

ROBO Cylinder[®]

Products designed for use in secondary
battery production processes

Slider Type

RCS4B-SA4C/SA4R/
SA6C/SA6R/
SA7C/SA7R/
SA8C/SA8R

Instruction Manual First Edition ME3850-1A



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IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

This instruction manual explains the handling methods, structure and maintenance of this product, providing the information you need in order 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.

Please download the user's manual from our website.

You can download it free of charge. User registration is required for the first time downloading.

URL : www.iai-robot.co.jp/data_dl/CAD_MANUAL/

When using the product, print out of the necessary portions of the relevant manual, or please display it on your computer, tablet terminal, etc. so that you can check it immediately.

After reading the instruction manual, keep it in a convenient place so that whoever is handling the product can refer to it quickly when necessary.

[Important]

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
- Use or reproduction of this instruction manual in full or in part without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the text are registered trademarks.

RCS4B Slider Type Instruction Manual Configuration

Product name	Instruction manual name	Control number
RCS4B Slider Type	Instruction Manual (this document)	ME3850
RCON System	RCON System Instruction Manual	ME0384
RSEL System	RSEL System Instruction Manual	ME0392
SCON2 Controller	SCON2 Controller Instruction Manual	ME0458
SCON-CB/CGB Controller	SCON-CB/CGB Controller Instruction Manual	ME0340
SCON-CAL/CGAL Controller	SCON-CAL/CGAL Controller Instruction Manual	ME0243
MSCON-C Controller	MSCON-C Controller Instruction Manual	ME0306
SSEL-CS Controller	SSEL-CS Controller Instruction Manual	ME0157
XSEL2 Controller	XSEL2 Controller Instruction Manual	ME0478
XSEL-P/Q Controller	XSEL-P/Q Controller Instruction Manual	ME0148
XSEL-RA/SA Controller	XSEL-RA/SA Controller Instruction Manual	ME0359
PC software	IA-OS First Step Guide * Refer to the guidance feature stored in IA-OS for how to operate	ME0391
PC Teaching Software for XSEL	IA-101-X-MW/IA-101-X-USBMW Instruction Manual	ME0154
Touch Panel Teaching Pendant TB-02/02D	Applicable for Position Controller Instruction Manual	ME0355
	Applicable for Program Controller Instruction Manual	ME0356
Touch Panel Teaching Pendant TB-03	Applicable for Position Controller Instruction Manual	ME0376
	Applicable for Program Controller Instruction Manual	ME0377

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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 instruction manual for each model. • Do not step or sit on the package. • Do not put any heavy thing that can deform the package, on it. • When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. • When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment’s capability limit. • Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. • Do not get on the load that is hung on a crane. • Do not leave a load hung up with a crane. • Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	• 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 (PE) on the AC power cable of the controller and the grounding plate in the control panel, make sure 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 standards and criteria). For detail, follow the description in [an instruction manual of each controller or controller built-in actuator]. ● Conduct functional grounding on the FG terminal for a controller supplying 24V DC or a controller built-in type actuator. In order to minimize influence to mechanical operation given by electromagnetic interference (noise) to an electrical device or insulation failure, conduct grounding on a terminal or a conductor that is electrically stable. The reference impedance should be Type D (Former Class 3, ground resistance 100Ω or less).

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 instruction manual for each model. • Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. • The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. • Pay attention not to lose the removed cover or 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 instruction manual of each unit to ensure the safety. • Using the devise in a way not indicated by IAI may lose the protection performance equipped to the device.

Alert Indication

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

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

Precautions for Handling

1. The Safety Guide attached with the product is intended to permit safe use of the product and thus to prevent risks and property damage. Be sure to read it before handling the product.

2. Do not attempt any handling or operation that is not indicated in this instruction manual.

3. Make sure to secure the actuator properly in accordance with this instruction manual.

If the actuator is not securely fixed, this may lead to abnormal noise, vibration, breakdown or shortened product life.

4. Make sure to observe the usage conditions and environment of the product.

Operation outside the warranty could cause decreased performance or product breakdown.

Use within the allowable range for each item.

Item	Cautions for use	Problems or breakdowns which may occur if the allowable range is exceeded
Speed and acceleration/deceleration	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life.
Allowable load moment	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life. In extreme cases, flaking may occur on the guide or ball screw.
Overhang load length		Mounting a load with an overhang length greater than the allowable values may lead to vibration or abnormal noise.

5. If return operations are continued over a short distance, they may rapidly degrade the film of grease.

Continuous return operation within a distance less than 30mm may cause the grease film to degrade rapidly.

As a guideline, in every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film. Continued use of the actuator in that state may lead to breakdown.

In extreme cases, flaking may occur on the guide or ball screw.

6. Do not attempt to have sliders collide with an obstacle at high speed.

This may damage the coupling or other mechanical parts.

7. In some conditions of environment of use, postures of installation and conditions of operation, the base oil separated from the grease may come out of ROBO Cylinder.

It is recommended to have a protection in case the peripheral devices could get influence of the base oil.

International Standard Compliance

The ROBO Cylinder complies with the following overseas standards.

Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

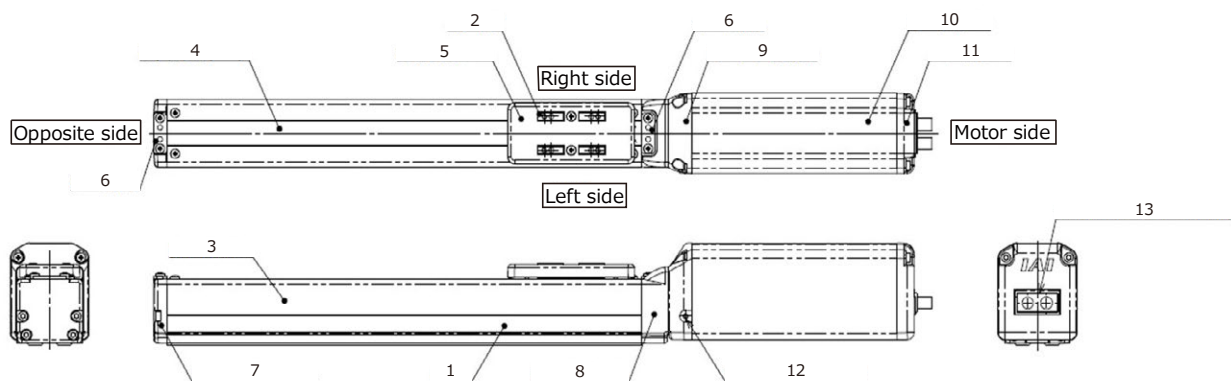
CE Marking	RoHS3 Directive
○	○

Names of the Parts

In this manual, the actuator left/right sides and motor/opposite sides are shown as in the figure below.

Motor Straight Type

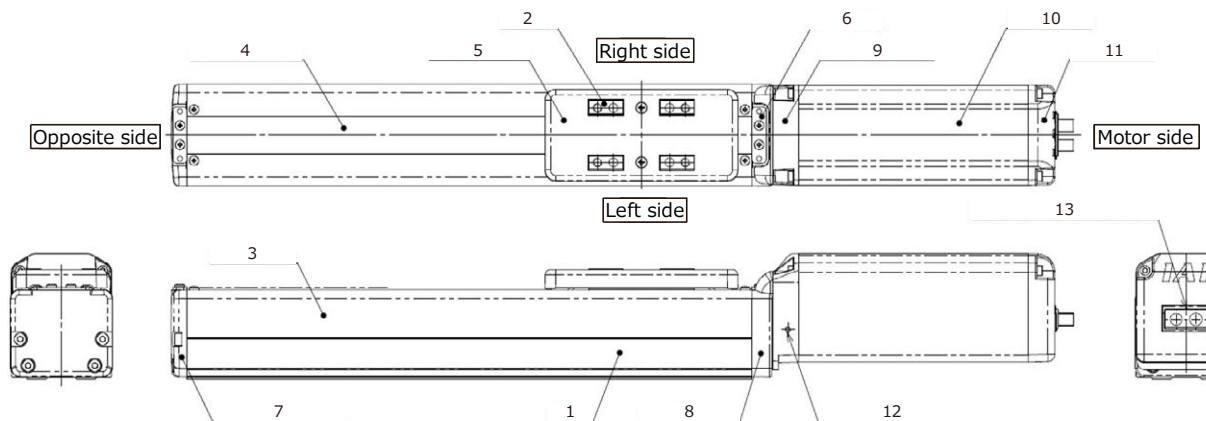
1.1 RCS4B-SA4C



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Screw hole for ground line attachment	—	—
13	Actuator cable Assy	—	—

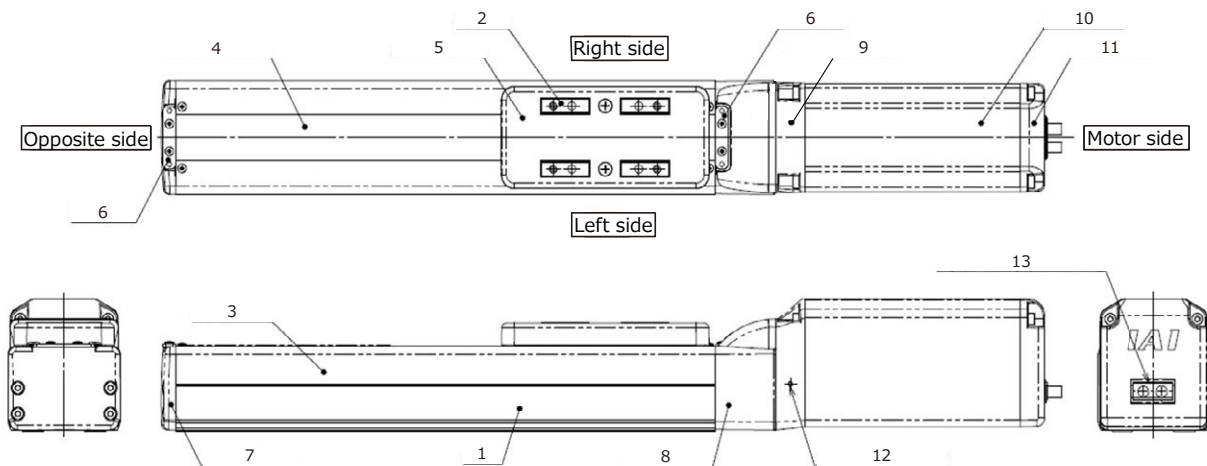
1.2 RCS4B-SA6C



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Screw hole for ground line attachment	—	—
13	Actuator cable Assy	—	—

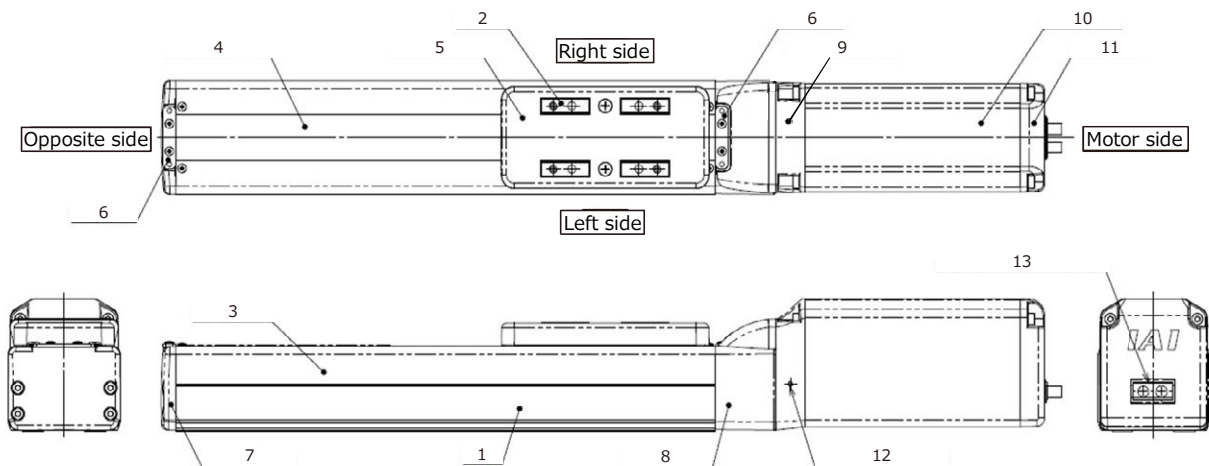
1.3 RCS4B-SA7C



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Screw hole for ground line attachment	—	—
13	Actuator cable Assy	—	—

1.4 RCS4B-SA8C

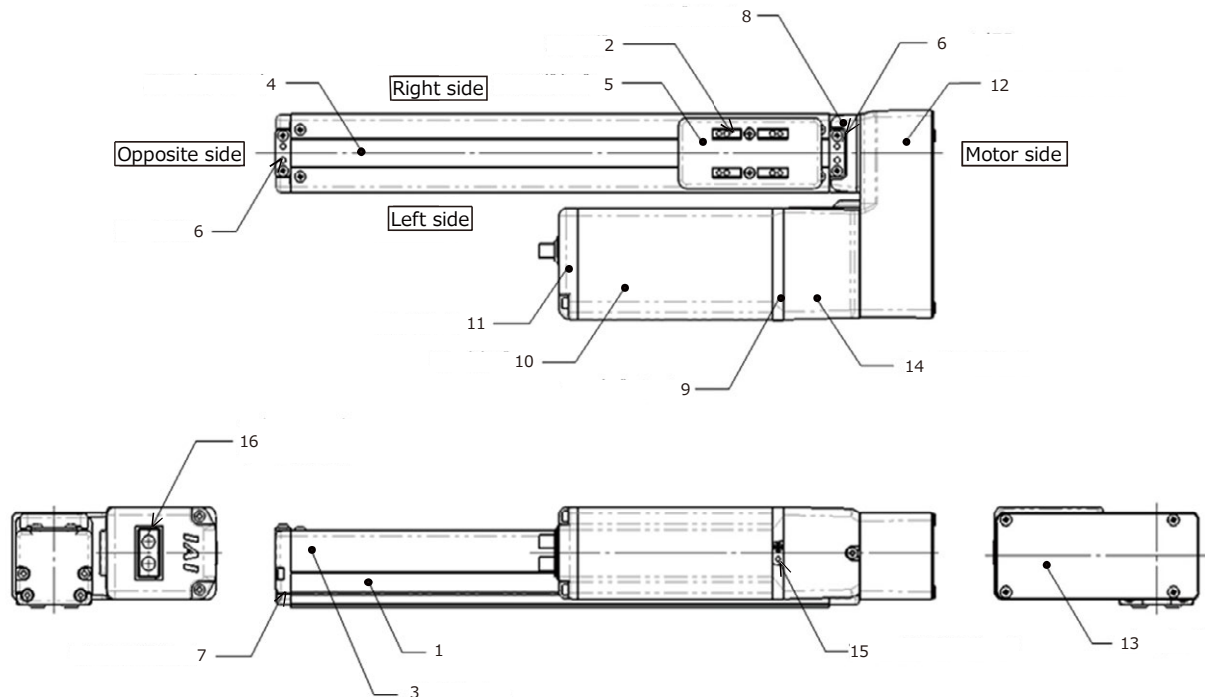


[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Screw hole for ground line attachment	—	—
13	Actuator cable Assy	—	—

Motor Reversing Type

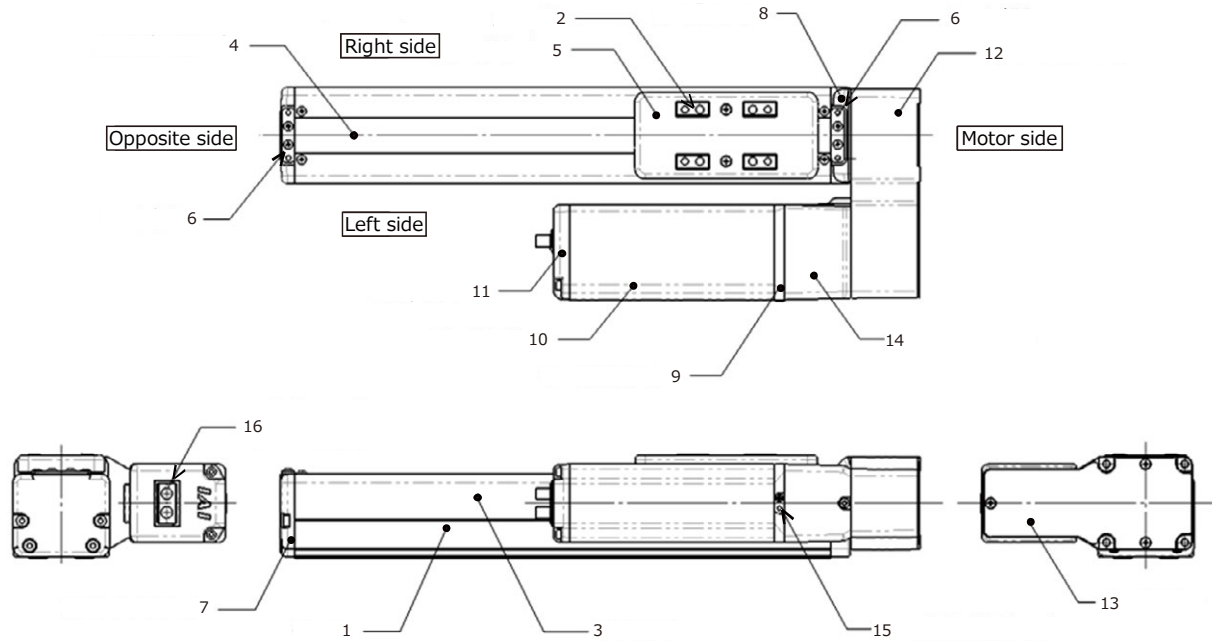
2.1 RCS4B-SA4R



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Reverse bracket	Aluminum die-casting	Decorative Surface Coating
13	Pulley cover	Aluminum Alloy	White Anodizing Treatment
14	Coupling cover	Plastic	—
15	Screw hole for ground line attachment	—	—
16	Actuator cable Assy	—	—

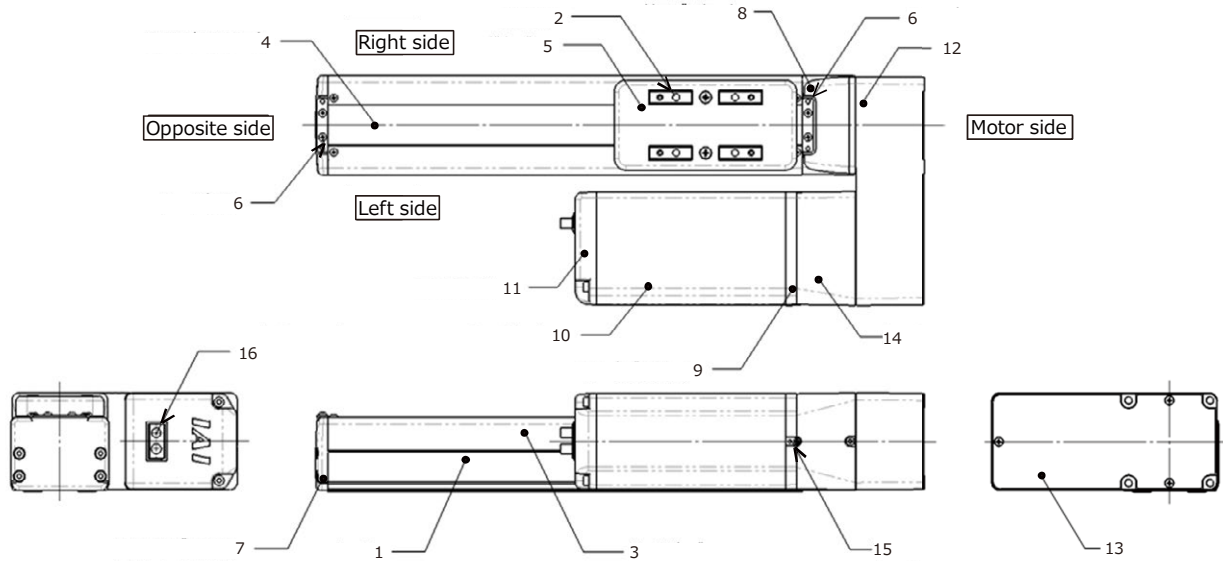
2.2 RCS4B-SA6R



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Reverse bracket	Aluminum die-casting	Decorative Surface Coating
13	Pulley cover	Aluminum Alloy	White Anodizing Treatment
14	Coupling cover	Plastic	—
15	Screw hole for ground line attachment	—	—
16	Actuator cable Assy	—	—

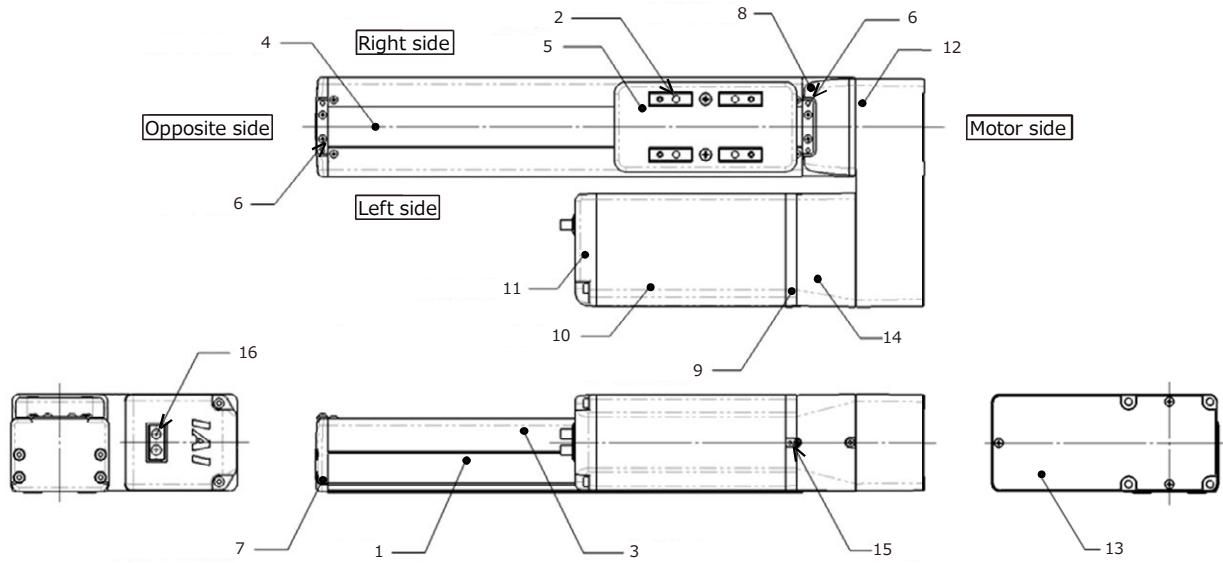
2.3 RCS4B-SA7R



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Reverse bracket	Aluminum die-casting	Decorative Surface Coating
13	Pulley cover	Aluminum Alloy	White Anodizing Treatment
14	Coupling cover	Plastic	—
15	Screw hole for ground line attachment	—	—
16	Actuator cable Assy	—	—

2.4 RCS4B-SA8R



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Side cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Slider cover	Plastic	—
6	Sheet retainer	Aluminum Alloy	—
7	Front bracket	Aluminum die-casting	Decorative Surface Coating
8	Rear bracket	Aluminum die-casting	Decorative Surface Coating
9	Motor bracket	Aluminum die-casting	Decorative Surface Coating
10	Motor cover	Aluminum Alloy	White Anodizing Treatment
11	End cover	Aluminum die-casting	Decorative Surface Coating
12	Reverse bracket	Aluminum die-casting	Decorative Surface Coating
13	Pulley cover	Aluminum Alloy	White Anodizing Treatment
14	Coupling cover	Plastic	—
15	Screw hole for ground line attachment	—	—
16	Actuator cable Assy	—	—

ROBO Cylinder

Chapter 1

Specifications

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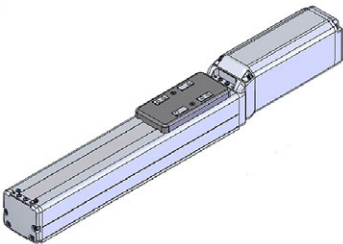
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1.1 Checking the Product

1.1.1 Parts

The following table shows the product configuration for the standard specification.

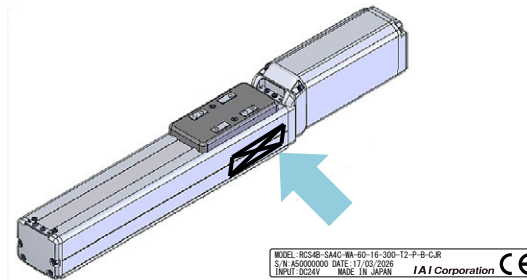
See the component list for the details of the enclosed components. If you find any fault or missing parts, contact your local IAI distributor.

Body		Accessories	
<u>Actuator Quantity 1</u>		<u>Motor Cable Quantity 1</u>	<u>Encoder Cable Quantity 1</u>
			
Accessories			
<u>Cross Recessed Pan Head Screw with Captive Washer M3×6 Quantity 2</u>	<u>Zip ties Quantity 2</u>	<u>Safety Guide Quantity 1</u>	
For affixing ground cable 	For clamping connector cover  * Refer to International Application Manual (ME0287) for how to use it.		

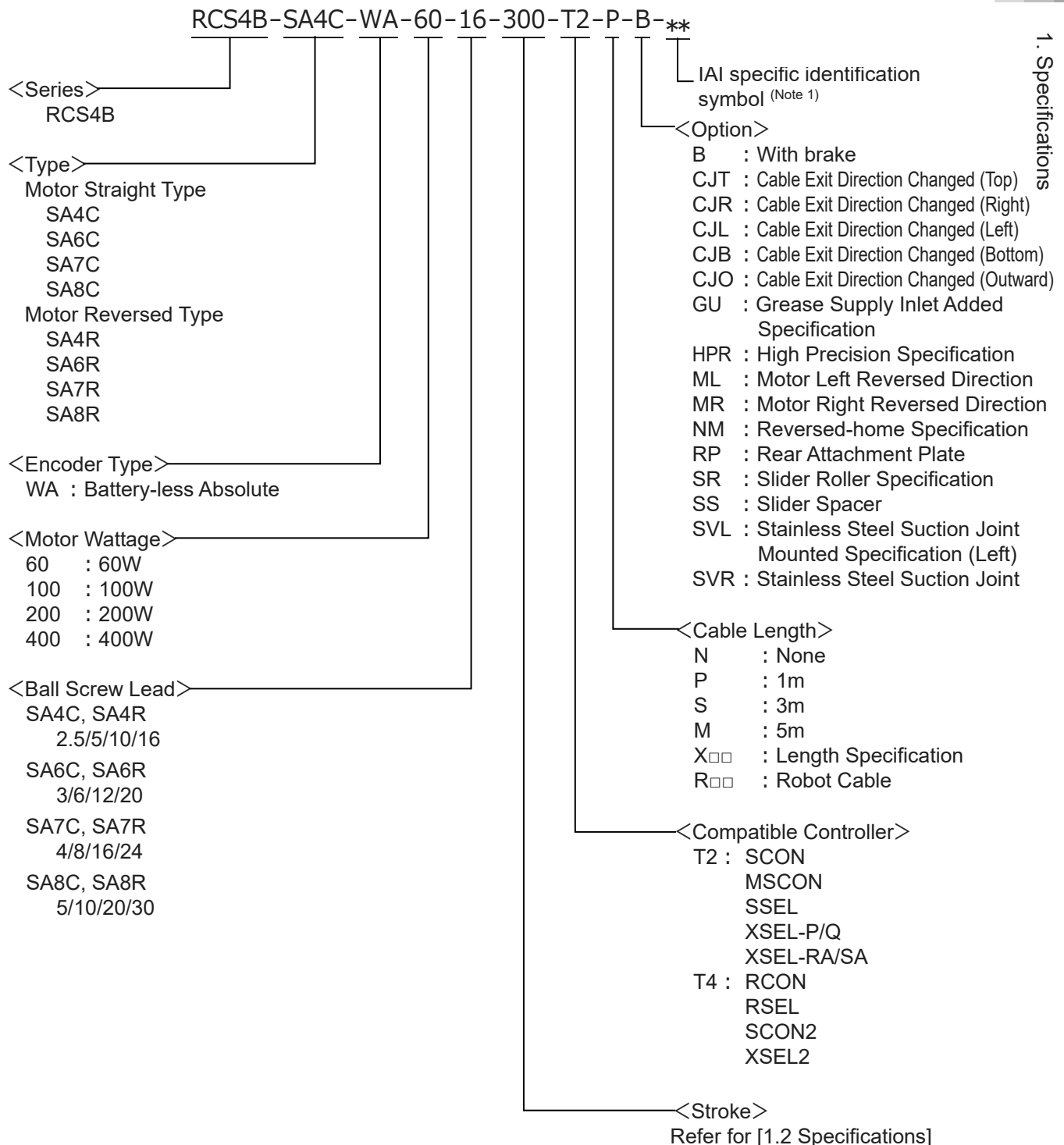
1.1.2 How to Read the Model Nameplate

Model	MODEL : RCS4B-SA4C-WA-60-16-300-T2-P-B-CJR	IAI Corporation 
Serial number	S/N : A50000000 DATE : 17/03/2026	
	INPUT : DC24V MADE IN JAPAN	

[Nameplate Position]



1.1.3 How to Read the Model Number



Note 1: IAI specific identification symbol: This may be indicated for our internal convenience. It does not represent the model code.

* Please note that the available range of motor wattage, ball screw lead, stroke and options will differ depending on the actuator type.

1.2 Specifications

1.2.1 Specifications

[1] RCS4B-SA4C

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
16	7	2	53
10	10	3.5	85
5	12	5.5	170
2.5	14	8.5	340

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 450 [Every 50mm]	500 mm
16	960	875
10	600	555
5	300	275
2.5	150	135



Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.

Minimum speed [mm/s] = Ball screw lead [mm/r] ÷ 16384 [p/r] × 1000 [1/s]

(mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 16

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	7	5.5	4	4	3	2	2	1	1	0.5
960	7	5.5	4	4	3	2	2	1	1	0.5

Lead 10

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	10	10	8.5	7	4	3.5	3.5	2	2	1.5
600	10	10	8.5	7	4	3.5	3.5	2	2	1.5

Lead 5

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	12	12	10.5	10.5	—	5.5	5.5	4	4	—
300	12	12	10.5	10.5	—	5.5	5.5	4	4	—

Lead 2.5

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	14	14	14	—	—	8.5	8.5	7	—	—
150	14	14	14	—	—	8.5	8.5	7	—	—

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

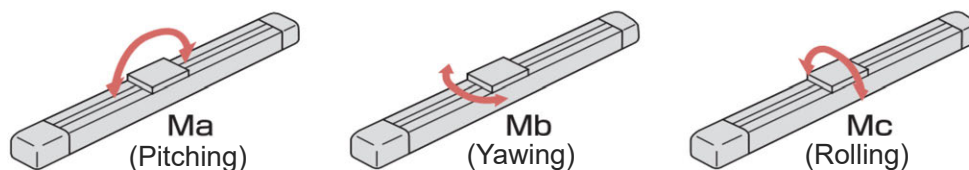
Item	Content
Drive System	Ball Screw $\phi 8\text{mm}$, Rolled C10
Positioning Repeatability (*1)	$\pm 0.01\text{mm}$ [$\pm 0.005\text{mm}$]
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 13.0 N•m, Mb direction: 18.6 N•m, Mc direction: 25.3 N•m
Allowable dynamic moment (*2, *3)	Ma direction: 5.0 N•m, Mb direction: 7.1 N•m, Mc direction: 9.7 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

(*1) Number in brackets [] show the specification for high precision type.

(*2) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

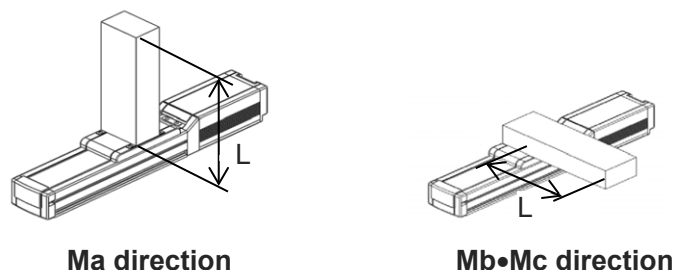
Revise the conditions for operation in such cases.

(*3) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

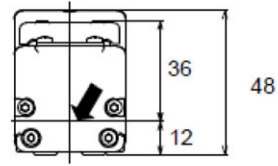
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below 1/2 the overhang load length.



- Overhang load length guideline ($L = 150\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.



Caution

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

[2] RCS4B-SA6C**[Lead and Payload]**

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
20	12.5	4	85
12	21	7.5	142
6	31.5	10.5	283
3	31.5	10.5	566

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 500 (Every 50mm)	550 mm	600 mm	650 mm	700 mm	750 mm	800 mm
20	1200	1130	970	840	735	650	575
12	720	620	535	460	405	355	315
6	360	305	265	230	200	175	155
3	180	150	130	115	100	85	75

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.

$$\text{Minimum speed [mm/s]} = \text{Ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 20

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	12.5	10.5	7	5.5	4	4	3.5	3	3	1.5
1200	12.5	10.5	7	5.5	4	4	3.5	3	3	1.5

Lead 12

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	21	17	14	10.5	10.5	7.5	7	7	5.5	5.5
720	21	17	14	10.5	10.5	7.5	7	7	5.5	5.5

Lead 6

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	31.5	21	14	14	—	10.5	10.5	10.5	10.5	—
360	31.5	21	14	14	—	10.5	10.5	10.5	10.5	—

Lead 3

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	31.5	21	14	—	—	10.5	10	7	—	—
180	31.5	21	14	—	—	10.5	10	7	—	—

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

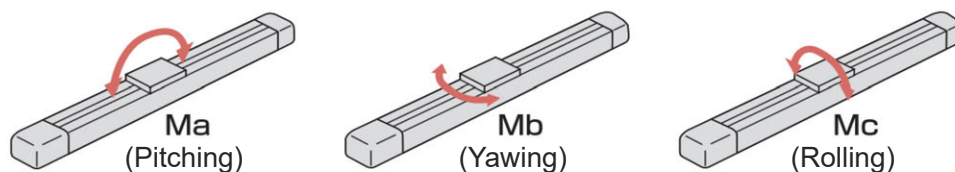
Item	Content
Drive System	Ball Screw $\Phi 10\text{mm}$, Rolled C10
Positioning Repeatability ^(*1)	$\pm 0.01\text{mm}$ [$\pm 0.005\text{mm}$]
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 48.5 N•m, Mb direction: 69.3 N•m, Mc direction: 103 N•m
Allowable dynamic moment ^(*2, *3)	Ma direction: 11.6 N•m, Mb direction: 16.6 N•m, Mc direction: 24.6 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

(*1) Number in brackets [] show the specification for high precision type.

(*2) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

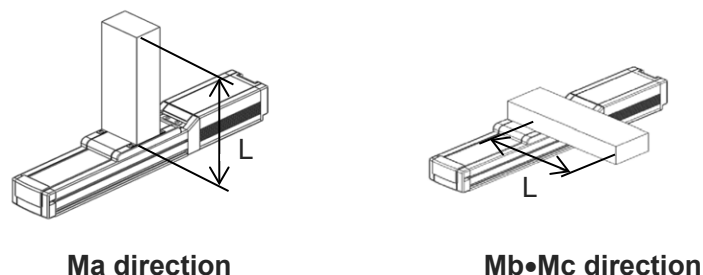
Revise the conditions for operation in such cases.

(*3) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

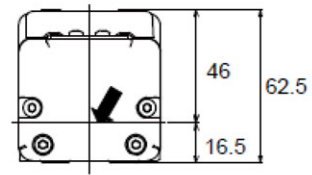
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below 1/2 the overhang load length.



- Overhang load length guideline ($L = 220\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.



Caution

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

[3] RCS4B-SA7C**[Lead and Payload]**

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
24	21	5	142
16	28	8.5	214
8	31.5	14	427
4	35	17.5	855

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 500 (Every 50mm)	550 mm	600 mm	650 mm	700 mm	750 mm	800 mm
24	1500	1440	1240	1095	965	850	760
16	1000	965	830	720	635	560	500
8	500	475	410	355	315	275	245
4	240	235	205	175	155	135	120

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.
 Minimum speed [mm/s] = Ball screw lead [mm/r] ÷ 16384 [p/r] × 1000 [1/s]
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 24

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	21	8.5	7	4	3.5	5	5	4	3.5	3
1500	21	8.5	7	4	3.5	5	5	4	3.5	3

Lead 16

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	28	21	10.5	10.5	8.5	8.5	8.5	7	5.5	5.5
1000	28	21	10.5	10.5	8.5	8.5	8.5	7	5.5	5.5

Lead 8

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	31.5	28	28	24.5	—	14	14	14	12.5	—
500	31.5	28	28	24.5	—	14	14	14	12.5	—

Lead 4

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	35	35	28	—	—	17.5	17.5	14	—	—
240	35	35	28	—	—	17.5	17.5	14	—	—

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

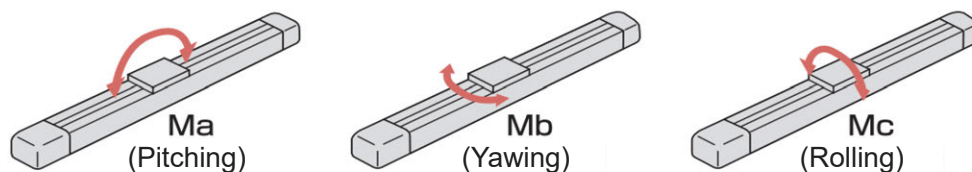
Item	Content
Drive System	Ball Screw $\phi 12\text{mm}$, Rolled C10
Positioning Repeatability (*1)	$\pm 0.01\text{mm}$ [$\pm 0.005\text{mm}$]
Lost Motion	0.1 mm or less
Allowable static moment	Ma direction: $115\text{ N}\cdot\text{m}$, Mb direction: $115\text{ N}\cdot\text{m}$, Mc direction: $229\text{ N}\cdot\text{m}$
Allowable dynamic moment (*2, *3)	Ma direction: $44.7\text{ N}\cdot\text{m}$, Mb direction: $44.7\text{ N}\cdot\text{m}$, Mc direction: $89.1\text{ N}\cdot\text{m}$
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C , 85%RH or less (Non-condensing)

(*1) Number in brackets [] show the specification for high precision type.

(*2) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

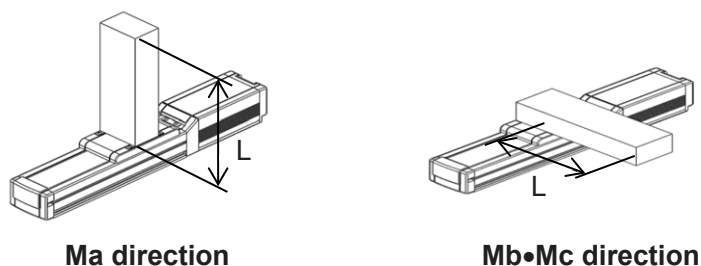
Revise the conditions for operation in such cases.

(*3) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

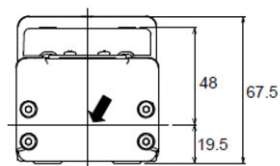
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below $1/2$ the overhang load length.



- Overhang load length guideline ($L = 300\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.



Caution

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

[4] RCS4B-SA8C**[Lead and Payload]**

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
30	21	8.5	226
20	42	14	339
10	56	24.5	678
5	63	31.5	1357

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 600 (Every 50mm)	650 mm	700 mm	750 mm	800 mm	850 mm	900 mm	950 mm	1000 mm	1050 mm	1100 mm
30	1800	1640	1440	1280	1155	1040	940	855	780	715	660
20	1200	1090	960	860	770	695	630	570	520	480	440
10	600	540	480	430	385	345	310	285	260	235	220
5	300	270	240	215	190	175	155	140	130	120	110

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.

Minimum speed [mm/s] = Ball screw lead [mm/r] ÷ 16384 [p/r] × 1000 [1/s]
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 30

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	21	17.5	14	10.5	7	8.5	8.5	7	5.5	4
1800	21	17.5	14	10.5	7	8.5	8.5	7	5.5	4

Lead 20

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	42	28	21	14	10.5	14	14	12.5	10.5	8.5
1200	42	28	21	14	10.5	14	14	12.5	10.5	8.5

Lead 10

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	56	56	49	42	—	24.5	24.5	24.5	21	—
600	56	56	49	42	—	24.5	24.5	24.5	21	—

Lead 5

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	63	63	49	—	—	31.5	31.5	24.5	—	—
300	63	63	49	—	—	31.5	31.5	24.5	—	—

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

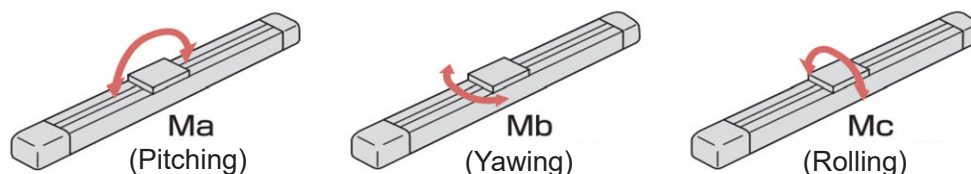
Item	Content
Drive System	Ball Screw $\phi 16\text{mm}$, Rolled C10
Positioning Repeatability (*1)	$\pm 0.01\text{mm}$ [$\pm 0.005\text{mm}$]
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 219 N•m, Mb direction: 219 N•m, Mc direction: 414 N•m
Allowable dynamic moment (*2, *3)	Ma direction: 77.0 N•m, Mb direction: 77.0 N•m, Mc direction: 146 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

(*1) Number in brackets [] show the specification for high precision type.

(*2) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

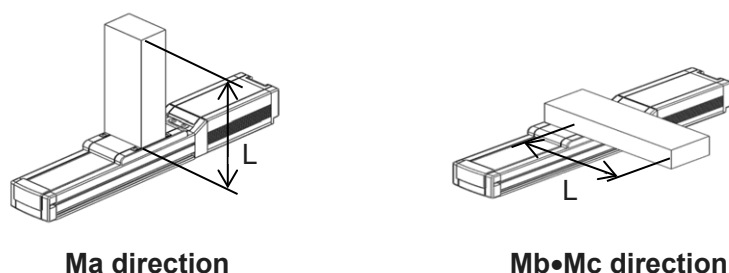
Revise the conditions for operation in such cases.

(*3) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

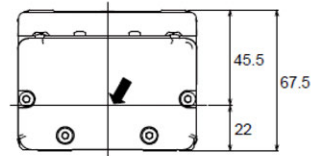
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below 1/2 the overhang load length.



- Overhang load length guideline ($L = 400\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.

**Caution**

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

[5] RCS4B-SA4R**[Lead and Payload]**

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
16	7	1.5	53
10	10	3	85
5	12	5.5	170
2.5	14	8.5	340

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 450 (Every 50mm)	500 mm
16	960	875
10	600	555
5	300	275
2.5	150	135

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.

Minimum speed [mm/s] = Ball screw lead [mm/r] ÷ 16384 [p/r] × 1000 [1/s]

(mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 16

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	7	5.5	4	4	1.5	1.5	1	1
960	7	5.5	4	4	1.5	1.5	1	1

Lead 10

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	10	10	8.5	7	3	3	2	2
600	10	10	8.5	7	3	3	2	2

Lead 5

Lead 6								
Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	12	12	10.5	9	5.5	5.5	4	4
300	12	12	10.5	9	5.5	5.5	4	4

Lead 2.5

Ecod 2.0								
Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	14	14	14	—	8.5	8.5	7	—
150	14	14	14	—	8.5	8.5	7	—

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

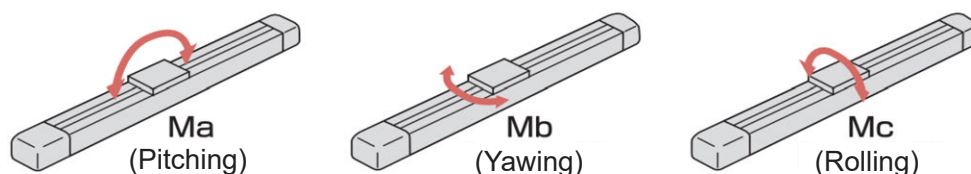
Item	Content
Drive System	Ball Screw $\phi 8\text{mm}$, Rolled C10
Positioning Repeatability (*1)	$\pm 0.01\text{mm}$ [$\pm 0.005\text{mm}$]
Lost Motion	0.1mm or less
Base	Material: Aluminum, White Anodized
Allowable static moment	Ma direction: 13.0 N•m, Mb direction: 18.6 N•m, Mc direction: 25.3 N•m
Allowable dynamic moment (*2, *3)	Ma direction: 5.0 N•m, Mb direction: 7.1 N•m, Mc direction: 9.7 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

(*1) Number in brackets [] show the specification for high precision type.

(*2) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

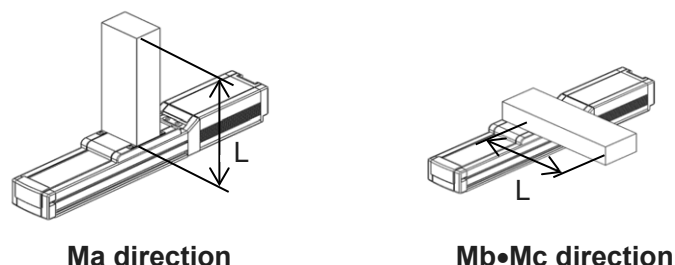
Revise the conditions for operation in such cases.

(*3) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

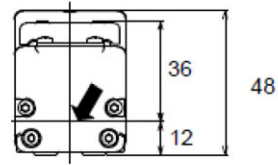
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below 1/2 the overhang load length.



- Overhang load length guideline ($L = 150\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.



Caution

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

[6] RCS4B-SA6R**[Lead and Payload]**

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
20	12.5	3.5	85
12	21	6.5	142
6	31.5	10.5	283
3	31.5	10.5	566

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 500 (Every 50mm)	550 mm	600 mm	650 mm	700 mm	750 mm	800 mm
20	1200	1130	970	840	735	650	575
12	720	620	535	460	405	355	315
6	360	305	265	230	200	175	155
3	180	150	130	115	100	85	75

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.
 Minimum speed [mm/s] = Ball screw lead [mm/r] ÷ 16384 [p/r] × 1000 [1/s]
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 20

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	12.5	10.5	7	5.5	3.5	3.5	3	3
1200	12.5	10.5	7	5.5	3.5	3.5	3	3

Lead 12

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	21	17	14	10.5	6.5	6.5	6.5	5.5
720	21	17	14	10.5	6.5	6.5	6.5	5.5

Lead 6

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	31.5	21	14	14	10.5	10.5	10.5	10.5
360	31.5	21	14	14	10.5	10.5	10.5	10.5

Lead 3

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	31.5	21	14	—	10.5	10	7	—
180	31.5	21	14	—	10.5	10	7	—

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

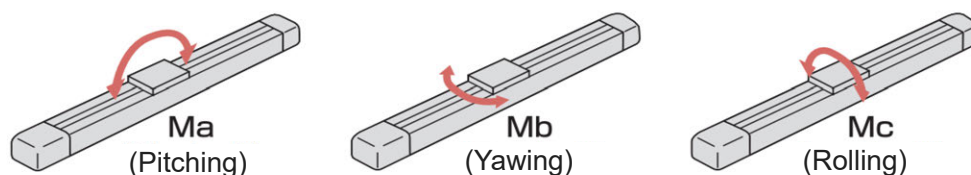
[Actuator Specifications]

Item	Content
Drive System	Ball Screw $\phi 10\text{mm}$, Rolled C10
Positioning Repeatability	$\pm 0.01\text{mm}$
Lost Motion	0.1 mm or less
Base	Material: Aluminum, White Anodized
Allowable static moment	Ma direction: 48.5 N•m, Mb direction: 69.3 N•m, Mc direction: 103 N•m
Allowable dynamic moment (*1, *2)	Ma direction: 11.6 N•m, Mb direction: 16.6 N•m, Mc direction: 24.6 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

(*1) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

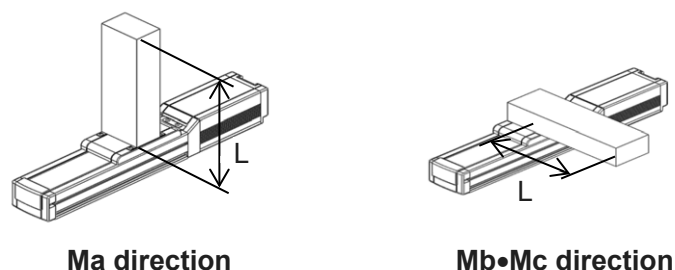
Revise the conditions for operation in such cases.

(*2) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

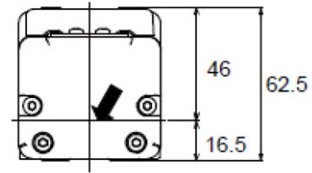
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below 1/2 the overhang load length.



- Overhang load length guideline ($L = 220\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.



Caution

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

[7] RCS4B-SA7R**[Lead and Payload]**

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
24	21	4	142
16	26.5	8.5	214
8	31.5	12.5	427
4	35	17.5	855

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 500 (Every 50mm)	550 mm	600 mm	650 mm	700 mm	750 mm	800 mm
24	1500	1440	1240	1095	965	850	760
16	1000	965	830	720	635	560	500
8	500	475	410	355	315	275	245
4	240	235	205	175	155	135	120

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.

Minimum speed [mm/s] = Ball screw lead [mm/r] ÷ 16384 [p/r] × 1000 [1/s]

(mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 24

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	21	8.5	7	4	4	4	3.5	3.5
1500	21	8.5	7	4	4	4	3.5	3.5

Lead 16

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	26.5	21	10.5	10.5	8.5	8.5	7	5.5
1000	26.5	21	10.5	10.5	8.5	8.5	7	5.5

Lead 8

Lead 6								
Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	31.5	28	28	24.5	12.5	12.5	12.5	11
500	31.5	28	28	24.5	12.5	12.5	12.5	11

Lead 4

Table 1								
Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	35	35	28	—	17.5	17.5	14	—
240	35	35	28	—	17.5	17.5	14	—

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

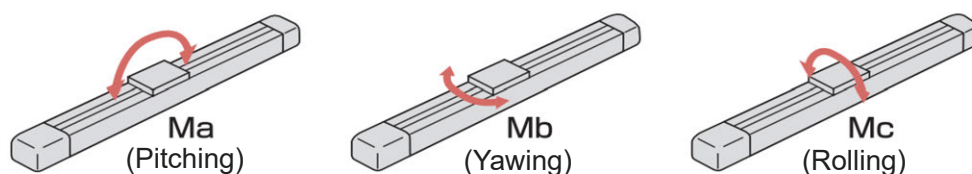
[Actuator Specifications]

Item	Content
Drive System	Ball Screw $\phi 12\text{mm}$, Rolled C10
Positioning Repeatability	$\pm 0.01\text{mm}$
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 115 N·m, Mb direction: 115 N·m, Mc direction: 229 N·m
Allowable dynamic moment (*1, *2)	Ma direction: 44.7 N·m, Mb direction: 44.7 N·m, Mc direction: 89.1 N·m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C 85%RH or less (Non-condensing)

(*1) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

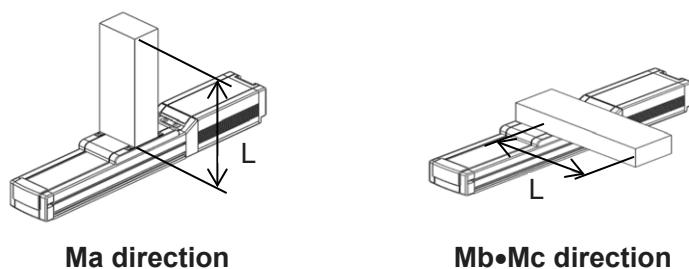
Revise the conditions for operation in such cases.

(*2) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

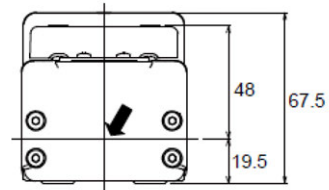
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below 1/2 the overhang load length.



- Overhang load length guideline ($L = 300\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.



Caution

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

[8] RCS4B-SA8R**[Lead and Payload]**

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
30	21	8.5	226
20	42	14	339
10	56	24.5	678
5	63	31.5	1357

[Stroke and Max Speed]

Unit: mm/s

Lead [mm]	50 to 600 (Every 50mm)	650 mm	700 mm	750 mm	800 mm	850 mm	900 mm	950 mm	1000 mm	1050 mm	1100 mm
30	1800	1640	1440	1280	1155	1040	940	855	780	715	660
20	1200	1090	960	860	770	695	630	570	520	480	440
10	600	540	480	430	385	345	310	285	260	235	220
5	300	270	240	215	190	175	155	140	130	120	110

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at the speed less than the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set at a speed less than the minimum speed.
- The minimum speed can be calculated with the equation below.
 Minimum speed [mm/s] = Ball screw lead [mm/r] ÷ 16384 [p/r] × 1000 [1/s]
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

At low load capacity, the acceleration/deceleration can be increased.

Lead 30

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	21	17.5	14	10.5	8.5	8.5	7	5.5
1800	21	17.5	14	10.5	8.5	8.5	7	5.5

Lead 20

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	42	28	21	14	14	14	12.5	10.5
1200	42	28	21	14	14	14	12.5	10.5

Lead 10

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	56	56	49	42	24.5	24.5	24.5	21
600	56	56	49	42	24.5	24.5	24.5	21

Lead 5

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	63	63	49	–	31.5	31.5	24.5	–
300	63	63	49	–	31.5	31.5	24.5	–

**Caution**

- Do not set any value above the allowable range for acceleration/deceleration.
This may lead to vibration, breakdown, or shortened product life.

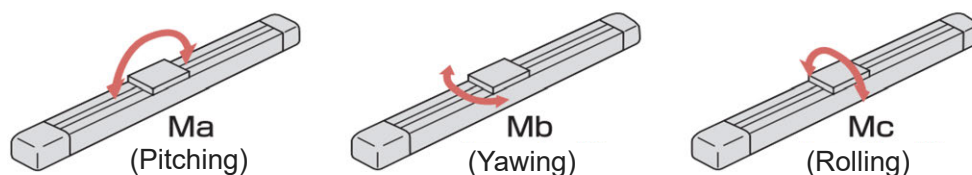
[Actuator Specifications]

Item	Content
Drive System	Ball Screw $\phi 16\text{mm}$, Rolled C10
Positioning Repeatability	$\pm 0.01\text{mm}$
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 219 N•m, Mb direction: 219 N•m, Mc direction: 414 N•m
Allowable dynamic moment (*1, *2)	Ma direction: 77.0 N•m, Mb direction: 77.0 N•m, Mc direction: 146 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

(*1) Even if the load goes moment and the load overhang length are in the allowable ranges, abnormal vibration or noise may occur because of influence of the way of installing the main body or transported object or the stiffness of the overhang installation beams.

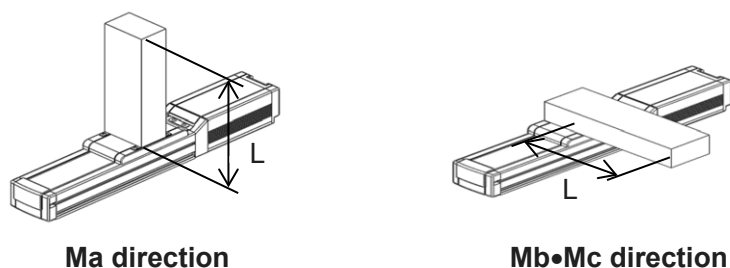
Revise the conditions for operation in such cases.

(*2) For reference rated life of 5000km. The running life differs according to operation conditions and mounting status.

Moment Direction**Overhang Load Length (L)**

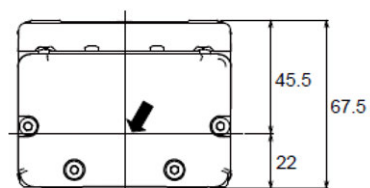
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.

Keep the mounted object center of gravity at or below 1/2 the overhang load length.



- Overhang load length guideline ($L = 400\text{mm}$ or less)

- * For calculation of M_a and M_c moments,
take the position pointed with an arrow as the datum.



Caution

- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

1.2.2 Duty ratio

The duty ratio is the operating rate, shown in percentage [%], of the actuator operating time within one cycle.

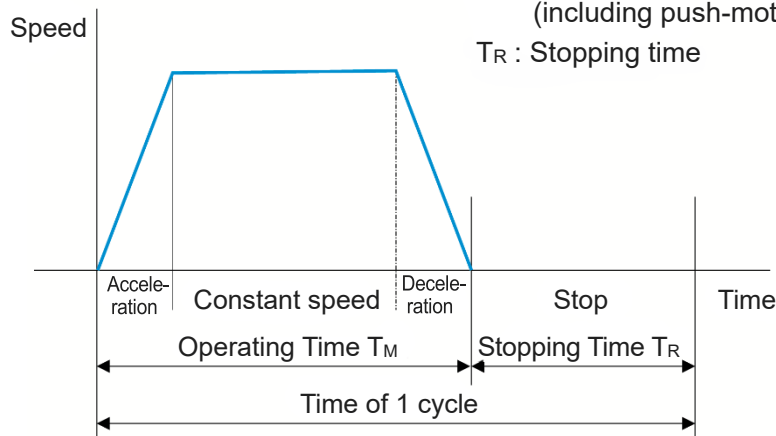
$$D = \frac{T_M}{T_M + T_R} \times 100 [\%]$$

D : Duty ratio

T_M : Operating time

(including push-motion operation)

T_R : Stopping time



As the reference for duty available to use may differ depending on the operation conditions (payload, acceleration / deceleration, etc.), it is necessary to figure out the load factor LF and acceleration / deceleration time ratio t_{od} using the calculation formulae below and find it out from the graph.

1) Figure out the load factor LF using the calculation formulae below.

Maximum payload at the acceleration 0.3G is described in 1.2 Specifications.

[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or below] Load Factor: $LF = \frac{M \times \alpha}{M_r \times 0.3} [\%]$ Max. Payload at Acceleration 0.3G : M_r [kg] Payload during Operation : M [kg] Acceleration during Operation : α [G]	[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or above] Load Factor: $LF = \frac{M \times \alpha}{M_d \times \alpha} = \frac{M}{M_d} [\%]$ Payload at Indicated Acceleration : M_d [kg] Payload during Operation : M [kg] Acceleration during Operation : α [G]
---	--

2) Figure out the acceleration / deceleration time ratio t_{od} using the calculation formulae below.

Acceleration / Deceleration Time Ratio t_{od} =

$$\frac{\text{Acceleration Time during Operation} + \text{Deceleration Time during Operation}}{\text{Duration of Operation}} [\%]$$

$$\text{Acceleration Time} = \frac{\text{Velocity during Operation (mm/s)}}{\text{Acceleration during Operation (mm/s}^2\text{)}} [\text{sec}]$$

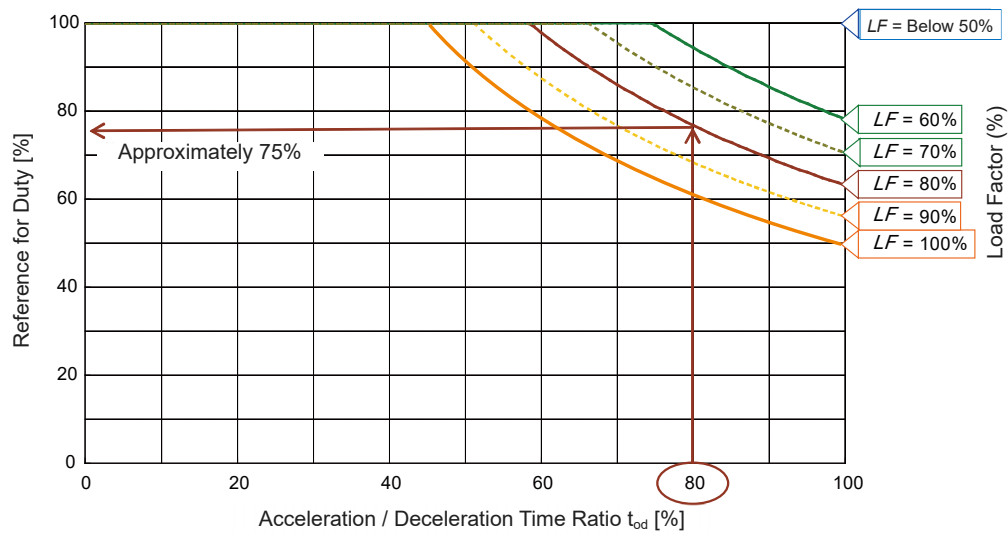
$$\text{Acceleration [mm/s}^2\text{]} = \text{Acceleration [G]} \times 9,800\text{mm/s}^2$$

$$\text{Deceleration Time} = \frac{\text{Velocity during Operation (mm/s)}}{\text{Deceleration during Operation (mm/s}^2\text{)}} [\text{sec}]$$

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

3) Read a reference for duty with the figured out “Load Factor” and “Acceleration / Deceleration Time Ratio”.

e.g.) The reference for duty when the load factor LF is 80% and the acceleration / deceleration time ratio t_{od} is 80% should be approximately 75%.



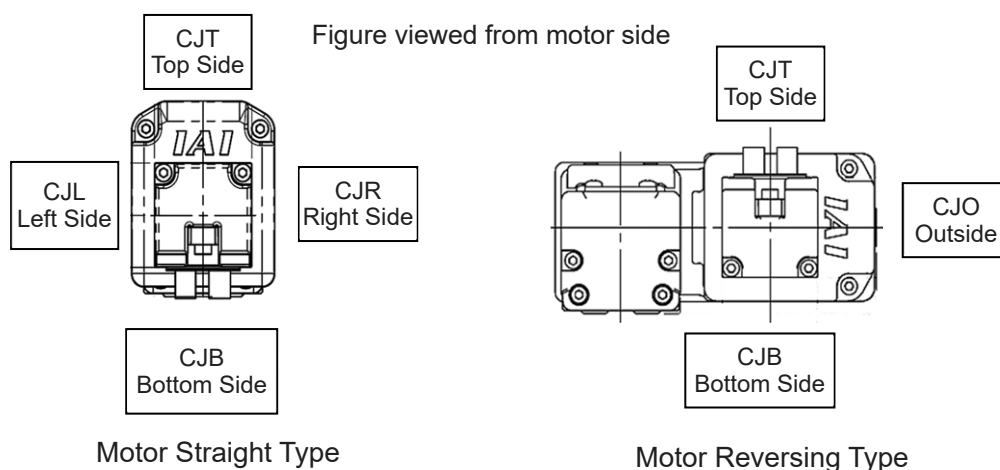
1.3 Options

1.3.1 With Brake (Model Code: B)

This is used to prevent the slider from moving during power outages or when the servo is OFF. It can also be used to prevent the slider from falling when mounted vertically.

1.3.2 Cable Exit Direction Changed (Model Code: CJT, CJR, CJL, CJB and CJO)

The orientation of the motor / encoder cable to be installed on the actuator unit can be changed the motor straight type to the top, bottom, left and right, and the motor reversed type to the top, bottom and outside.



1.3.3 Grease Supply Inlet Added Specification (Model Code: GU)

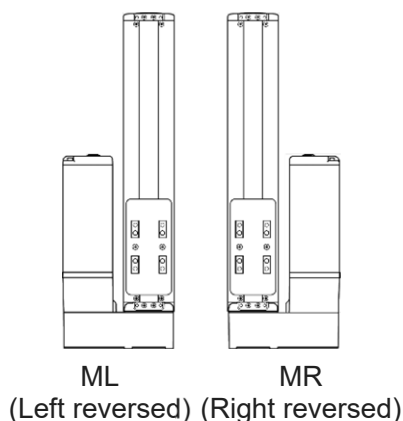
A grease supply inlet can be added. For the grease supply inlet position, refer to [Chapter 5 External Dimensions].

1.3.4 High Precision Specifications (Model Code: HPR)

Standard positioning repeatability is $\pm 0.01\text{mm}$. When this option is specified, positioning repeatability will become $\pm 0.005\text{mm}$. It should be available to order only for lead length 20mm or less.

1.3.5 Motor Reversed Direction (Model Code: ML, MR)

It is the code to indicate the direction of motor reversed when selecting the motor reversed type. ML shows reversed to left and MR to right.



1.3.6 Reversed-home Specification (Model Code: NM)

The standard home position is on the motor side.

However, the opposite side specification is selected if the home position direction is reversed in accordance with equipment layout or assembly direction.

(Note) As the home position is adjusted at the delivery from the factory, it is necessary that the unit is returned to us for adjustment when the home position is required to be changed after delivery.

1.3.7 Rear Attachment Plate (Model Code: RP)

It is a bracket (plate) to affix the motor reversed type (SA4R) at the back to a device.

1.3.8 Slider Roller Specification (Model Code: SR)

The structure of the slider in the standard type can be changed to the roller structure same as the one in the cleanroom type.

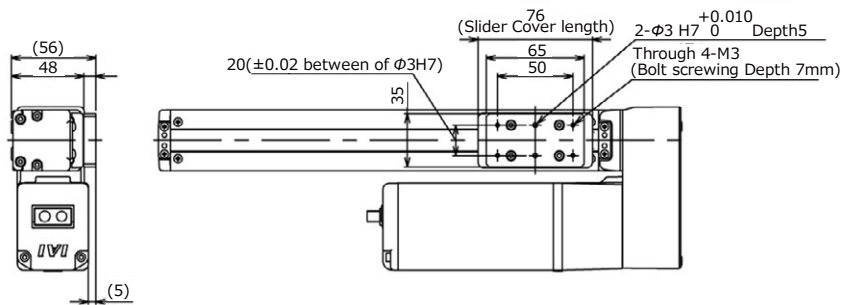
If it gets chosen to have the slider roller type, the appearance and dimensions of the slider cover should become the same as the cleanroom type.

1.3.9 Slider Spacer (Model Code: SS)

It is a spacer to set the top of the slider higher than the top of the motor cover.

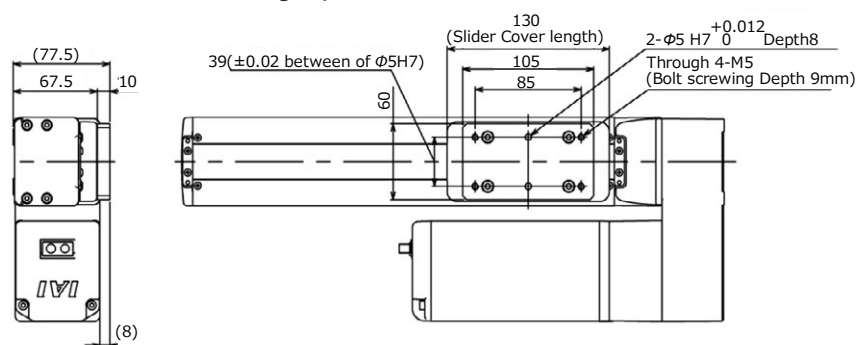
RCS4B-SA4R

Model number of single product: RCS4-SS-SA4



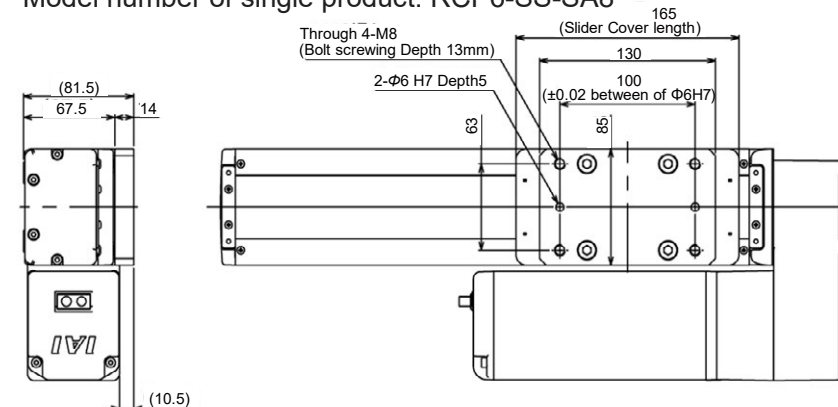
RCS4B-SA7R

Model number of single product: RCP6-SS-SA7



RCS4B-SA8R

Model number of single product: RCP6-SS-SA8



1.3.10 Stainless Steel Suction Joint Mounted Specification (Right) (Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Left) (Model Code: SVL)

Mount the stainless steel suction joint for air intake. Refer to [5 External Dimensions] for the joint position.

ROBO Cylinder

Chapter 2

Installation

2.1	Precautions for transportation	2-1
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2.3.5	Mounting transported objects	2-13

2.1 Precautions for transportation

[Handling the package]

- Do not damage or drop the package.

The package is not specially designed to withstand dropping or shock due to collision.

- Keep the unit in horizontal orientation for stationary positioning or transportation.
- Do not climb onto the package.
- Do not put anything that could deform the package on it.



[Handling after unpacking]

- Hold the base part when you carry the unit.
- Do not carry the unit by its motor cover or stainless steel sheet.
- Do not damage or drop the package during transportation.
- Do not apply excessive force to any part of the actuator.

For the names of each part, refer to [Names of the Parts] on page Intro-11 to 18.



[Handling when assembled into machinery (system)]

- Fix the slider so they would not accidentally move during transportation.
- If the actuator or any moving part is overhanging, fix it appropriately to avoid large wobbles due to external vibration. When transporting without fixing the tip, do not apply impact of 0.3G or more.
- When suspending machinery (system) with ropes, be careful not to catch the rope on the actuator or cable.

2.2 Installation and storage/preservation environment

Usage is possible in environments of pollution degree 2 or equivalent.

Pollution degree 2: Environment in which generally only nonconductive pollution occurs, but temporary conductive pollution may occur due to condensation (IEC 60664-1)

2.2.1 Installation Environment

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

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

- Where the actuator receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 10 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds 85% RH
- Where the actuator receives direct sunlight
- Where the actuator is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of powder dust, salt or iron (at level exceeding what is normally expected in an assembly plant)
- Where the actuator is subject to splashed water, oil (including oil mist or cutting fluid) or chemical solutions
- Where the actuator receives impact or vibration
- Where the altitude is more than 2,000m

Provide sufficient work space for the following maintenance and inspection.

- Space to replenish grease
- Space for replacement work of components such as a motor

Make sure to make a shield very well in a use in the following circumstances.

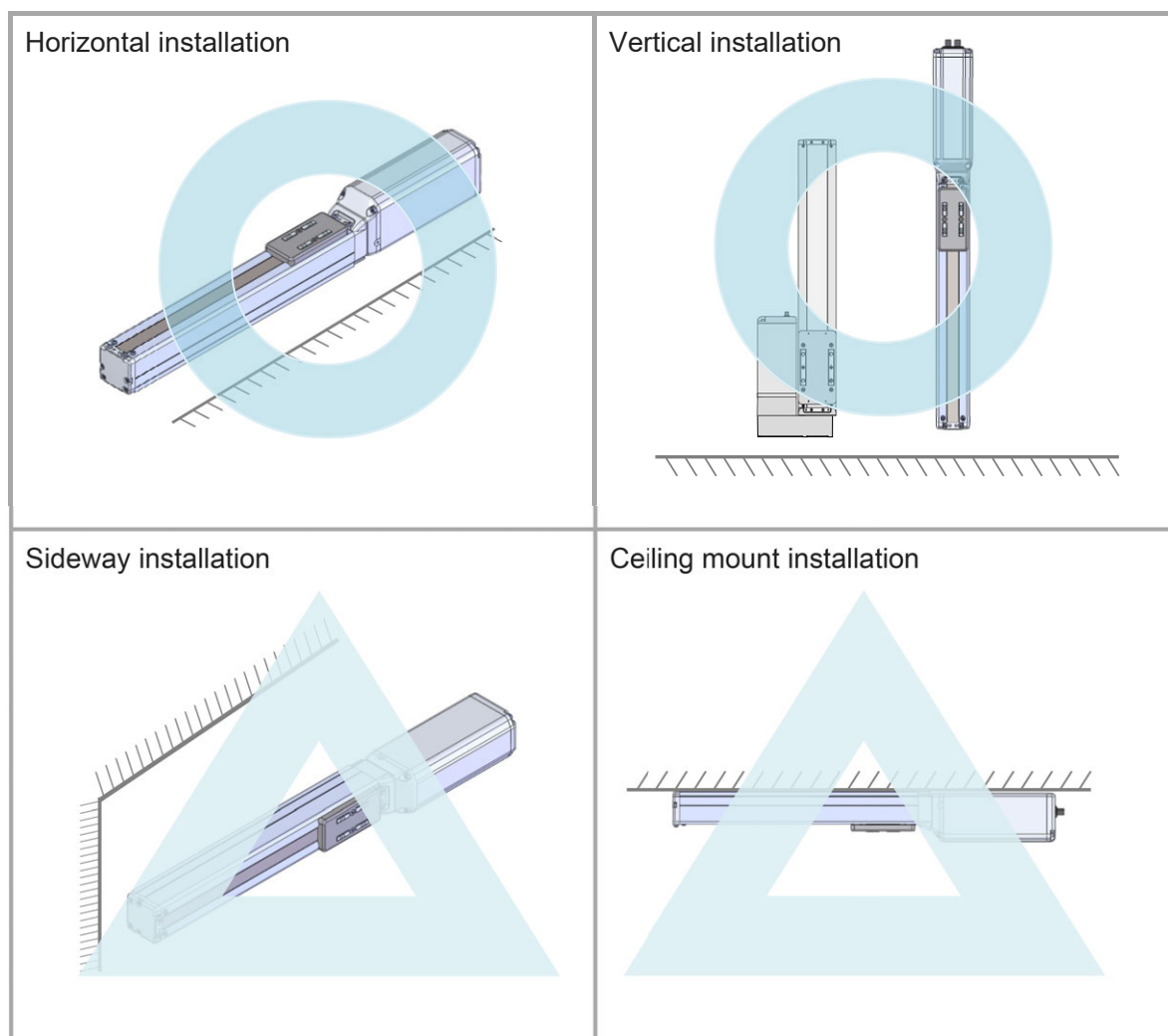
- Where noise generates due to static electricity, etc.
- Where the actuator is subject to a strong electric or magnetic field
- Where the actuator is subject to ultraviolet ray or radiation

2.2.2 Storage/preservation environment

- For the storage and preservation environment, see the installation environment.
However, give especial consideration to the prevention of condensation during long-term storage/preservation.
- Unless especially specified, desiccant is not included in the package at shipping.
If the product is to be stored/preserved in an environment where condensation is anticipated, take condensation preventive measures.
- For short-term storage, it can be stored at 60°C or below.
For storage of one month or more, make sure that the temperature does not exceed 50°C.
- The product should be placed horizontally for storage and preservation.
If storing in the packaged condition, observe the conditions, if any, regarding storage orientation.

2.3 How to Install

2.3.1 Mounting Orientation



○ : Available for Installation

△ : Confirm in [2.3.2 Precautions regarding stainless steel sheet] for use.



Caution

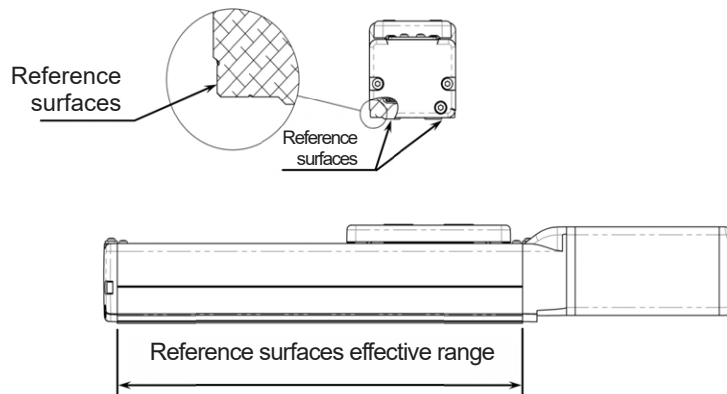
- It is recommended to have the motor installed on top for the vertical orientation.

2.3.2 Precautions regarding stainless steel sheet

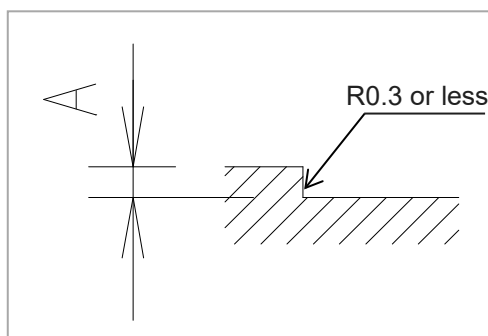
- During installation and transport, do not grasp or press on the stainless steel sheet.
Otherwise, this may lead to stainless steel sheet damage.
- Although lateral or ceiling installation is possible, it may cause slackness or misalignment of the stainless steel sheet.
Continued usage in this orientation may lead to damage to the stainless steel sheet.
Adjust the stainless steel sheet if slackness or misalignment occurs.
- Keep adhesive, paint, and other viscous material off the stainless steel sheet.
Such material adhering to the stainless steel sheet can lead to defective slider operation or sheet damage.
Avoid installation in environments of this kind, or take safety measures to prevent adhesion.

2.3.3 Installation surface

- The body mounting surface should be a machined surface or a plane with similar accuracy, with flatness within 0.05mm/m.
 - The mounting frame should have a structure rigid enough to prevent the generation of vibration, etc.
 - Also consider enough space necessary for maintenance work such as actuator replacement and inspection.
 - The bottom surface and both side surfaces of the body base serve as the reference surfaces for slider running accuracy.
- Use these surfaces as the reference surfaces for mounting when running accuracy is required.



When mounting using the side reference surface, machine the installation surface according to the figure below.

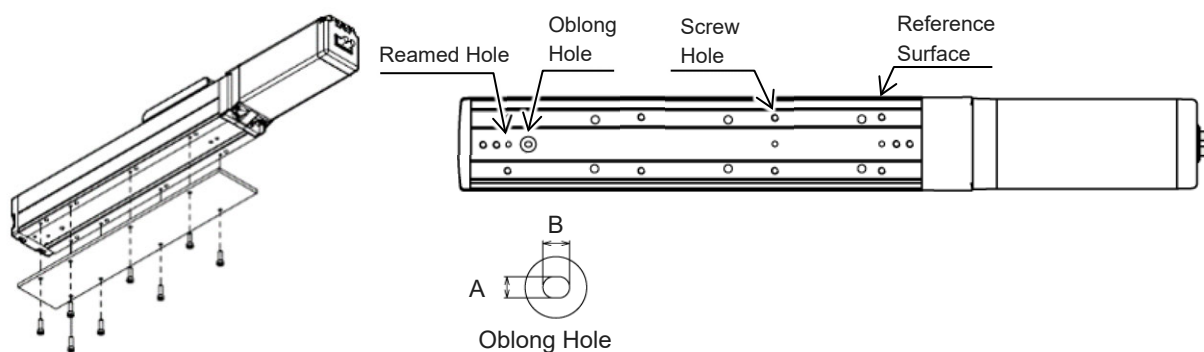


A dimension	
SA4, SA6, SA7	2 to 4mm
SA8	3 to 5mm

2.3.4 Installation of the Main Unit

[When using the screw holes on the bottom of the base]

There are screw holes for attachment at the back of the base that allow fixation from the back. For details regarding the position and dimensions, refer to [Chapter 5 External Dimensions].



[Dimensions for Screw Hole Positions]

Type	Screw Hole Size	Screw Holes Depth (Thread Depth)	Reamed Hole [mm]	Oblong Hole	Tightening Torque	
					In the case that steel is used for the bolt seating surface	In the case that aluminum is used for the bolt seating surface
SA4C SA4R	M4	Through (6mm or less)	$\phi 3H7$ Depth 4	A: $3 \begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ B: 4 Depth 4mm or less	3.59N·m	1.76N·m
SA6C SA6R	M5	Through (10mm or less)	$\phi 4H7$ Depth 5.5	A: $4 \begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ B: 5 Depth 5.5mm or less	7.27N·m	3.42N·m
SA7C SA7R	M5	Through (10mm or less)	$\phi 4H7$ Depth 6	A: $4 \begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ B: 5 Depth 6mm or less	7.27N·m	3.42N·m
SA8C SA8R	M6	Through (12mm or less)	$\phi 6H7$ Depth 6.5	A: $6 \begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ B: 7 Depth 6.5mm or less	12.3N·m	5.4N·m

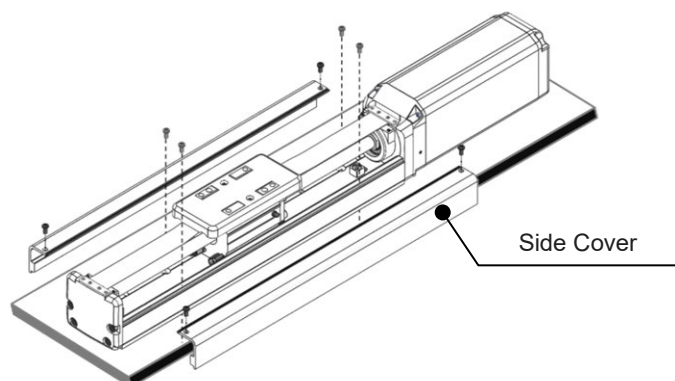


Notice

- The use of high-strength bolts of ISO-10.9 or higher is recommended.
- Make sure the internal thread and bolt effective engagement length is approximately 1.8 times the nominal diameter or more.

[Using the Through Holes on the Top of the Base]

There are through holes for attachment on the base for SA4, SA6 and SA7 that allow fixation from the top when the side covers on both ends are taken off.



For mounting bolts, use hexagonal socket head bolts indicated in the following table depending on the platform material.

Type	Through Hole	Mounting Bolt	Tightening Torque
SA4C, SA4R	Φ3.4 drilled hole, Φ6.5 counter boring depth 3.5	M3	0.83N·m
SA6C, SA6R	Φ4.5 drilled hole, Φ8 counter boring depth 4.5	M4	1.76N·m
SA7C, SA7R	Φ6 drilled hole, Φ9.5 counter boring depth 5.5	M5	3.42N·m

[Detaching Side Cover]

- Remove the 4 pieces of attachment screws with using a hex wrench.
- The slider cannot be driven only with ROBO Cylinder itself if it is equipped with a brake. Connect a controller and have JOG operation to move the slider. It is also available to move with using a brake release box (BKR-01).



Caution

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



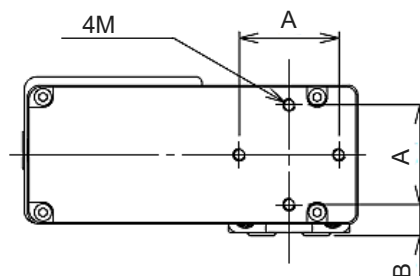
Notice

- The use of high-strength bolts of ISO-10.9 or higher is recommended.
- Make sure the internal thread and bolt effective engagement length is approximately 1.8 times the nominal diameter or more.

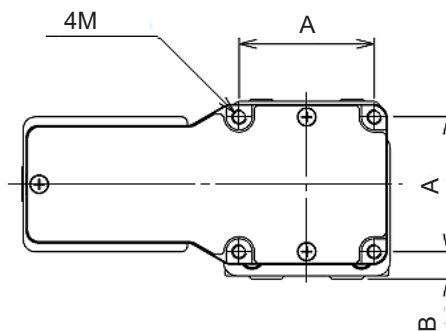
[When Using Attachment Holes on Bracket in Motor Reversing Type]

As there are screw holes on the reversing bracket, it is available to screw in from the back. It should be an option (Model: RP) for SA4R.

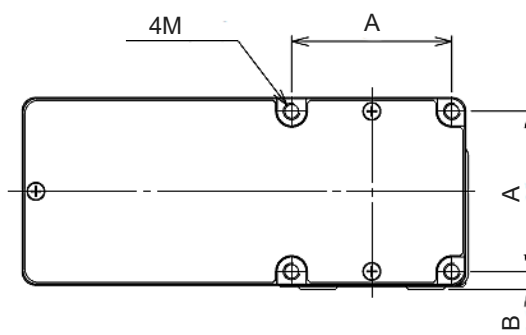
For SA4R (Option)



For SA6R



For SA7R and SA8R



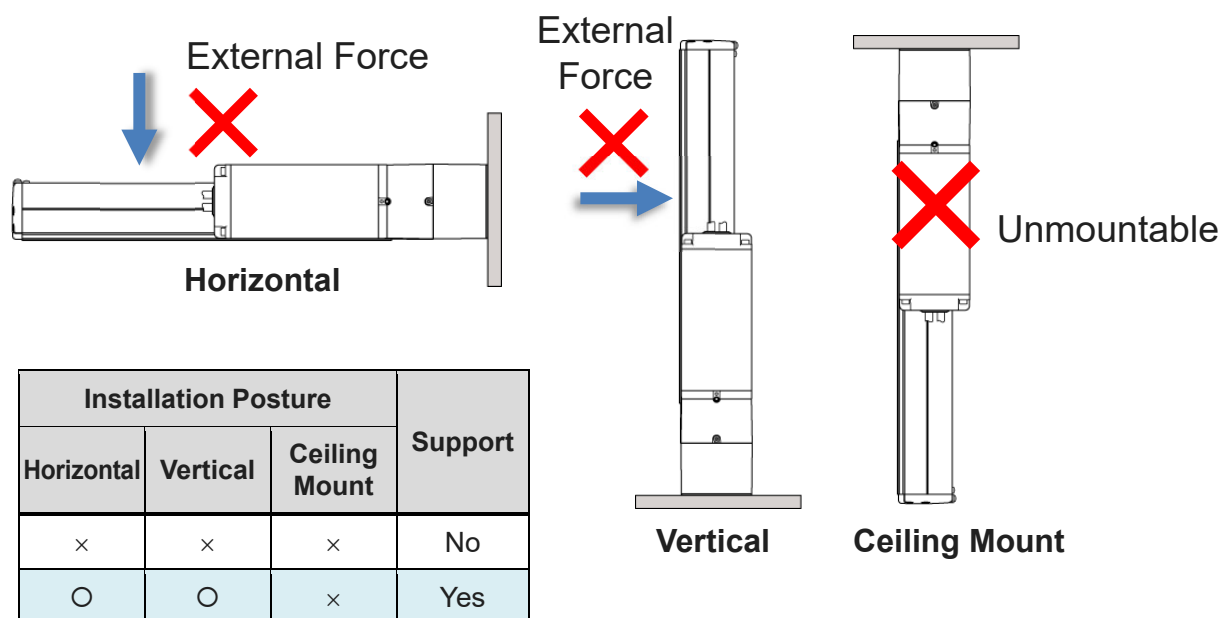
Type	A	B	Attachment Hole M	Tightening Torque
SA4R	32	10	M4 Depth 8	1.76N·m
SA6R	47	9.5	M5 Depth 10	3.42N·m
SA7R	58	6.5	M6 Depth 12	5.4N·m
SA8R	58	8	M6 Depth 12	5.4N·m

**Notice**

- The use of high-strength bolts of ISO-10.9 or higher is recommended.
- Make sure the internal thread and bolt effective engagement length is approximately 1.8 times the nominal diameter or more.

[Precautions when using reversing brackets]

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

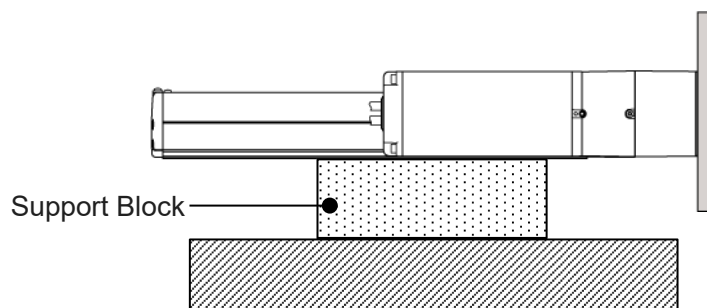


Caution

- Do not attempt to affix the unit only with the screw holes on the side-mounted bracket.
 - Do not apply external force to the actuator body after installation.
- External force may cause malfunctions or damage to parts.

[Precautions for horizontal mounting using reversing brackets]

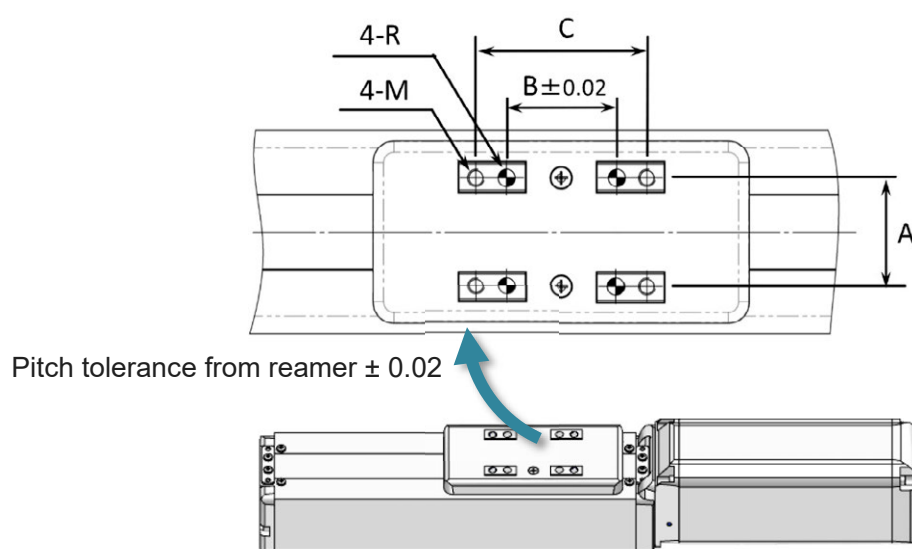
Prepare a support block for the body, as shown in the figure below.



2.3.5 Mounting transported objects

[For SA4C/R, SA6C/R, SA7C/R]

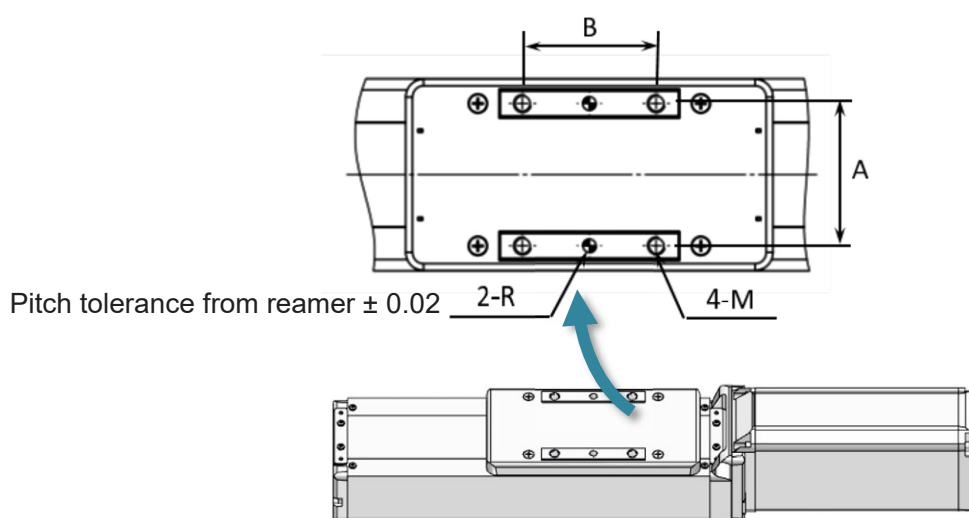
- Use the screw mounting holes on the top surface of the slider to fix transported objects.
- There are 4 reamed holes on the top surface of the slider.
Use these reamed holes if repeated attaching and detaching is required.
- If fine-tuning of perpendicularity, etc. is required, use one of the reamed holes for this adjustment.
- Refer to the figure below for the screw-in depth and reamed hole depth.



Type	A	B	C	Reamed Hole R	Screw Hole M	Mounting Bolt	
						Bolt Nominal Diameter	Tightening Torque
SA4C SA4R	20	24	32	$\Phi 3H7$ Depth 6	M3 Depth 7	M3	0.83N·m
SA6C SA6R	31	32	50	$\Phi 5H7$ Depth 6	M5 Depth 10	M5	3.42N·m
SA7C SA7R	39	42	65	$\Phi 5H7$ Depth 10	M5 Depth 10	M5	3.42N·m

[For SA8C/R]

- Use the screw mounting holes on the top surface of the slider to fix transported objects.
- There are 2 reamed holes on the top surface of the slider.
Use these reamed holes if repeated attaching and detaching is required.
- If fine-tuning of perpendicularity, etc. is required, use one of the reamed holes for this adjustment.
- Refer to the figure below for the screw-in depth and reamed hole depth.



Type	A	B	Reamed Hole R	Screw Hole M	Mounting Bolt	
					Bolt Nominal Diameter	Tightening Torque
SA8C SA8R	63	60	$\phi 6H7$ Depth 10	M8 Depth 12	M8	11.5N·m

**Caution**

- Be careful with regard to the length of the mounting bolt and positioning pin.
- The use of screw-in depth greater than that of the screw or reamed mounting holes may damage the screw hole or reduce the mounting strength of the transported object, leading to decreased accuracy or unexpected accidents.

**Notice**

- The mounting bolts are to be prepared by the customer.
- The use of high-strength bolts of ISO-10.9 or higher is recommended

ROBO Cylinder

Chapter 3

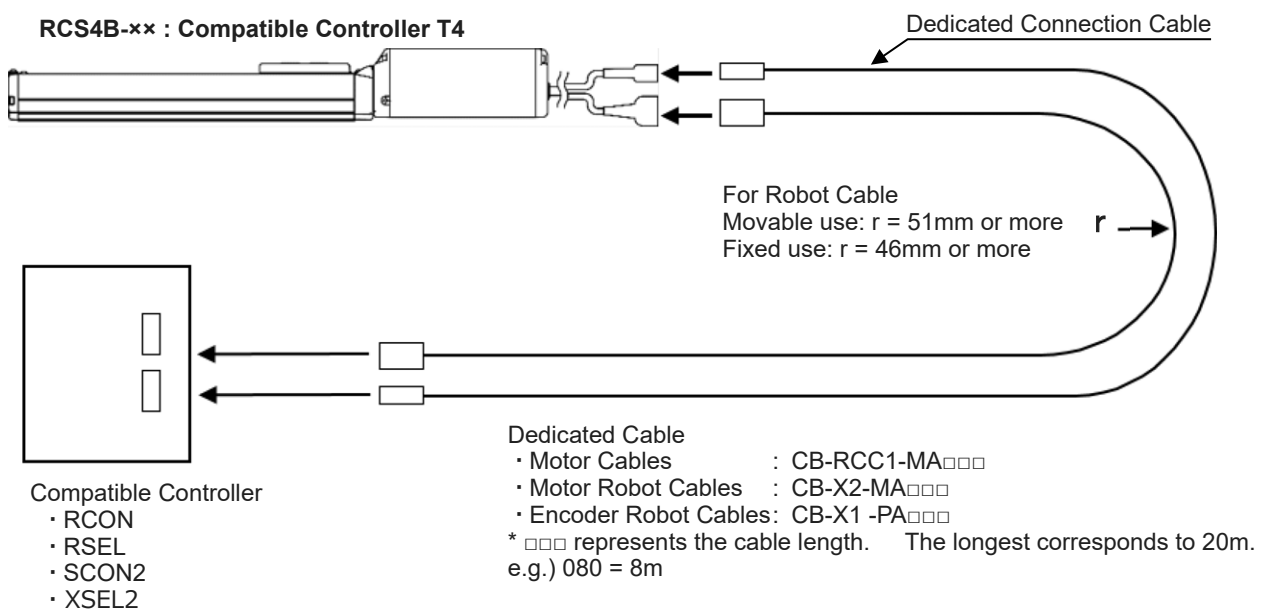
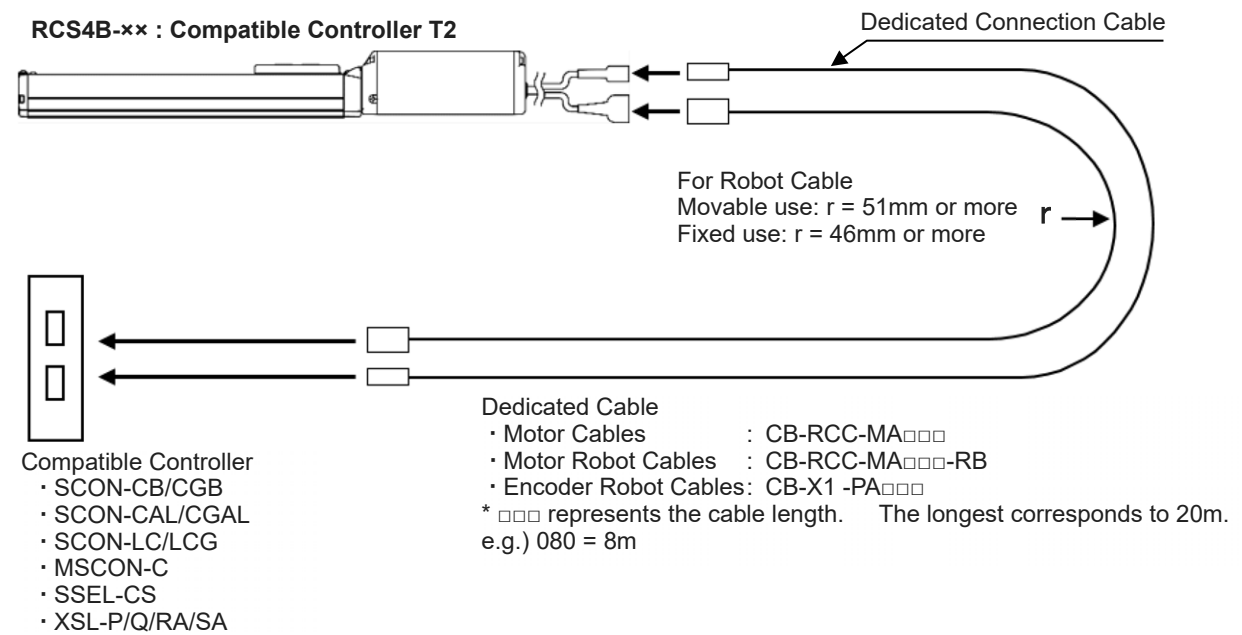
Connecting with the Controller

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3.1 Connecting with the Controller

As the connection cable for the controller and the actuator, use the IAI-dedicated connection cable.

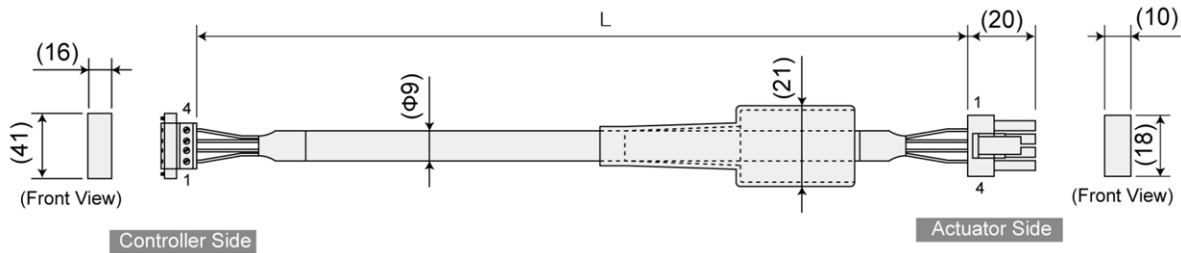
Please consult with IAI if you require a different kind of cable than the one supplied.



3.2 Motor Encoder Cable

3.2.1 Motor cable (Compatible Controller T2)

Model code: **CB-RCC-MA□□□/ CB-RCC-MA□□□-RB (Robot cable)**



Minimum bending radius = 51mm (for movable use)
 * It is only robot cable available to use inside the cable carrier

GIC2.5/4-STF-7.62 (PHOENIX)

SLP-04 (JST)

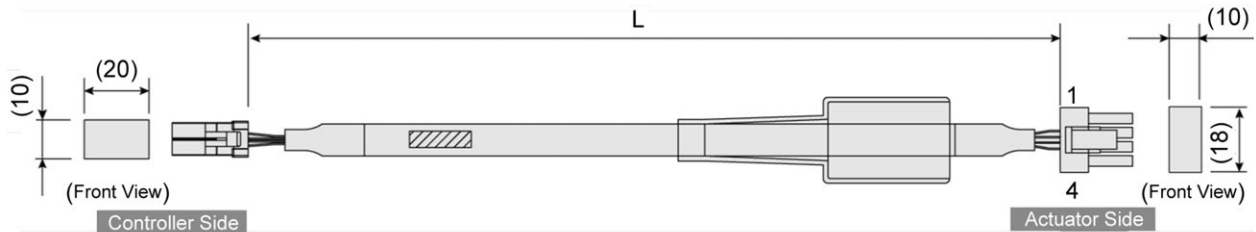
Wire Size	Color	Signal	No.	No.	Signal	Color	Wire Size
AWG18	Green	PE	1	1	U	Red	AWG18 (Crimped)
	Red	U	2	2	V	White	
	White	V	3	3	W	Black	
	Black	W	4	4	PE	Green	

- The cable length (L) should be 1m at minimum and 20m at maximum.
 Order can be make in unit of 1m long.
- An example for model codes is as shown below.

Cable length 1m → CB-RCC-MA010 (-RB)
 Cable length 3m → CB-RCC-MA030 (-RB)
 Cable length 10m → CB-RCC-MA100 (-RB)

3.2.2 Motor cable (Compatible Controller T4)

Model code: **CB-RCC1-MA□□□/CB-X2-MA□□□ (Robot cable)**



Minimum bending radius = 51mm (for movable use)

* It is only robot cable available to use inside the cable carrier

F35FDC-04V-K (JST)

Wire Size	Color	Signal	No.
AWG18 (Crimped)	Red	U	B1
	White	V	B2
	Black	W	A1
	Green	PE	A2

SLP-04V (JST)

No.	Signal	Color	Wire Size
1	U	Red	AWG18 (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

- The cable length (L) should be 1m at minimum and 20m at maximum.
Order can be made in unit of 1m long.
- An example for model codes is as shown below.

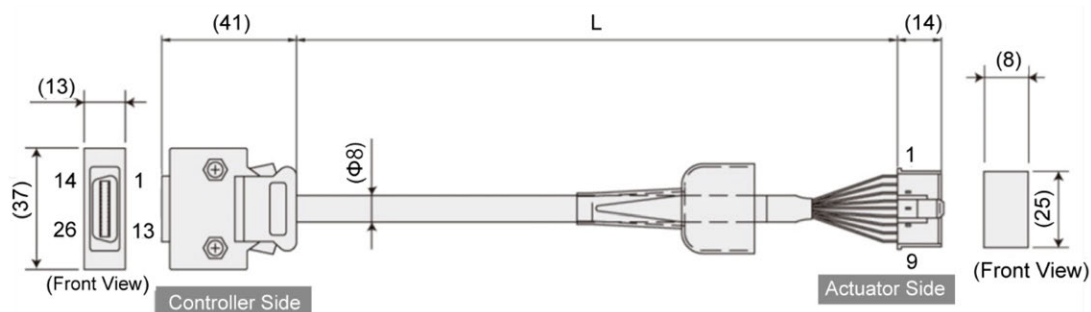
Cable length 1m → CB-RCC1-MA010

Cable length 3m → CB-RCC1-MA030

Cable length 10m → CB-RCC1-MA100

3.2.3 Encoder Cable

Model code: **CB-X1-PA**□□□ (Robot cable)



Minimum bending radius = 44mm (for movable use)
 * Robot cable is standard for this model.

10126-3000PE (Sumitomo 3M)

Wire Size	Color	Signal	No.
AWG26 (Soldered)	—	—	10
	—	—	11
	—	E24V	12
	—	0V	13
	—	LS	26
	—	CREEP	25
	—	OT	24
	—	RSV	23
	—	—	9
	—	—	18
	—	—	19
	—	A+	1
	—	A-	2
	—	B+	3
	—	B-	4
	—	Z+	5
	—	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Gray	BAT-	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	—	—	22

Clamp the shield to the hood.

Ground wire or Braided Shield wire

XMP-09V (JST)

No.	Signal	Color	Wire Size
1	BAT+	Purple	AWG26 (Crimped)
2	BAT-	Gray	
3	SD+	Orange	
4	SD-	Green	
5	VCC	Red	
6	GND	Black	
7	FG	Drain	
8	BK-	Blue	
9	BK+	Yellow	

- The cable length (L) should be 1m at minimum and 20m at maximum.
Order can be made in unit of 1m long.
- An example for model codes is as shown below.

Cable length **1m** → CB-X1-PA**010**

Cable length **3m** → CB-X1-PA**030**

Cable length **10m** → CB-X1-PA**100**

3.3 Caution in Wiring Process



Caution

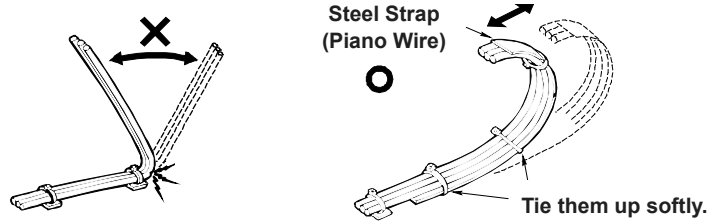
For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure, or an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

- The actuator cable out of the motor unit is a robot cable.
- 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.
- When a dedicated cable is to be used at a movable part, use a robot cable.
- Do not attempt to use a dedicated cable with its bending radius at or less than the allowable bending radius.
- 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 carrier.
- 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.

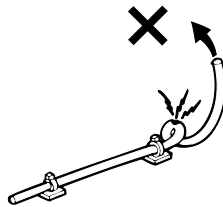


Caution

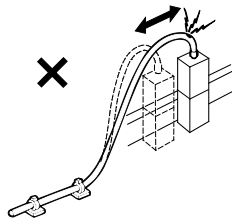
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



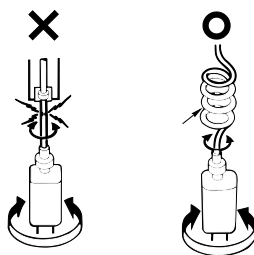
- Do not let the cable bend, kink or twist.



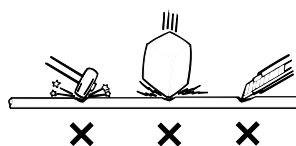
- Do not pull the cable with a strong force.



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



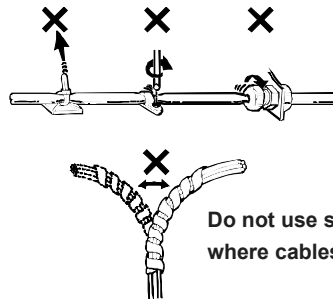
- Do not pinch, drop a heavy object onto or cut the cable.





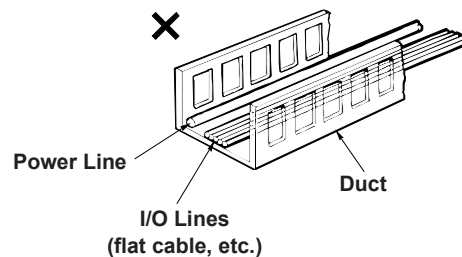
Caution

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



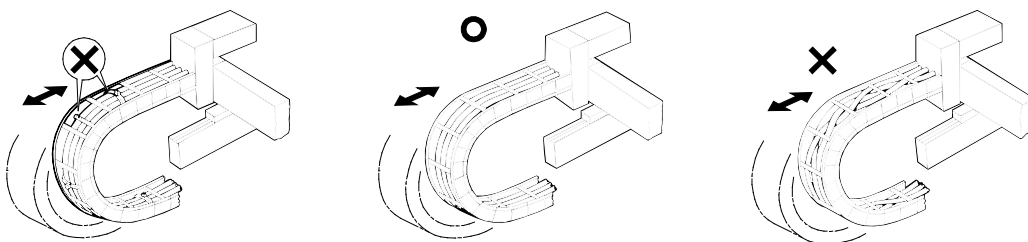
Do not use spiral tube in any position where cables are bent frequently.

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



Follow the instructions below when using a cable carrier.

- If there is an indication to the cable for the space factor in a cable carrier, refer to the wiring instruction given by the supplier when storing the cable in the cable carrier.
- Avoid the cables to get twined or twisted in the cable carrier, 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.



ROBO Cylinder

Chapter 4

Maintenance and Inspection

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4.6.2	Timing belt replacement/adjustment	4-17
4.6.3	Motor unit replacement	4-20

4.1 Precautions for maintenance and inspection work

Make sure to read the following precautions before conducting any maintenance or inspection work.



Caution

- Do not climb on or put anything on the actuator.
Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life.
- Before releasing the brake, make sure to check there is nothing that will interfere with moving parts within the operation range.
- The slider may fall, possibly injuring the operator or people nearby and damaging the actuator, workpiece or equipment.
- Check that the power to the actuator is OFF before conducting any maintenance or inspections.
- Be careful not to lose the cover or any removed screws.
Be sure to return the product to the original condition after maintenance and inspection work.
Mounting in an incomplete state may cause injuries or damage to the product.
- Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion under any circumstances.
- The grease film may run out if the actuator performs return operation continuously over a distance of 30mm or less. As a guideline, every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film.
The ball screw or guide may be damaged if the oil film runs out.



Notice

- First, be sure to wipe off the old grease, and then supply new grease.
- The degradation speed of grease may differ depending on the operating environment (temperature, humidity and ambient atmosphere).

It is recommended to shorten the grease supply period if the actuator is used under poor environmental conditions such as high temperatures, high humidity or dusty atmospheres.

- Also, it is recommended to improve the environmental conditions in case the grease changes color notably due to poor operating conditions.
- Base oil may separate from the grease due to the mounting orientation or operating conditions.

Base oil may also leak from the inside of the actuator to the exterior through gaps.

Check visually for oil drips when supplying grease.

- An actuator stored for 6 months or more may suffer from grease degradation.

Supply grease before the start of use.

Refer to [4.5 Grease Supply]

4.2 Inspection Schedule

Follow the maintenance inspection schedule below.

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

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

4.2.1 Inspection items and schedule *Stainless steel sheet life guideline: 5,000km

Inspection period	External inspection	Internal inspection	Greasing	
			Ball screw	Guide
Start of work inspection	○	—	—	—
1-month inspection	○	—	—	—
3-months inspection	—	—	○	○
3-months after starting operation	—	—	Grease supply timing (Guideline) dependent	
6-months inspection	○	○		
Every 6 months thereafter	○	○		

4.2.2 Grease supply timing (Guideline)

Maximum operating speed [mm/s]	Grease supply timing [Guideline]	
	Operation distance	Months
0 to 750 or less	1,250km	6 months
750 to 1500 or less	2,500km	
1500 to 2200	5,000km	

4.3 Visual Inspection

For the detailed way to supply grease, refer to [4.5 Grease Supply] and [4.6 Replacement of Components].

4.3.1 External visual inspection

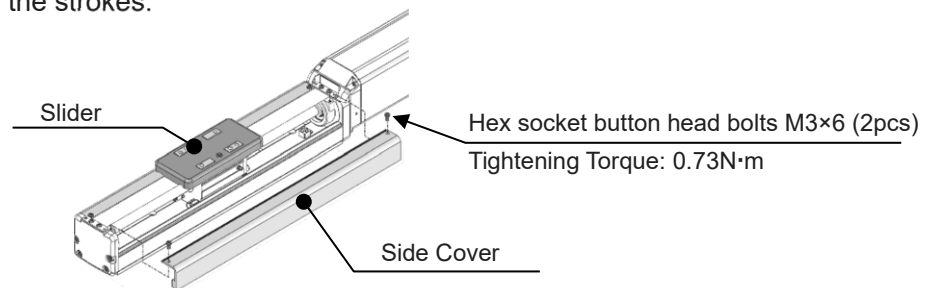
Inspection items	Maintenance work
Is abnormal noise or vibration generated?	Take an action by referring to [Troubleshooting in Controller Instruction Manual].
Are actuator mounting bolts loose?	Tighten them further.
Is the cable scratched?	Replace if the damage is severe.
Is the connector loose?	Re-insert correctly.
Is grease dripping out? (especially if vertically mounted)	Clean up any drips. Replenish the grease.
Is the stainless steel sheet scratched?	Replace the stainless steel sheet.
Is the stainless steel sheet misaligned or slack?	Adjust the alignment and hang.

4.3.2 Internal visual inspection

[1] How to Inspect Inside Slider

Inspection items	Maintenance work
Backlash/play or wear debris found?	The ball screw guide may be damaged. Contact IAI.
Has foreign matter penetrated inside?	Remove the foreign matter, clean, and inspect the interior for any damage.
Is the ball screw or guide grease not lubricating well? (Even if the grease is brown, lubrication is adequate if the running surface is shiny)	Wipe off old grease and supply grease.
Is dust or foreign matter adhered to the ball screw or guide?	Clean it up and supply grease.

1. Remove the hex socket button head bolts (2 pcs) and take the side cover off.
2. Check inside.
3. Attach the stainless steel sheet with the cross recessed pan head machine screws (2 pcs).
Put a shim (approx. 0.1 to 0.2mm) between the stainless steel sheet and the side cover so the side cover slightly offsets.
The stainless steel sheet contacting the side cover may cause damage or waviness on the stainless steel sheet which could lead to early degradation or abrasion.
4. Make sure that the slider and the side cover do not interfere, moving the slider backwards and forwards between the strokes.



Caution

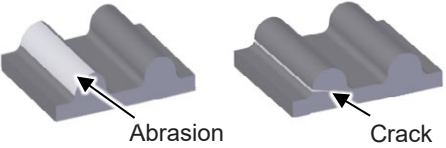
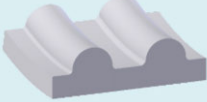
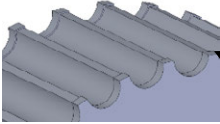
- Do not bend the stainless steel sheet forcefully or damage it during internal inspection. Do not tug on the stainless steel sheet or in any way attempt to reposition it. Change in the attached condition may cause the sheet to be mounted unevenly or impact the product life.
- Keep in mind that the edges of the stainless steel sheet can cause injuries. Always wear gloves when working on it.

[2] Inspection Items and How to Inspect on Timing Belt on Motor Reversing Type

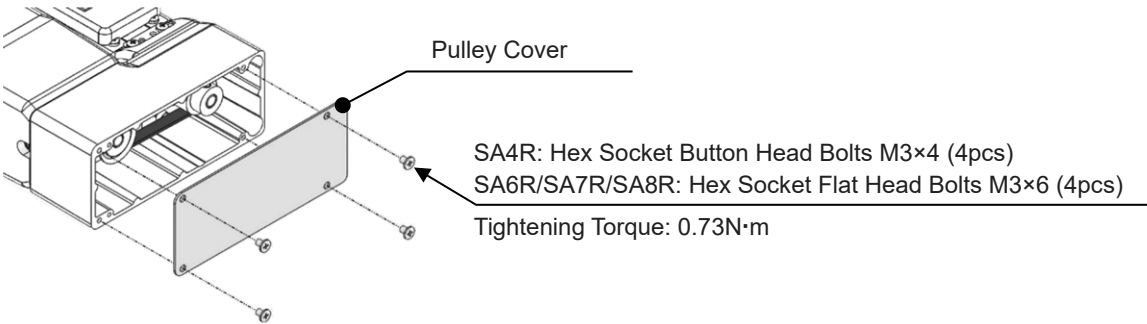
Applicable models: SA4R, SA6R, SA7R, SA8R

The durability of a belt could fluctuate depending on the operating period and there is no specific period for replacement.

As abrasion and degradation of a belt could go along as it is used time by time, it is necessary to check the following inspection items for the motor reversed type.

Inspection items	Maintenance work
Is the belt significantly worn out on the teeth area? Is there any crack on the teeth area? Is there any chipped tooth? 	Replace the timing belt in case any of those stated on the left is found.
Is the belt hardened, softened or deformed (shrunk or expanded)? 	Replace the timing belt in case any of those stated on the left is found.
Is there any significant abrasion on pulley teeth? 	When abnormality stated on the left is found: Consult with IAI.

1. Remove the screws (4 pcs) to take the pulley cover off.



2. Check the condition of the timing belt visually.
3. Attach the pulley cover with the hex socket button head bolts (2 pcs).

4.4 Cleaning

4.4.1 External cleaning

- Clean exterior surfaces as necessary.
- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air as it may cause dust to get in through the gaps.
- Do not use oil-based solvents as they can harm lacquered and painted surfaces.
- To remove severe buildup, wipe gently with a soft cloth soaked in a neutral detergent or alcohol.

4.4.2 Internal cleaning

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

4.5 Grease Supply

4.5.1 Grease used

◆ **Standard Type** Use an equivalent product

Type	Oil Supply Point	During Maintenance (recommended product)	Default (reference)
SA4 SA6 SA7 SA8	Ball screw	IAI CORPORATION IAGR-LDP01-400	IAI CORPORATION IAGR-LDP01-400
	Guide		



Caution

- Do not attempt to apply any grease other than the one listed above.
Mixing with other greases not only reduces the performance of the grease, but it may even cause damage to the actuator.

4.5.2 Grease Supply Procedure



Caution

- Supplying too much grease may increase sliding resistance and load to the motor, resulting in a drop of performance.
Also, excess grease on the ball screw may be splashed around in the ambience.
- Do not damage the stainless steel sheet by bending it forcefully during work.
- Keep in mind that the edges of the stainless steel sheet can cause injuries. Always wear gloves when working on it.
- The front bracket is supporting the ball screw. Do not detach it.
If the front bracket loses its tuned condition, it may cause an increase of driving resistance, shortened life of each component or abnormal noise due to the center of the axis being off the right position.
- In case the grease got into your eye, wash it with clean water for 15 minutes and immediately go see the doctor to get appropriate care.
- After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease OFF.

◆ Preparation

- Hex wrench (Opposite side: 2mm)
- Protection Equipment (e.g. Work Gloves)
- Grease Gun

Grease Gun	Nozzle	Supplier of Nozzle
Grease gun of mounting screw R1/8 (Example) GC-57K (Yamada Corporation)	NZ3	NSK

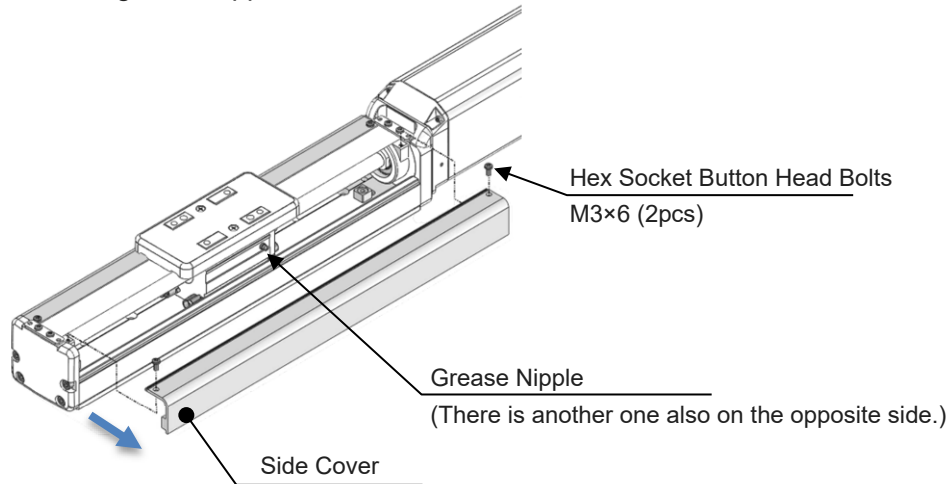
- Grease

Type	Amount of Grease Supply (Reference)	Grease Nipple Diameter
SA4	0.5cc to 1.0cc	Φ3.5
SA6	1.5cc to 2.0cc	
SA7	2.0cc to 2.5cc	
SA8	3.5cc to 4.0cc	

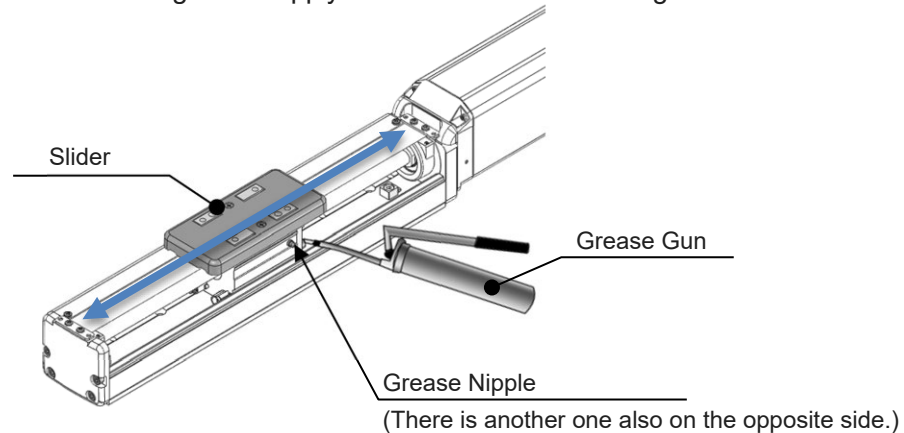
◆ Grease Supply Procedure

1. Remove the hex socket button head bolts (2 pcs) on either side of the side covers and take the side cover off.

* There is another grease nipple on the other side.



2. Supply grease with a grease gun at the grease nipple.
Wipe off the grease before supplying new in case it is extremely dirty.
- * There is another grease nipple available for grease supply on the other side.
Either side is available for grease supply on the ball screw and the guides.

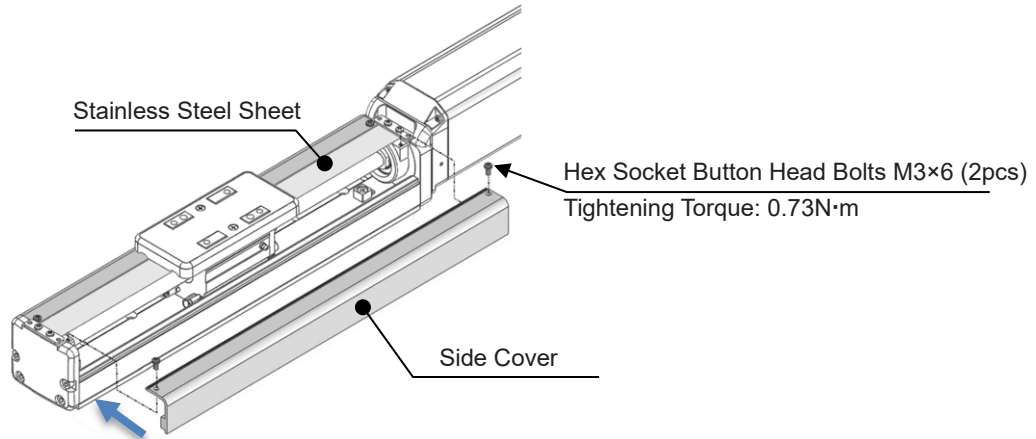


3. Move the slider in the full stroke range to spread the grease evenly.
 - Confirm the surface on the ball screw and the ball feeding area on the guides are glossy with grease oil. If grease is not spread evenly, supply grease again.
 - Wipe off excess grease.

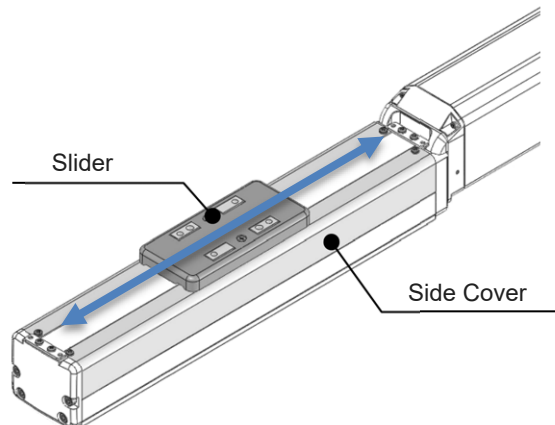
4. Put the side cover on with the hex socket button head bolts (2 pcs).

(Note) Put a shim (approx. 0.1 to 0.2mm) between the stainless steel sheet and the side cover so the side cover slightly offsets.

The stainless steel sheet contacting the side cover may cause damage or waviness on the stainless steel sheet which could lead to early degradation or abrasion.



5. Move the slider in the full stroke range to make sure there is no interference of the slider and the side covers.



4.6 Replacement of Components

4.6.1 Stainless steel sheet replacement/adjustment

◆ Preparation

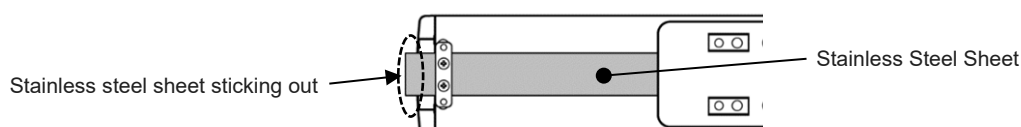
- Hex Wrench (Opposite side: 2mm)
- Protection Equipment (e.g. Work Gloves)
- Tape
- Scissors
- Stainless Steel Sheet for replacement

Type	Model Code
SA4C/SA4R	ST-6A4-(Stroke)
SA6C/SA6R	ST-6A6-(Stroke)
SA7C/SA7R	ST-6A7-(Stroke)
SA8C/SA8R	ST-6A8-(Stroke)



Caution

- Degradation and wear-out of the stainless steel sheet relies on its tension of attachment. If the stainless steel sheet is pulled with a huge force and the gap between the sheet and the slider cover is large, there is a risk of metal fatigue. On the other hand, if the tensile strength is too low, the stainless steel sheet would interfere with the back side of the slider cover and make dust to be generated.
- Ensure that the stainless steel sheet does not stick out of the end of the actuator when it is mounted. It may lead to a risk of cutting your finger on the stainless steel sheet.



- As a guideline, the stainless steel sheet should last for about 5,000km of motion. However, depending on the usage or environment, replace the stainless steel sheet appropriately.

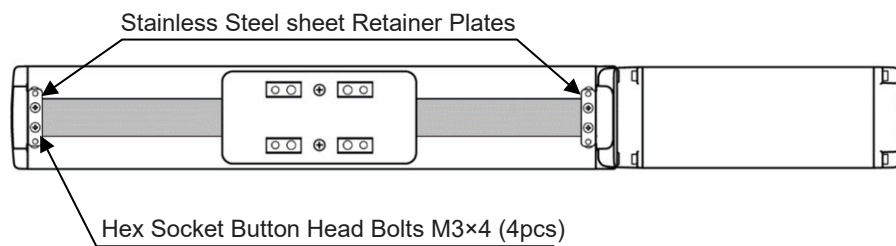
◆ Replacement Procedure

For SA7 and SA8 have a replacement and tuning in Procedure 1.

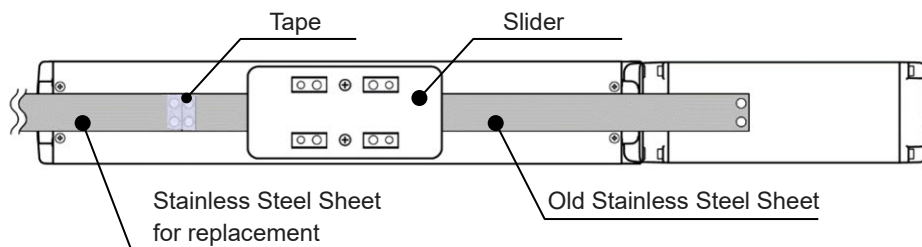
For SA4 and SA6 have a replacement and tuning in either Procedure 1 or Procedure 2.

● Procedure 1

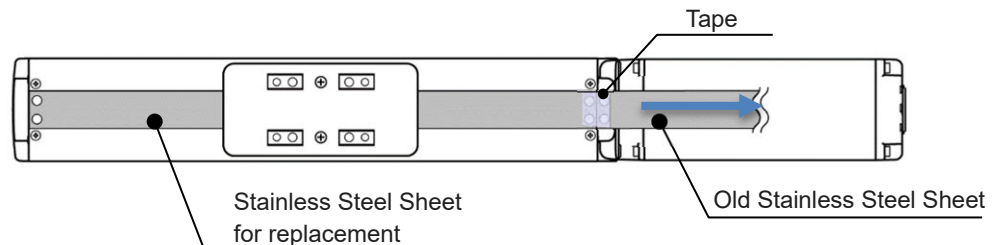
1. Remove the hex socket button head bolts (4 pcs) and take the stainless steel sheet retainers off



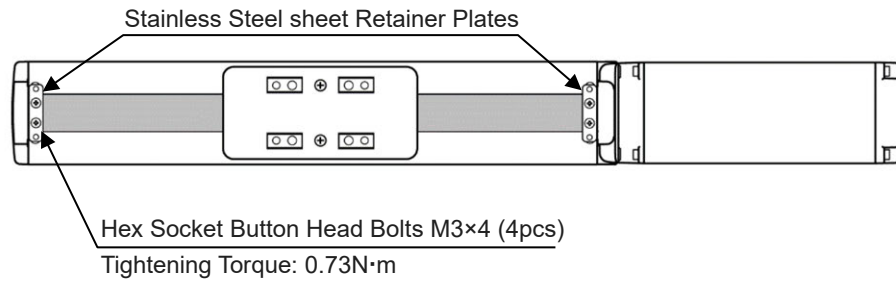
2. Join the old stainless steel sheet with a stainless steel sheet for replacement.
* Make sure width of adhesive tape would not go out of the stainless steel sheet width.



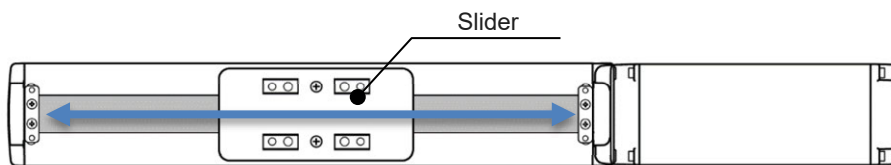
3. Pull the old stainless steel sheet slowly to replace it with the stainless steel sheet for replacement, and take off the old stainless steel sheet and the tape.



4. Attach the stainless steel sheet retainers with the hex socket button head bolts (4 pcs).
* There are two grooves on the main body for the stainless steel sheet attachment guide.
Set the stainless steel sheet in the center between the two grooves.

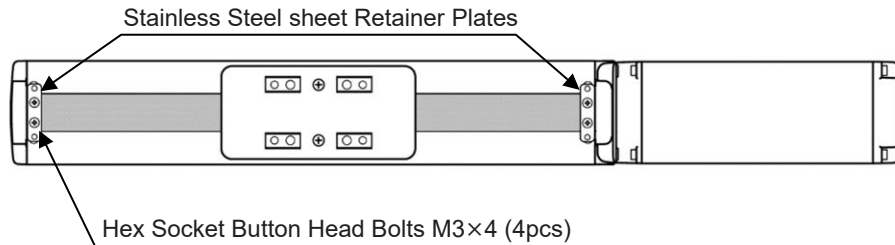


5. Move the slider in the full stroke range to make sure there is no waviness or looseness on the stainless steel sheet.
Redo the procedure from Step 4 if there is any problem.

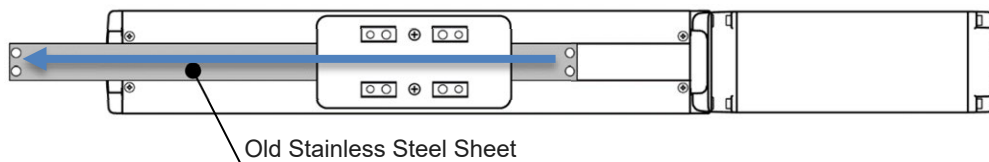


● Procedure 2

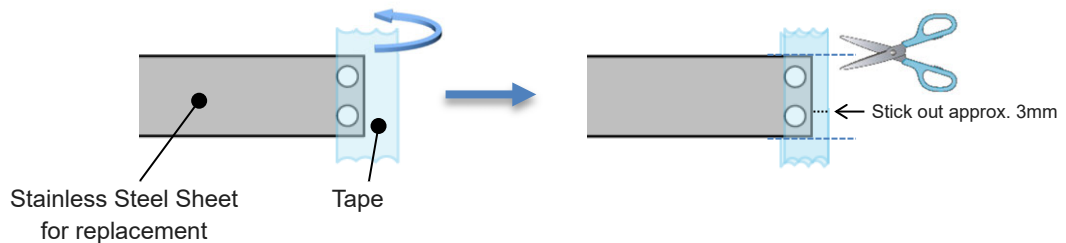
1. Remove the hex socket button head bolts (4 pcs) and take the stainless steel sheet retainers off.



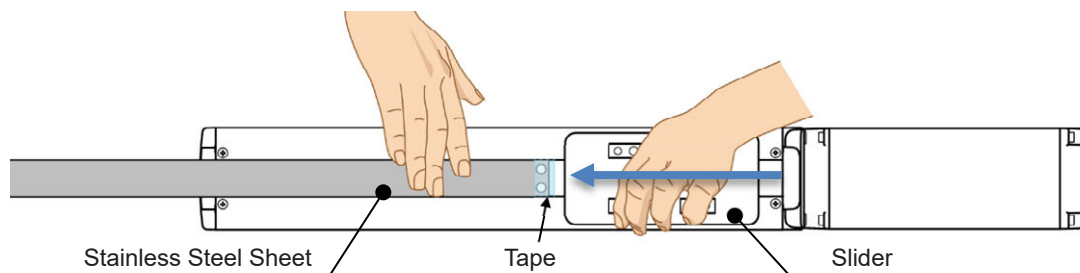
2. Pull out the old stainless steel sheet.



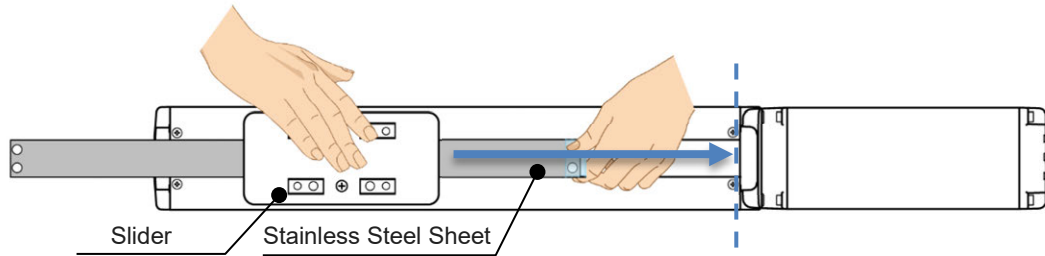
3. Put adhesive tape on one end of a stainless steel sheet for replacement.
Put tape and fold it to cover both sides of the stainless steel sheet (with approximately 3mm sticking out from the stainless steel sheet) and cut excess parts.



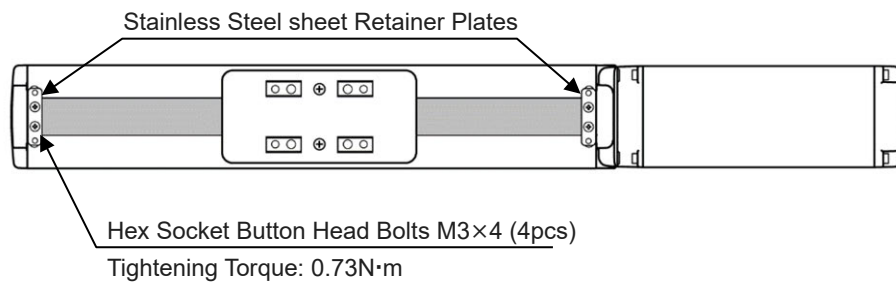
4. Put the stainless steel sheet for replacement with adhesive tape on the main body, and move the slider while holding the stainless steel sheet to set the stainless steel sheet through.
* There are two grooves on the main body for the stainless steel sheet attachment guide.
Set the stainless steel sheet in the center between the two grooves.



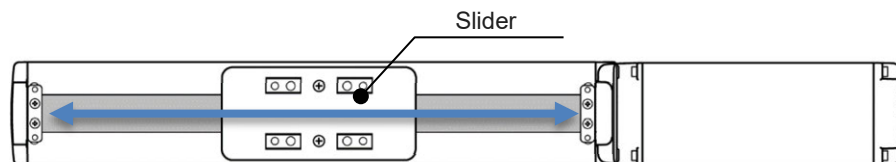
5. Hold the stainless steel sheet on one side and pull it out slowly to the position of the stainless steel sheet retaining plate, and then take the tape off.



6. Attach the stainless steel sheet retainers with the hex socket button head bolts (4 pcs).



7. Move the slider in the full stroke range to make sure there is no waviness or looseness on the stainless steel sheet.
Redo the procedure from Step 6 if there is any problem.



4.6.2 Timing belt replacement/adjustment



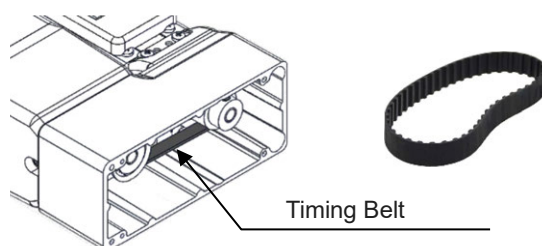
Caution

In case of replacing the timing belt while keeping the vertical orientation, fix the slider in advance. The slider will drop and cause danger.

◆ Preparation

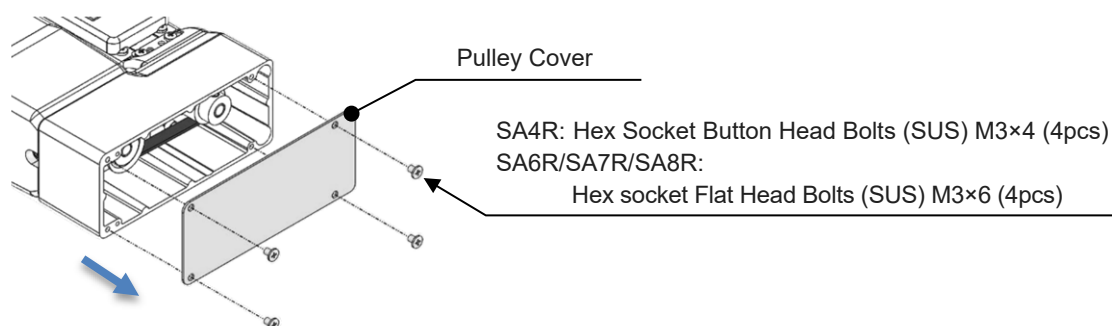
- Phillips Screwdriver
- Hex Wrench Opposite side: 3mm, 4mm
- Tension Gauge
- Long string such as wire or zip ties
- Timing Belt for replacement

Type	Model Code
SA4R	TB-RCS4-STRA4R
SA6R	TB-RCS4-STRA6R
SA7R	TB-RCS4-STRA7R
SA8R	TB-RCS4-SA8R

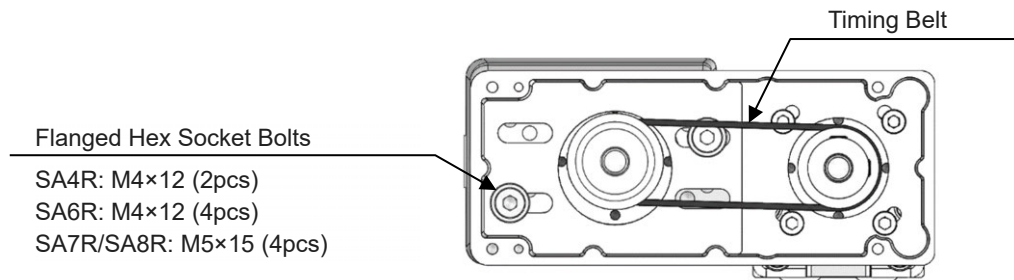


◆ Replacement Procedure

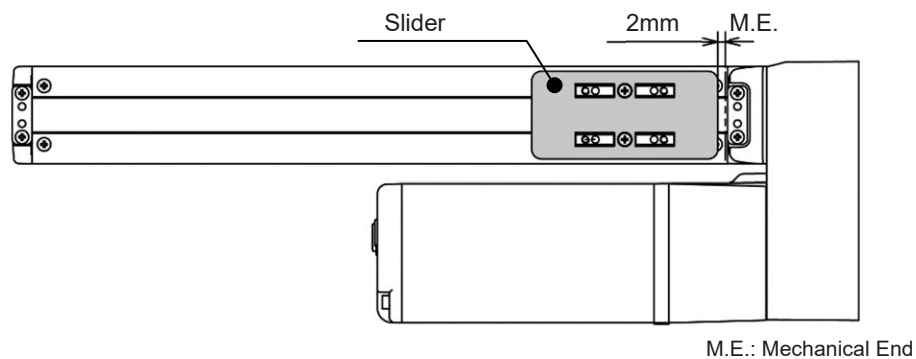
1. Remove the screws (4 pcs) and take the pulley cover off.



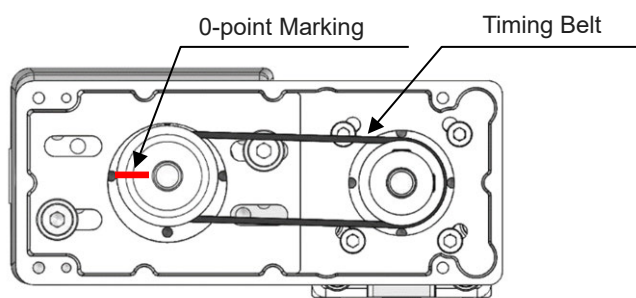
2. Loosen the flanged hex socket bolts and take off the timing belt.



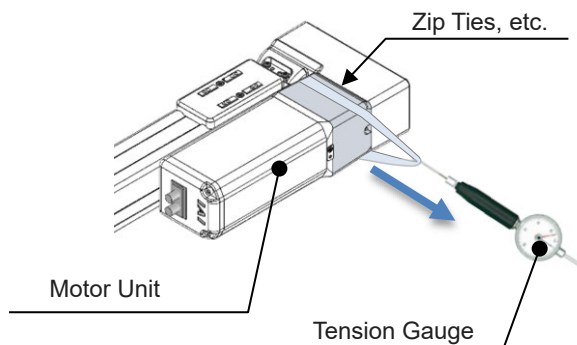
3. Have the slider moved "2mm" away from the mechanical end (M.E.) and keep it at that position.



4. Confirm that the 0-point marking marked on the pulley on the motor side orienting outside, and hang a timing belt for replacement between the pulleys.



5. Hang a zip ties or equivalent on the motor unit and apply the specified load (tensile strength) with a tension gauge.



Tensile Force when Attaching Motor Unit

Type	Tension Force [N]
SA4R	20 to 25
SA6R	40 to 45
SA7R	70 to 80
SA8R	100 to 110

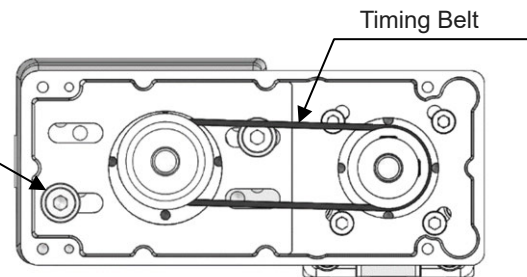
6. While the specified load (tensile strength) is applied, tighten up the flanged hex socket bolts to hold the motor.

Flanged Hex Socket Bolts

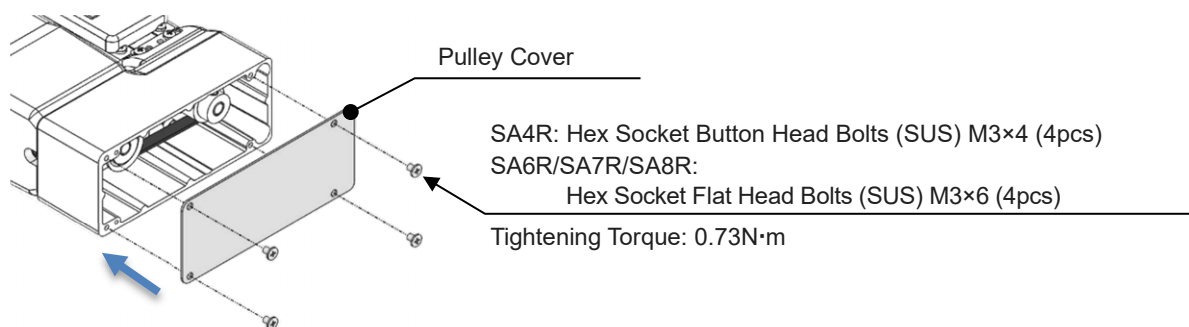
SA4R: M4×12 (2pcs) Tightening Torque: 2.2N·m

SA6R: M4×12 (4pcs) Tightening Torque: 2.2N·m

SA7R/SA8R: M5×15 (4pcs) Tightening Torque: 4.4N·m



7. Attach the pulley cover with the screws (4 pcs).



4.6.3 Motor unit replacement



Caution

- Make sure to hold the slider so it would not move in case of replacing a motor in vertical installation which is not equipped with a brake. It will be dangerous as the slider will be dropped, if it is not held, as soon as the motor gets taken off.



Notice

- Pay attention not to get the cable pinched when attaching the motor cover and end cover.
- When the actuator is not equipped with a brake, make sure that the motor is magnetized when attaching it so the shaft and the origin point get aligned.

[1] Motor Straight Type : SA4C, SA6C, SA7C, SA8C

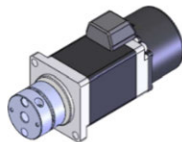
◆ Preparation

- Hex Wrench Opposite side: 2mm, 2.5mm
- Motor Unit for replacement

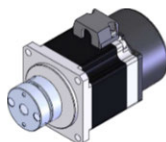
Example of Model Code: RCS4B-SA6C/equipped with Brake

Model Code: RCS4-MUSRTA6C-B

Type	Basic Model Code	Brake
SA4C	RCS4-MUSRTA4C	No Description (W/o Brake)
SA6C	RCS4-MUSRTA6C	
SA7C	RCS4-MUSRTA7C	B (With Brake)
SA8C	RCS4-MUSRA8C	



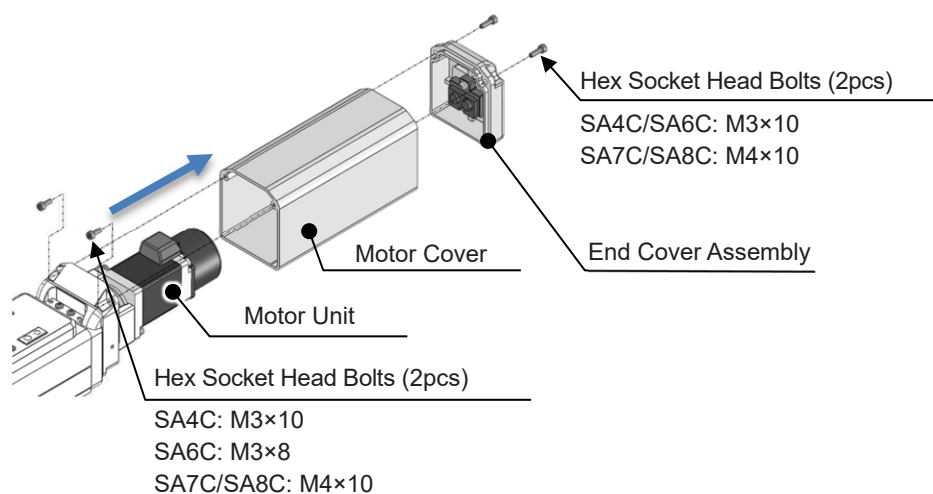
SA4C, SA6C



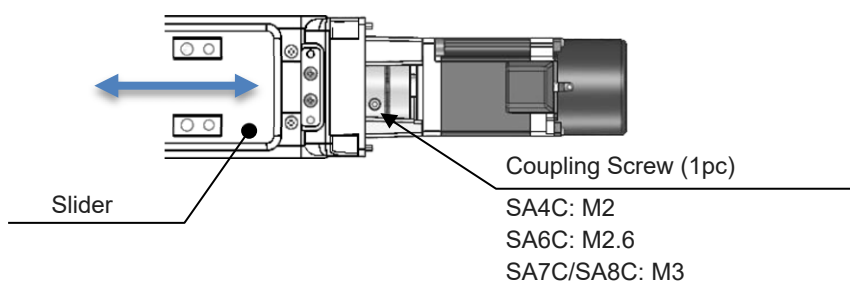
SA7C, SA8C

◆ Replacement Procedure

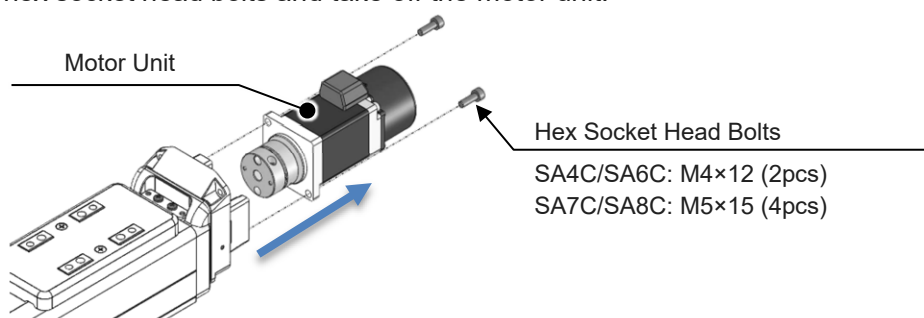
1. Remove the hex socket head bolt (2 pcs) on the end cover assembly side and the hex socket head bolt (2 pcs) on the motor unit side and move the motor cover and end cover assembly slightly.
 * Do not attempt to pull it forcefully as there are cables joined.
2. Unplug the cables joining the motor unit and the end cover assembly, and take off the end cover assembly and the motor cover.



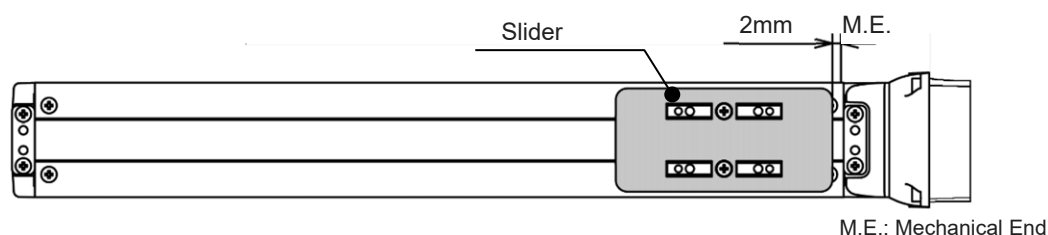
3. Move the slider to a position where the coupling screw can be seen and loosen the coupling screw (1 pc).



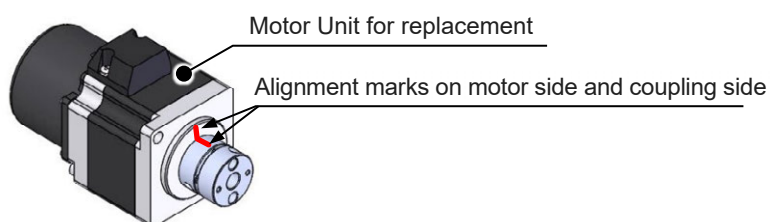
4. Remove the hex socket head bolts and take off the motor unit.



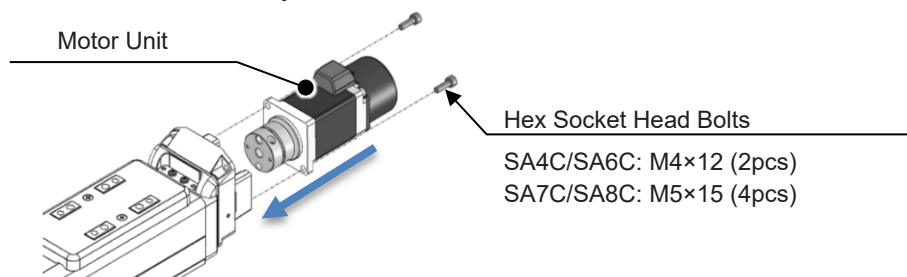
5. Have the slider moved "2mm" away from the mechanical end and keep it at that position.



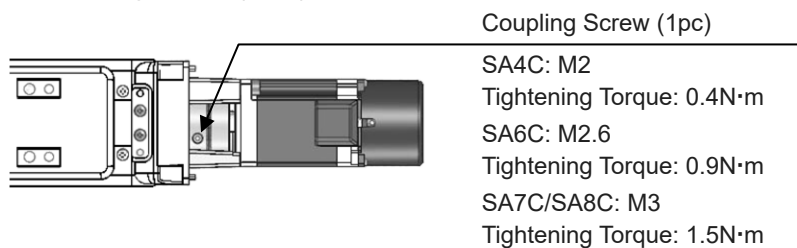
6. Align the alignment mark for coupling on the motor unit for replacement.



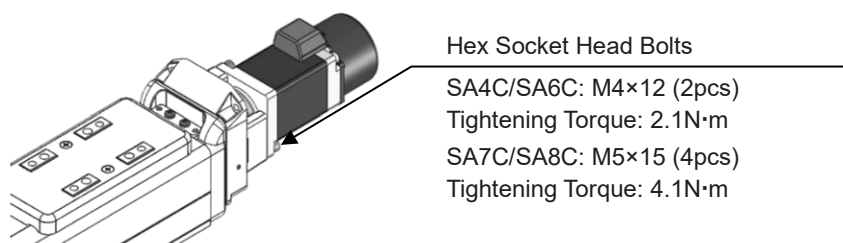
7. Tighten the motor unit loosely with the hex socket head bolts.



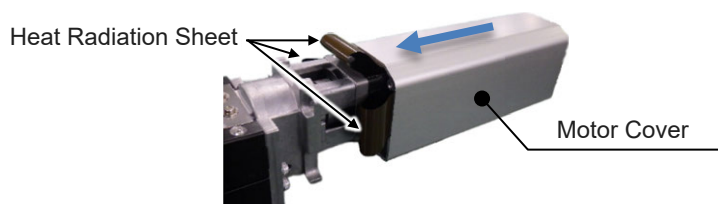
8. Tighten the coupling screw (1 pc) up.



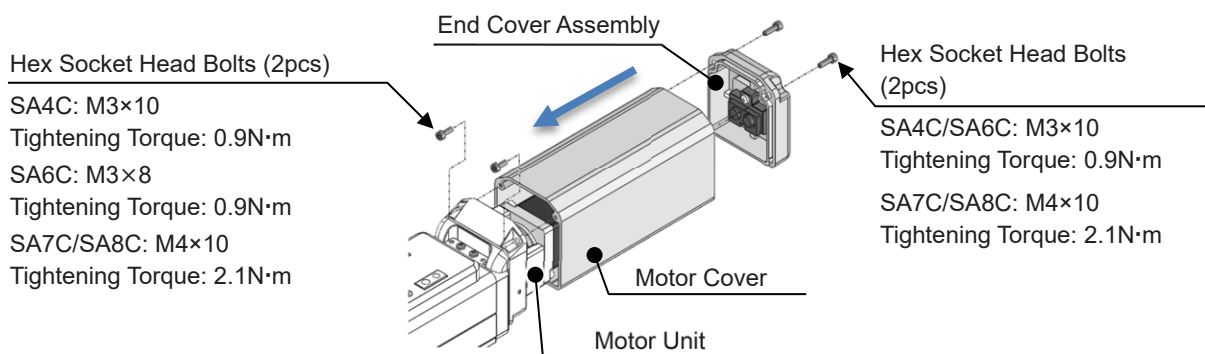
9. Tighten the hex socket head cap bolts up.



10. Put the motor cover over the motor unit, and plug in the cables joining the motor unit and the end cover assembly.



11. Attach the motor cover and the end cover assembly with the hex socket head bolts (2 pcs) on the end cover assembly side and the hex socket head bolts (2 pcs) on the motor unit side.



12. Conduct the home-return operation using the PC teaching software or a touch panel teaching.

* If there is a misalignment in the coupling tightened position (approx. 0.5mm) after the home-return operation, adjust the misalignment with the following parameters.

SCON(2) MSCON RCON-SC	Parameter No. 22 To be adjusted with offset movement amount (for lead length or less)
RSEL	Driver Unit Parameter No. 22 Adjust with home-return offset (for lead length or less)
XSEL(2)	Axis-Specific Parameter No. 12 Adjust with home preset (for lead length or less)

[2] Motor Reversing Type: SA4R, SA6R, SA7R, SA8R

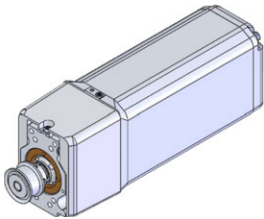
◆ Preparation

- Hex Wrench Opposite side: 2mm, 2.5mm
- Motor Unit for replacement

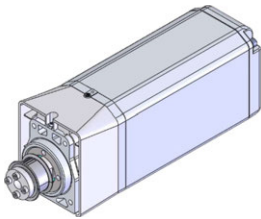
Example of Model Code: RCS4B-SA6R/ equipped with Brake/ Cable Exit Direction Bottom
Side/ Motor Reversed Direction Left Side

Model Code: RCS4B-MUSRTA6WSRA12R-B-CJB-ML-PU

Type	Basic Model Code	Brake	Cable Ejected Orientation (Option)	Orientation of Motor Attachment	Pulley
SA4R	RCS4B-MUSRTA4WSRA10R	No Description (W/o Brake) B (With Brake)	CJT/CJR CJL/CJB	ML/MR	PU
SA6R	RCS4B-MUSRTA6WSRA12R				
SA7R	RCS4B-MUSRTA7WSRA14R				
SA8R	RCS4B-MUSA8R				



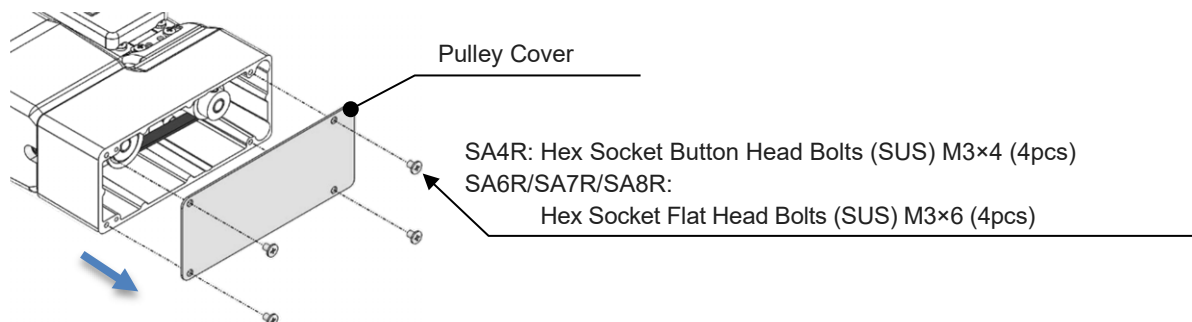
SA4R, SA6R



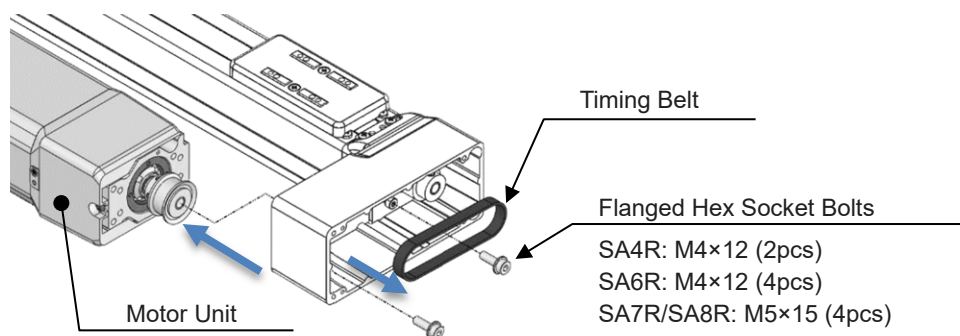
SA7R, SA8R

◆ Replacement Procedure

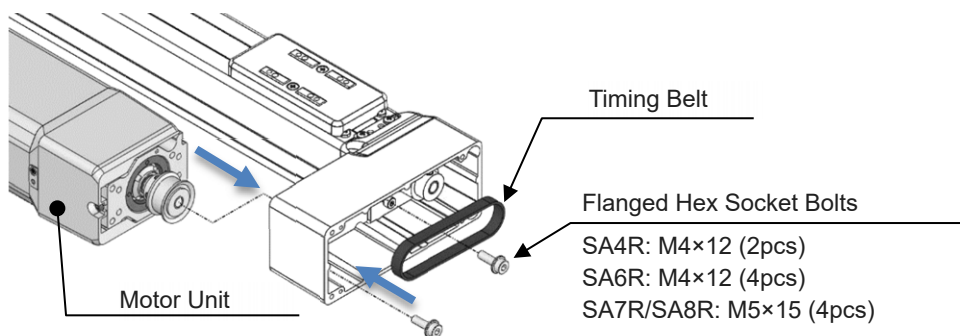
1. Remove the screws (4 pcs) and take the pulley cover off.



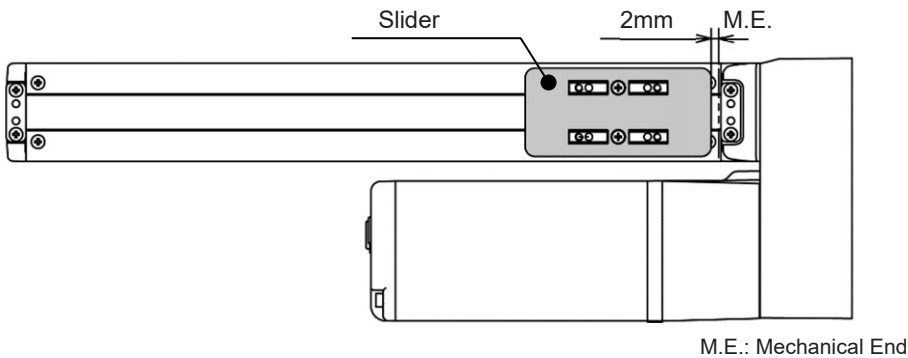
2. Remove the flanged hex socket set screws and take off the timing belt and the motor unit.



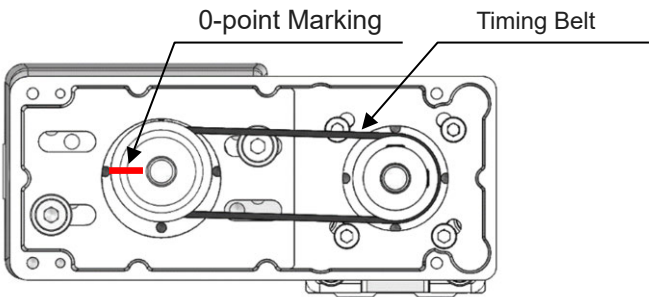
3. Attach a motor unit and timing belt for replacement and tighten them loosely with the flanged hex socket set screws.



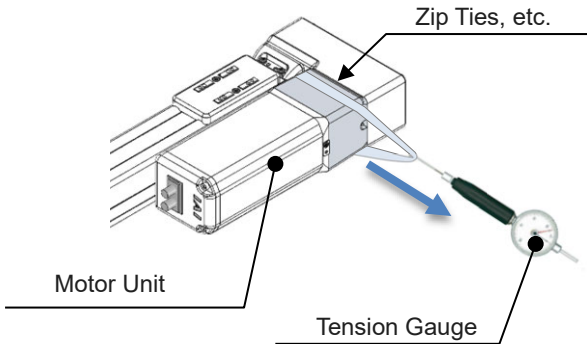
4. Have the slider moved "2mm" away from the mechanical end (M.E.) and keep it at that position.



5. Confirm that the "0-point marking" marked on the pulley on the motor side orienting outside.



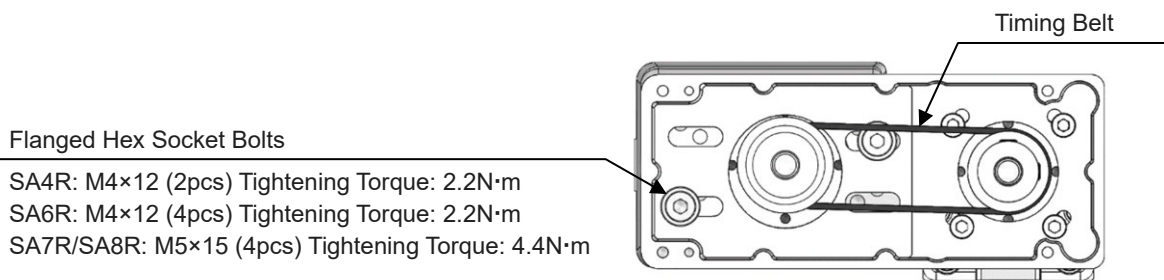
6. Hang a zip ties or equivalent on the motor unit and apply the specified load (tensile strength) with a tension gauge.



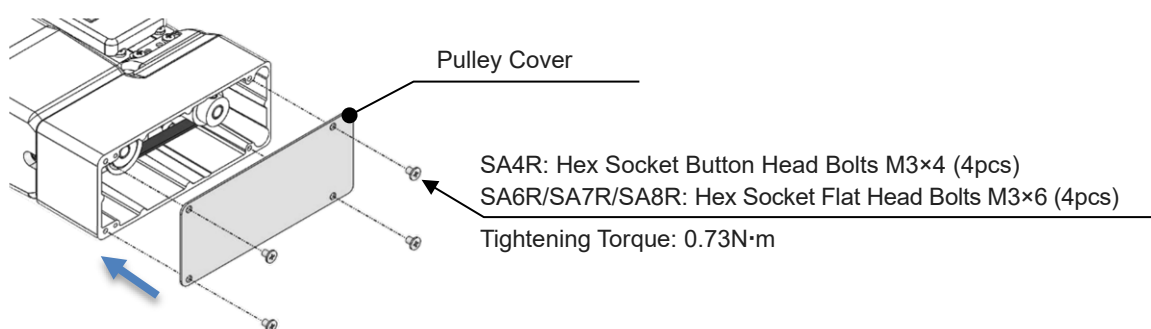
Tensile Force when Attaching Motor Unit

Type	Tension Force [N]
SA4R	20 to 25
SA6R	40 to 45
SA7R	70 to 80
SA8R	100 to 110

7. While the specified load (tensile strength) is applied, tighten up the flanged hex socket set screw to hold the motor unit.



8. Attach the pulley cover with the screws (4 pcs).



9. Conduct the home-return operation using the PC teaching software or a touch panel teaching.

* If there is a misalignment in the coupling tightened position (approx. 0.5mm) after the home-return operation, adjust the misalignment with the following parameters.

SCON(2) MSCON RCON-SC	Parameter No. 22 To be adjusted with offset movement amount (for lead length or less)
RSEL	Driver Unit Parameter No. 22 Adjust with home-return offset (for lead length or less)
XSEL(2)	Axis-Specific Parameter No. 12 Adjust with home preset (for lead length or less)

ROBO Cylinder

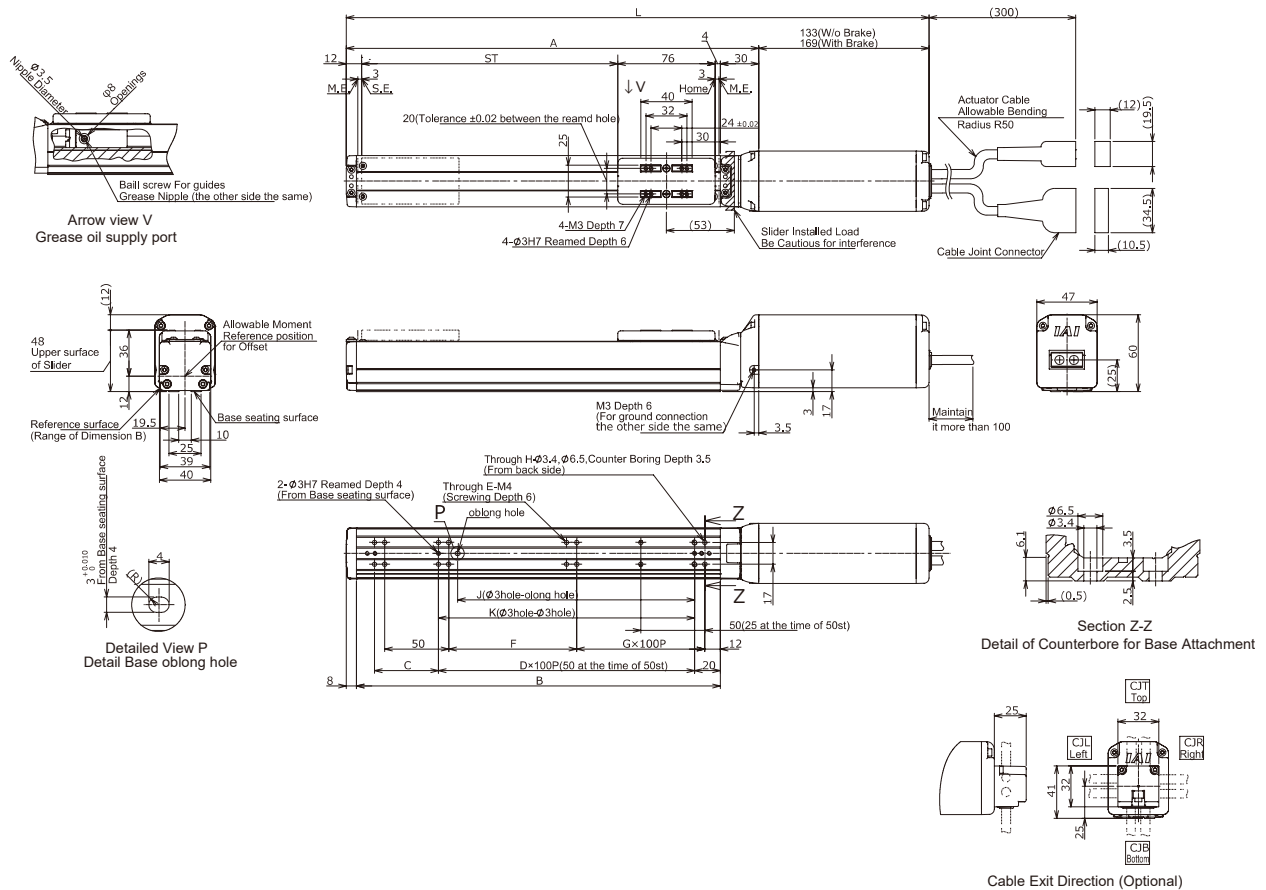
Chapter 5

External Dimensions

5.1	External Dimensions	5-1
5.1.1	RCS4B-SA4C.....	5-1
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5.1.5	RCS4B-SA4R.....	5-9
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5.1.1 RCS4B-SA4C

ST : Stroke
M.E. : Mechanical End
S.E. : Stroke End



Unit: mm

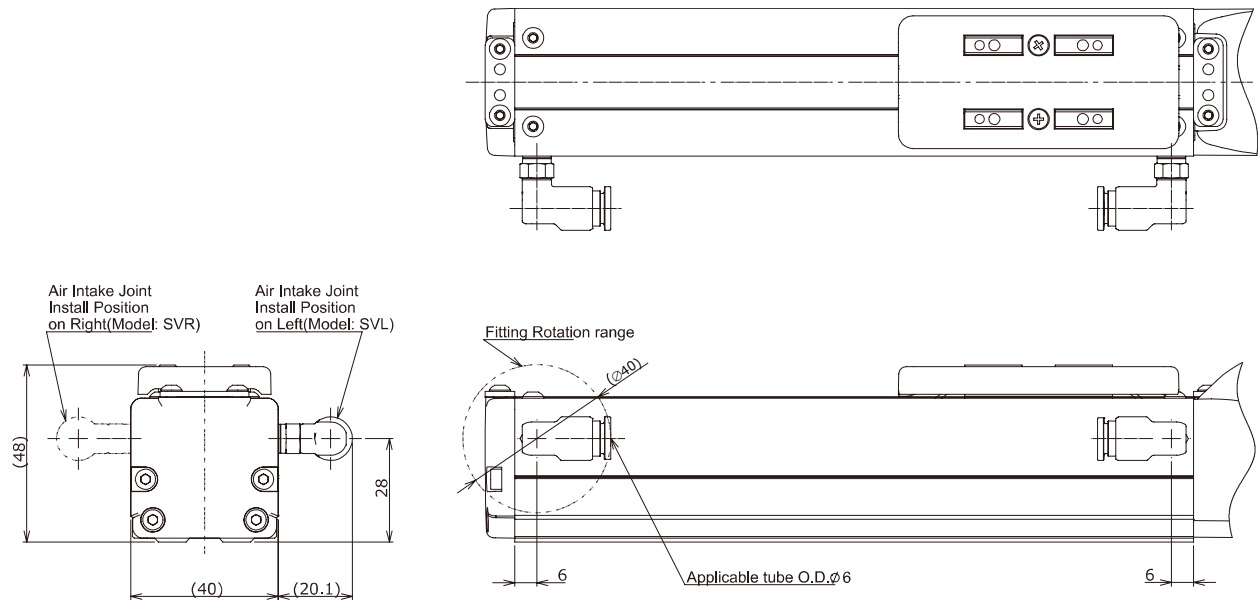
Stroke		50	100	150	200	250	300	350	400	450	500
L	W/o Brake	305	355	405	455	505	555	605	655	705	755
	With Brake	341	391	441	491	541	591	641	691	741	791
A		172	222	272	322	372	422	472	522	572	622
B		134	184	234	284	334	384	434	484	534	584
C		50	50	100	50	100	50	100	50	100	50
D		—	1	1	2	2	3	3	4	4	5
E		6	6	6	8	8	10	10	12	12	14
F		50	100	50	100	50	100	50	100	50	100
G		0	0	1	1	2	2	3	3	4	4
H		8	8	10	10	12	12	14	14	16	16
J		35	85	85	185	185	285	285	385	385	485
K		50	100	100	200	200	300	300	400	400	500

Note: The dimensions in the table are for models without the cable ejection direction option.

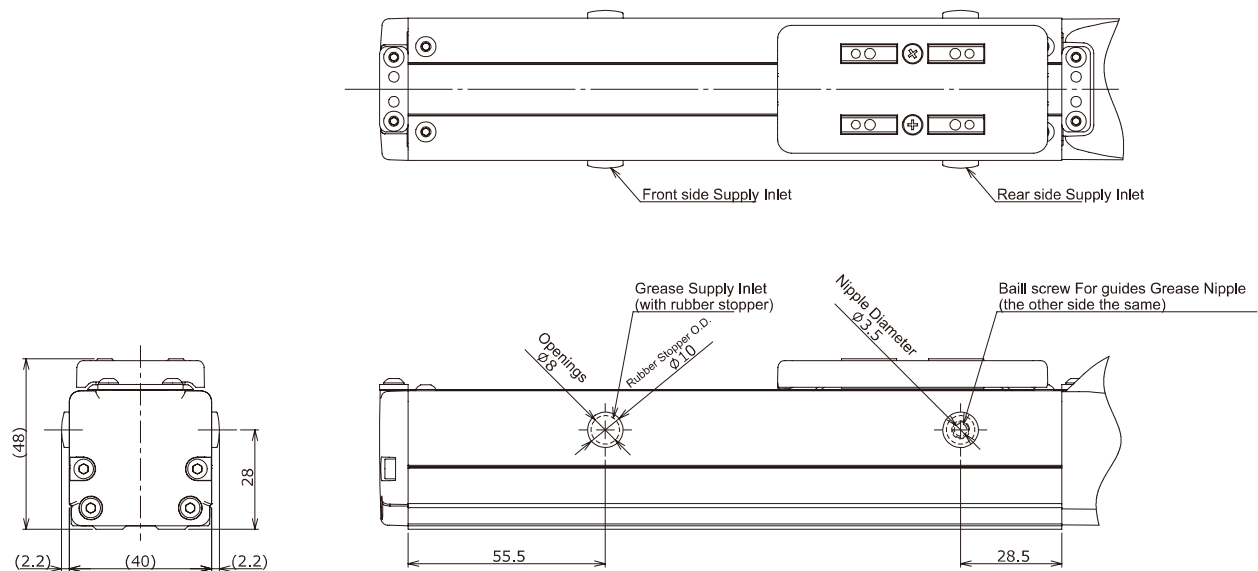
For models with the cable ejection direction option, the overall length increases by 25 mm.

Stroke		50	100	150	200	250	300	350	400	450	500
Mass [kg]	W/o Brake	1.2	1.3	1.4	1.5	1.5	1.6	1.7	1.8	1.9	2.0
	With Brake	1.4	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.1	2.2

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)

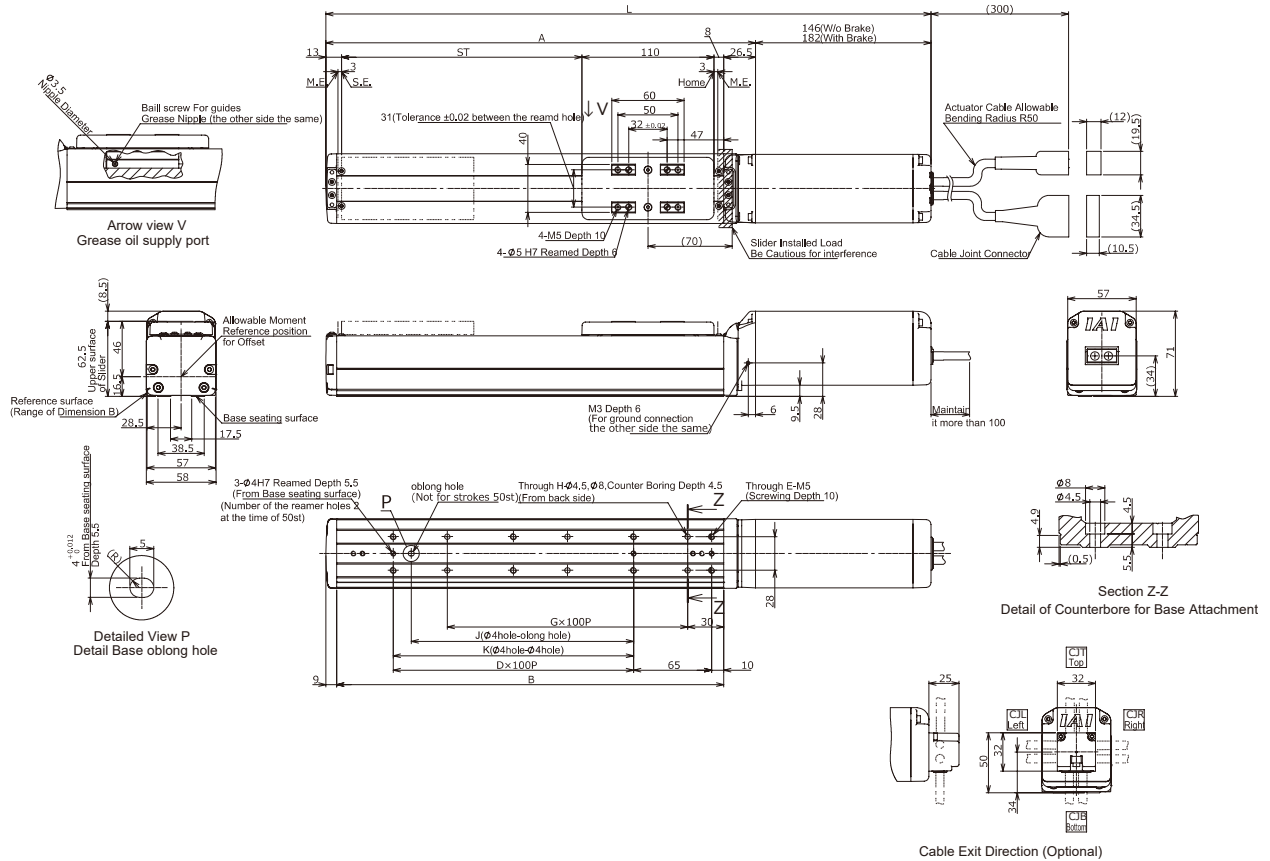


■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



5.1.2 RCS4B-SA6C

ST : Stroke
M.E. : Mechanical End
S.E. : Stroke End



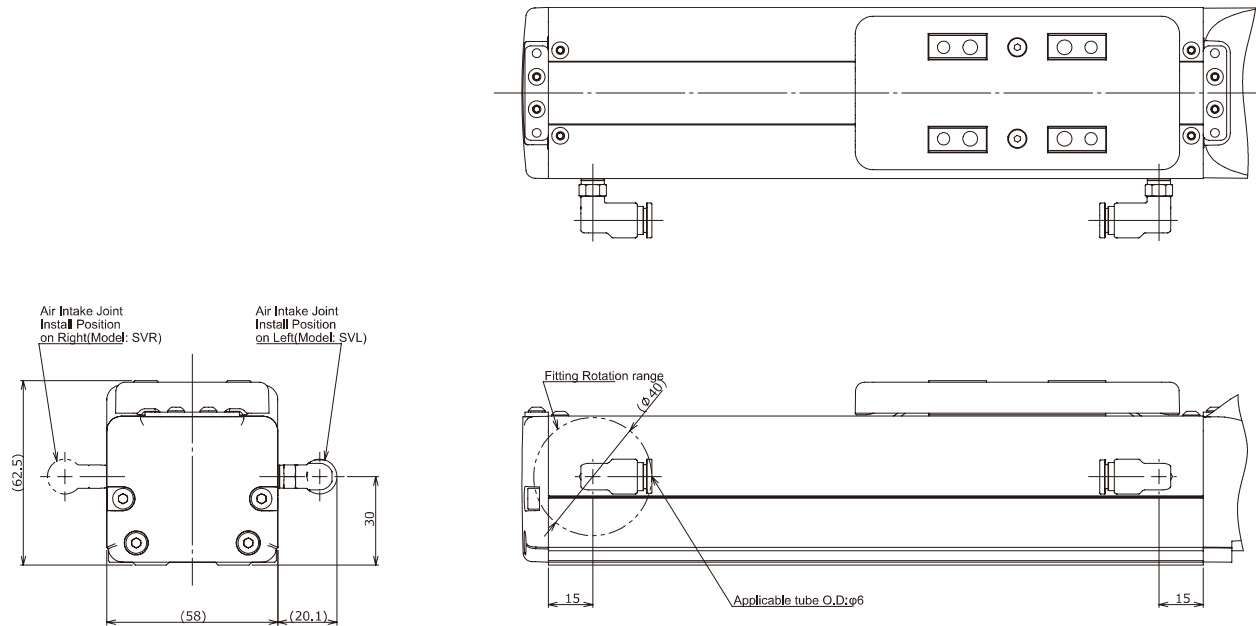
		Unit: mm															
L	Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
	W/o Brake	353.5	403.5	453.5	503.5	553.5	603.5	653.5	703.5	753.5	803.5	853.5	903.5	953.5	1003.5	1053.5	1103.5
	With Brake	389.5	439.5	489.5	539.5	589.5	639.5	689.5	739.5	789.5	839.5	889.5	939.5	989.5	1039.5	1089.5	1139.5
	A	207.5	257.5	307.5	357.5	407.5	457.5	507.5	557.5	607.5	657.5	707.5	757.5	807.5	857.5	907.5	957.5
	B	172	222	272	322	372	422	472	522	572	622	672	722	772	822	872	922
	D	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8
	E	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
	G	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8
	H	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
	J	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
	K	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800

Note: The dimensions in the table are for models without the cable ejection direction option.

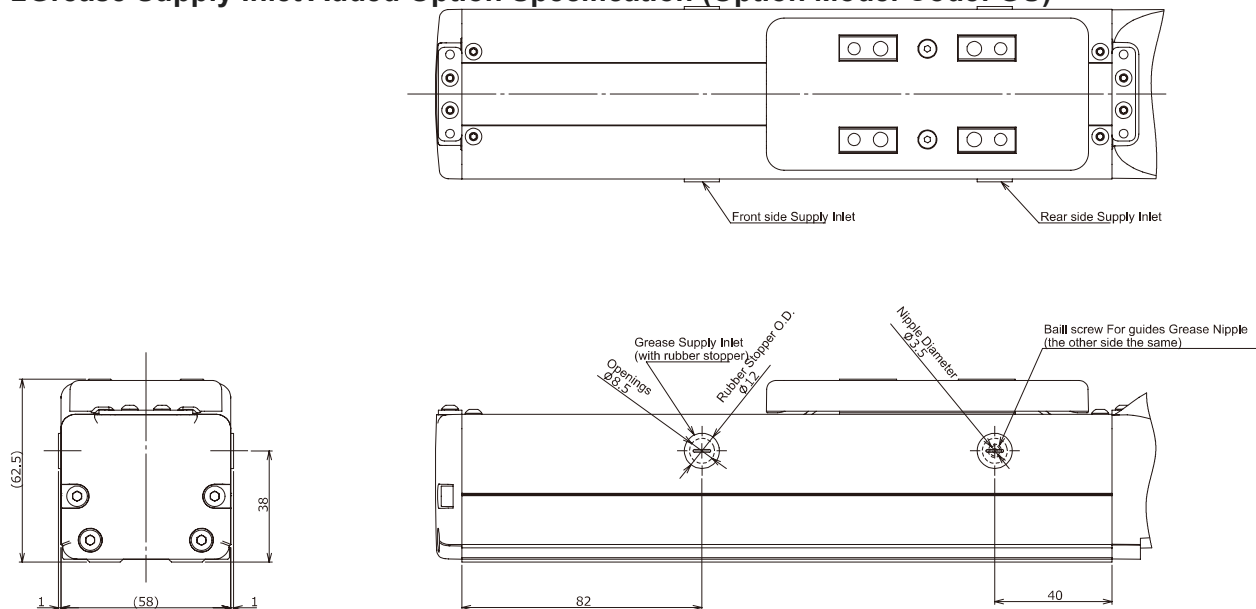
For models with the cable ejection direction option, the overall length increases by 25 mm.

		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass	W/o Brake	2.0	2.2	2.4	2.6	2.7	2.9	3.1	3.3	3.4	3.6	3.8	4.0	4.2	4.3	4.5	4.7
[kg]	With Brake	2.3	2.5	2.7	2.9	3.0	3.2	3.4	3.6	3.7	3.9	4.1	4.3	4.5	4.6	4.8	5.0

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)

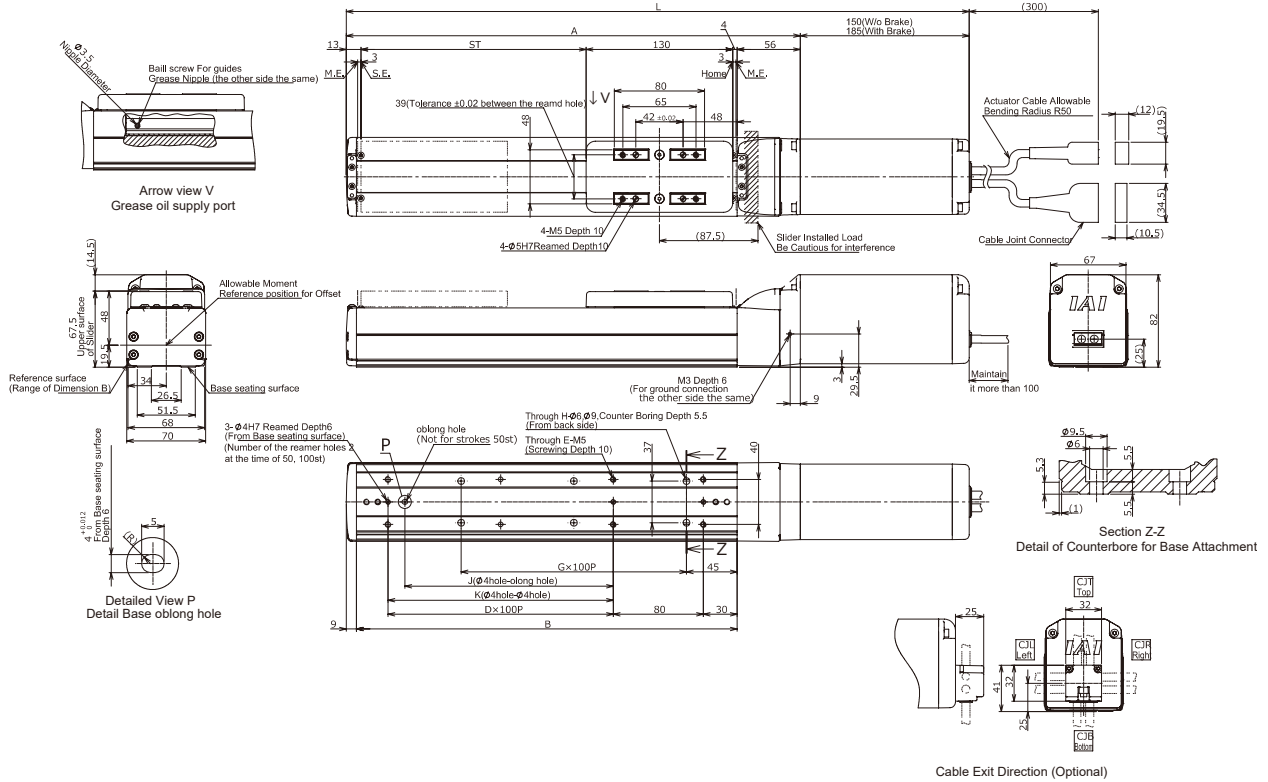


■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



5.1.3 RCS4B-SA7C

ST : Stroke
M.E. : Mechanical End
S.E. : Stroke End



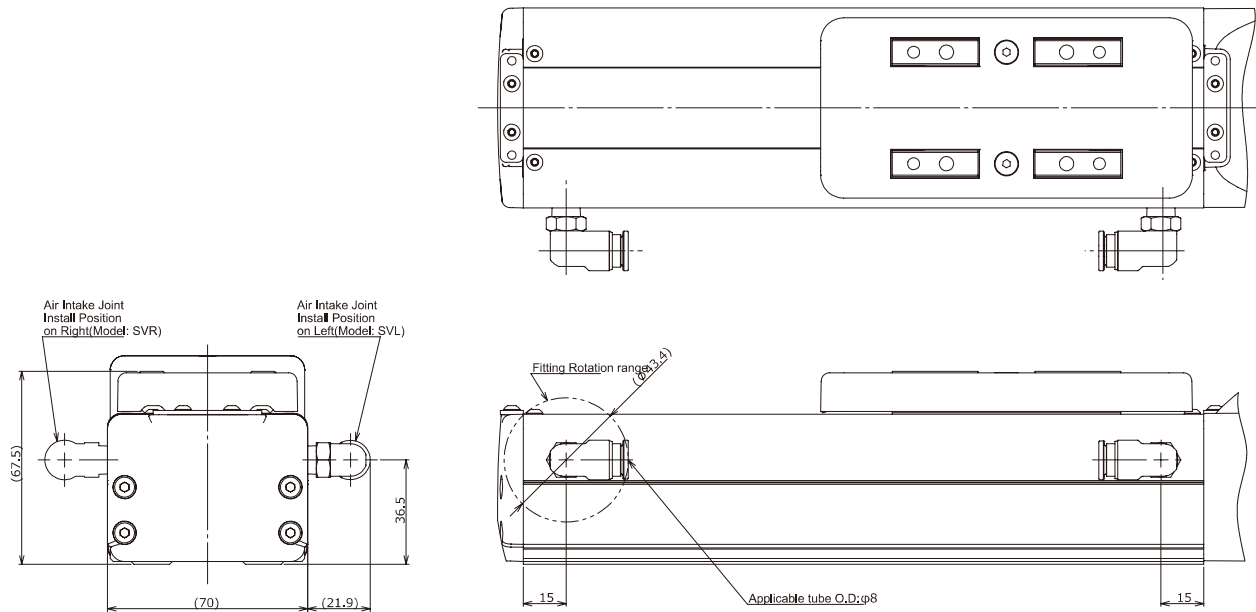
		Unit: mm															
L	Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
	W/o Brake	403	453	503	553	603	653	703	753	803	853	903	953	1003	1053	1103	1153
	With Brake	438	488	538	588	638	688	738	788	838	888	938	988	1038	1088	1138	1188
	A	253	303	353	403	453	503	553	603	653	703	753	803	853	903	953	1003
	B	188	238	288	338	388	438	488	538	588	638	688	738	788	838	888	938
	D	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8
	E	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
	G	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8
	H	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
	J	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
	K	0	0	100	200	200	300	300	400	400	500	500	600	600	700	700	800

Note: The dimensions in the table are for models without the cable ejection direction option.

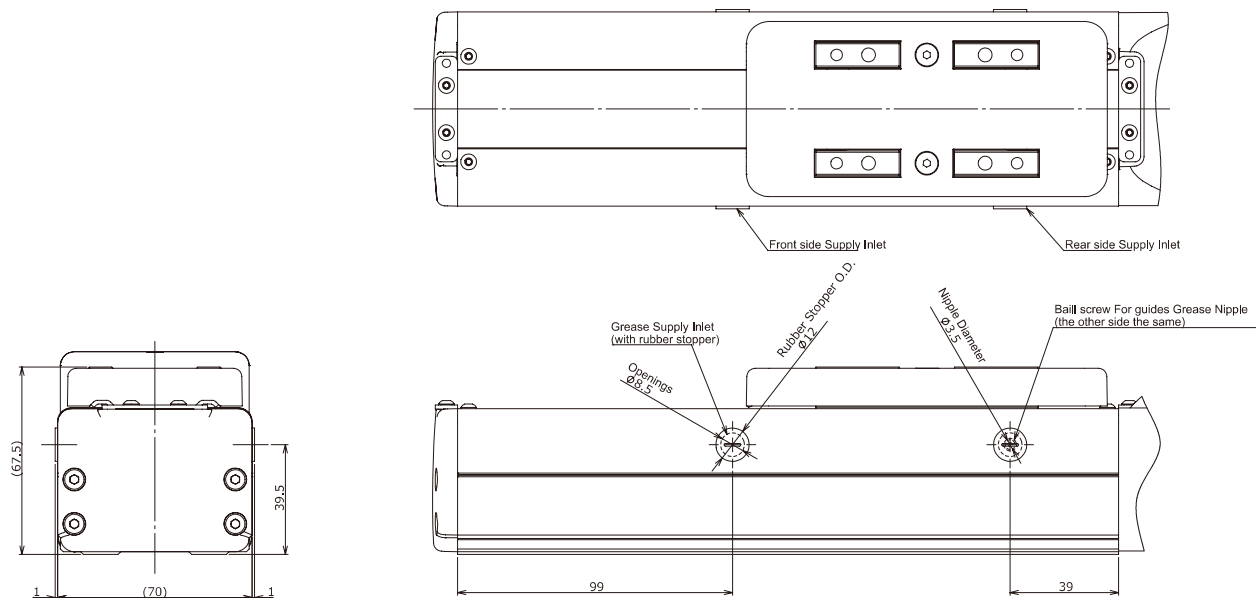
For models with the cable ejection direction option, the overall length increases by 25 mm.

		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass	W/o Brake	3.5	3.8	4.0	4.3	4.5	4.7	5.0	5.2	5.4	5.7	5.9	6.1	6.4	6.6	6.8	7.1
[kg]	With Brake	4.0	4.3	4.5	4.8	5.0	5.2	5.5	5.7	5.9	6.2	6.4	6.6	6.9	7.1	7.3	7.6

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)

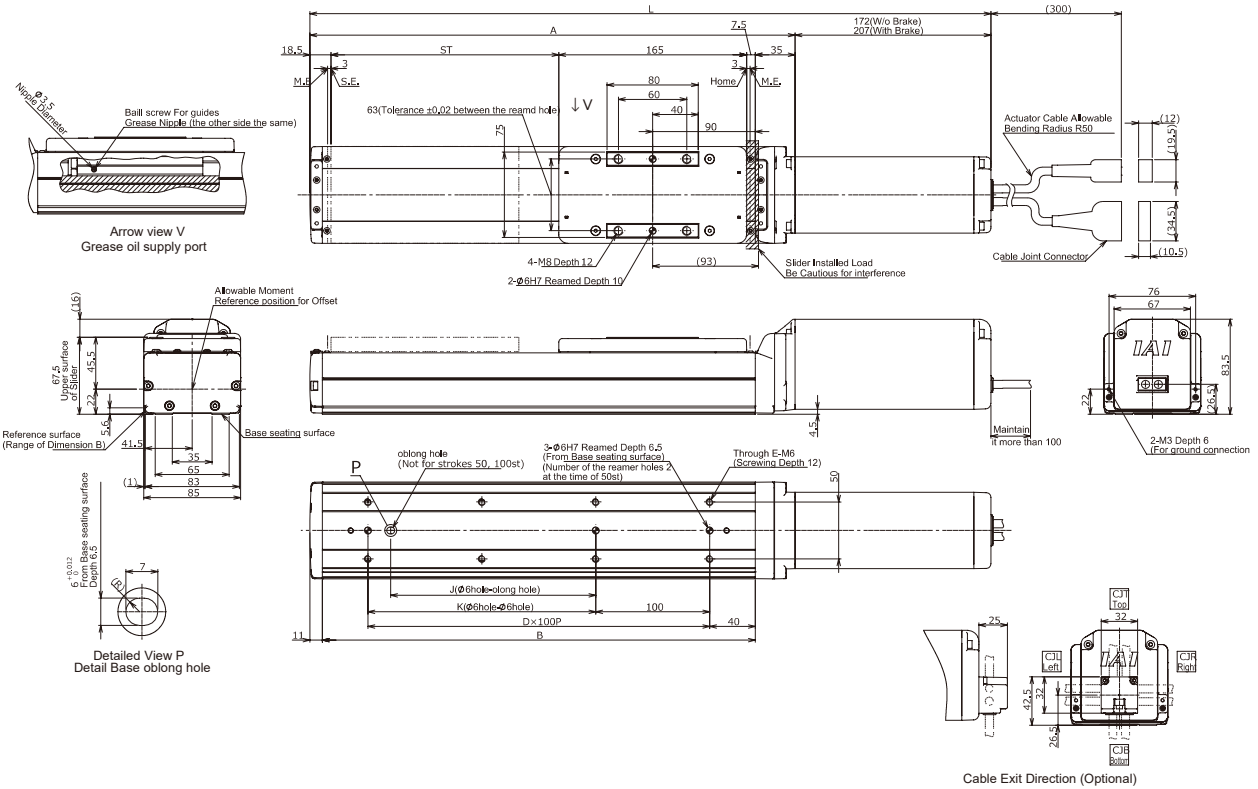


■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



5.1.4 RCS4B-SA8C

ST : Stroke
M.E. : Mechanical End
S.E. : Stroke End



Unit: mm

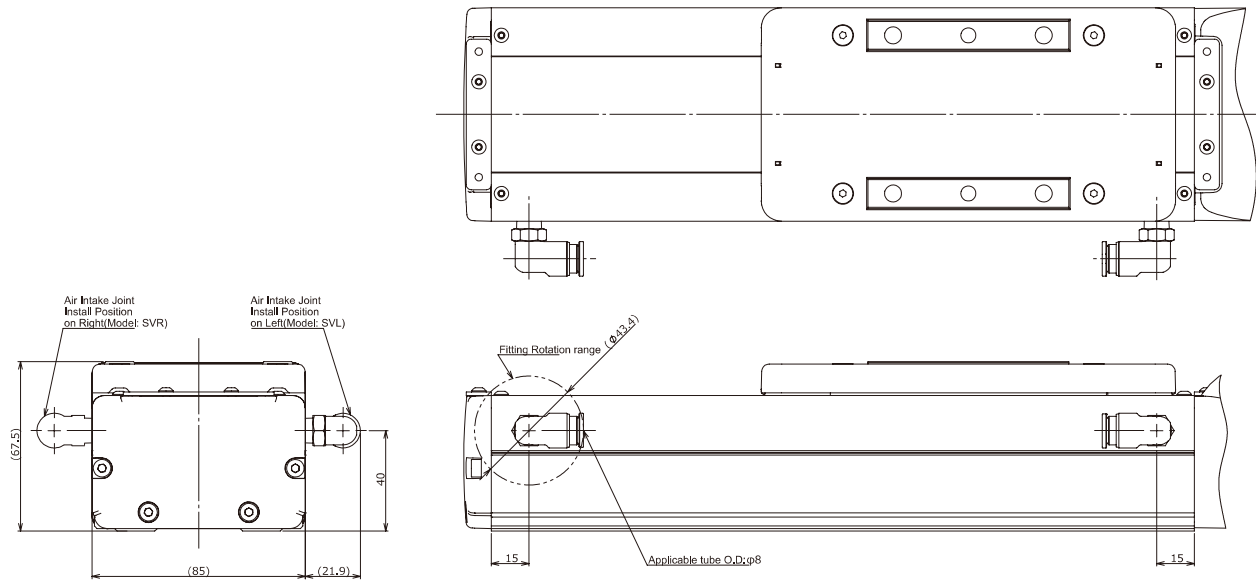
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
L	W/o Brake	448	498	548	598	648	698	748	798	848	898	948	998	1048	1098	1148	1198	1248	1298	1348	1398	1448	1498
	With Brake	483	533	583	633	683	733	783	833	883	933	983	1033	1083	1133	1183	1233	1283	1333	1383	1433	1483	1533
A		276	326	376	426	476	526	576	626	676	726	776	826	876	926	976	1026	1076	1126	1176	1226	1276	1326
B		230	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030	1080	1130	1180	1230	1280
D		1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
E		4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26
J		0	0	80	180	180	280	280	380	380	480	480	580	580	680	680	780	780	880	880	980	980	1080
K		0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800	800	900	900	1000	1000	1100

Note: The dimensions in the table are for models without the cable ejection direction option.

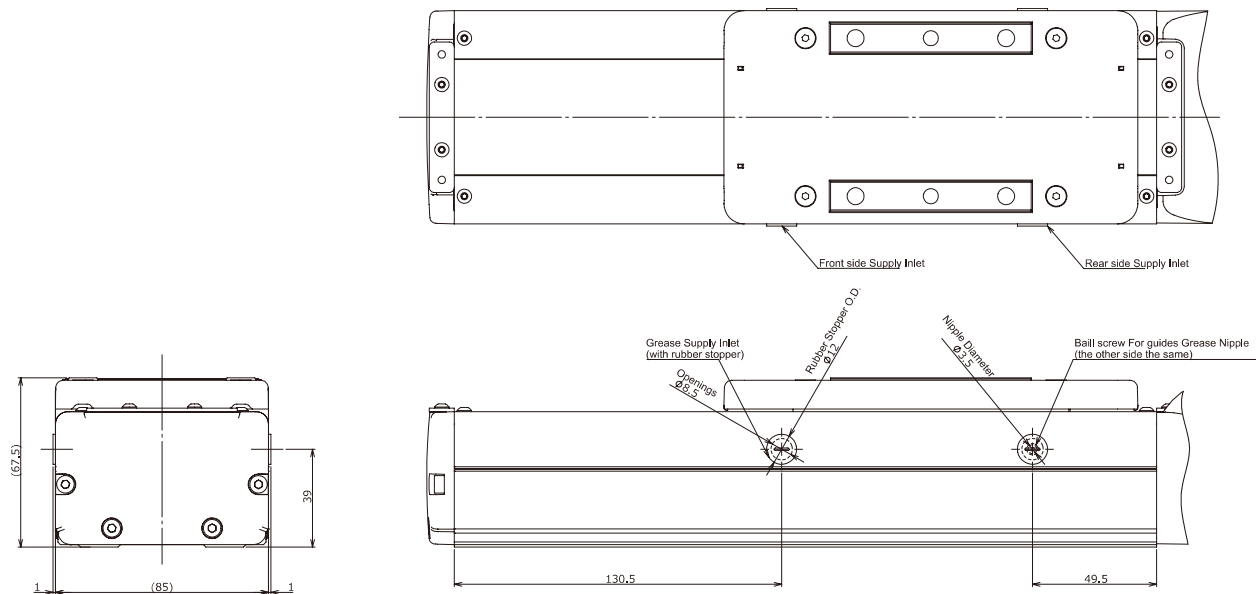
For models with the cable ejection direction option, the overall length increases by 25 mm.

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
Mass [kg]	W/o Brake	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7	10.0	10.3	10.6	10.8
	With Brake	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.1	8.4	8.7	9.0	9.3	9.6	9.9	10.2	10.5	10.8	11.1	11.3

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)



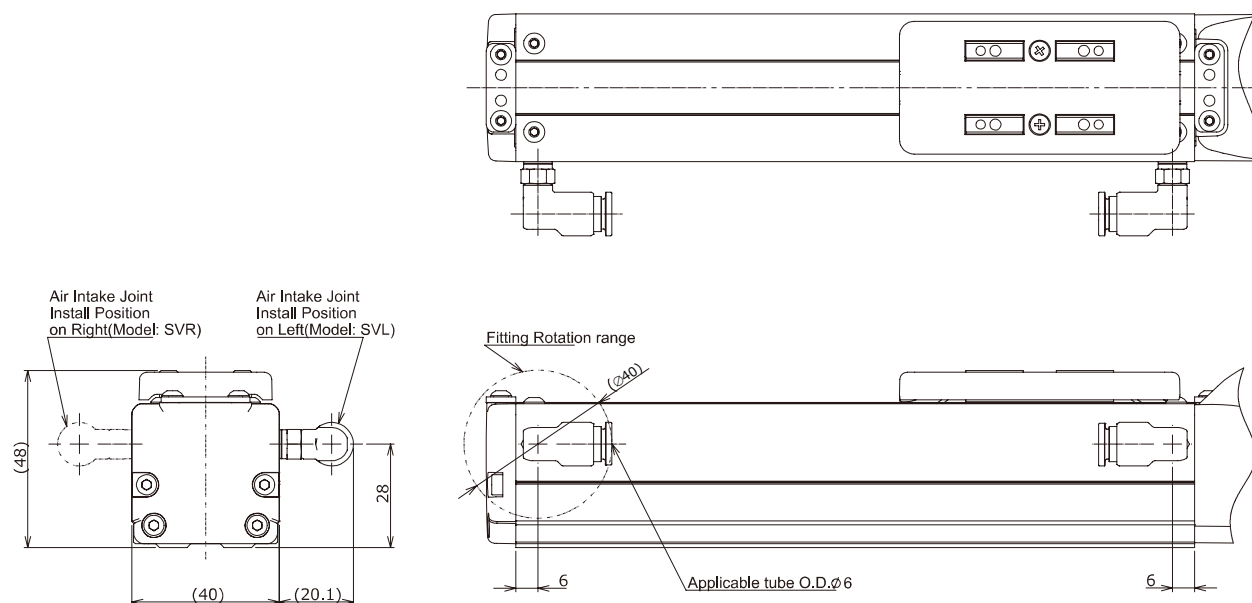
■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



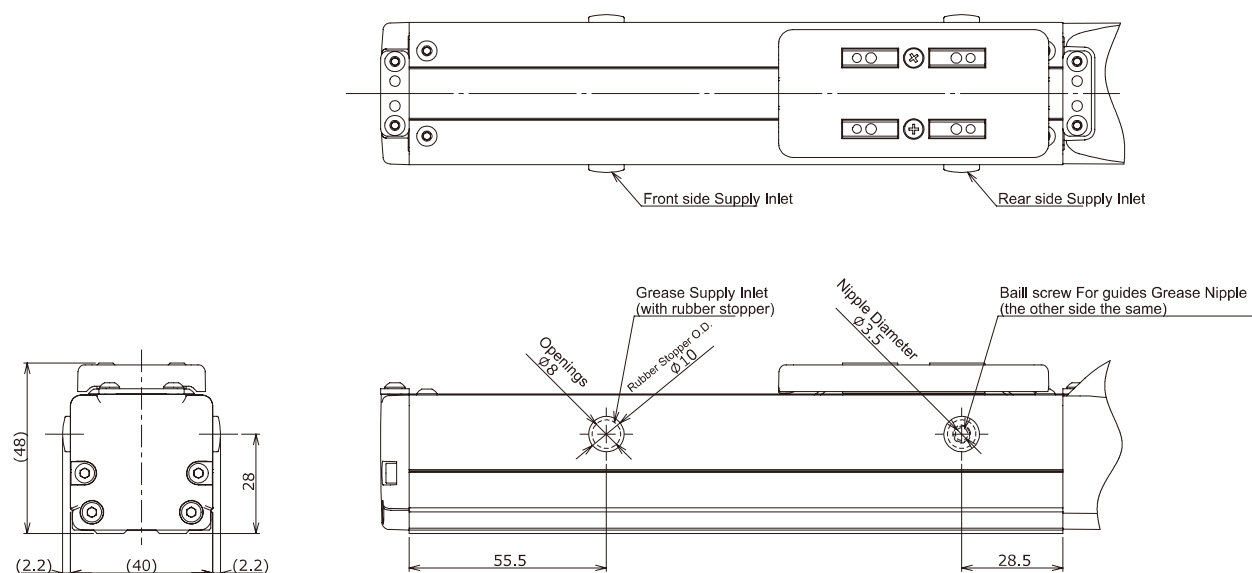


Stroke		50	100	150	200	250	300	350	400	450	500
Mass [kg]	W/o Brake	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.1	2.2	2.3
	With Brake	1.7	1.8	1.9	1.9	2.0	2.1	2.2	2.3	2.4	2.5

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)



■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



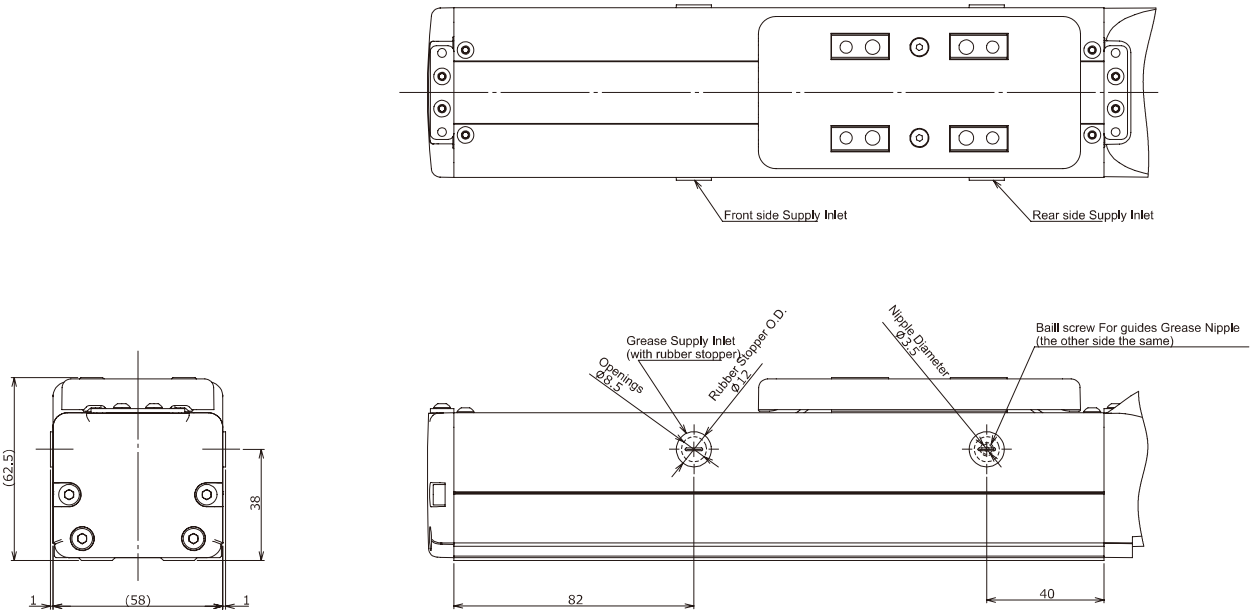
ST : Stroke
M.E. : Mechanical End
S.E. : Stroke End



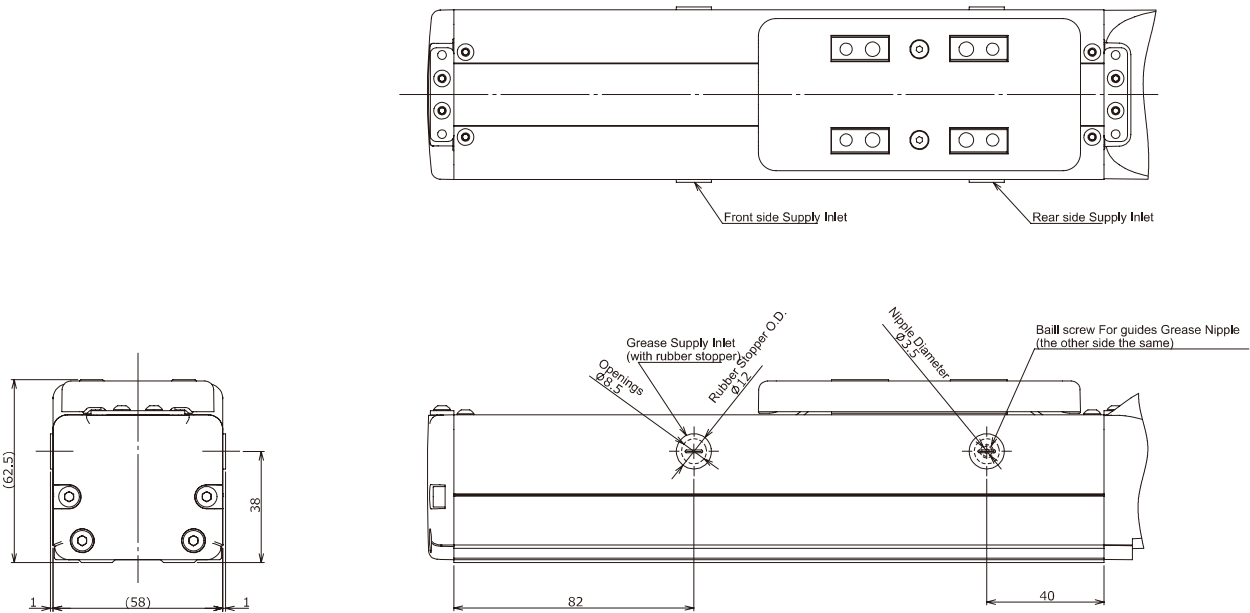
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	234.5	284.5	334.5	384.5	434.5	484.5	534.5	584.5	634.5	684.5	734.5	784.5	834.5	884.5	934.5	984.5
A	193	243	293	343	393	443	493	543	593	643	693	743	793	843	893	943
B	172	222	272	322	372	422	472	522	572	622	672	722	772	822	872	922
D	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8
E	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
G	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8
H	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
J	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
K	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass [kg]	W/o Brake	2.4	2.5	2.7	2.9	3.1	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5	4.7	4.9	5.0
	With Brake	2.7	2.8	3.0	3.2	3.4	3.5	3.7	3.9	4.1	4.3	4.4	4.6	4.8	5.0	5.2	5.3

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR)
Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)

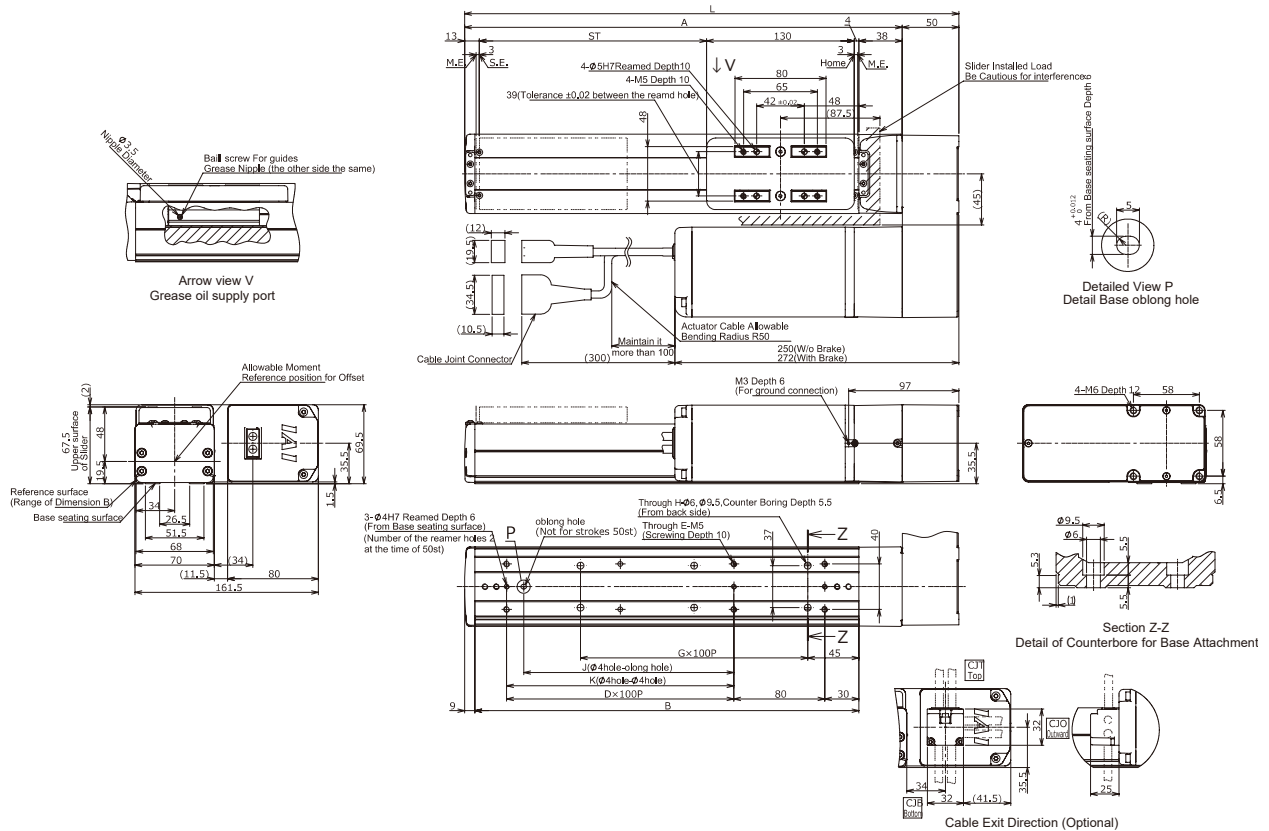


■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



5.1.7 RCS4B-SA7R

ST : Stroke
M.E. : Mechanical End
S.E. : Stroke End

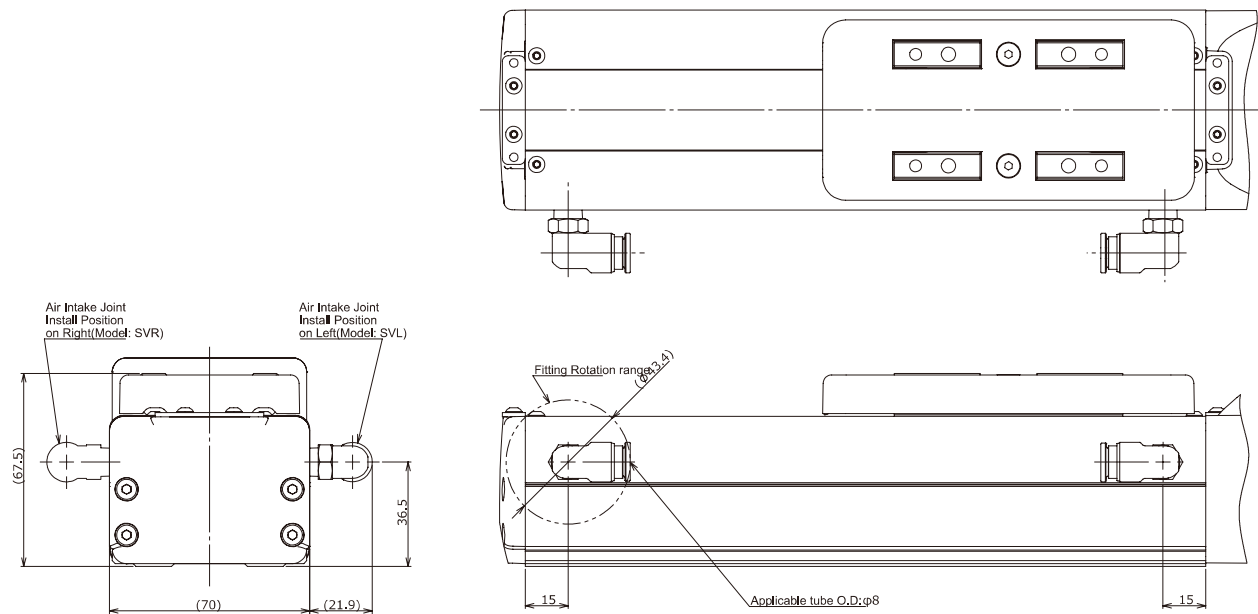


Unit: mm

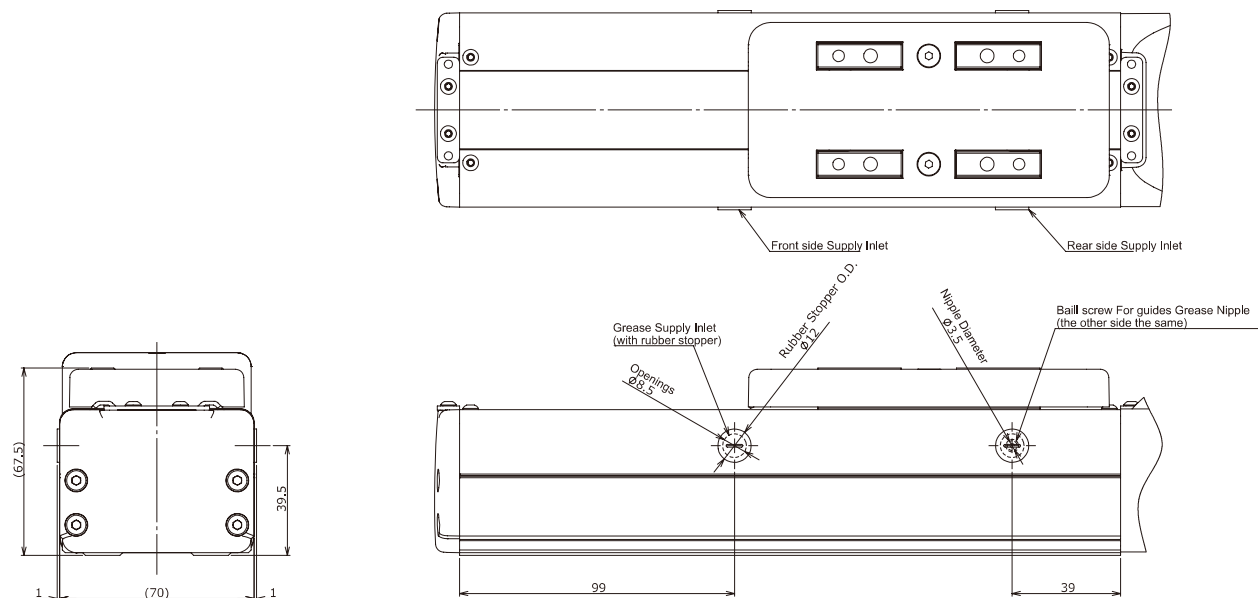
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	285	335	385	435	485	535	585	635	685	735	785	835	885	935	985	1035
A	235	285	335	385	435	485	535	585	635	685	735	785	835	885	935	985
B	188	238	288	338	388	438	488	538	588	638	688	738	788	838	888	938
D	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8
E	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20
G	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8
H	4	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18
J	0	85	85	185	185	285	285	385	385	485	485	585	585	685	685	785
K	0	0	100	200	200	300	300	400	400	500	500	600	600	700	700	800

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass [kg]	W/o Brake	4.3	4.6	4.8	5.0	5.3	5.5	5.8	6.0	6.2	6.5	6.7	6.9	7.2	7.4	7.9
	With Brake	4.8	5.1	5.3	5.5	5.8	6.0	6.3	6.5	6.7	7.0	7.2	7.4	7.7	7.9	8.4

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)

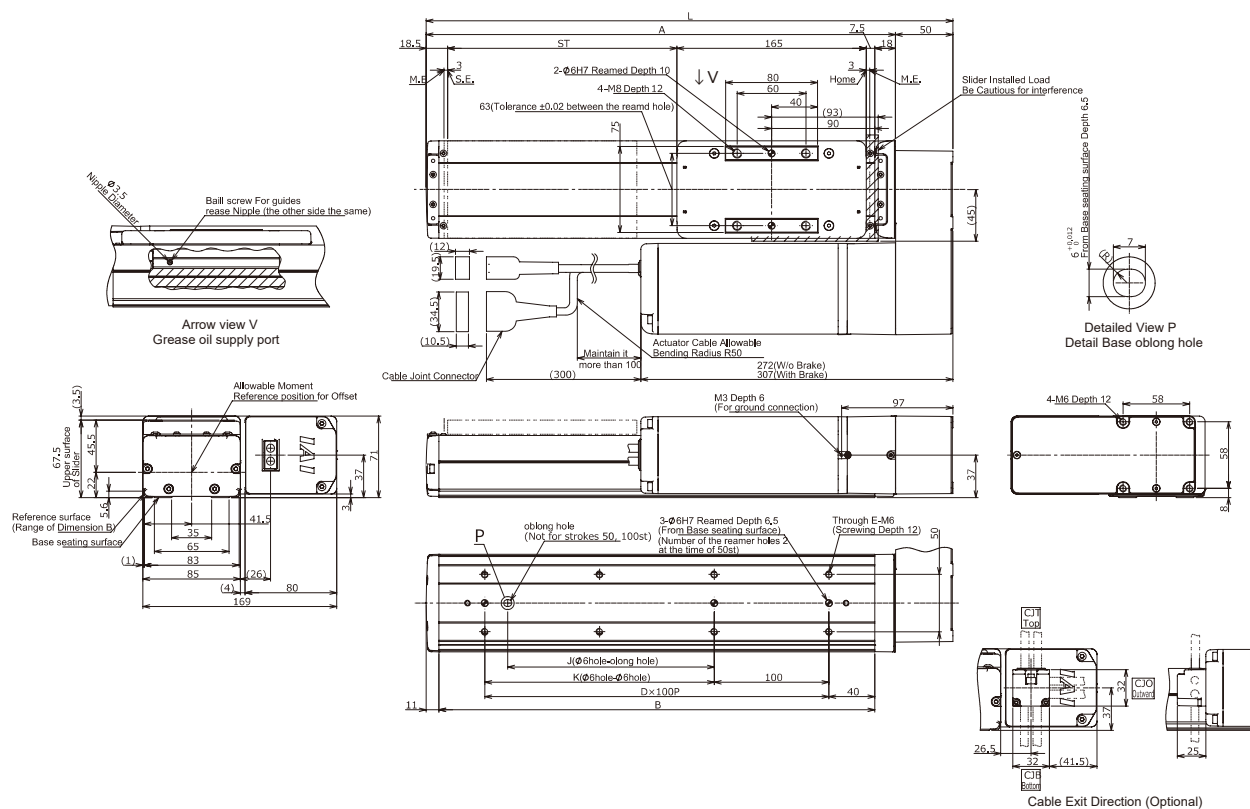


■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



5.1.8 RCS4B-SA8R

ST : Stroke
M.E. : Mechanical End
S.E. : Stroke End

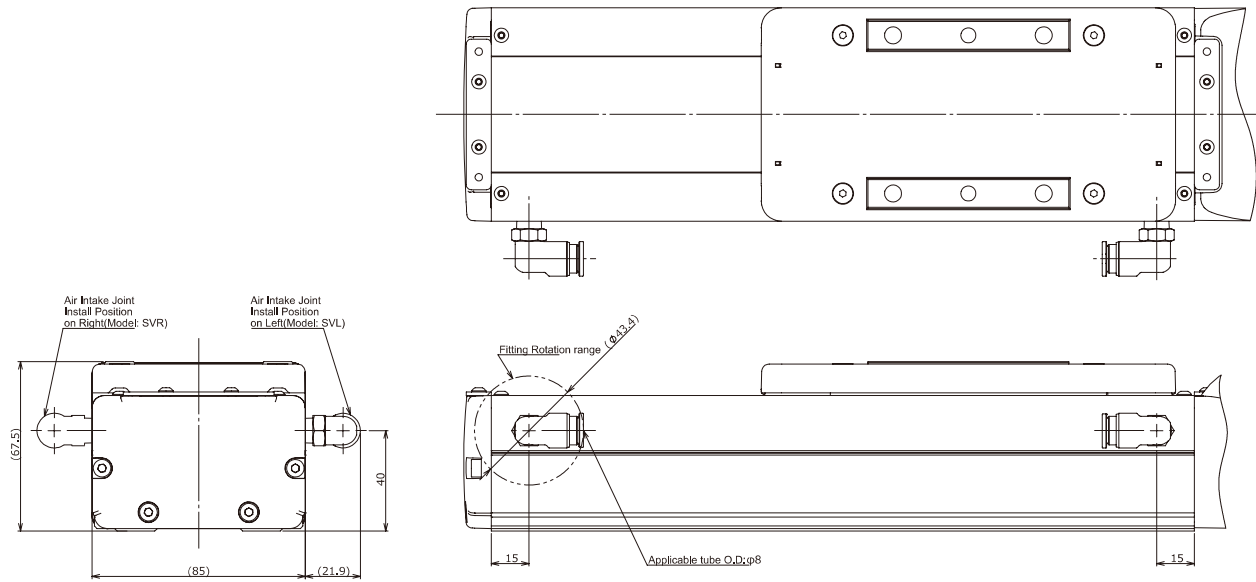


單位〔mm〕

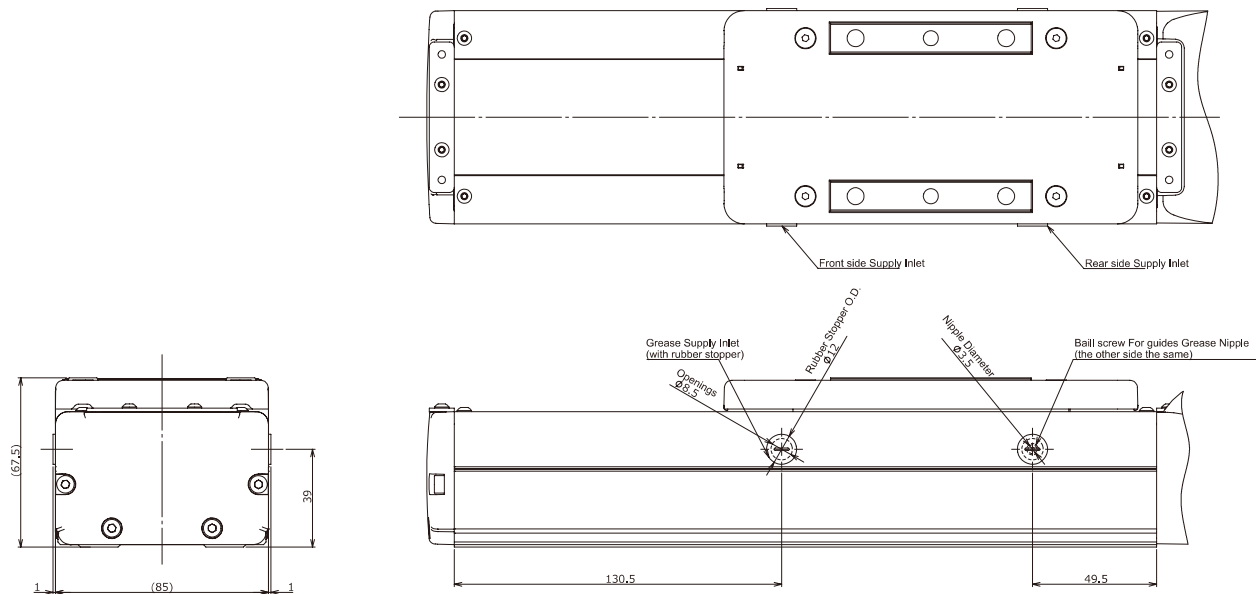
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
L	309	359	409	459	509	559	609	659	709	759	809	859	909	959	1009	1059	1109	1159	1209	1259	1309	1359
A	259	309	359	409	459	509	559	609	659	709	759	809	859	909	959	1009	1059	1109	1159	1209	1259	1309
B	230	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030	1080	1130	1180	1230	1280
D	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
E	4	6	6	8	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26
J	0	0	80	180	180	280	280	380	380	480	480	580	580	680	680	780	780	880	880	980	980	1080
K	0	100	100	200	200	300	300	400	400	500	500	600	600	700	700	800	800	900	900	1000	1000	1100

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
Mass	W/o Brake	5.6	5.9	6.2	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.6	9.9	10.2	10.5	10.8	11.1	11.4	11.7
[kg]	With Brake	6.1	6.4	6.7	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9	10.1	10.4	10.7	11.0	11.3	11.6	11.9	12.2

■Stainless Steel Suction Joint Mounted Specification (Left) (Option Model Code: SVR) Stainless Steel Suction Joint Mounted Specification (Right) (Option Model Code: SVL)



■Grease Supply Inlet Added Option Specification (Option Model Code: GU)



ROBO Cylinder

Chapter 6

Life

6.1	Concept of life for slider type	6-1
6.1.1	How to calculate operation life	6-1
6.1.2	Relation between operation life and moment	6-3

6.1 Concept of life for slider type

The mechanical life of the slider type is represented by that of the linear guide receiving the greatest moment load.

The operation life of the linear guide is to be determined by the total driving distance reachable without flaking (peeling on rail surface) in 90% of a group of products operated under the same conditions.

Operation life can be calculated with the method shown below.

6.1.1 How to calculate operation life

For the operation life of the linear guide, use the dynamic allowable moment stated in "1.2 specifications", and calculate with the formula below.

$$L = \left(\frac{C_M}{M} \right)^3 \times 5,000\text{km}$$

L : Operation life [km]

C_M : Dynamic allowable moment [N·m]

M : Moment acting [N·m]

5,000km : Standard rated life of ROBO Cylinder

In addition, calculate with the formula below if the life may be shortened due to vibration or mounting status.

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{ws}}{f_w} \cdot \frac{1}{f_\alpha} \right)^3 \times 5,000\text{km}$$

L : Operation life [km]

C_M : Dynamic allowable moment [N·m]

M : Moment acting [N·m]

5,000km: Standard rated life of ROBO Cylinder

f_{ws} : Standard load coefficient

f_w : Load coefficient

f_α : Mounting coefficient

For "Standard load coefficient f_{ws} ", "Load coefficient f_w " and "Mounting coefficient f_a ", refer to the contents below for configuration and selection.

[Standard load coefficient f_{ws}]

For ROBO Cylinders described in this manual, calculate with $f_{ws} = 1.2$.

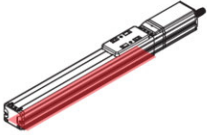
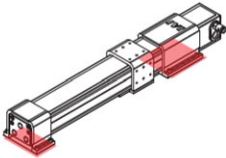
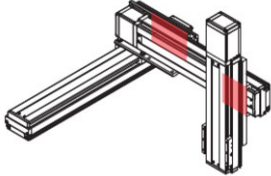
[Load coefficient f_w]

This coefficient allows consideration of the effects on life due to operating conditions.

Load coefficient f_w	Operating conditions	Guideline for acceleration/deceleration
1.0 to 1.5	Low vibration/impact, slow operation	1.0G or less

[Mounting coefficient f_a]

This coefficient allows consideration of the effects on life due to ROBO Cylinder mounting status.

Mounting coefficient f_a	1.0	1.2	1.5
Mounting status	Fixed on entire surface 	Fixed at both ends 	Fixed locally 

- The actuator used in the explanatory figures above is not the RCS4 ROBO Cylinder. Replace with ROBO Cylinder and select the mounting coefficient.
- Even when seated over the total length of the product, select 1.2 or 1.5 for the mounting coefficient depending on the position of screw fixing and not "fixing over the entire surface".
- It should be judged as "fixing over the entire surface" only when all the screw holes (counterbored holes) equipped on the seat surface are used for fixation.

6.1.2 Relation between operation life and moment

The operation life depends on the moment acting on the slider.

With a light load, it may be longer than 5,000km, the standard rated life.

With no consideration of vibration and mounting conditions, the operation life is 40,000km according to the calculation with the formula on the previous page, assuming that $0.5 C_M$ (half of dynamic allowable moment) of moment is applied.

We see that it can be 8 times longer than the standard rated life, which is 5,000km.

ROBO Cylinder

Chapter 7

Warranty

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7.5	Conformance with applicable standards/regulations, etc., and application conditions	7-2
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7.1 Warranty period

Whichever of the following periods is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to a specified location
- 2,500 operational hours

7.2 Scope of the warranty

Our products are covered by warranty when all of the following conditions are met.

Faulty products covered by warranty will be replaced or repaired free of charge:

- (1) The breakdown or malfunction in question pertains to our product as delivered by IAI or our authorized dealer.
- (2) The breakdown or malfunction in question occurred during the warranty period.
- (3) The breakdown or malfunction in question occurred while the product was in use for an appropriate purpose under the operating conditions and operating environment specified in the instruction manual and catalog.
- (4) The breakdown or malfunction in question was caused by a specification defect, malfunction, or poor product quality.

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

- Anything other than our product
- Modification or repair performed by a party other than IAI (unless approved by IAI)
- Anything that could not be easily predicted with the level of science and technology available at the time of shipment from IAI
- Natural disaster, unnatural disaster, incident or accident for which we are not liable
- Natural fading of paint or other symptoms of aging
- Wear, depletion or other expected results of use
- Operation noise, vibration or other subjective sensations not affecting function or maintenance

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

7.3 Honoring the warranty

As a rule, the product must be consigned to IAI for repair under warranty.

7.4 Limited liability

- (1) We 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 assume no liability for any program or control method created by the customer to operate our product or for the results of any such program or control method.

7.5 Conformance with applicable standards/regulations,etc., and application conditions

- (1) If our product is combined with another product or any system, equipment, 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 assume no liability 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 IAI if you must use our product for any of these applications:

- Medical equipment used to maintain, control or otherwise affect human life or physical health
 - Mechanisms and machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)
 - Machinery components essential for safety (safety devices etc.)
 - Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact IAI in advance if our product is to be used in any condition or environment that differs from that specified in the catalog or instruction manual.

7.6 Other Items excluded from warranty

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

- Guidance for mounting/adjustment and witnessing of test operation
- Maintenance and inspection
- Technical guidance and education on operating/wiring methods, etc.
- Technical guidance and education on programming and other items related to programs

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