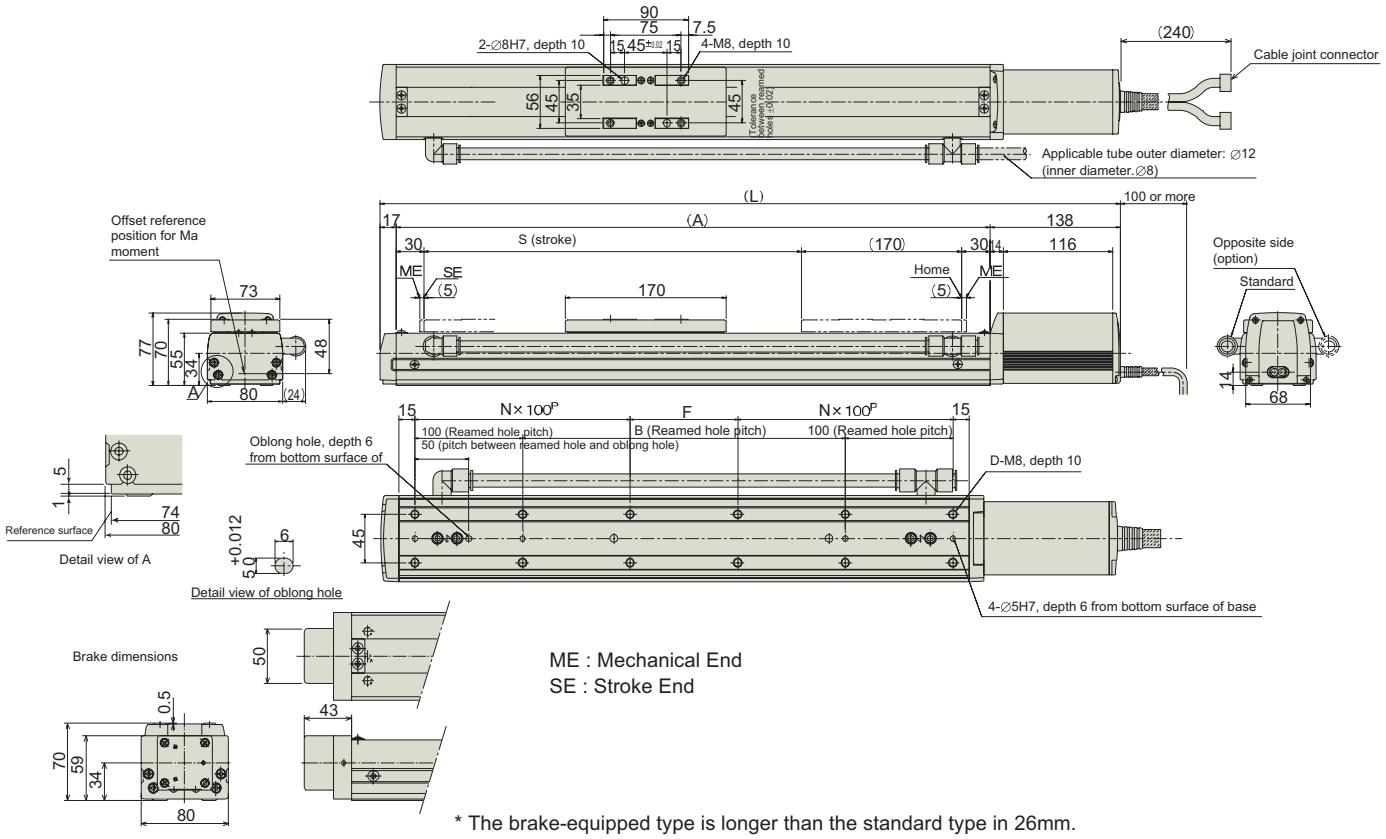


ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer than the standard type in 24.5mm.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600
L	351	401	451	501	551	601	651	701	751	801	851	901
A	226	276	326	376	426	476	526	576	626	676	726	776
B	0	40	90	140	190	240	290	340	390	440	490	540
C	90	40	90	140	190	40	90	140	190	40	90	140
D	6	8	8	8	8	12	12	12	12	16	16	16
M	1	1	1	1	1	2	2	2	2	3	3	3
N	0	1	1	1	1	2	2	2	2	3	3	3
Weight [kg]	3.3	3.6	3.9	4.2	4.6	4.9	5.3	5.6	6.0	6.3	6.6	6.9

10.1.17 RCP2CR-SS8C



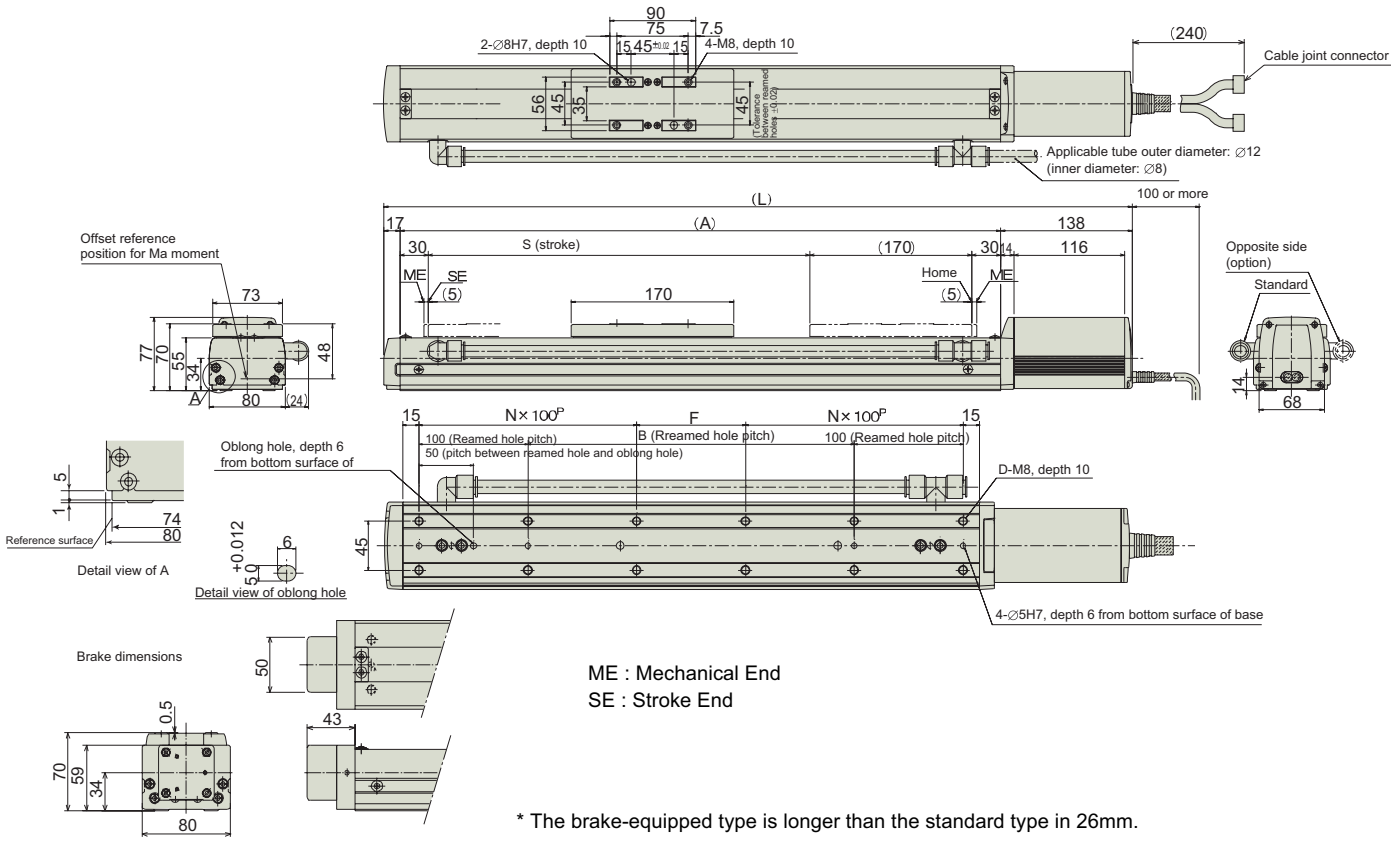
ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer than the standard type in 26mm.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	435	485	535	585	635	685	735	785	835	885	935	985	1035	1085	1135	1185
A	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
B	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
D	8	8	8	10	12	12	12	14	16	16	16	18	20	20	20	22
F	50	100	150	0	50	100	150	0	50	100	150	0	50	100	150	0
N	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5
Weight [kg]	7.0	7.5	8.0	8.5	9.0	9.6	10.1	10.6	11.2	11.7	12.3	12.7	13.3	13.8	14.4	14.9

Stroke	850	900	950	1000
L	1235	1285	1335	1385
A	1080	1130	1180	1230
B	850	900	950	1000
D	24	24	24	26
F	50	100	150	0
N	5	5	5	6
Weight [kg]	15.4	15.9	16.5	17.0

10.1.18 RCP2CR-HS8C



ME : Mechanical End
SE : Stroke End

* The brake-equipped type is longer than the standard type in 26mm.

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	435	485	535	585	635	685	735	785	835	885	935	985	1035	1085	1135	1185
A	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
B	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
D	8	8	8	10	12	12	12	14	16	16	16	18	20	20	20	22
F	50	100	150	0	50	100	150	0	50	100	150	0	50	100	150	0
N	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5
Weight [kg]	7.0	7.5	8.0	8.5	9.0	9.6	10.1	10.6	11.2	11.7	12.3	12.7	13.3	13.8	14.4	14.9

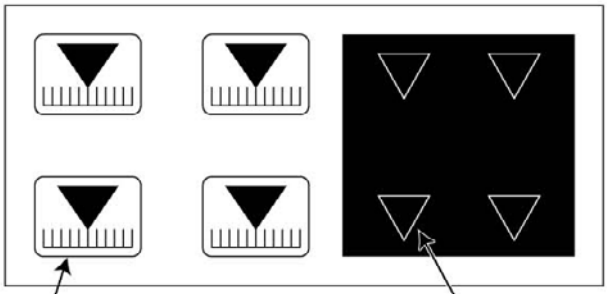
Stroke	850	900	950	1000
L	1235	1285	1335	1385
A	1080	1130	1180	1230
B	850	900	950	1000
D	24	24	24	26
F	50	100	150	0
N	5	5	5	6
Weight [kg]	15.4	15.9	16.5	17.0

10.2 How to use the home mark

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

Contents of sticker

Home mark sticker



× 1 sheet

Home mark scale × 4 Home mark × 4

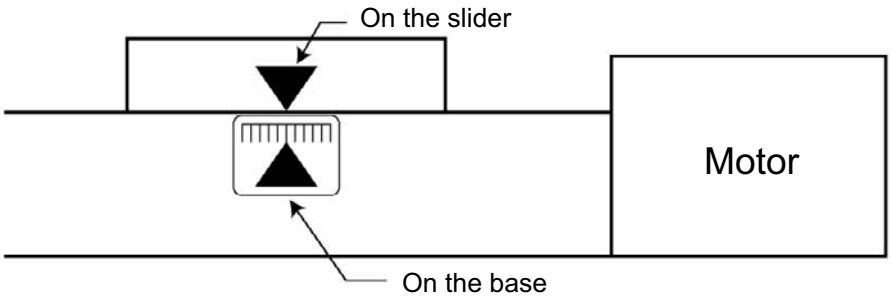
(Scale: 1mm graduation mark, 10mm width)

· Peel off the home marks and use as a base sheet.

Note 1. Every mark has an adhesive back.
2. Remove smears and stains from the surface before affixing the marks.
3. Avoid labels or nameplates as a marking location.

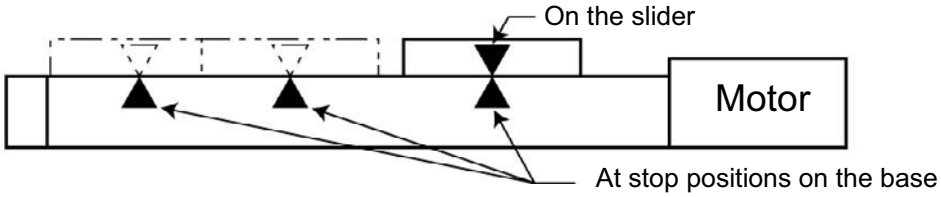
Example of Use

[1] Used as home position



· Place the two marks when the actuator is stopped at the home position.

[2] Used as stop positions



11. Warranty

11.1 Warranty Period

One of the following periods, whichever is shorter:
- 18 months after shipment from IAI
- 12 months after delivery to the specified location
- 2,500 hours of operation

11.2 Scope of Warranty

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

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

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

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

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

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

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

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

11.3 Honoring the Warranty

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

11.4 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.

11.5 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.

11.6 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	
	First edition	Added information on RCS3 and RCS3CR actuators.
March 2010	Second Edition	• “Please Read Before Use”: Entirely revised the content. • “Safety Guide”: Entirely revised the content. • P. 37 to 39: Changed to 7, “Wiring Cable.” • P. 9: Added “Handling Precautions.” • P. 16, 17: Added 2, “Checking after Unpacking.” • P. 18 to 27: Added “Maximum acceleration," “Acceleration and payload capacity,” “Rated thrust,” “Drive method” and “Common specification” under 6, “Specification.” Added references to the performance of conventional specification and “High-acceleration/deceleration specification” models under “Acceleration and payload capacity.” • P. 40: Added “If continuous back-and-forth operations are performed over a distance of 130 mm or less, grease film may be broken. As a guide, operate the actuator back and forth five times or so over a distance of 50 mm or more after every 5,000 to 10,000 cycles. ” • Back cover: Changed the reference to “Eight” by describing it as a “24-hour service” desk. Added IAI Shanghai.
July 2010	Third Edition	• P. 9: Added “Pay attention to the position when the servo is turned ON” under “Handling Precautions.”
November 2010	Fourth Edition	• P. 16: Added “PMEC” to “How to Read the Model Number.” • P. 17: Added “SA5C, lead 20” and “SA6C, lead 20” to the explanation of limitations on stroke and maximum speed. • P. 19: Added “SA5C, lead 20” to the graphs of speed vs. payload capacity. • P. 20: Added “SA6C, lead 20” to the graphs of speed vs. payload capacity. • P. 25: Added “SA5C, lead 20” and “SA6C, lead 20” under (3), “Drive method.” Added “SA5C, lead 20” and “SA6C, lead 20” under (5), “Common specification.” • P. 26: Added “Static allowable load moments.” • P. 27: Added the reference positions in Ma and Mb directions. • P. 29: Added 4, “Life.” • P. 30: Changed “Preservation Environment” to “Storage/Preservation Environment.” • P. 32: Added 5.1, “Installation.” • P. 40: Added “Connecting to PCON/PSEL Controller” and “Connecting to PMEC/PSEP Controller.” • P. 43: Added 7, “Options.” • P. 44: Added 8, “Motor/Encoder Cables.” • P. 47: Added 9.4, “Adjusting the Stainless Sheet.”
April 2011	Fifth edition	• A page for CE Marking added
June 2011	Sixth edition	• P.31: Contents of caution for vertically oriented mount changed.
July 2011	Seventh edition	• P.31: Change in ceiling installation availability (×: Not installable → △: Daily inspection is required) • P.112 to 113 : Contents changed in 11. Warranty

Revision Date	Description of Revision
December 2011	Eighth edition • Contents changed in Safety Guide Caution notes added for when working with two or more persons • P.31, 38: Note added to state that RCP2CR-SA5C and RCP2CR-SA6C cannot be ensured for Cleanliness Class 10 in vertical orientation, horizontally oriented wall mount or in ceiling mount
February 2012	Ninth edition • “Motor cable CB-RFA-MA***” added to 8.2 Cable for PCON and PSEL Controllers • Weight added to 10.1 External Dimensions
March 2012	Tenth edition • P.1 to 7: Contents added and changed in Safety Guide • P.8: Note “Make sure to attach the actuator properly by following this instruction manual.” added in Caution in Handling • P.51: Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care.
May 2012	Eleventh edition • P.55: Gap checking tool became a plate and figure corrected
May 2012	Twelfth edition • P.17: Correction made to maximum speed of SA7C and SA7R 470mm/s → 533mm/s
April 2013	Thirteen edition • P.11: A page of CE Marking deleted and Internatiional Standerds Compliances added P.19, 22 to 28: Rated acceleration shown in correlation graph for acceleration and payload P.44 to 46: Caution for wiring fully revised

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IAI
Quality and Innovation

IAI Corporation

Head Office: 577-1 Obane Shimizu-KU Shizuoka City Shizuoka 424-0103, Japan
TEL +81-54-364-5105 FAX +81-54-364-2589
website: www.iai-robot.co.jp/

Technical Support available in USA, Europe and China

IAI America, Inc.

Head Office: 2690 W. 237th Street, Torrance, CA 90505
TEL (310) 891-6015 FAX (310) 891-0815
Chicago Office: 1261 Hamilton Parkway, Itasca, IL 60143
TEL (630) 467-9900 FAX (630) 467-9912
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066
TEL (678) 354-9470 FAX (678) 354-9471
website: www.intelligentactuator.com

IAI Industrieroboter GmbH

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany
TEL 06196-88950 FAX 06196-889524

IAI (Shanghai) Co., Ltd.

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China
TEL 021-6448-4753 FAX 021-6448-3992
website: www.iai-robot.com

IAI Robot (Thailand) Co., Ltd.

Phairoj Kijja Tower 12th Floor, 400 Soi29, Bangna-Trad RD., Bangna, Bangkok 10260, Thailand
TEL/+66-2-361-4458 FAX/+66-2-361-4456

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