ROBO CYLINDER

ROBO Cylinder
RCP4W
Slider Type
Instruction Manual

Fourth Edition

Dustproof/Splash proof type (IP65), RCP4W-SA5C, SA6C, SA7C

IAI America, Inc.

Please Read Before Use

Thank you for purchasing our product.

This Instruction Manual describes all necessary information to operate this product safely such as the operation procedure, structure and maintenance procedure.

Before operation, read this manual carefully and fully understand it to operate this product safely.
The DVD that comes with the product contains instruction manuals for IAI products.
For a use of the products, print out or display on your personal computer the necessary pages of the applicable Instruction Manuals.

After reading the Instruction Manuals, be sure to keep them in a convenient place easily accessible to the personnel using this product.

[Important]

- This Instruction Manual is original.
- This product is not to be used for any other purpose from what is noted in this Instruction Manual. IAI shall not be liable whatsoever for any loss or damage arising from the result of using the product for any other purpose from what is noted in the manual.
- The information contained in this Instruction Manual is subject to change without notice for the purpose of production improvement.
- If you have any question or finding regarding the information contained in this Instruction Manual, contact our customer center or our sales office near you.
-
-

Table of Contents

Safety Guide

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

Safety Precautions for Our Products

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

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

No.	Operation Description	Description
2	Transportation	● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. ● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the 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 on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm^2 (AWG20 or equivalent) or more for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). ● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).

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

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

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

Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the 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

Caution in Handling

1. This actuator is not conducted hygienic treatment to apply to food.
   Have an appropriate protection when using the product in an environment related to food that requires the hygienic management so the actuator would not directly touch the food.
   In case the actuator has touched the food, do not treat it as selling goods.

2. Do not attempt to establish the settings for the speed and acceleration/deceleration above the allowable range.
   An operation with speed and acceleration/deceleration beyond the allowable range may cause an abnormal noise, vibration, malfunction or shortened life.

3. Set the allowable load moment within the allowable range.
   An operation with the load beyond the allowable load moment may cause an abnormal noise, vibration, malfunction or shortened life. If it is extreme, flaking may occur on the guide.

4. Set the overhang length within the allowable range.
   Attaching a load with an overhang length above the allowable range may cause vibration and abnormal noise.

5. If back and forth operations are performed repeatedly in short distance, it may wear out the film of grease.
   Continuous back and forth operation within a distance less than 30mm may cause wear of grease. As a reference, have approximately 5 cycles of back and forth operation in a distance more than 50mm in every 5,000 to 10,000 cycles to regenerate the oil film. Keep using the actuator with the grease worn out may cause malfunction. If it is extreme, flaking may occur on the guide.

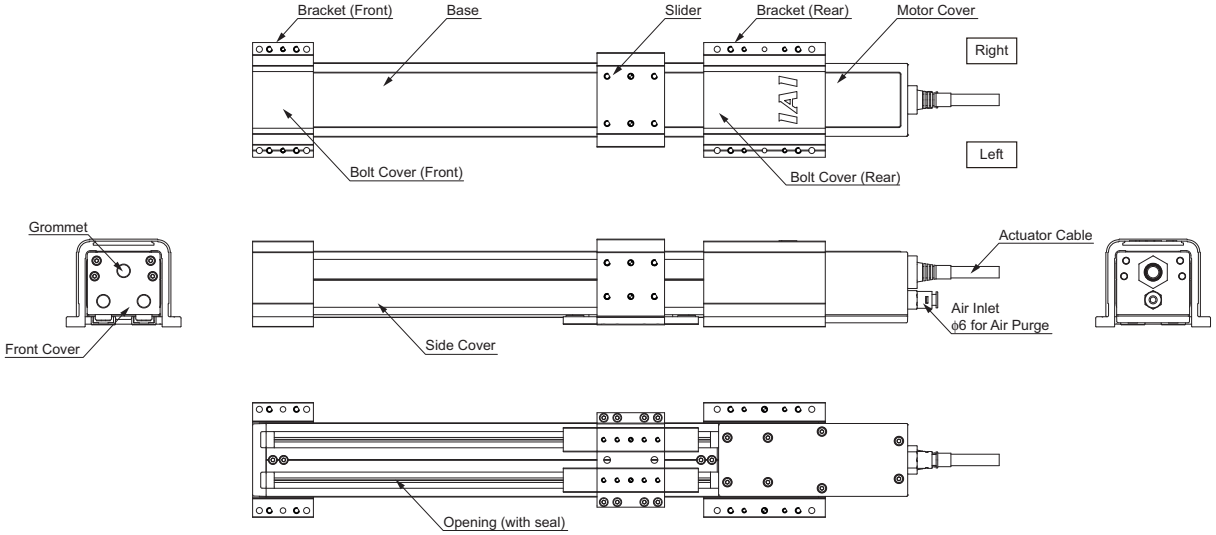
6. Make sure to attach the actuator properly by following this instruction manual.
   Using the product with the actuator not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.

7. Ensure use of the product in the specified conditions, environments and ranges.
   An operation out of the guarantee may cause a drop in performance or malfunction of the product.

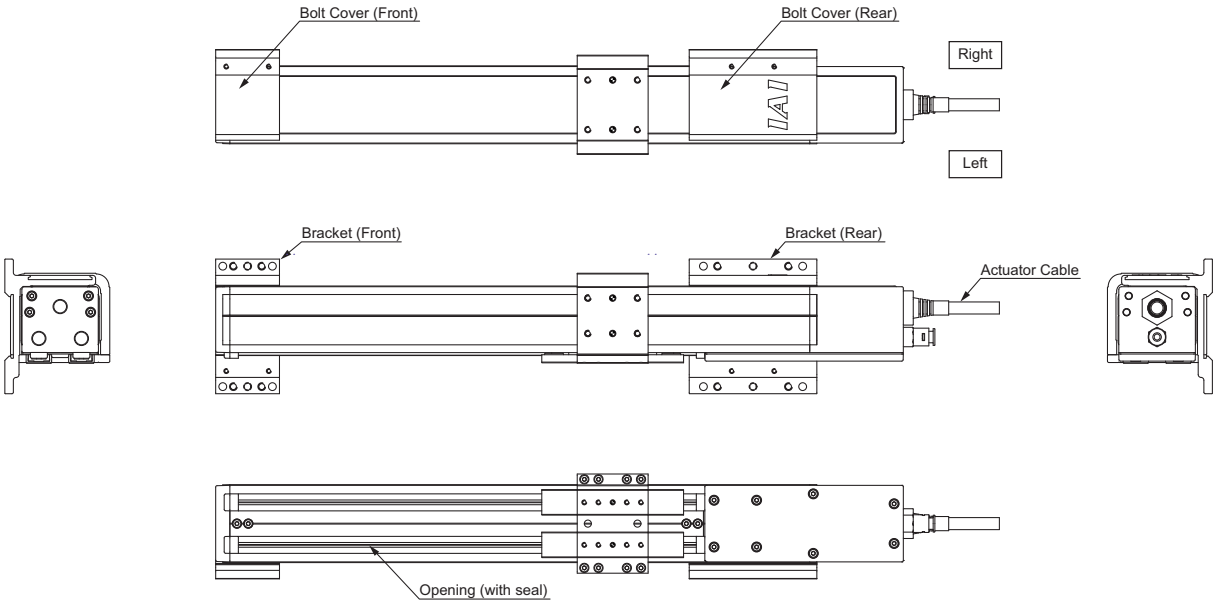
Names of the Parts

In this manual, actuators are shown in the way that it is placed horizontally, the opening comes to the bottom and left and right determined by the view from motor side.

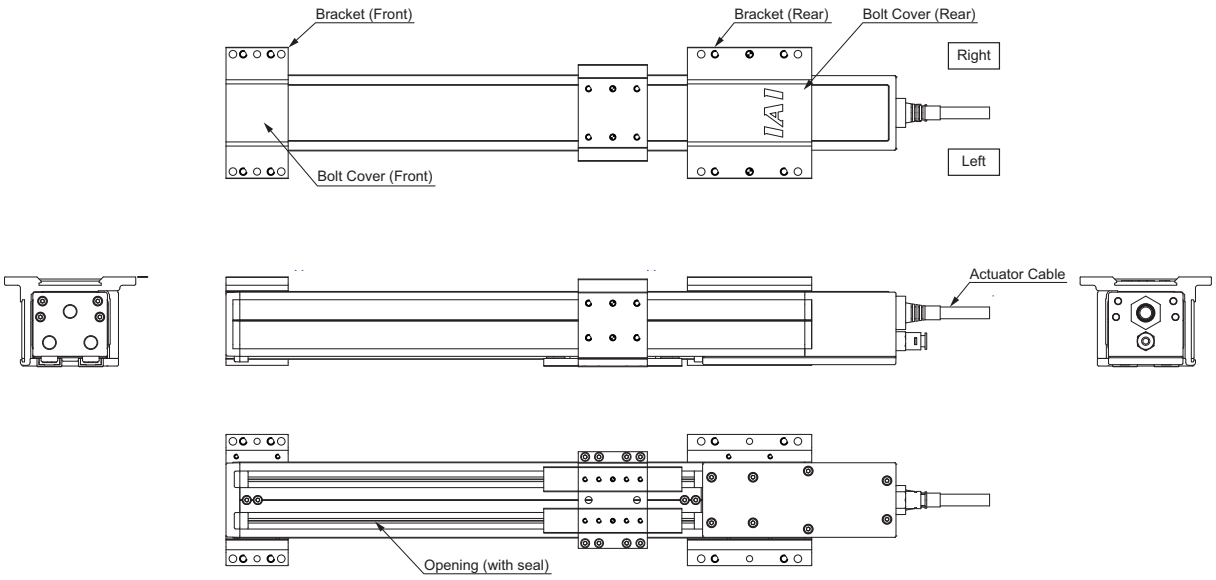
[Standard Type]
Use the bracket to install the unit horizontally with the openings facing the bottom.



[Wall-hang Type]
Install the actuator horizontally on the wall with the opening on the bottom and with using the bracket.



[Ceiling Type]
Install the actuator handing on the ceiling with the opening on the bottom and with using the bracket.



1. Specifications Check

1.1 Product Check

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

1.1.1 Parts

No.	Part Name	Model	Quantity	Remarks
1	Main Body	Refer to “How to read the model plate” and “How to read the model No.”.	1	
Accessories				
2	Motor • Encoder Cable (Note 1)		1	
3	First Step Guide		1	
4	Instruction Manual (DVD)		1	
5	Safety Guide		1	

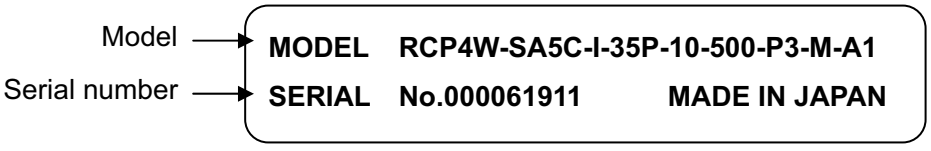
Note 1 The motor • encoder cables differ between the standard model and robot cable.
[Refer to 1.4 Motor • Encoder Cables.]

1.1.2 Instruction Manuals related to this product, which are contained in the DVD.

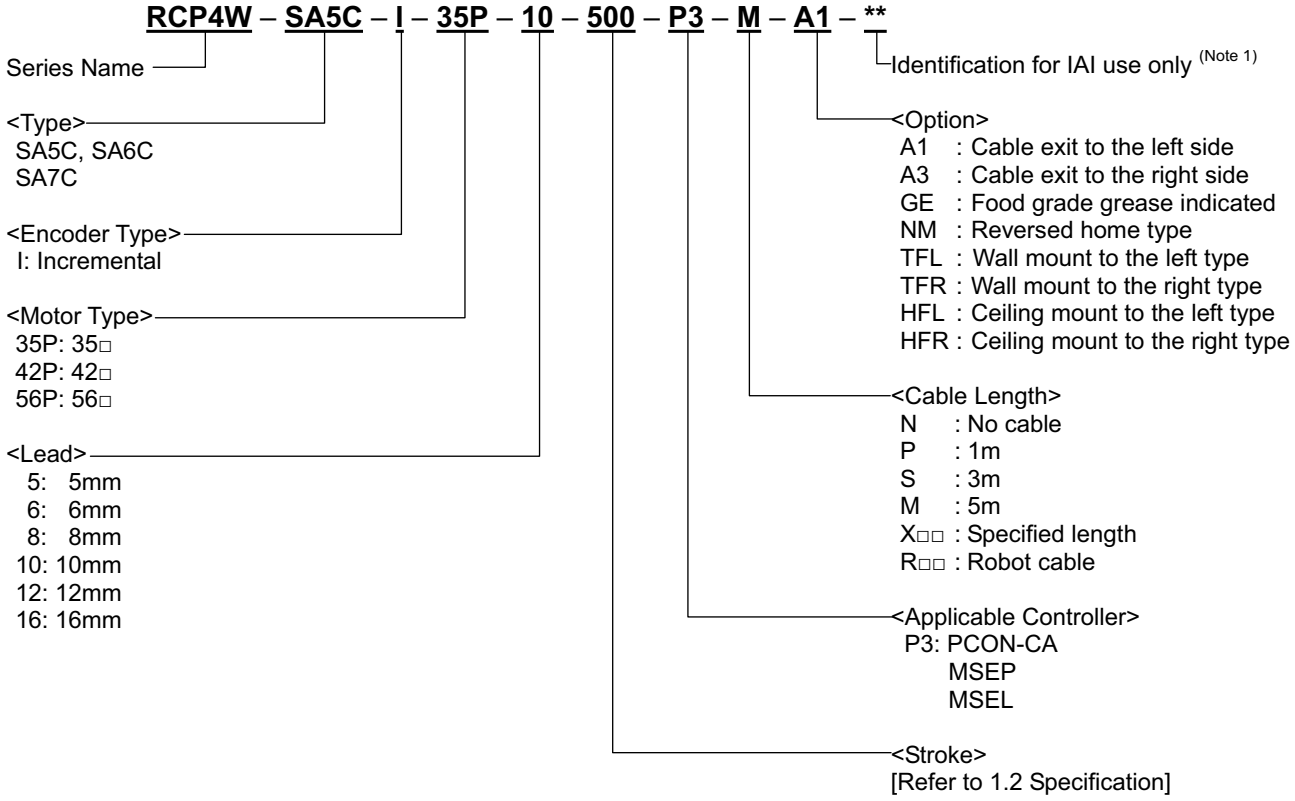
Shown below is a list of the instruction manuals for the controllers related to this product which is recorded in Instruction Manual (DVD).

No.	Name	Manual No.
1	PCON-CA Controller Instruction Manual	ME0289
2	RC PC Software RCM-101-MW/RCM-101-USB Instruction Manual	ME0155
3	Touch Panel Teaching CON-PTA/PDA/PGA Instruction Manual	ME0295

1.1.3 How to read the model plate



1.1.4 How to read the model No.



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

1.2 Specification

[1] Speed

Restriction on Speed (Unit: mm/s)

Size	Motor Type	Lead [mm]	Horizontal/ Vertical	Minimum speed	Stroke [mm]												
					100	150	200	250	300	350	400	450	500	550	600	650	700
SA5C	35P	5	Horizontal	6.25	165									–	–	–	–
		10	Horizontal	12.5	330									–	–	–	–
SA6C	42P	6	Horizontal	7.5	200											–	–
		12	Horizontal	15	400											–	–
SA7C	56P	8	Horizontal	10	265												
		16	Horizontal	20	530												

[2] Maximum Acceleration and Transportable Weight
When the transported weight is low, the acceleration/deceleration speed can be increased.
Installation with holding only one side on the bracket (rear) on the motor end of the actuator is restricted to the models of 150 or less for the stroke type.

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Two-sided Fix *1/ One-sided Fix *2	Transportable Weight for Each Acceleration [kg]				
					Speed [mm/s]	0.3G	0.4G	0.5G	0.6G
SA5C	35P	5	Horizontal	Two-sided Fix	165	10	8	6	4
				One-sided Fix		2	1.5	1.2	1
		10	Horizontal	Two-sided Fix	330	5	4	3	2
				One-sided Fix		1.5	1	0.7	0.5
SA6C	42P	6	Horizontal	Two-sided Fix	200	15	12	9	6
				One-sided Fix		4.5	3.5	3	2.5
		12	Horizontal	Two-sided Fix	400	7.5	5.5	4	3
				One-sided Fix		3	2.5	2	1.5
SA7C	56P	8	Horizontal	Two-sided Fix	265	20	16	12	8
				One-sided Fix		7	6	5	4
		16	Horizontal	Two-sided Fix	530	10	8	6	4
				One-sided Fix		4.5	4	3.5	3

*1 Two-sided Fix : Unit is held on the bracket (front) and bracket (rear).
*2 One-sided Fix : Hold on bracket (rear) (only for the types with stroke 150mm or less), holding only on the bracket (front) is prohibited.

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

[3] Driving System • Position Detector

Type	Motor Type	Lead [mm]	No. of Encoder Pulses	Ball Screw Type		
				Type	Diameter	Accuracy
SA5C	35P	5	800	Rolled	ϕ8mm	C10
		10				
SA6C	42P	6		Rolled	ϕ10mm	C10
		12				
SA7C	56P	8		Rolled	ϕ12mm	C10
		16				

[4] Positioning Accuracy

Type	Lead [mm]	Item	Performance
SA5C	5, 10	Positioning Repeatability	±0.02mm
		Lost Motion	0.1mm or less
SA6C	6, 12	Positioning Repeatability	±0.02mm
		Lost Motion	0.1mm or less
SA7C	8, 16	Positioning Repeatability	±0.02mm
		Lost Motion	0.1mm or less

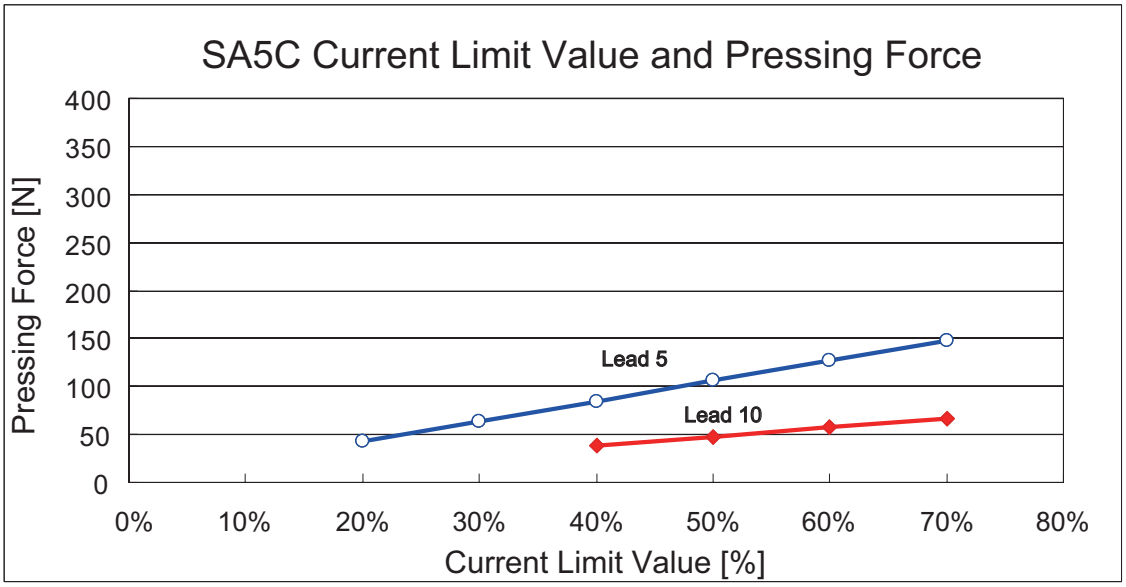
It is the accuracy when product is shipped out from the factory. It does not include the consideration of time-dependent change.

[5] Relation between Current Limit and Pressing Force

- SA5C

Pressing Force [N]

Ball Screw Lead [mm]	Current Limit Value [%]					
	20	30	40	50	60	70
5	42.3	63.4	84.5	105.6	126.8	147.9
10			38.2	47.8	57.3	66.9



⚠ Caution: (1) The relation of the current limit and the pressing force is a reference assuming when the speed is 20mm/s.

(2) There will be a little variance in the actual pressing force. If the value of current limit is small, the variance for the pressing force becomes big.

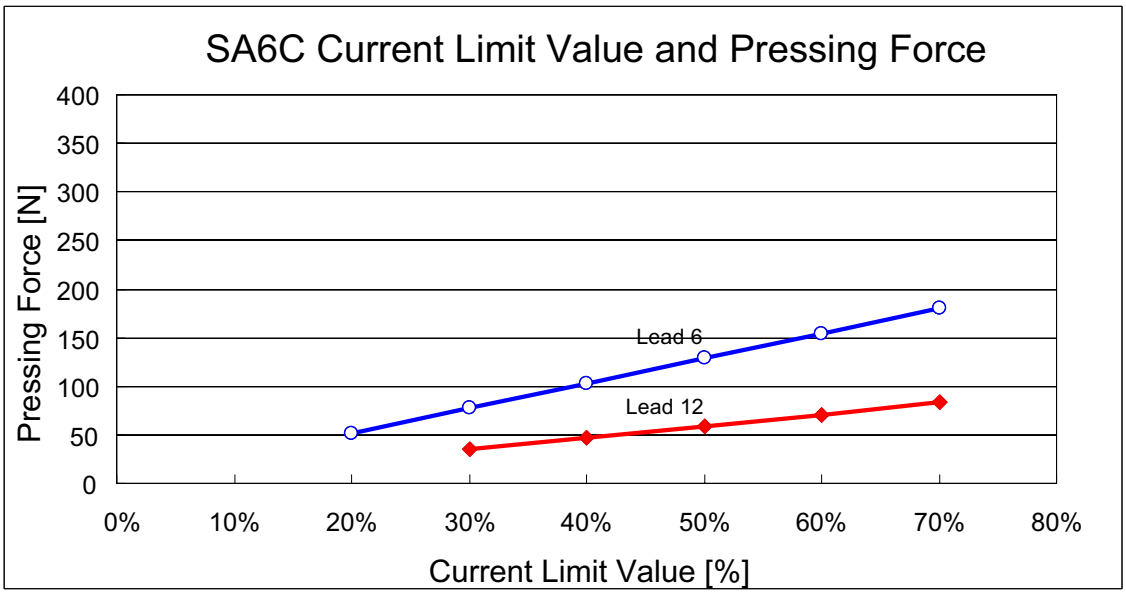
(3) Use the product with the current limit within the range specified in the graph. If used below 20%, the pressing force would not be stable. An operation may not be made in some cases. An operation cannot be made also when it is beyond 70%. If use in such a condition, it may extremely shorten the product life by the degradation of insulator in the motor coil due to heat generation.

(4) When the approaching speed (setting in the position table) to the pressing start position is 20mm/s or less, the pressing operation will be made with the approaching speed. In this case, also, the pressing force would not be stable. In such cased, check in advance that the actuator can be used with no problem before start using.

- SA6C

Pressing Force [N]

Ball Screw Lead [mm]	Current Limit Value [%]					
	20	30	40	50	60	70
6	51.3	76.9	102.6	128.2	153.9	179.5
12		35.5	47.3	59.1	71.0	82.8



⚠ Caution: (1) The relation of the current limit and the pressing force is a reference assuming when the speed is 20mm/s.

(2) There will be a little variance in the actual pressing force. If the value of current limit is small, the variance for the pressing force becomes big.

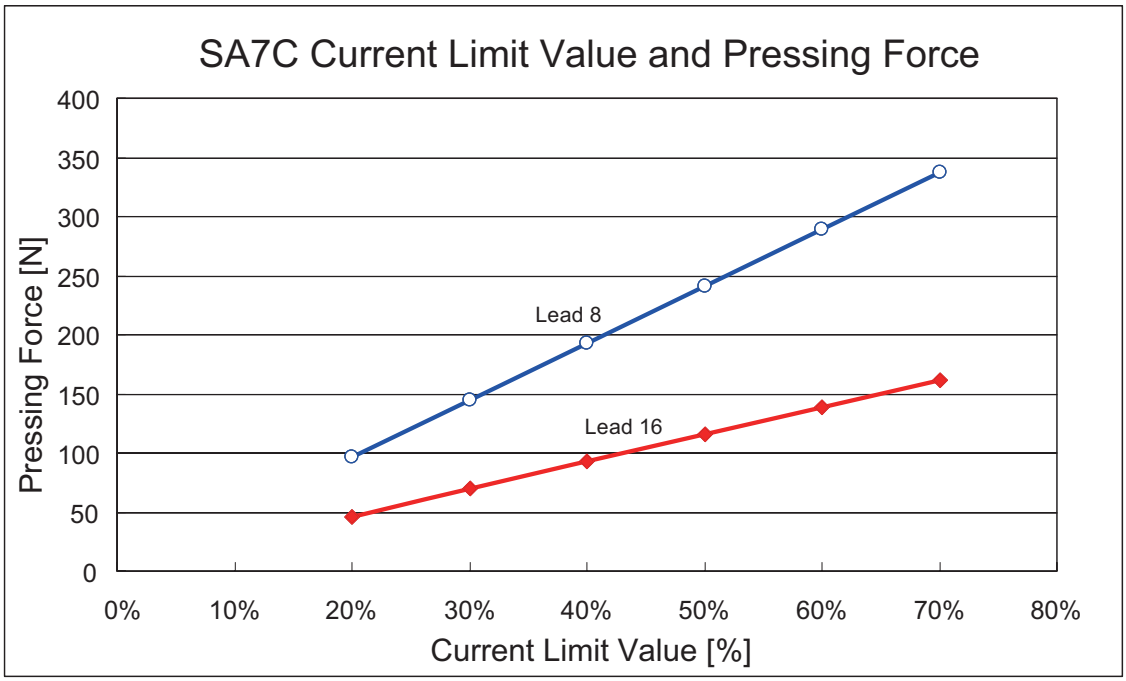
(3) Use the product with the current limit within the range specified in the graph. If used below 20%, the pressing force would not be stable. An operation may not be made in some cases. An operation cannot be made also when it is beyond 70%. If use in such a condition, it may extremely shorten the product life by the degradation of insulator in the motor coil due to heat generation.

(4) When the approaching speed (setting in the position table) to the pressing start position is 20mm/s or less, the pressing operation will be made with the approaching speed. In this case, also, the pressing force would not be stable. In such cased, check in advance that the actuator can be used with no problem before start using.

- SA7C

Pressing Force [N]

Ball Screw Lead [mm]	Current Limit Value [%]					
	20	30	40	50	60	70
8	96.5	144.8	193.1	241.4	289.6	337.9
16	46.3	69.4	92.5	115.6	138.8	161.9



⚠ Caution: (1) The relation of the current limit and the pressing force is a reference assuming when the speed is 20mm/s.

(2) There will be a little variance in the actual pressing force. If the value of current limit is small, the variance for the pressing force becomes big.

(3) Use the product with the current limit within the range specified in the graph. If used below 20%, the pressing force would not be stable. An operation may not be made in some cases. An operation cannot be made also when it is beyond 70%. If use in such a condition, it may extremely shorten the product life by the degradation of insulator in the motor coil due to heat generation.

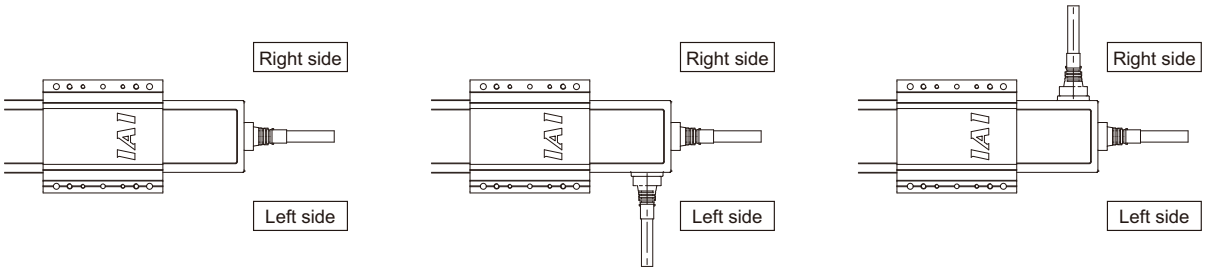
(4) When the approaching speed (setting in the position table) to the pressing start position is 20mm/s or less, the pressing operation will be made with the approaching speed. In this case, also, the pressing force would not be stable. In such cased, check in advance that the actuator can be used with no problem before start using.

[6] Duty Ratio in Continuous Operation
Continuous operation is available with the duty ratio 100%.
Duty ratio is the rate of operation expressed in % that presents the time of the actuator being operated in 1 cycle of operation.

[7] Protection Class
If air purge is conducted = IP65
[Refer to 2.4 Air Purge for the details.]

1.3 Option

1.3.1 Cable Exit Direction (Model: A1, A2)



Standard type | Cable Exit to the Left Side (AI) | Cable Exit to the Right Side (AI)

1.3.2 Food Grade Grease Indicated (Model: GE)

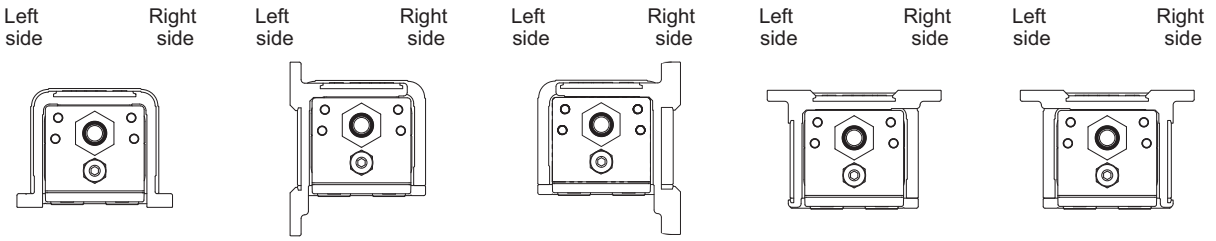
Food grade grease (Medallion FM Grease No. 1) is to be applied.

1.3.3 Reversed-home Type (Model: NM)

For the standard type, the home position is set on the motor end. The home position for Home Reversed Type is on the opposite side (front cover side) of the motor. This is the type that the operation direction can be matched to the coordinates of the equipment that the actuator is to be installed.
[Refer to 5. External Dimensions for the home position of Standard Type and Home Reversed Type.]

> ⚠ Caution: The home position is already set in the factory before delivered out. If changed to the reversed type is required after the unit is delivered, it is necessary to return the unit to our factory for the setting change. Contact our sales office or agent near you.

1.3.4 Types of Installation (Model: TFL, TFR, HFL, HFR)



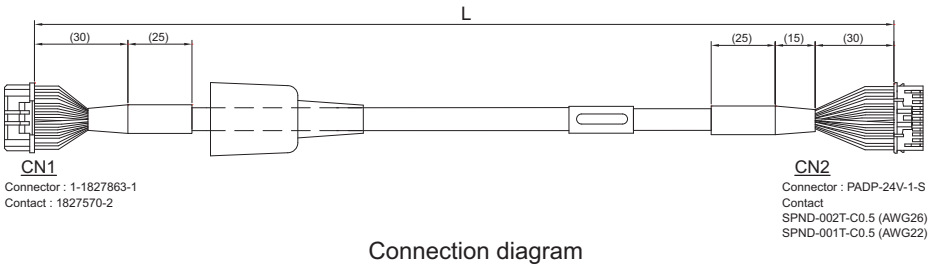
Standard type | Wall mount to the left type (TFL) | Wall mount to the right type (TFR) | Ceiling mount to the left type (HFL) | Ceiling mount to the right type (HFR)

View from Side of Motor

1.4 Motor • Encoder Cables

1.4.1 Motor • Encoder Integrated Cables

CB-CA-MPA□□□



Connection diagram

CN1
1-1827863-1(AMP)

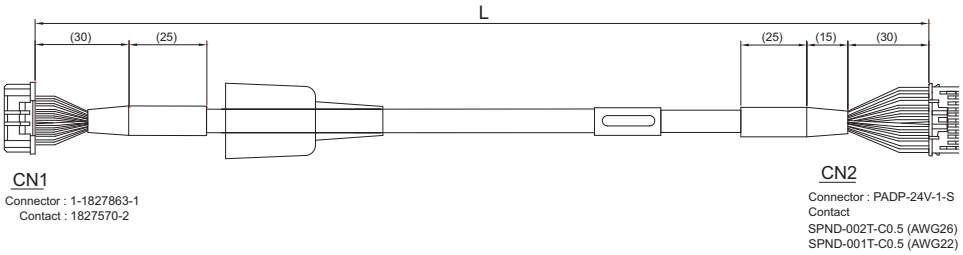
Pin No.	Symbol	Color
A1	ϕA/U	BL(AWG22/19)
B1	VMM/V	OR(AWG22/19)
A2	ϕ_A/W	GN(AWG22/19)
B2	ϕB/-	BR(AWG22/19)
A3	VMM/-	GY(AWG22/19)
B3	ϕ_B/-	RD(AWG22/19)
A4	LS+/BK+	BK(AWG26)
B4	LS-/BK-	YW(AWG26)
A6	-/A+	BL(AWG26)
B6	-/A-	OR(AWG26)
A7	A+/B+	GN(AWG26)
B7	A-/B-	BR(AWG26)
A8	B+/Z+	GY(AWG26)
B8	B-/Z-	RD(AWG26)
A5	BK+/LS+	BL(AWG26)
B5	BK-/LS-	OR(AWG26)
A9	LS_GND	GN(AWG26)
B9	VPS	BR(AWG26)
A10	VCC	GY(AWG26)
B10	GND	RD(AWG26)
A11	—	—
B11	FG	BK

CN2
PADP-24V-1-S(JST)

Pin No.	Symbol	Color
1	ϕA/U	BL(AWG22/19)
2	VMM/V	OR(AWG22/19)
5	ϕ_A/W	GN(AWG22/19)
3	ϕB/-	BR(AWG22/19)
4	VMM/-	GY(AWG22/19)
6	ϕ_B/-	RD(AWG22/19)
7	LS+/BK+	BK(AWG26)
8	LS-/BK-	YW(AWG26)
11	-/A+	BL(AWG26)
12	-/A-	OR(AWG26)
13	A+/B+	GN(AWG26)
14	A-/B-	BR(AWG26)
15	B+/Z+	GY(AWG26)
16	B-/Z-	RD(AWG26)
9	BK+/LS+	BL(AWG26)
10	BK-/LS-	OR(AWG26)
20	LS_GND	GN(AWG26)
18	VPS	BR(AWG26)
17	VCC	GY(AWG26)
19	GND	RD(AWG26)
21	—	—
22	—	—
23	—	—
24	FG	BK

1.4.2 Motor • Encoder Integrated Cables Robot Cable

CB-CA-MPA□□□-RB



Connection diagram

CN1
1-1827863-1(AMP)

Pin No.	Symbol	Color
A1	ϕA/U	BK(AWG22/19)
B1	VMM/V	WT(AWG22/19)
A2	ϕ_A/W	BR(AWG22/19)
B2	ϕB/-	GN(AWG22/19)
A3	VMM/-	YW(AWG22/19)
B3	ϕ_B/-	RD(AWG22/19)
A4	LS+/BK+	OR(AWG25)
B4	LS-/BK-	GY(AWG25)
A6	-/A+	WT(AWG25)
B6	-/A-	YW(AWG25)
A7	A+/B+	RD(AWG25)
B7	A-/B-	GN(AWG25)
A8	B+/Z+	BK(AWG25)
B8	B-/Z-	BR(AWG25)
A5	BK+/LS+	BK(AWG25)
B5	BK-/LS-	BRAWG25)
A9	LS_GND	GN(AWG25)
B9	VPS	RD(AWG25)
A10	VCC	WT(AWG25)
B10	GND	YW(AWG25)
A11	—	—
B11	FG	

CN2
PADP-24V-1-S (JST)

Pin No.	Symbol	Color
1	ϕA/U	BK(AWG22/19)
2	VMM/V	WT(AWG22/19)
5	ϕ_A/W	BR(AWG22/19)
3	ϕB/-	GN(AWG22/19)
4	VMM/-	YW(AWG22/19)
6	ϕ_B/-	RD(AWG22/19)
7	LS+/BK+	OR(AWG25)
8	LS-/BK-	GY(AWG25)
11	-/A+	WT(AWG25)
12	-/A-	YW(AWG25)
13	A+/B+	RD(AWG25)
14	A-/B-	GN(AWG25)
15	B+/Z+	BK(AWG25)
16	B-/Z-	BR(AWG25)
9	BK+/LS+	BK(AWG25)
10	BK-/LS-	BR(AWG25)
20	LS_GND	GN(AWG25)
18	VPS	RD(AWG25)
17	VCC	WT(AWG25)
19	GND	YW(AWG25)
21	—	—
22	—	—
23	—	—
24	FG	Shield

2. Installation

2.1 Transportation

[1] Handling of the Robot

Unless otherwise specified, the actuators are wrapped individually when the product is shipped out.

(1) Handling of the Packed Product

- Do not damage or drop. The package is not applied with any special treatment that enables it to resist an impact caused by a drop or crash.
- An operator should never attempt to carry a heavy package on their own. Also, use an appropriate way for transportation.
- If the shipping box is to be left standing, it should be in a horizontal position. Follow the instruction if there is any for the packaging condition.
- Do not step or sit on the package.
- Do not put any load that may cause a deformation or breakage of the package.

(2) Handling after Unpackaged

- Do not carry the actuator by holding the cable, or do not move it by pulling the cable.
- When transporting the actuator main unit, hold the base or bracket part.
- Do not hit or drop the product while carrying.
- Do not give any excessive force to any of the sections in the actuator.

[2] Handling of the Multi-Axes Type

This is the case that this product is delivered with other actuators being combined. Multi-axes type will be delivered in a package with an outer case fixed to a wooden base. Sliders are fixed so they would not accidently move while in transportation. The end of the actuator is also fixed to avoid it swinging by external vibration.

(1) Handling of the Packed Product

- Do not damage or drop. The package is not applied with any special treatment that enables it to resist an impact caused by a drop or crash.
- An operator should never attempt to carry a heavy package on their own. Also, use an appropriate way for transportation.
- When suspending the package using ropes, pass the ropes from underneath the reinforcement frames at the bottom of the base. When lifting with a forklift, also place the forks underneath the base.
- Do not apply an impact on the package or let it bounce when putting it down.
- Do not step or sit on the package.
- Do not put any load that may cause a deformation or breakage of the package.

(2) Handling after Unpackaged

- Secure the sliders to prevent sudden movement during transport.
- Appropriately fix the tip of the actuators if it is overhanging so it would not widely shake with external vibration. If the actuator assembly is transported without the ends being secured, do not apply an impact of 0.3G or more.
- In the case that the actuator needs to be carried up with ropes or another method, be sure to use an appropriate cushioning to avoid the robot being deformed or put on an excessive pressure. And also, be sure to keep the robot in a stable and horizontal posture. Make a tool to utilize the attachment holes and tapped holes on the actuator and attach it if necessary.
- Do not attempt to apply load to the actuator or connector box. Also, avoid the cables being pinched or caused an excessive deformation.

[3] Handling of the Robot Mounted on Mechanical Equipment (System)

The following are the cautions for when transporting the actuators installed in the machinery equipment (system) in the whole system.

- Affix the slider so they would not move while transporting.
- Appropriately fix the tip of the actuators if it is overhanging so it would not widely shake with external vibration. If the actuator assembly is transported without the ends being secured, do not apply an impact of 0.3G or more.
- Do not attempt to apply load to actuators or connector box when hanging the machinery equipment (system) with tools such as a rope. Also, avoid the cables being pinched or caused an excessive deformation.

2.2 Installation and Storage • Preservation Environment

[1] Installation Environment

Do not use this product in the following environments.
Also make sure to keep enough work space necessary for maintenance.

- Location exposed to radiant heat from a huge heat source such as the heat treatment
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 85%RH
- The product gains the water-proof performance of IP65 protection structure if an air purge is conducted.
- Location exposed to direct sunlight
- Location exposed to corrosive gases or combustible gases
- Location exposed to significant amount of dust, salt or iron powder (Outside of an ordinary assembly plant)
- Location where oil (includes oil mist and cutting fluid) or a chemical is splashed
- Location where the product main body receives vibration or hit impact

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

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

[2] Storage • Preservation Environment

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

- Storage and preservation should be performed in the horizontal condition. In the case it is stored in the packaged condition, follow the posture instruction if any displayed on the package.

2.3 How to Install

Shown below is how to install the actuators to the machinery equipment.

2.3.1 Attachment Orientation

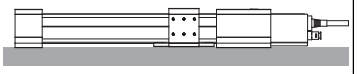
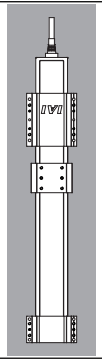
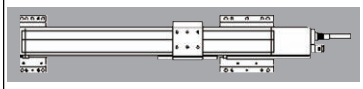
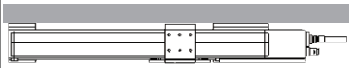
Shown below are the basic concepts for the product attachment.
Pay special attention when deciding how to install the product (Except with custom-order models).

○: Available ×: Not available

Attachment Orientation	Horizontal Installation	Vertical Installation	Wall Mount Installation (Note 1)	Ceiling Mount Installation (Note 1)
Types of Installation	Standard Type	–	Wall-hang Type	Ceiling Type
Installation Availability	○	×	○	○

Note 1 It is necessary to have the dedicated bracket (option). Request should be made at the order.

Attachment Orientation

Horizontal	Vertical	Wall Mount	Ceiling Mount
			

⚠ Caution: The actuator can only be installed in the orientation with the opening on the bottom side when it is in the wall mount or ceiling mount installation. If installation is conducted in a way out of indicated, the Protection Class cannot be guaranteed.

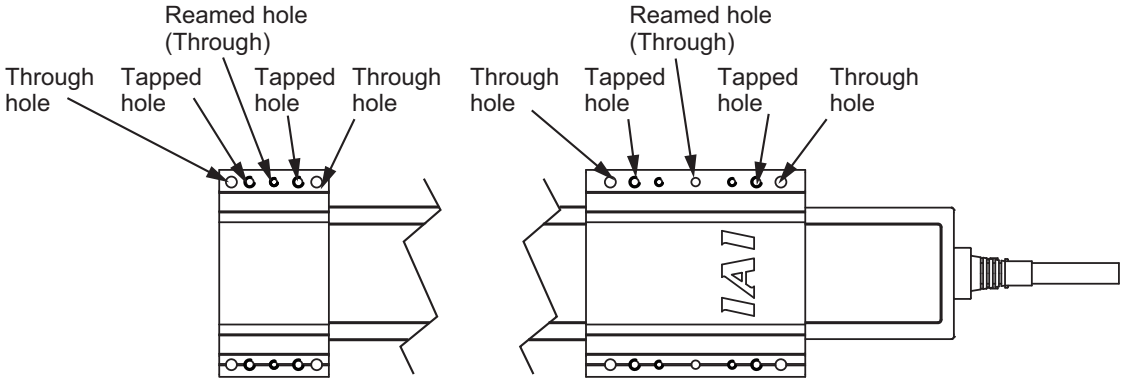
2.3.2 Installation

[1] Installation of Main Unit

- The surface to mount the actuator main unit should be a machined surface or a plane that possesses an equivalent accuracy and the flatness should be within 0.1mm. Also, the platform should have a structure stiff enough to install the unit so it would not generate vibration or other abnormality.
- Also consider enough space necessary for maintenance work such as actuator replacement and inspection.
- There are datum surfaces for installation on the side and bottom of the actuator bracket. The flatness of the table operation differs for the total length stroke of each actuator. [Refer to (1) Datum surface in this section]
- On the bracket of the actuator, there are tapped holes and through holes for installation and reamed holes for positioning. Please refer to the appearance drawings for the details of the positions and dimensions. [Refer to 5. External Dimensions]
  Utilize the reamed holes when the repeatability in attachment is required after detaching. However, when small tunings such as the perpendicularity is required, consider such things like to use one reamed hole.
- The actuator can be held only on the bracket (rear) on the motor end. However, the stroke type is restricted to those of 150 or less. Also, the static allowable load moment, dynamic allowable load moment and overhang length are different from when fixed with the brackets on two sides. [Refer to [2] Load Attachment in this section]

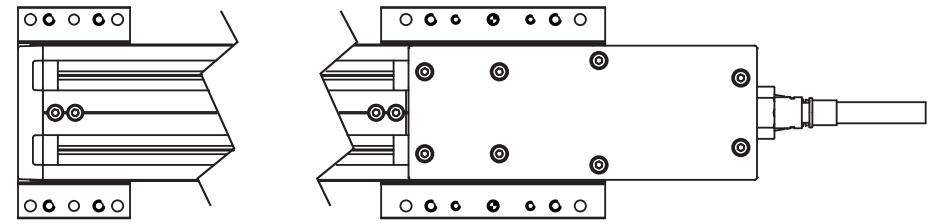
◎ Standard Type

☆ Top



Bracket (Front) Bracket (Rear)

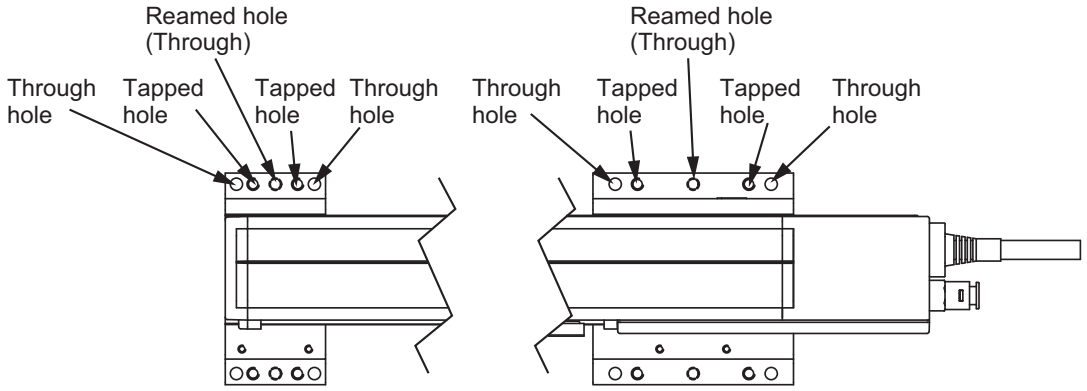
☆ Bottom



Bracket (Front) Bracket (Rear)

◎ Wall-hang Type

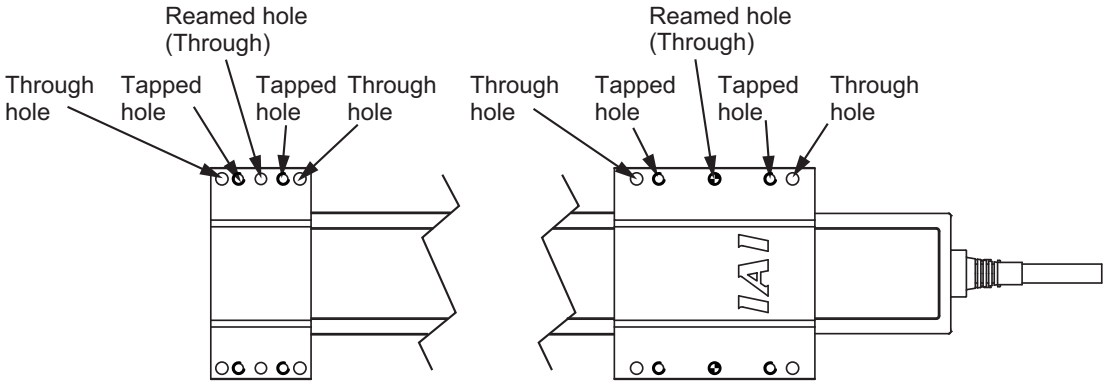
☆Side



Bracket (Front) Bracket (Rear)

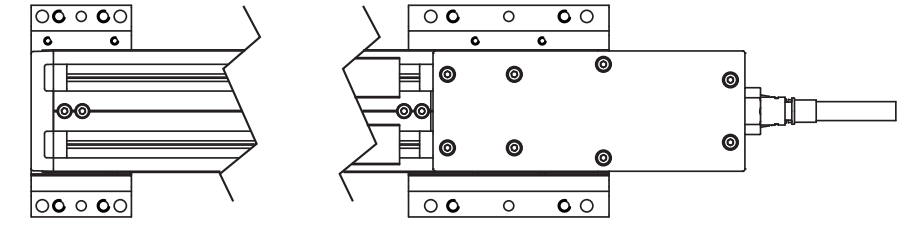
◎ Ceiling Type (Top)

☆Top



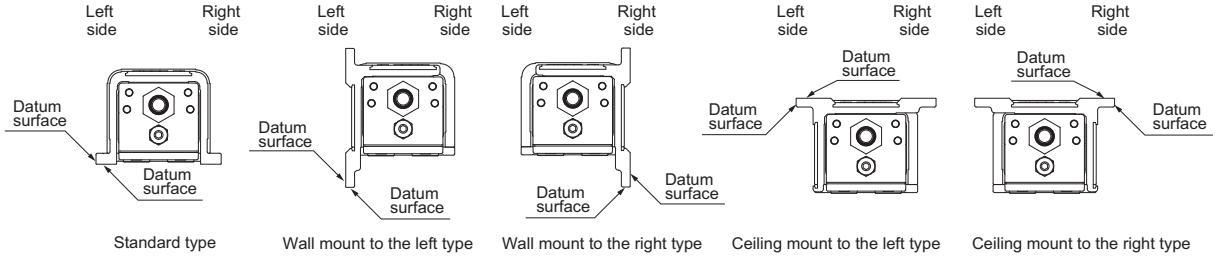
Bracket (Front) Bracket (Rear)

☆ Bottom



Bracket (Front) Bracket (Rear)

(1) Datum surface
There are datum surfaces for attachment on the bracket.
The flatness of the table operation differs for the stroke type of each actuator.



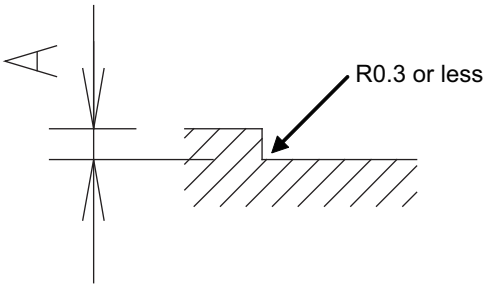
Positions of Datum Surfaces (View from Shaft End on Motor Side)

Stroke	100	150	200	250	300	350	400	450	500	550	600	650	700
Traveling Parallelism(Note 1)	0.10mm or less				0.12mm or less				0.15mm or less				0.18mm or less

Note 1: The values are those at temperature 20°C. It is the accuracy of travelling against the datum surface.

(Reference) Shown below is the section view of the machined area for the attachment surface when mounting using the datum surface.

A: 1.5mm or more



(2) Mounting method 1 (When Utilizing the Tapped Holes)
Follow the table below for the torque to tighten the attachment screws.

Standard Type

Actuator Type	Tapping Diameter	Tightening Torque [N•m]	
		In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
SA5C	M4	3.59	1.76
SA6C/SA7C	M5	7.27	3.42

Wall-hang Type • Ceiling Type

Actuator Type	Tapping Diameter	Tightening Torque [N•m]	
		In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
SA5C/SA6C/SA7C	M5	7.27	3.42

Mounting screw
- It is recommended to use high-tensile bolts with ISO-10.9 or more.
- The length of thread engagement should be 1.8 times more than the nominal diameter.

⚠ Caution: Pay attention to the bolt length. If a bolt with inappropriate length is used, damage on tapped holes or accident or failure due to insufficient strength on the actuator attachment.

(3) Mounting method 2 (When Utilizing the Through Holes)
Follow the table below for the torque to tighten the attachment screws.

Standard Type

Actuator Type	Mounting Holes	Mounting Screw	Tightening Torque [N•m]
SA5C	ϕ4.5 through hole	M4	1.76
SA6C/SA7C	ϕ5.5 through hole	M5	3.42

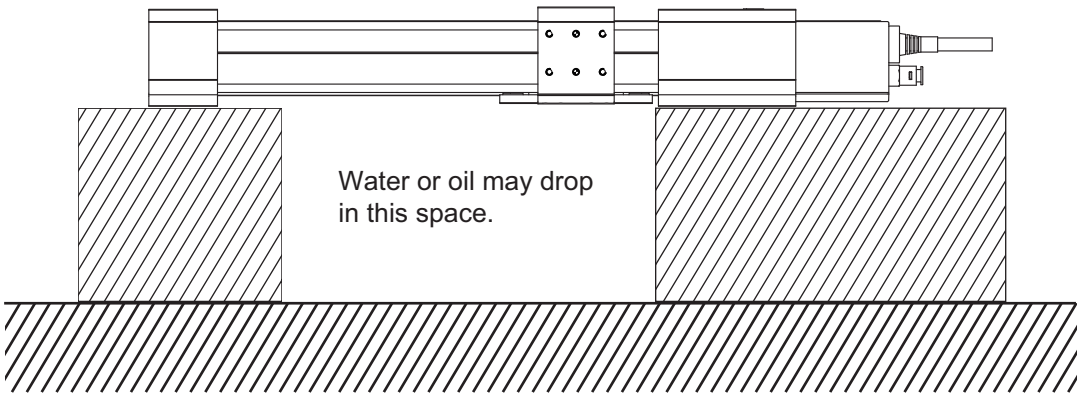
Wall-hang Type • Ceiling Type

Actuator Type	Mounting Holes	Mounting Screw	Tightening Torque [N•m]
SA5C/SA6C/SA7C	ϕ5.5 through hole	M5	3.42

Mounting screw

- It is recommended to use high-tensile bolts with ISO-10.9 or more.
- Make sure to have the effective length of screw engagement described below or more for the tightening of a bolt and a female screw.
  When female screw is on steel → thread length same as nominal diameter
  When female screw is on aluminum → 1.8 times of nominal diameter

⚠ Caution:
- Pay attention when selecting screws. If a bolt other than those of the instruction is used, damage on tapped holes or unexpected accident or failure due to insufficient strength on the actuator attachment or interference on the driving area.
- There may be a case that water or oil of the grease drops from the seals on the openings at the bottom surface.
  If the unit is installed as shown below, use it in a way that should be no problem even if water or oil drops below the actuator. Do not place anything that may cause a problem if water or oil is dropped on it. Otherwise apply a cover on it.



[2] Load Attachment

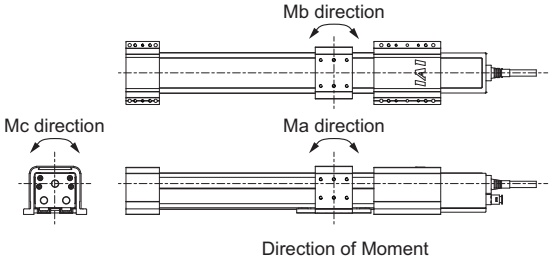
- There is a restriction on the moment and overhang load length when attaching a load to the table.

Allowable moment and overhang load length

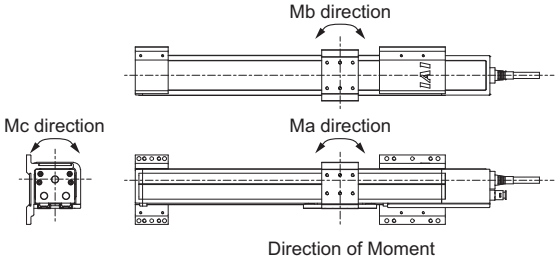
Actuator Type	Two-sided Fix /One-sided Fix (Note 1)	Static allowable Moment [N•m]			Dynamic allowable Moment [N•m]			Allowable overhang load length L [mm]
		Ma	Mb	Mc	Ma	Mb	Mc	
SA5C	Two-sided Fix	5.9	8.4	13.7	8.52	12.2	19.8	Ma direction 125 Mb, Mc direction 125
	One-sided Fix (Attachment on spots)	2.9	4.2	6.8	4.36	6.25	10.14	Ma direction 75 Mb, Mc direction 75
SA6C	Two-sided Fix	8.5	12.2	19.9	11.6	16.6	27.2	Ma direction 150 Mb, Mc direction 150
	One-sided Fix (Attachment on spots)	4.3	6.1	10.0	5.94	8.5	13.93	Ma direction 90 Mb, Mc direction 90
SA7C	Two-sided Fix	11.7	16.6	31.8	15.1	21.6	41.3	Ma direction 175 Mb, Mc direction 175
	One-sided Fix (Attachment on spots)	5.8	8.3	15.9	7.73	11.6	21.15	Ma direction 105 Mb, Mc direction 105

Note 1 One-sided attachment is allowed only with the stroke type of 150 or less.

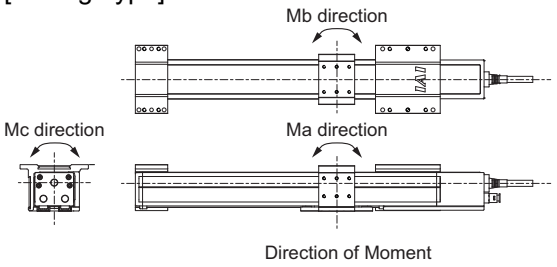
[Standard type]

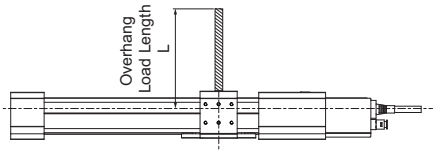


[Wall-hang Type]

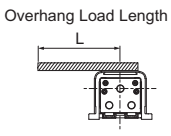


[Ceiling Type]



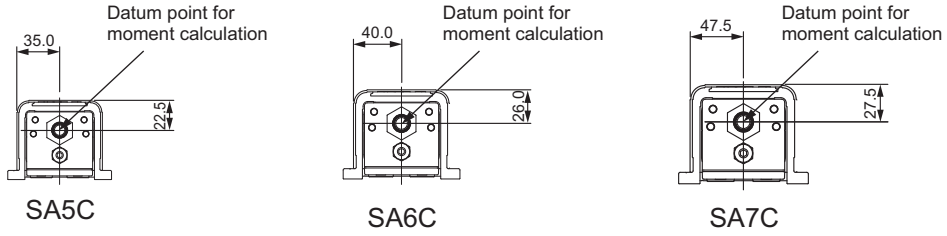


Allowable overhang direction of Ma direction

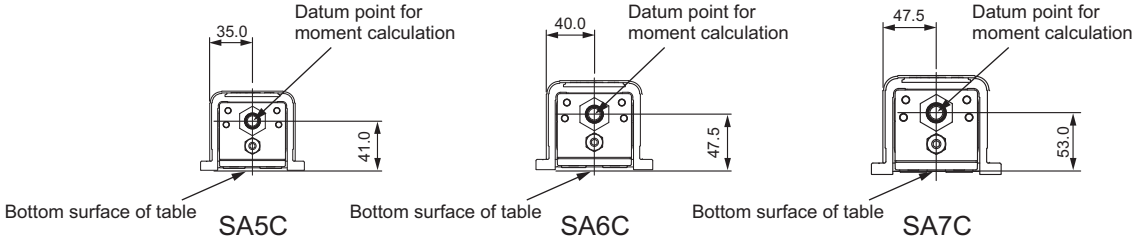


Allowable overhang direction of Mb and Mc directions

If installing on the top surface of the slider, for the calculation of Ma and Mc moments, consider the position indicated with an arrow as the datum point.



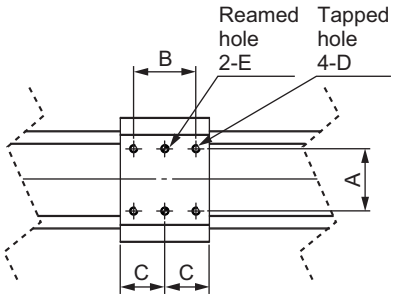
If installing on the bottom surface of the slider, for the calculation of Ma and Mc moments, consider the position indicated with an arrow as the datum point.



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

- There are tapped holes prepared for attachment of a load on the top, side and bottom surfaces of the slider. Also, there are two reamed holes. Utilize the reamed holes when repeatability in the attachment after detaching is required. Also, if you require precision in your attachment, such as a right angle, use the reamed hole to make fine adjustments.
- Shown below is the detail of the attachment area. Attach a load with the bolts listed in the table below with the specified tightening torque.

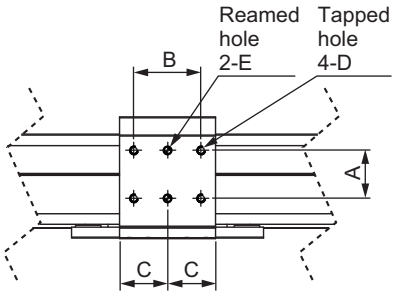
Top Surface of the Slider



Reamed Hole Pitch Tolerance: A ±0.02

Actuator Type	A	B	C	D	E	Tapping Diameter	Tightening Torque [N•m]
SA5C	35	35	25	M4, depth 6	ϕ4H7, depth 4	M4	1.76
SA6C	45	45	30	M5, depth 8	ϕ4H7, depth 5	M5	3.42
SA7C	55	55	35	M5, depth 8	ϕ4H7, depth 5	M5	3.42

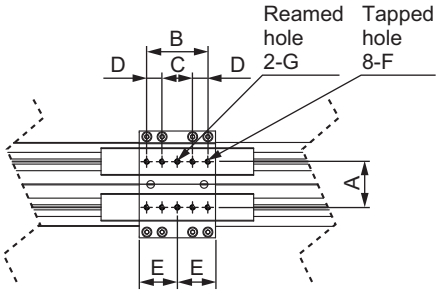
Side Surface of the Slider



Reamed Hole Pitch Tolerance: A ±0.02

Actuator Type	A	B	C	D	E	Tapping Diameter	Tightening Torque [N•m]
SA5C	35	35	25	M4, depth 6	ϕ4H7, depth 4	M4	1.76
SA6C	45	45	30	M5, depth 8	ϕ4H7, depth 5	M5	3.42
SA7C	55	55	35	M5, depth 8	ϕ4H7, depth 5	M5	3.42

Bottom Surface of the Slider



Reamed Hole Pitch Tolerance: A ±0.02

Actuator Type	A	B	C	D	E	F	G	Tapping Diameter	Tightening Torque [N•m]
SA5C	30	40	20	10	25	M3, depth 6	ϕ3H7, depth 5	M3	0.83
SA6C	37	50	25	12.5	30	M3, depth 6	ϕ3H7, depth 5	M3	0.83
SA7C	52	60	30	15	35	M3, depth 6	ϕ3H7, depth 5	M3	0.83

Mounting screw

- It is recommended to use high-tensile bolts with ISO-10.9 or more.

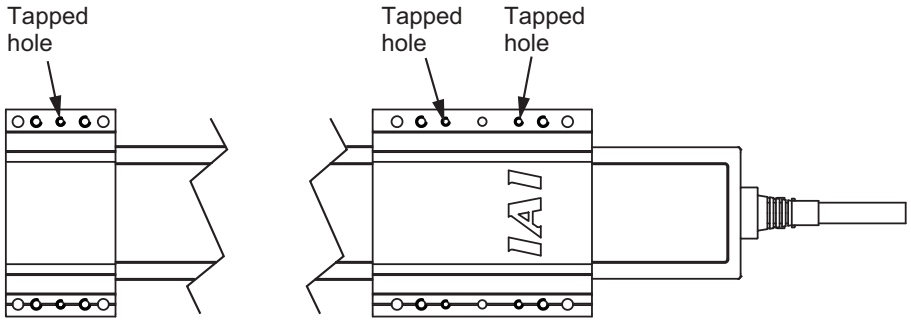
⚠ Caution: Pay attention when selecting screws. If a bolt other than those of the instruction is used, it may cause damage on tapped holes or unexpected accident or failure due to insufficient strength on the actuator attachment.

[3] Installation of Wiring

There are tapped holes prepared for some purposes such as attaching cables on the bracket of the actuator. See the external dimensions for the details of the position and diameters. [Refer to 5. External Dimensions]

◎ Standard Type

☆Top

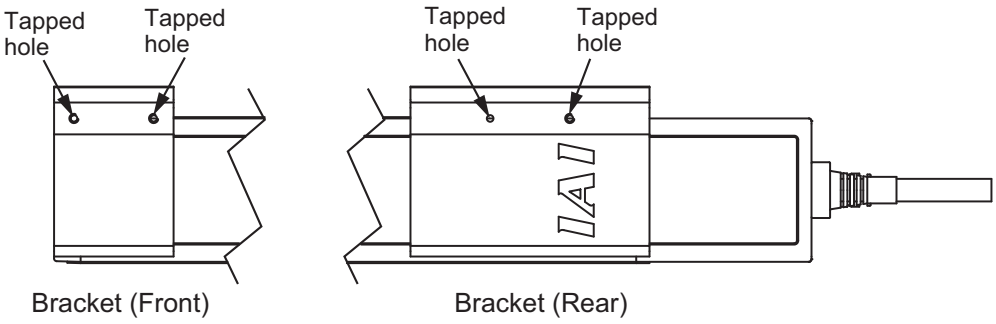


Bracket (Front) Bracket (Rear)

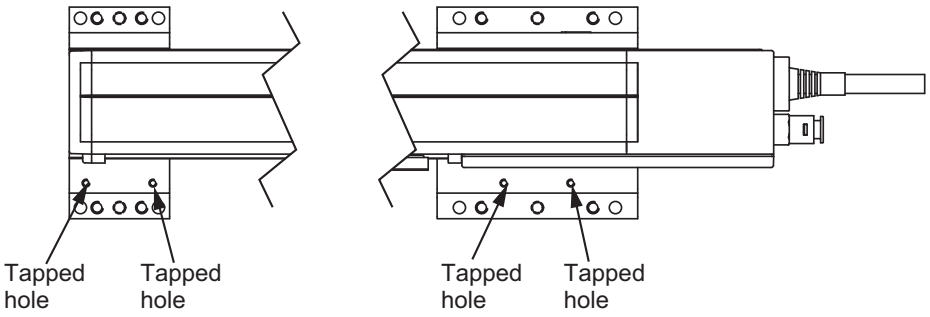
Actuator Type	Bracket (Front) Tapped Hole	Bracket (Rear) Tapped Hole	Tapping Diameter	Tightening Torque [N•m]
SA5C	2×M3, depth 3	4×M3, depth 7	M3	0.83
SA6C	2×M3, depth 4	4×M3, depth 7	M3	0.83
SA7C	2×M3, depth 4	2×M3, depth 8	M3	0.83

◎ Wall-hang Type

☆Top



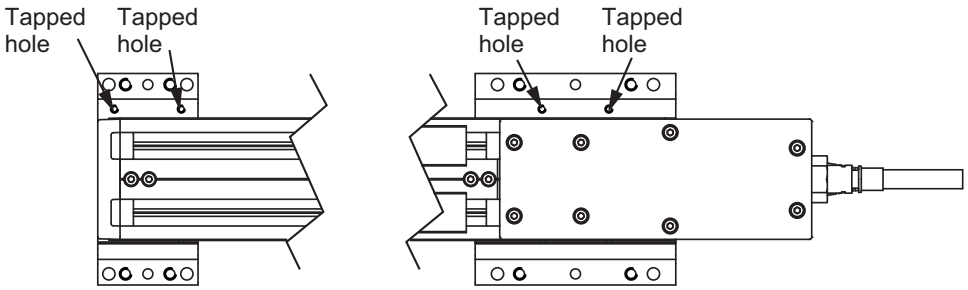
☆Side



Actuator Type	Bracket (Front) Tapped Hole	Bracket (Rear) Tapped Hole	Tapping Diameter	Tightening Torque [N•m]
SA5C	4×M3, depth 6	4×M3, depth 6	M3	0.83
SA6C	4×M3, depth 6	4×M3, depth 6	M3	0.83
SA7C	4×M3, depth 6	4×M3, depth 6	M3	0.83

◎ Ceiling Type (Top)
Shown in the figure below is the right ceiling mount type. For the left ceiling mount type, the positions of tapped holes are on the opposite side when looking in the front view.

☆Bottom



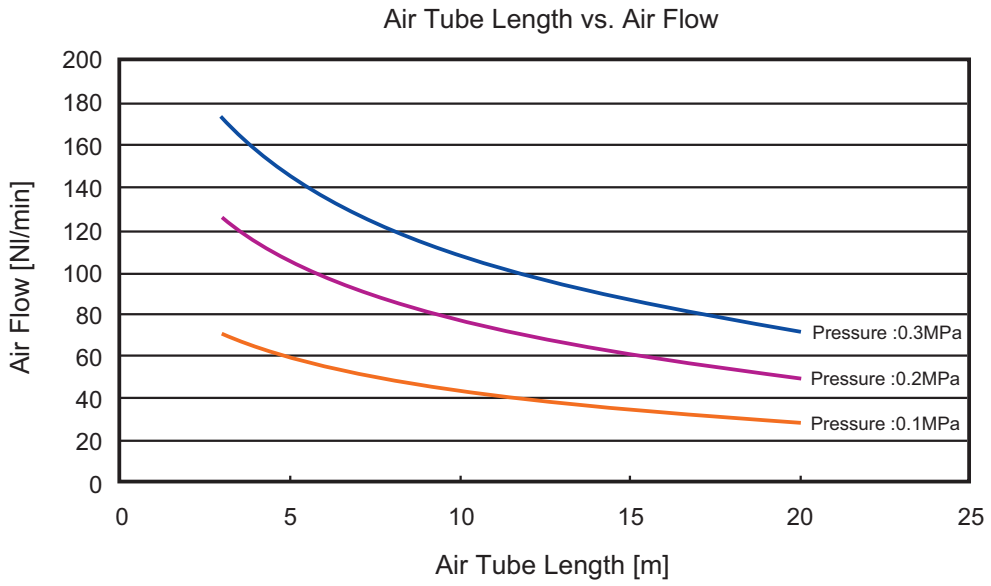
Bracket (Front) Bracket (Rear)

Actuator Type	Bracket (Front) Tapped Hole	Bracket (Rear) Tapped Hole	Tapping Diameter	Tightening Torque [N•m]
SA5C	2×M3, depth 6	2×M3, depth 6	M3	0.83
SA6C	2×M3, depth 6	2×M3, depth 6	M3	0.83
SA7C	2×M3, depth 6	2×M3, depth 6	M3	0.83

Mounting screw
- Make sure to have the length of at least 1.8 times to the bolt diameter below for the effective length of screw engagement for the tightening of a bolt and a female screw.

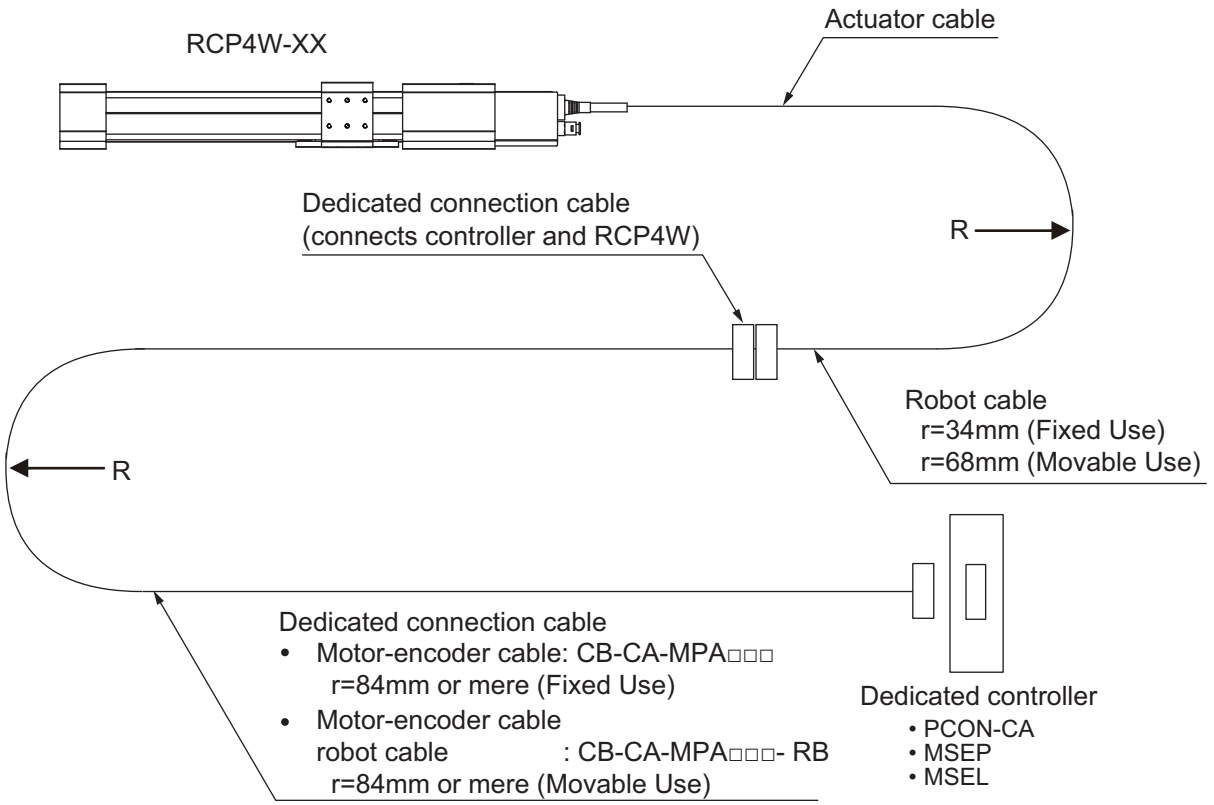
2.4 Air Purge

If using the product in the standard of IP65, it is necessary to conduct air purge to blow clean dry air to the actuator.
Conduct air purge from the inlet on the side of the motor end of the main unit with air flow 40Nl/min or more.
Shown below is how the air flow changes with the length of an air tube (O.D. 6mm, I.D. 4mm).
Have an adjustment to obtain air flow of 40Nl/min. by referring to the following graph.



3. Connection to the Controller

For the controller, only the dedicated controller manufactured by our company can be used.
Using other controllers may cause a problem such as burning the product, ignition or generating heat.
Use the dedicated cable enclosed in the package when connecting the actuator and the controller.

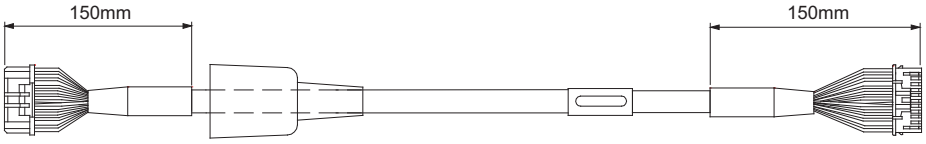


(Note) □□□ indicates the cable length. Up to 20m can be specified.
Example) 080 = 8 m

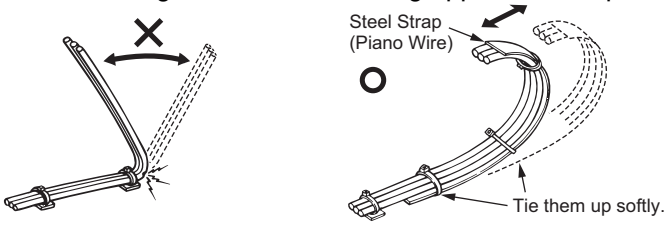
⚠ Caution: Cable joint connectors are not treated against water drops. Do not attempt to apply water on them.

When constructing the application system, make sure to lay out each cable and connect them correctly otherwise it may cause unexpected troubles such as cable breakage or contact failure. Described below are the things that are prohibited to be done regarding the treatment of cables.

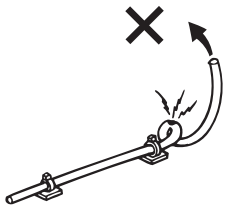
- Do not attempt to cut and extend the cable, or short-circuit or re-joint it.
- Do not apply the robot cable to the moving part. The actuator cable is a robot cable with its length approximately 2m.
  [For the bending radius, refer to 1.4 Motor • Encoder Cables]
- Do not bend the cable in the area from the connector tip inward to 150mm on both ends.
  Standard cable : CB-CA-MPA□□□
  Robot cable : CB-CA-MPA□□□-RB



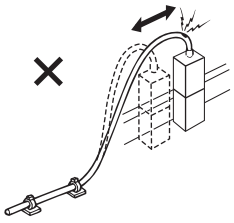
- Have a sufficient radius for bending to avoid stress being applied to one place.



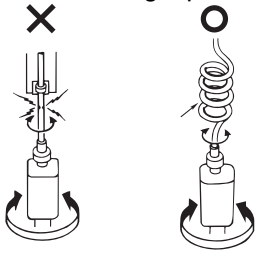
- Do not let the cable bend, kink or twist.



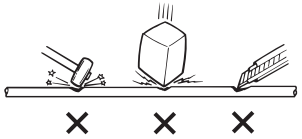
- Do not pull the cable with a strong force.



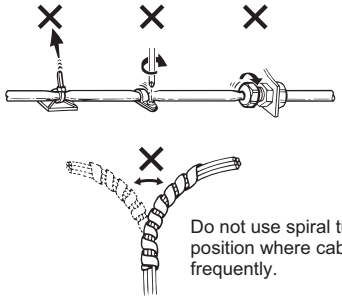
- Do not let the cable receive a turning force at a single point.



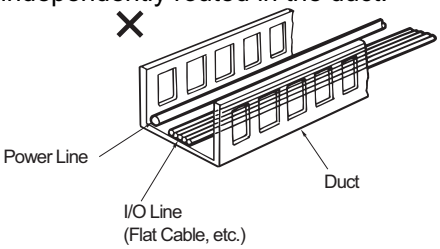
• Do not pinch, drop a heavy object onto or cut the cable.



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

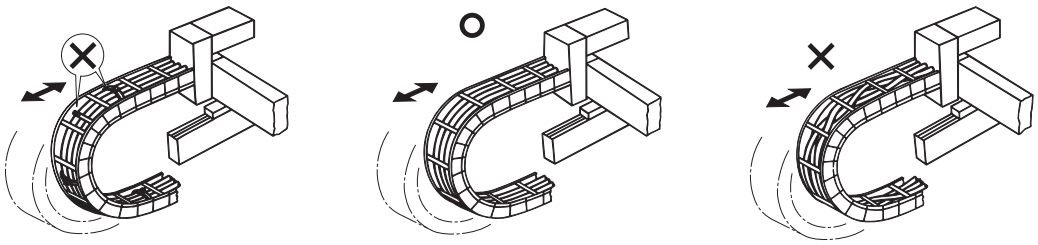


• Separate the I/O line, communication line and power line from each other.
Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable track.

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



⚠ Warning:

• When the cable is connected or disconnected, make sure to turn off the power to the controller. When the cable is connected or disconnected with the controller power turned ON, it might cause a malfunction of the actuator and result in a serious injury or damage to the machinery.
• When the connector connection is not correct, it would be dangerous because of a malfunction of the actuator. Make sure to confirm that the connector is connected correctly.

4. Maintenance Inspection

4.1 Inspection Items and Inspection Schedule

Have maintenance inspections following the intervals below.
The calculation is conducted under the condition that there are 8 working hours per day. Have inspections more frequently if the operation frequency is high for night and day continuous operation, etc.

Schedule	External visual inspection	Internal inspection	Grease supply (Note 1)
Start of work inspection	○		
1 month inspection	○		
3 month inspection			○
3 months after starting operation			○
6 months inspection	○	○ (Note 2)	
Every 6 month inspection	○	○ (Note 2)	○

Note 1 Grease film may run out if the actuator is moved back and forth continuously over a distance of 30 mm or less. As a guide, perform a back-and-forth operation five times or so over a distance of 50 mm or more after a back-and-forth operation over such short distance has been repeated 5,000 to 10,000 times. This will restore oil film.
Note 2 Check the condition of grease, and wipe off the grease before supplying new in case it is extremely dirty.

[Period of Grease Supply (reference)]
Perform grease supply when it has reached to either the operation distance or spent months described in the table below.

Maximum Speed of Use [mm/s]	Grease Supply Timing (Reference)	
	Operated distance	Months
0 to 530 or less	625 km	6-month

⚠ Caution:
- An actuator after 6 months of storage may have caused a degradation of the grease. Supply grease before start using. [Refer to 4.6 “Grease Supply”]
- Degradation speed of grease may differ depending on the environment of use (temperature, humidity and ambient conditions). It is recommended to shorten the grease supply period if the actuator is used under a bad condition such as in high temperature, high humidity or in dusty ambience.
  Also, it is recommended to improve the environment conditions in case the grease changes its color due to the bad condition of use.

4.2 Visual inspection

For the visual inspection, check the appearance following items.

Main Body	Looseness of attachment screws
Cables	Scratches, proper connection of connectors
Seal	Deformation on sealing, gap on moving slider part
Overall	Noise, vibration

* Replace the scraper (seal) in appropriate interval period as it is a maintenance part.
The reference for replacement is 3,000km of operation distance or 1.5 years of used period.
(The distance and period may change depending on the condition of use such as temperature.)

4.3 Cleaning

- Please clean the external body on a regular basis.
- When cleaning, wipe with a soft cloth to remove dust and dirt.
- There is a risk of dust getting in from a clearance. Do not blow compressed air strongly to the body.
- Do not apply petroleum solvent since it may damage the resin or painted surfaces.
- When extremely dirty, wipe it off firmly with cloth that a neutral detergent or alcohol is applied on.

4.4 Inside Visual Inspection

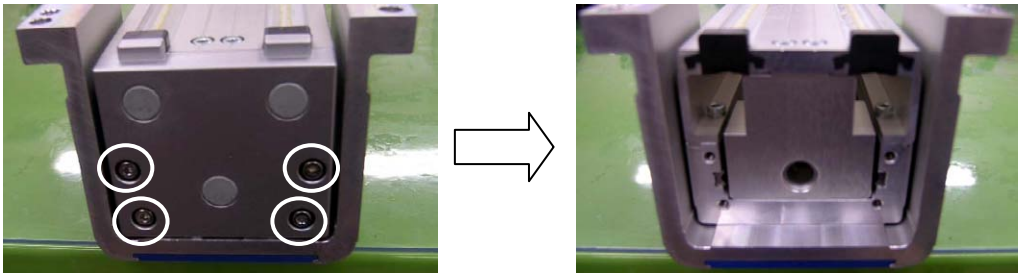
Turn the power OFF and have a visual inspection.
Conduct the item below in the internal inspection.

Main Body	Looseness of attachment screws
Guide Part	Condition and dirt of lubricant

Detach the seals and ball screw guide by following the procedures described below so you can see the guiding area to visually inspect the condition inside. In the inspection, it should be checked if dust is involved inside and the condition of the lubricant.
Even if the grease looks brown, it will be fine as long as the sliding area seems wet and shiny.
If the grease is mixed with dust and dirty or has no shiny appearance, or if the grease has lost its efficacy due to prolonged use, clean the applicable area and then replenish the grease.
Described below is how to check inside.

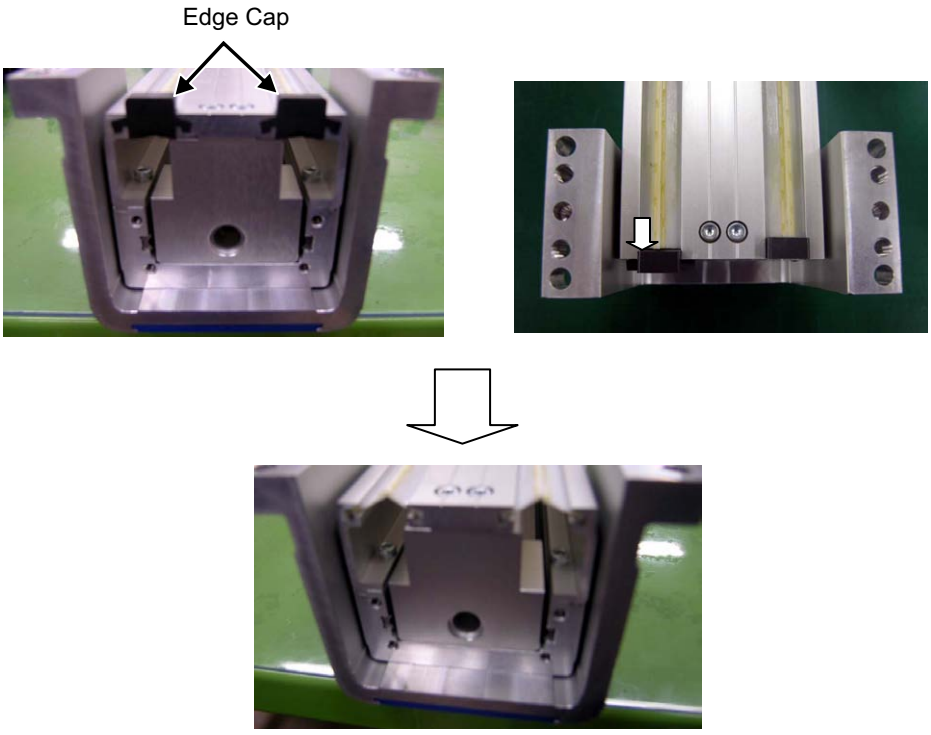
[Procedures to Detach Seals and Ball Screw Guide]

1) Loosen the four hex socket head cap screws holding the cover on the side opposite to the motor (at the circled places) with a hex wrench to detach the cover.

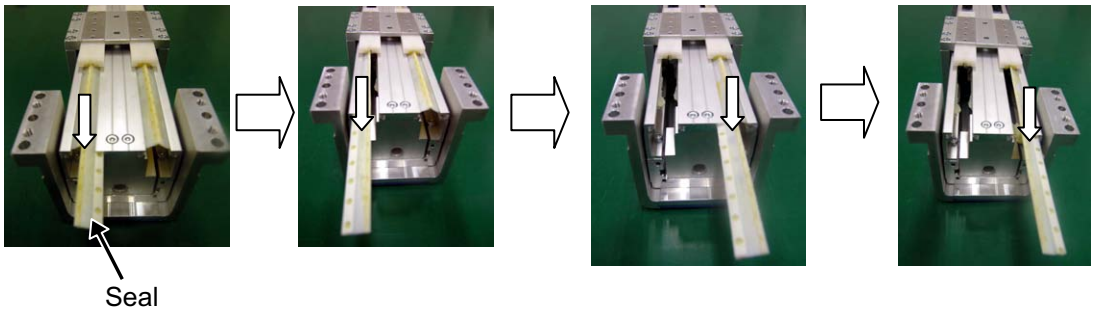


Tool to use: Hex wrench 2.5mm-sized

2) Slide the terminal caps to remove them.

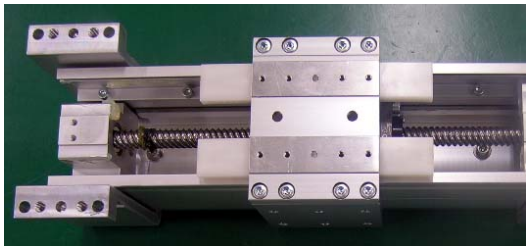


3) Pull out the four seals.
Next, loosen the four hex socket head cap screws holding the ball screw cover (at the circled places) with a hex wrench to detach the cover.



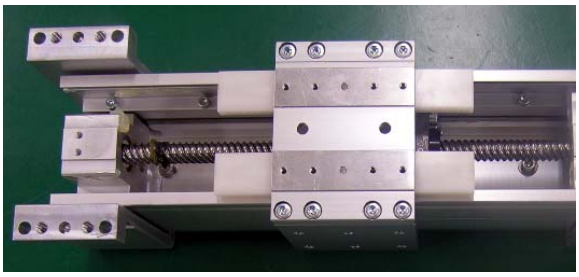
Tool to use: Hex wrench 2.5mm-sized

Tightening Torque : 88.7N•cm

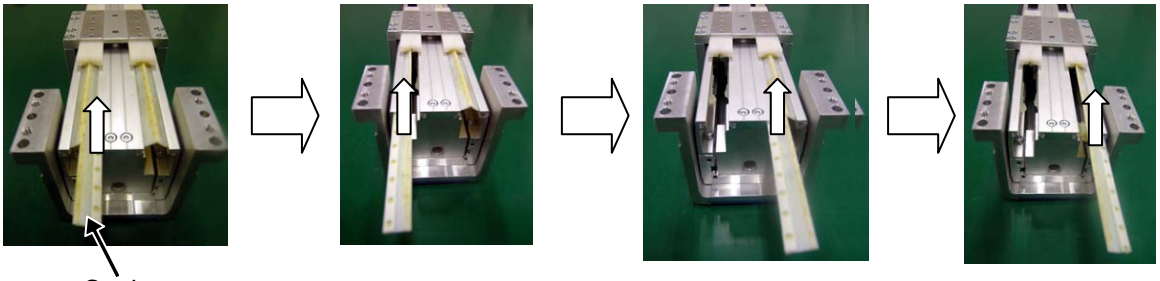


[Procedures to Detach Seals and Ball Screw Guide]

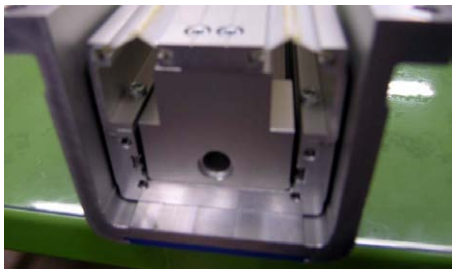
1) Tighten the four hex socket head cap screws to hold the ball screw cover (at the circled places) with a hex wrench to attach the cover. Next, slide in the four seals to mount them.

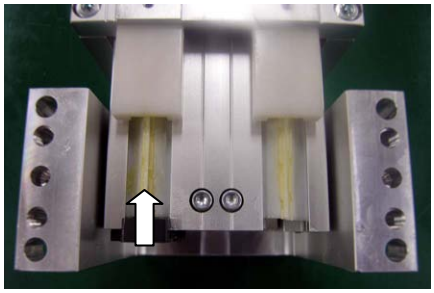


Tool to use: Hex wrench 2.5mm-sized

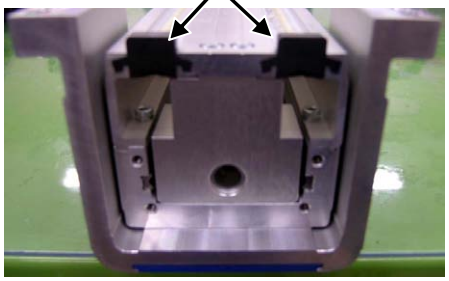


2) Slide in the terminal caps to attach them.

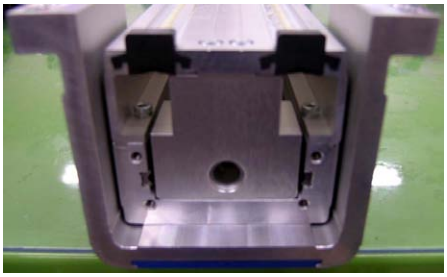




Edge Cap



3) Tighten the four hex socket head cap screws to hold the cover on the side opposite to the motor (at the circled places) with a hex wrench to attach the cover.



Tool to use: Hex wrench 2.5mm-sized
Tightening Torque : 88.7N•cm

4.5 Internal Cleanup

- When cleaning, wipe with a soft cloth to remove dust and dirt.
- Do not blow compressed air so dust would not get in from gaps.
- Do not use oil type solvent, neutral detergent or alcohol.

4.6 Grease Supply

4.6.1 Applied Grease

[1] Standard type

The following grease is applied when the product is shipped out.

Idemitsu Kosan Co., Ltd.	Daphne Eponex Grease No.2

Apart from above, there are equivalent sorts of grease sold in the market. For details contact a grease supplier, provide the grease name shown above and ask them to select an equivalent.
Listed below are some equivalents for an example.

Showa Shell Sekiyu K. K.	Alvania Grease S2
Mobil Oil	Unirex N2

⚠ Warning: Do not attempt to apply fluorine grease. When mixed with lithium grease, not only decrease the grease characteristics, but also may damage the actuator.

[2] Food grade grease type

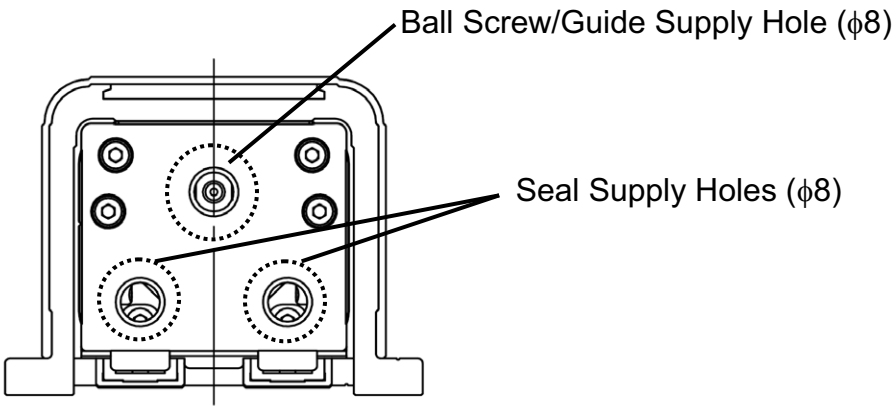
The following grease is applied when the product is shipped out.

Taiyo Petroleum Gas Co., Ltd.	Medallion FM Grease No.2

4.6.2 How to Apply Grease

Grease supply is to be conducted at the grease supply holes on the front cover.

1. “Ball screw/guide supply hole” and “seal supply holes” are covered up with grommets. Remove the grommets at three points.
2. Move the slider until it stops on the side opposite of the motor.
3. Insert a grease gun to the ball screw/guide supply hole and supply grease to the grease nipple seen in the hole.
   By supplying grease to the grease nipple, grease can be supplied to both the ball screw and guide.
4. Insert a grease gun at the seal supply holes and apply grease to the seal on the actuator openings.
5. Move the slider back and forth several times by hand.
6. Attach the grommet.



Nipple inlet diameter for ball screw, guides	ϕ3.5 [mm]

Model	Grease supply volume(reference)
SA5C	2 to 2.5cc
SA6C、SA7C	3 to 3.5cc

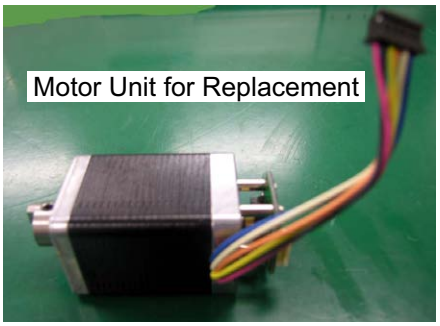
Recommended grease gun	Nozzle	Supplier
MG70	N type	THK

⚠ Caution:
- Supplying grease too much may increase the sliding resistance and load to the motor, which could drop the performance. Also, excess grease on the ball screw may be splashed around in the ambience.
- In case the grease got into your eye, 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.

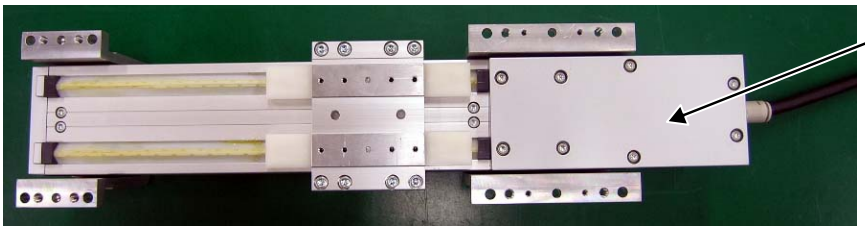
4.7 Motor Replacement Process

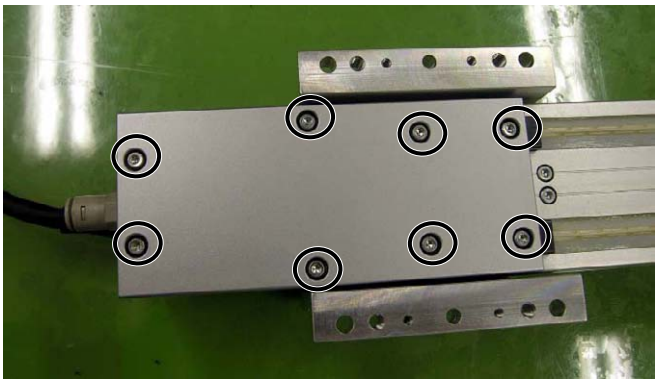
4.7.1 SA5C, SA6C

[Items Required for Replacement Work]
• Motor Unit for Replacement
• Hex Wrench
2mm, 2.5mm and 3mm-sized

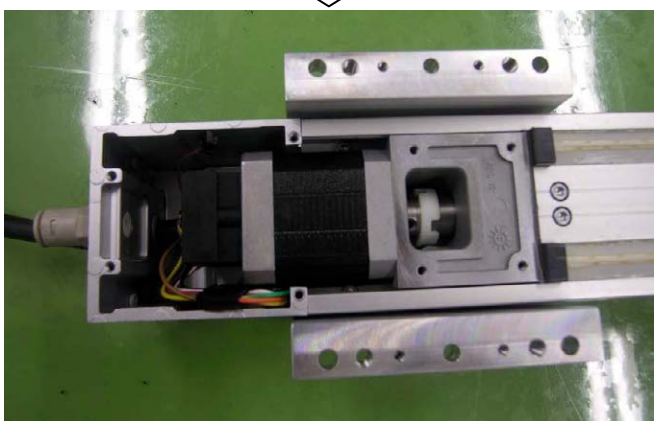


[Step]
1) Loosen the eight hex socket head cap screws holding the bottom cover on the bottom of the actuator (at the circled places) with a hex wrench to detach the cover.

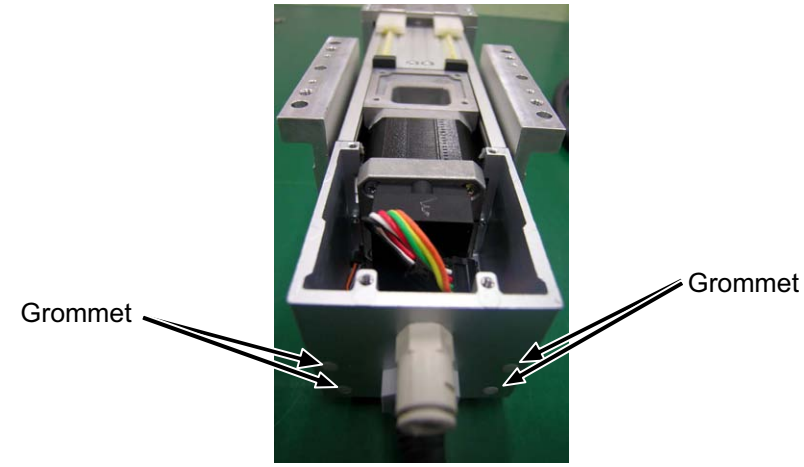


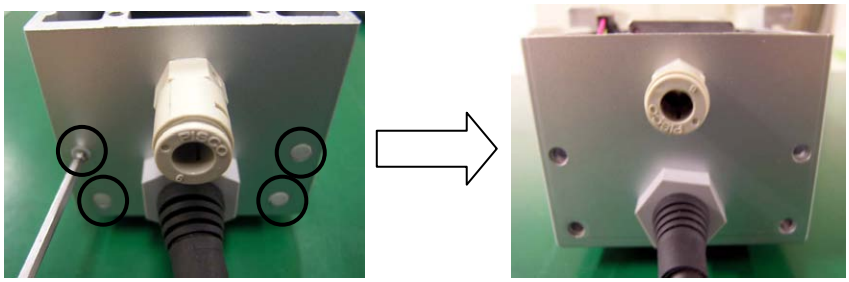


Tool to use:
Hex wrench 2.5mm-sized

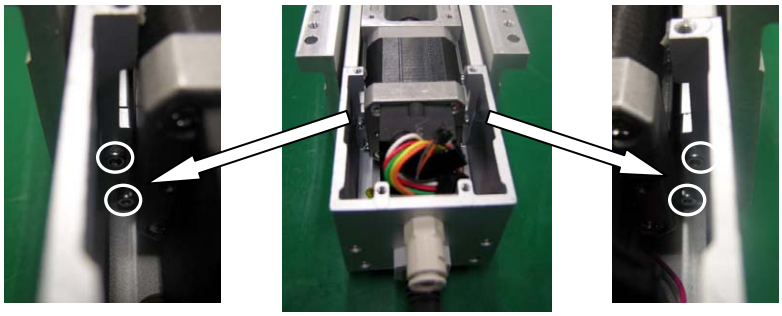


2) By using a tool with a long and slim shape such as a hex wrench, push in the four grommets (at the circled places) on the back side to detach them.

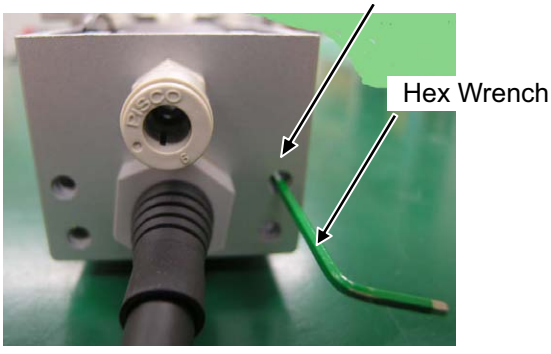


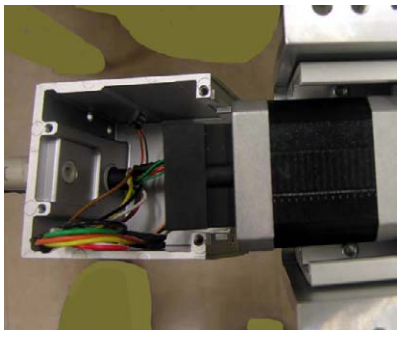


3) Insert a hex wrench to the holes the grommets were taken out to detach the four hex socket head cap screws holding the motor cover (at the circled places) with it.



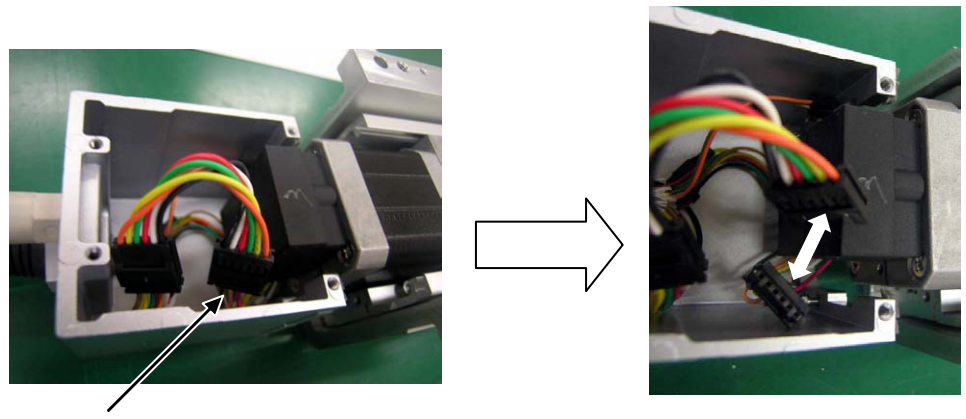
Hole that the grommet was taken out of



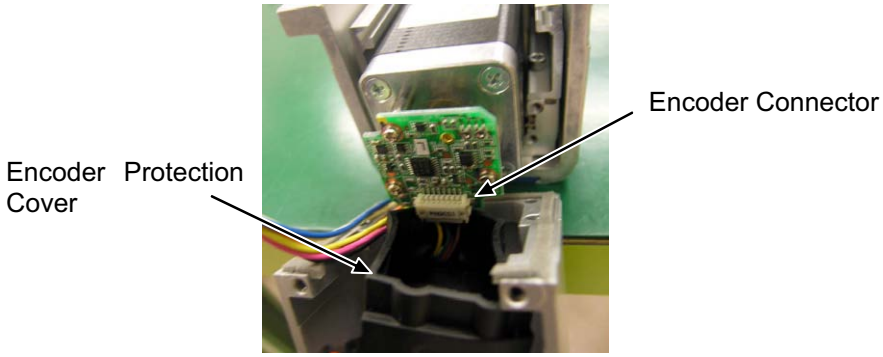


Tool to use: Hex wrench 2mm-sized

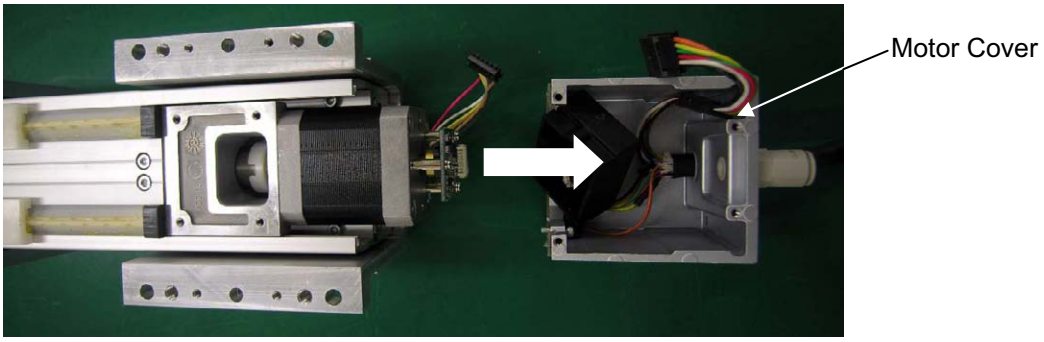
4) Unplug the motor cable connector.



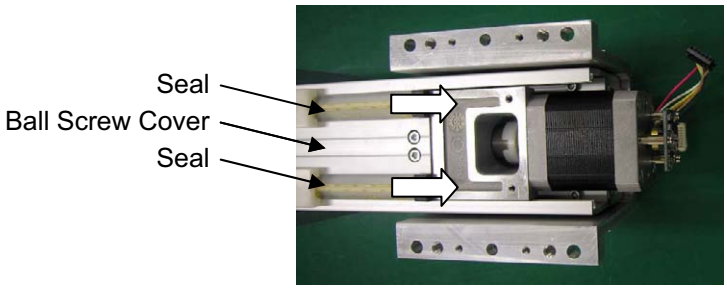
5) Detach the protection cover for the encoder and unplug the encoder connector.



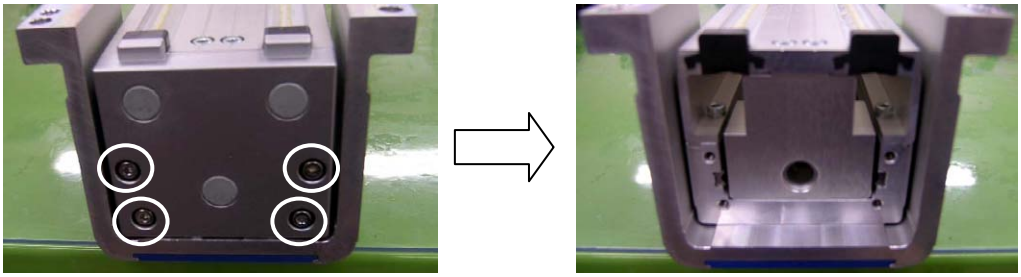
6) Detach the motor cover.



7) For SA5C and SA6C, the motor unit is held with screws from the direction shown with arrows. Remove the ball screw cover and the seal, loosen the screws and then detach the motor unit.

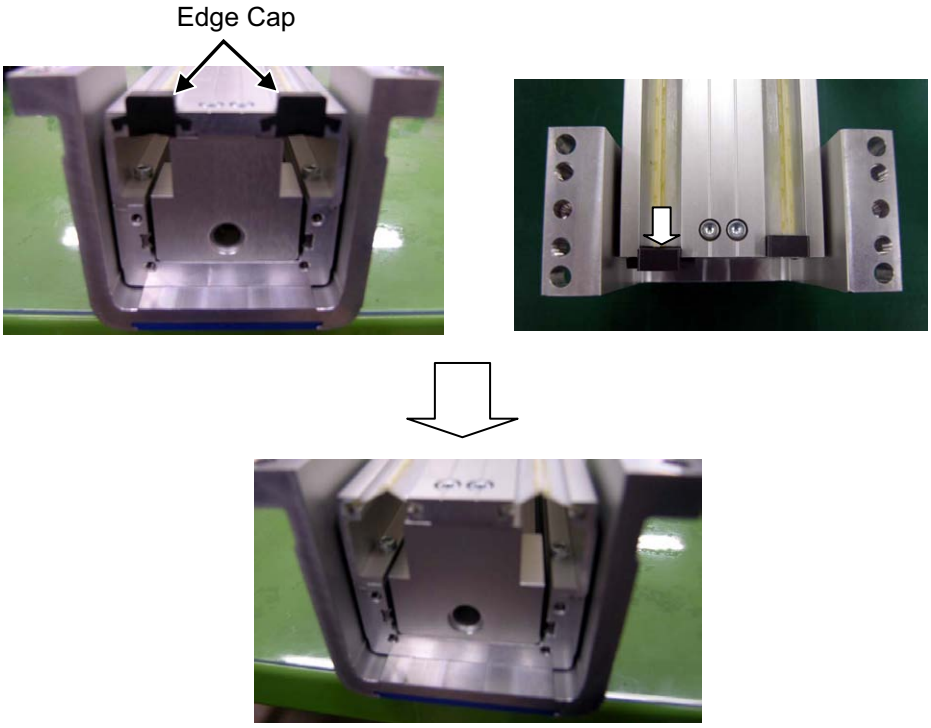


Loosen the four hex socket head cap screws holding the cover on the side opposite to the motor (at the circled places) with a hex wrench to detach the cover.

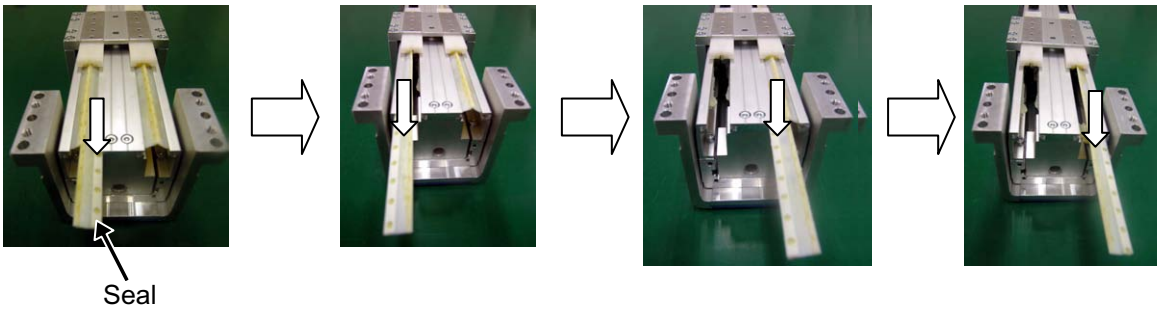


Tool to use: Hex wrench 2.5mm-sized

8) Slide the terminal caps to remove them.

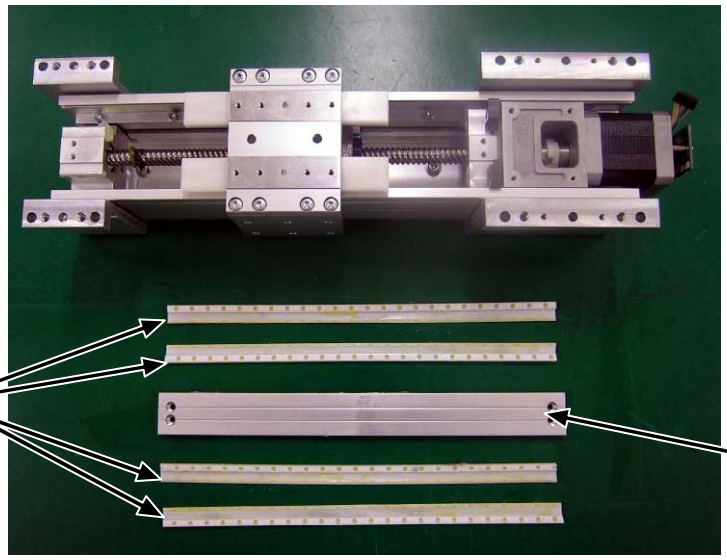


9) Pull out the four seals.
Next, loosen the four hex socket head cap screws holding the ball screw cover (at the circled places) with a hex wrench to detach the cover.

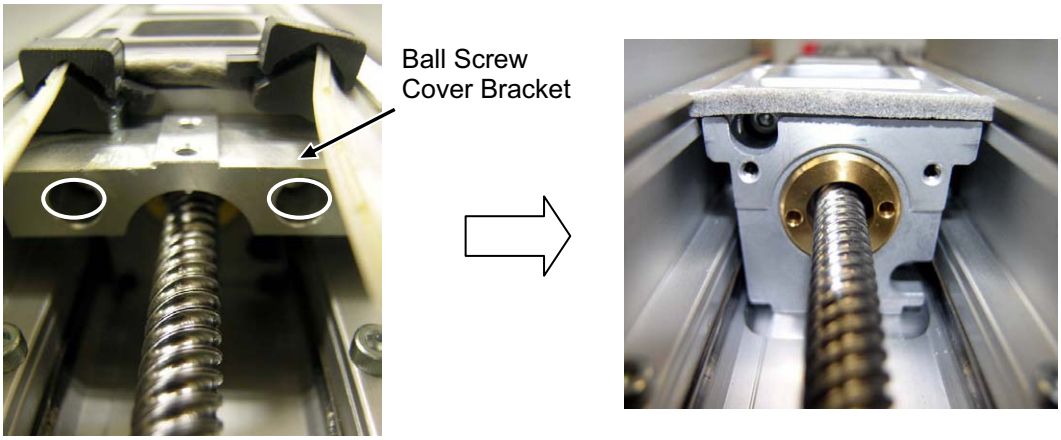


Seal

Tool to use: Hex wrench 2.5mm-sized

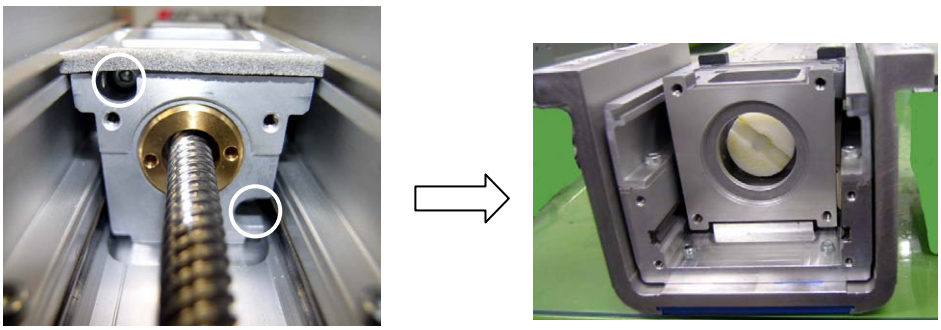


10) Detach the two screws holding the ball screw cover bracket (at the circled places) with a hex wrench.



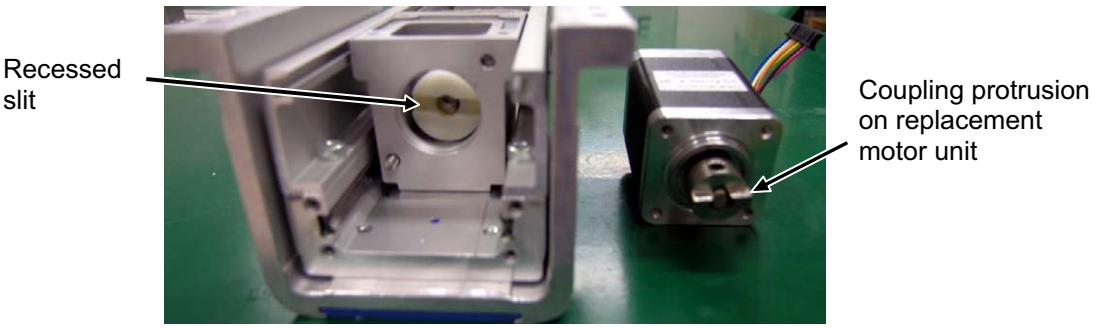
Tool to use: Hex wrench 2.5mm-sized (SA5C)
3.0mm-sized (SA6C)

11) Remove the two screws (for SA5C) and four screws (for SA6C) holding the motor (at the circled places) with a hex wrench and detach the motor.

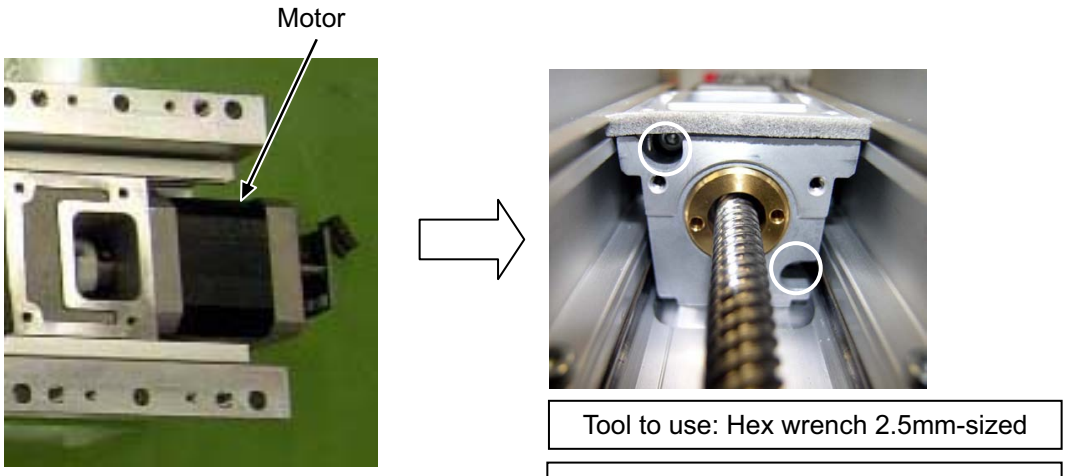


Tool to use : Hex wrench 2.5mm-sized

12) Rotate the coupling on the replacement motor unit to adjust the position of the protrusion on it so it fits to the recessed slit.



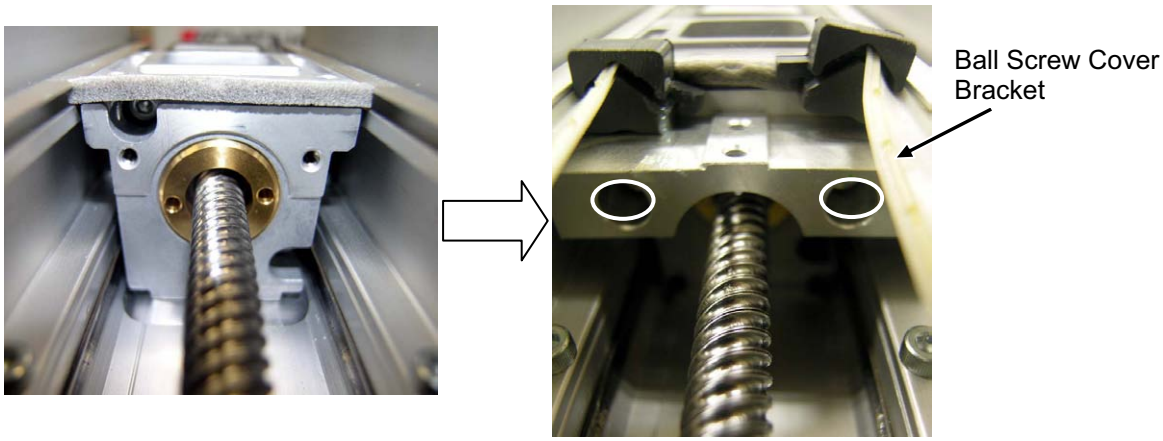
13) Tighten the two screws (for SA5C) and four screws (for SA6C) to hold the motor (at the circled places) with a hex wrench to attach the motor.



Tool to use: Hex wrench 2.5mm-sized

Tightening Torque : 88.7N•cm

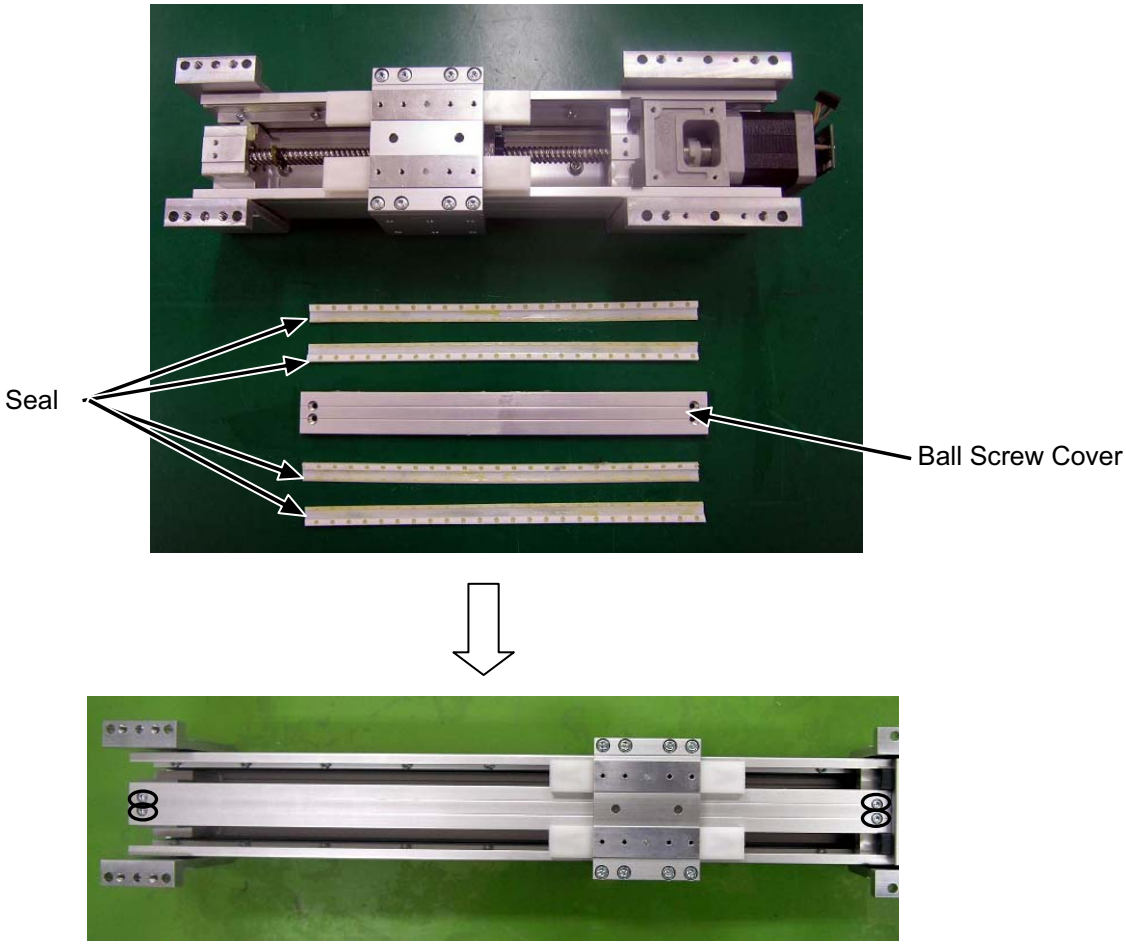
14) Tighten the two screws to hold the ball screw cover bracket (at the circled places) with a hex wrench to attach the ball screw cover bracket.



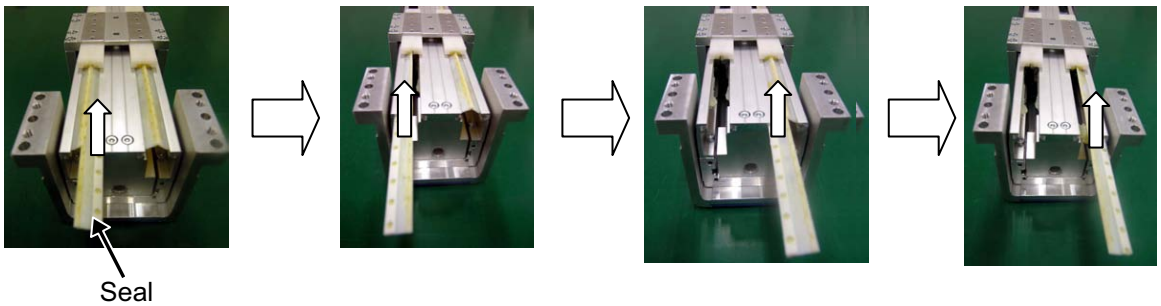
Tool to use: Hex wrench 2.5mm-sized (SA5C)
3.0mm-sized (SA6C)

Tightening Torque : 88.7N•cm (SA5C)
207N•cm (SA6C)

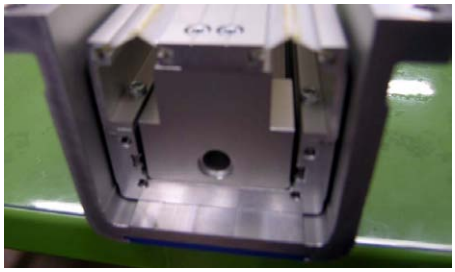
15) Tighten the four hex socket head cap screws to hold the ball screw cover (at the circled places) with a hex wrench to attach the cover. Next, slide in the four seals to mount them.

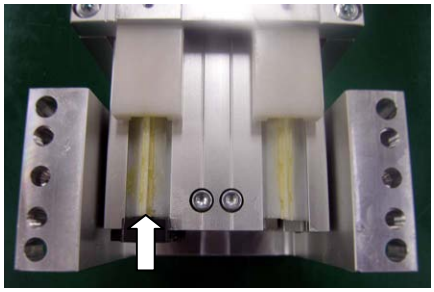


Tool to use: Hex wrench 2.5mm-sized	Tightening Torque : 88.7N•cm

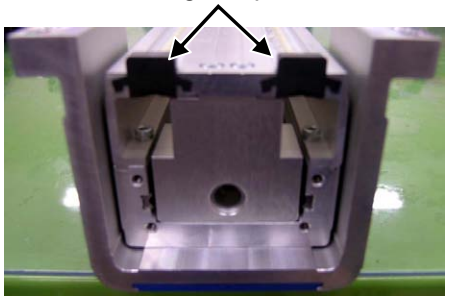


16) Slide in the terminal caps to attach them.

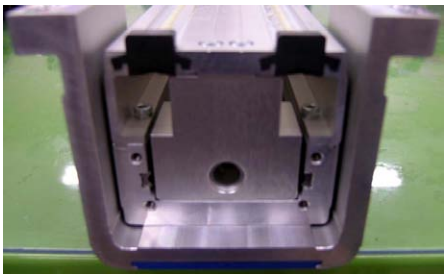




Edge Cap



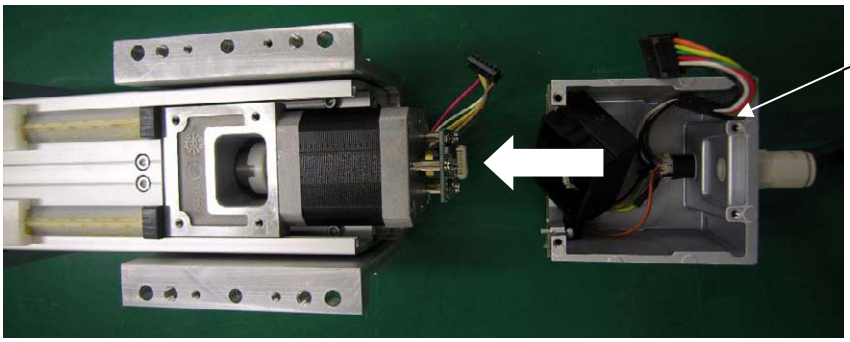
17) Tighten the four hex socket head cap screws to hold the cover on the side opposite to the motor (at the circled places) with a hex wrench to attach the cover.

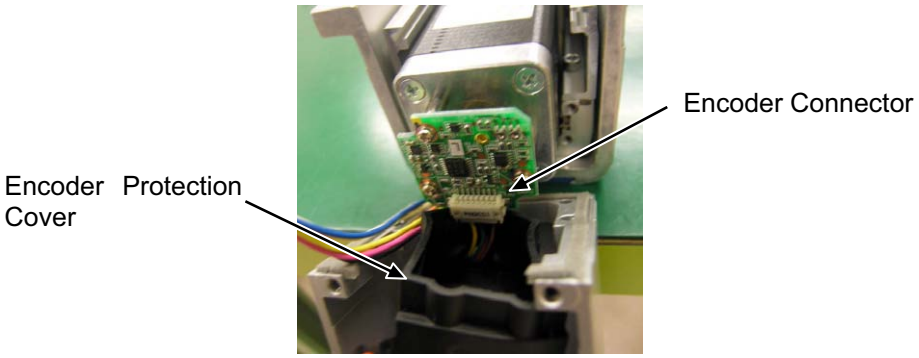


Tool to use: Hex wrench 2.5mm-sized

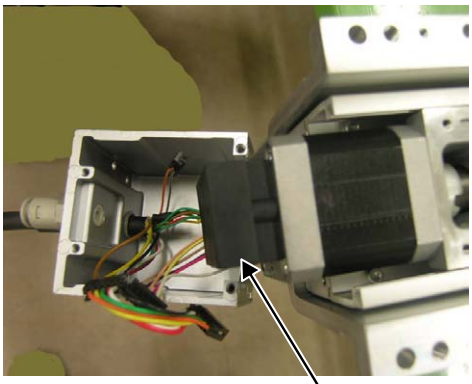
Tightening Torque : 88.7N•cm

18) Attach the motor cover and plug in the encoder connector.



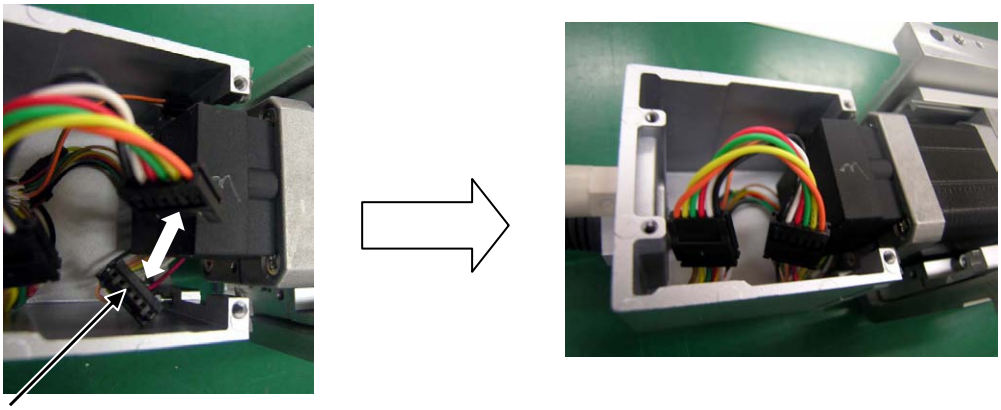


19) Put the encoder protection cover on the encoder.



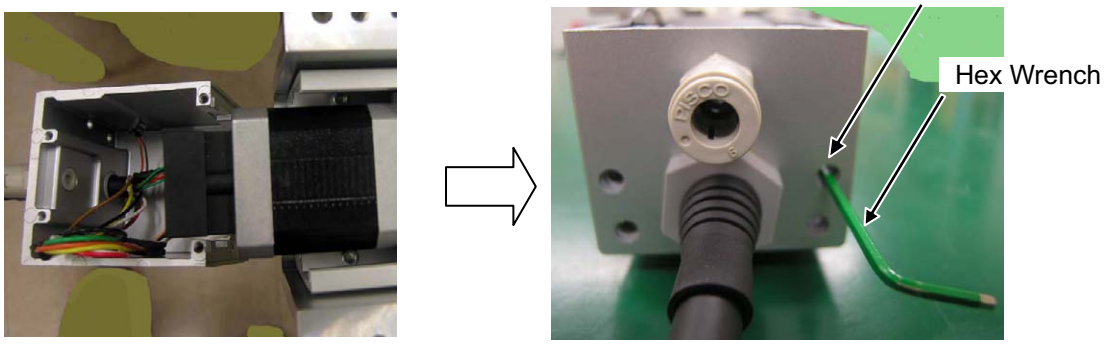
Encoder Protection Cover

20) Plug in the motor cable connector.



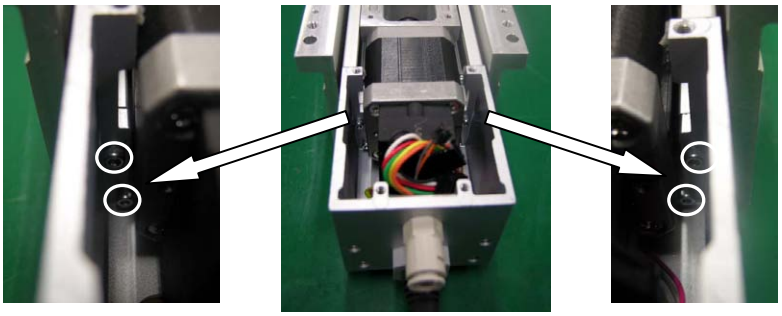
Motor Cable Connector

21) Insert a hex wrench to the holes the grommets were taken out of to tighten the four hex socket head cap screws to hold the motor cover (at the circled places) with it.

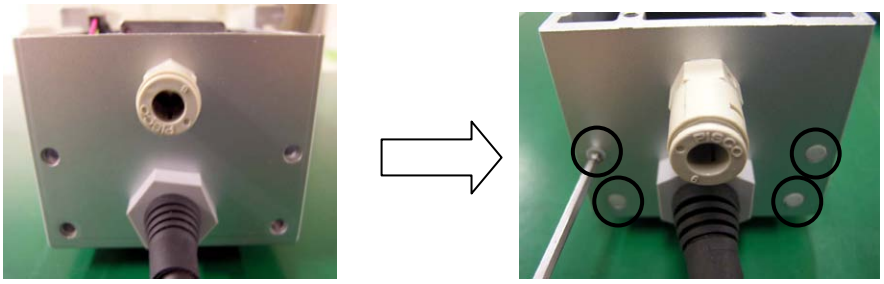


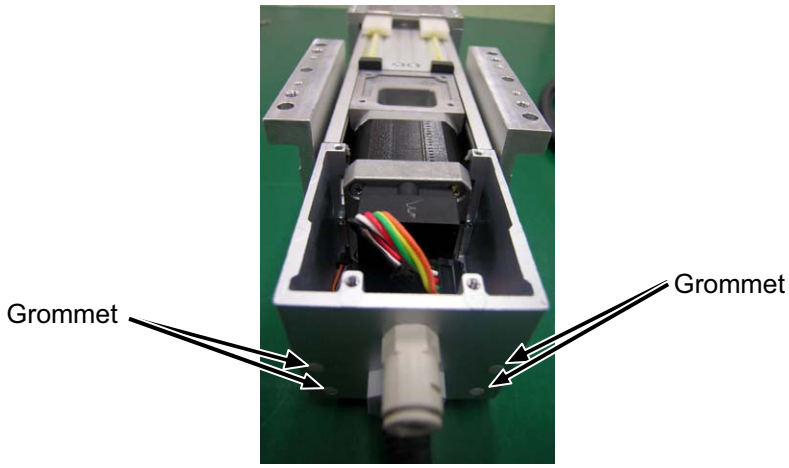
Tool to use: Hex wrench 2mm-sized

Tightening Torque : 49.8N•cm

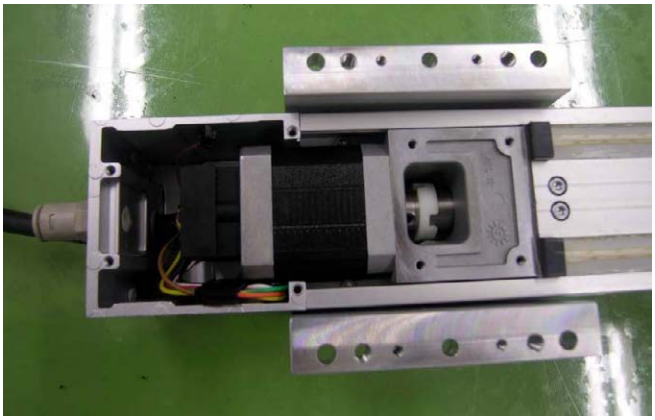


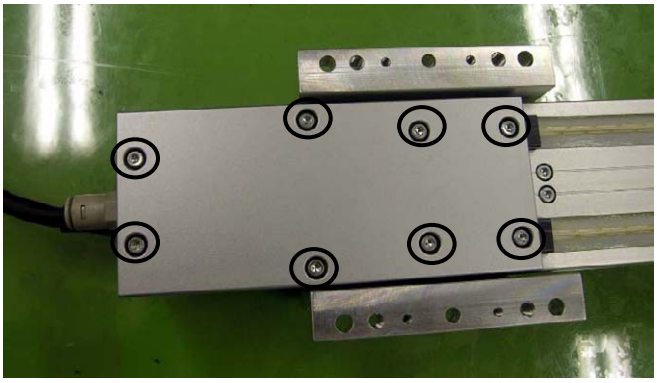
22) By using a tool with a long and slim shape such as a hex wrench, push in the four grommets (at the circled places) on the back.





23) Attach the bottom cover at the bottom of the actuator and tighten the eight hex socket head cap screws (at circled places) with a hex wrench to affix the cover.





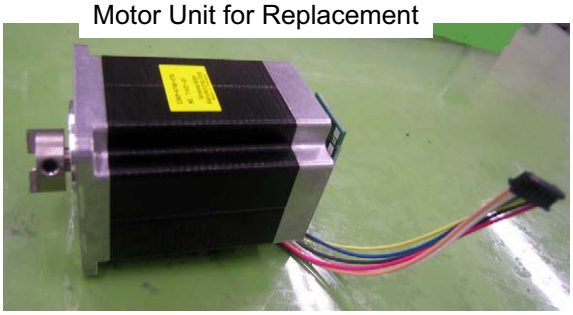
Tool to use: Hex wrench 2.5mm-sized

Tightening Torque : 88.7N•cm

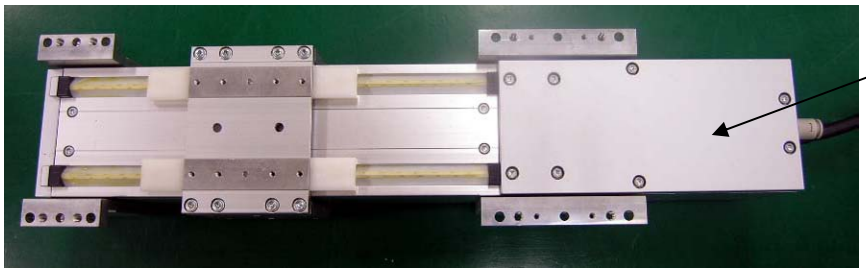
4.7.2 SA7C

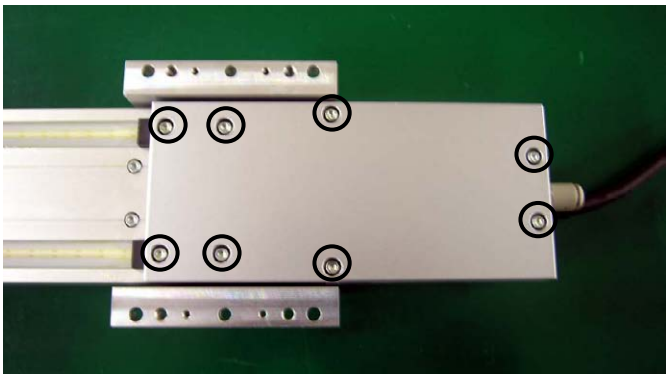
[Items Required for Replacement Work]
• Motor Unit for Replacement
• Hex Wrench
2mm, 2.5mm and 3mm-sized

Motor Unit for Replacement

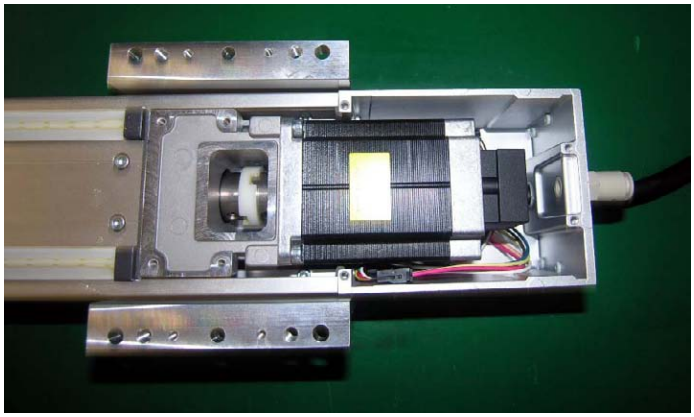


[Step]
1) Loosen the eight hex socket head cap screws holding the bottom cover on the bottom of the actuator (at the circled places) with a hex wrench to detach the cover.

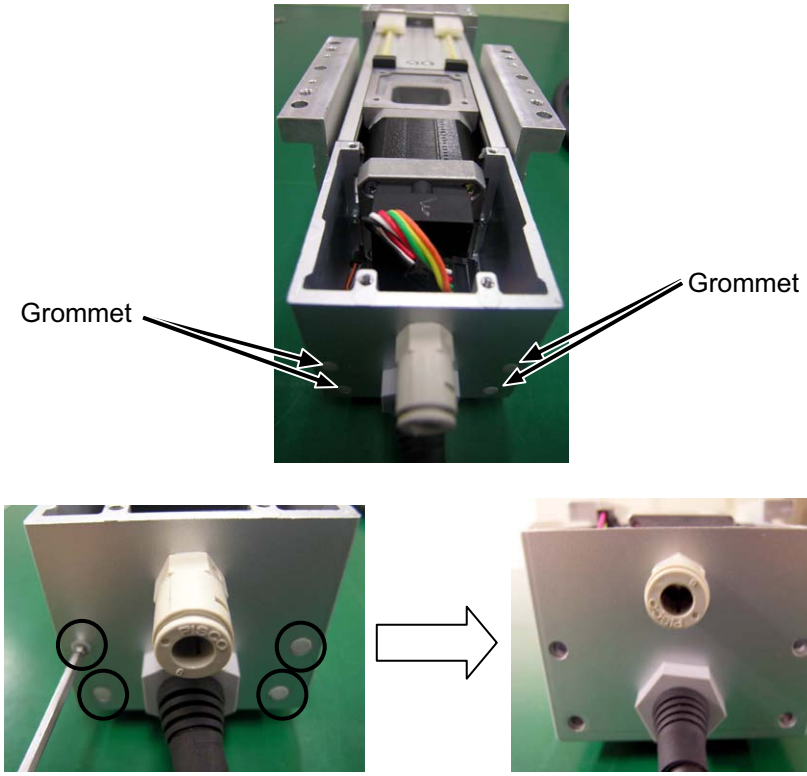




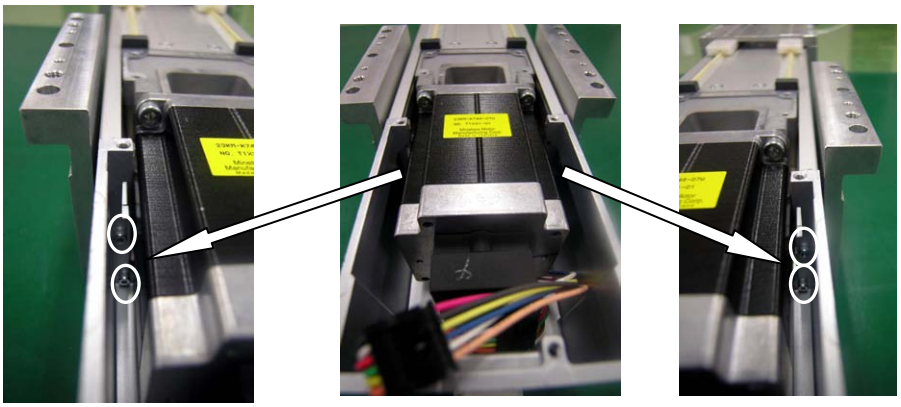
Tool to use:
Hex wrench 2.5mm-sized

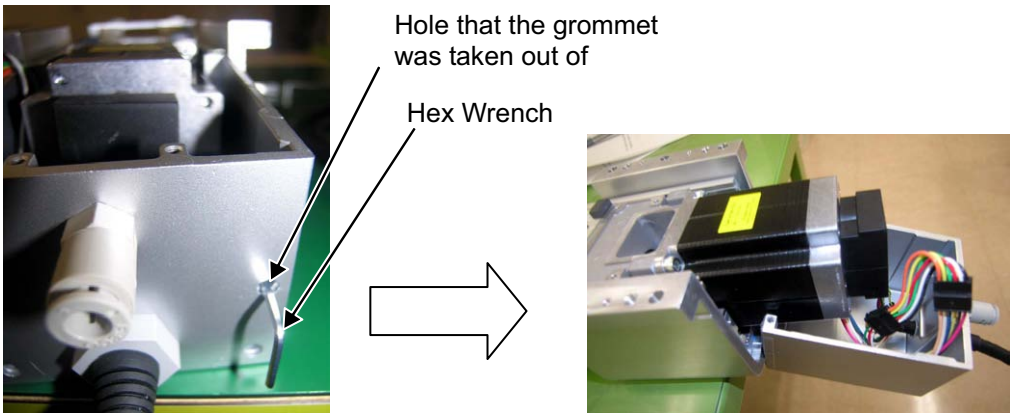


2) By using a tool with a long and slim shape such as a hex wrench, push in the four grommets (at the circled places) on the back side to detach them.



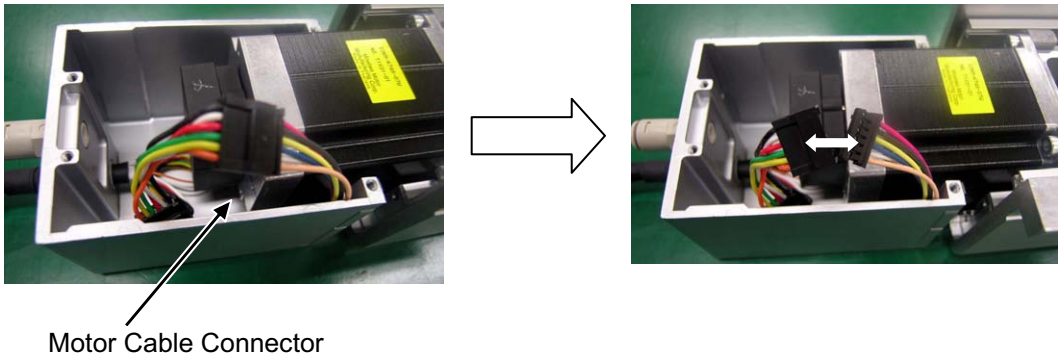
3) Insert a hex wrench to the holes the grommets were taken out of to detach the four hex socket head cap screws holding the motor cover (at the circled places) with it.



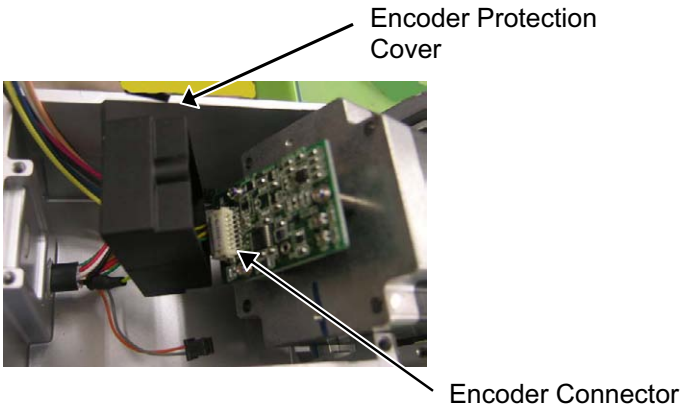


Tool to use: Hex wrench 2mm-sized

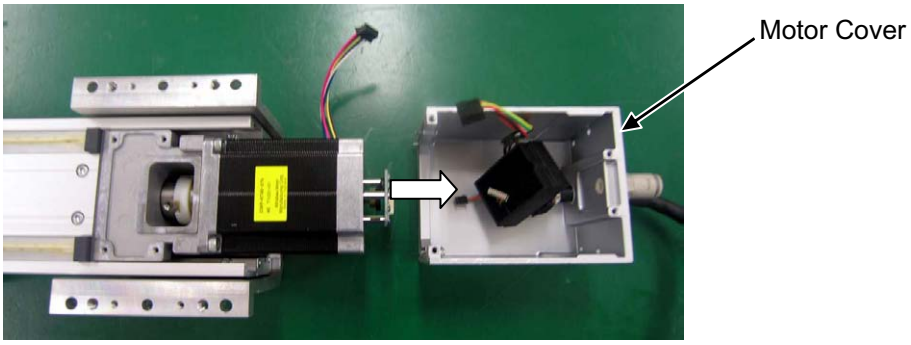
4) Unplug the motor cable connector.



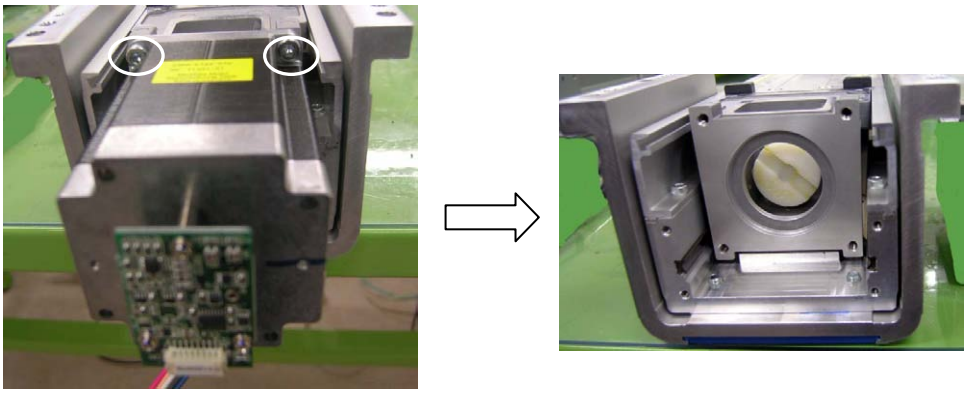
5) Detach the protection cover for the encoder and unplug the encoder connector.



6) Detach the motor cover.

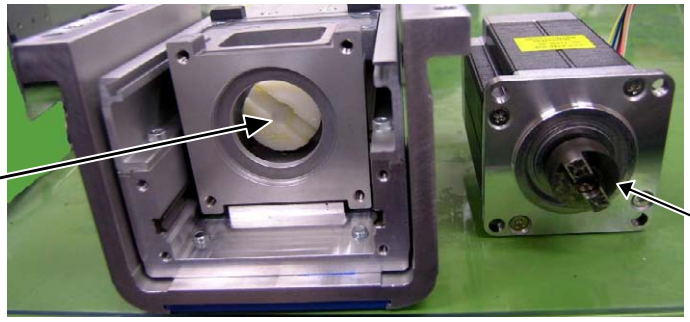


7) Remove the four screws holding the motor (at circled places) with a hex wrench to detach the motor.

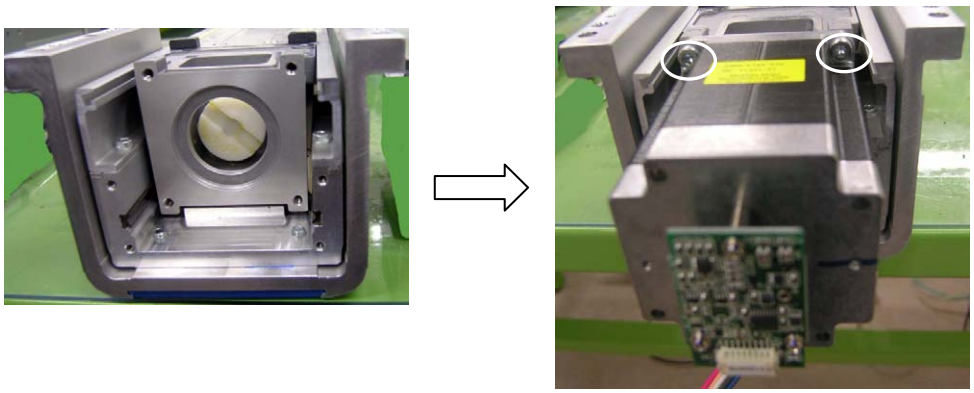


Tool to use: Hex wrench 3mm-sized

8) Rotate the coupling on the replacement motor unit to adjust the position of the protrusion on it so it fits to the recessed slit.



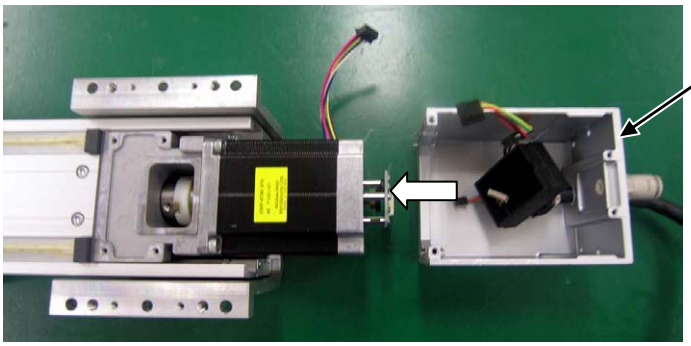
9) Attach the motor and tighten the four screws to hold the motor (at circled places) with a hex wrench.

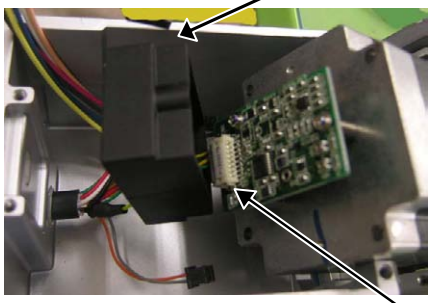


Tool to use: Hex wrench 3mm-sized

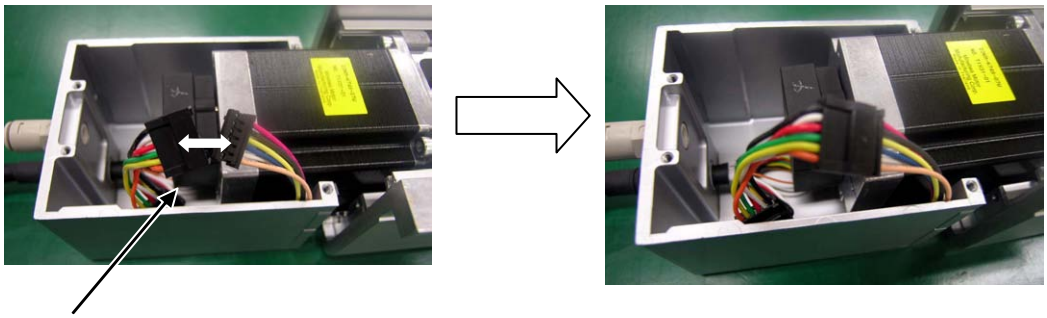
Tightening Torque : 207N•cm

10) Attach the motor cover and plug in the encoder connector.

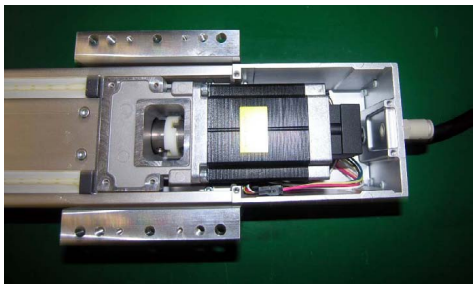


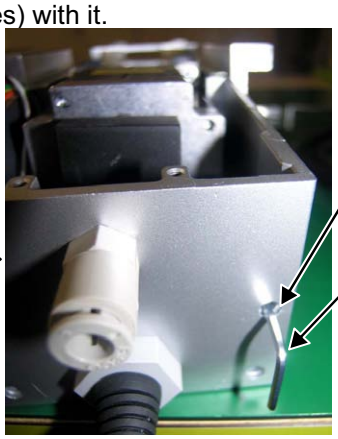


11) Plug in the motor cable connector.



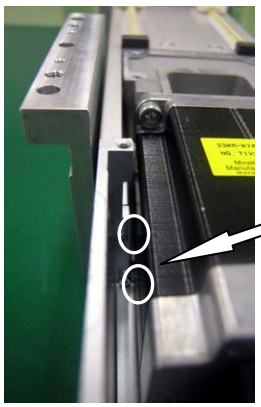
12) Insert a hex wrench to the holes the grommets were taken out of to tighten the four hex socket head cap screws to hold the motor cover (at the circled places) with it.

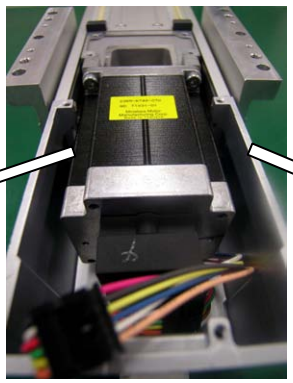


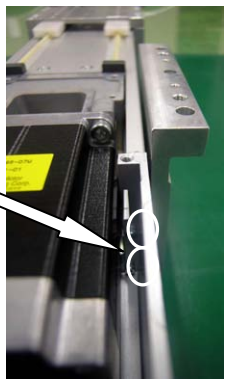


Tool to use: Hex wrench 2mm-sized

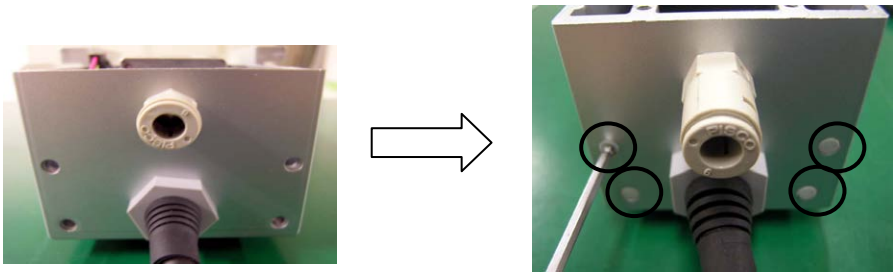
Tightening Torque : 49.8N•cm

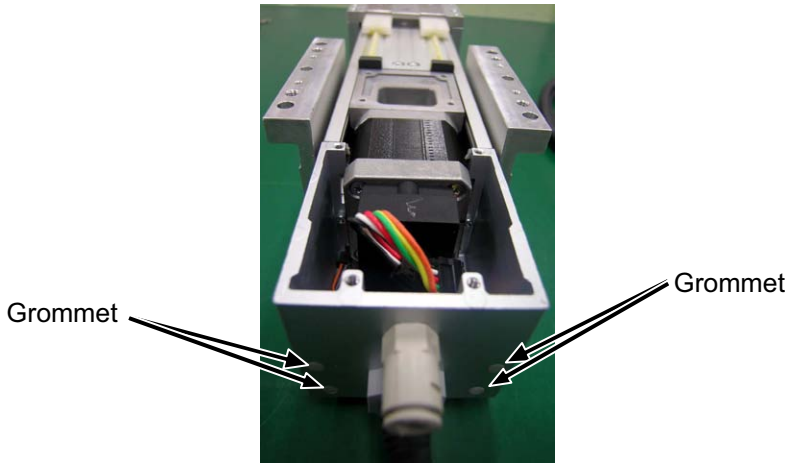




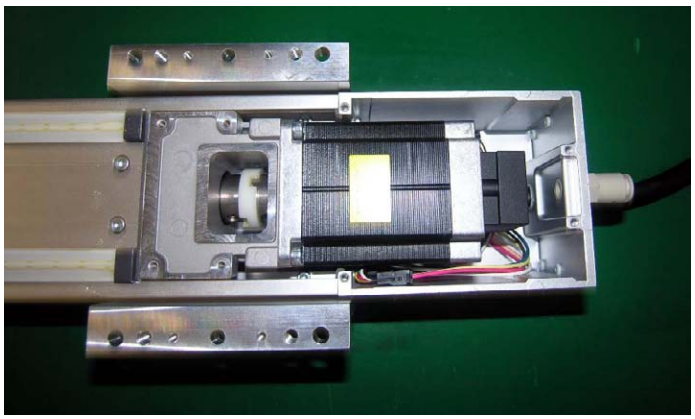


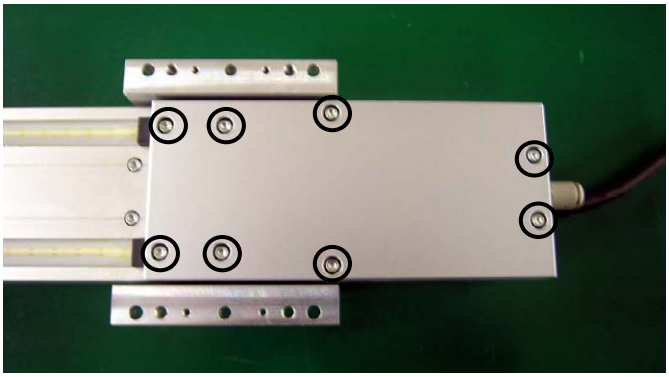
13) By using a tool with a long and slim shape such as a hex wrench, push in the four grommets (at the circled places) on the back.





14) Attach the bottom cover at the bottom of the actuator and tighten the eight hex socket head cap screws (at circled places) with a hex wrench to affix the cover.





Tool to use: Hex wrench 2.5mm-sized

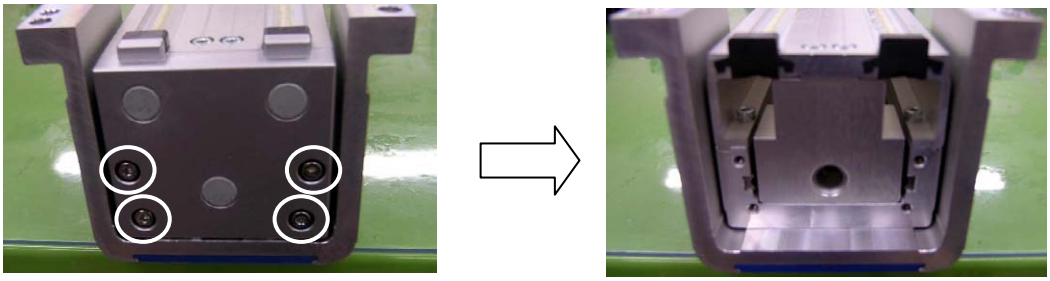
Tightening Torque : 88.7N•cm

4.8 Seal (opening) Replacement Process

[Items Required for Replacement Work]
• Seal
• Hex Wrench
2.5mm-sized

Seal

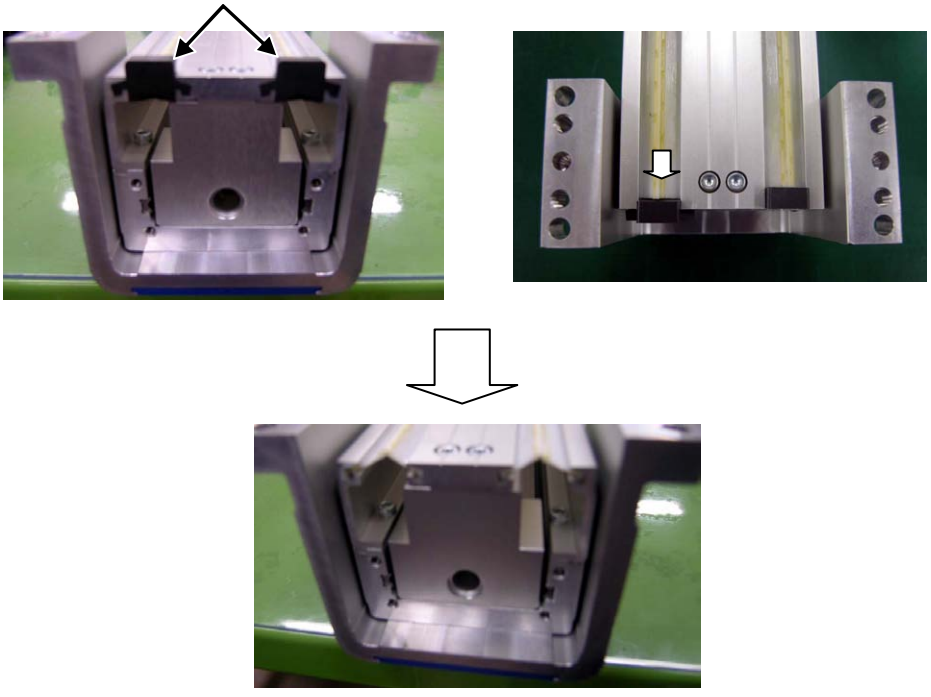
[Step]
1) Loosen the four hex socket head cap screws holding the cover on the side opposite to the motor (at the circled places) with a hex wrench to detach the cover.



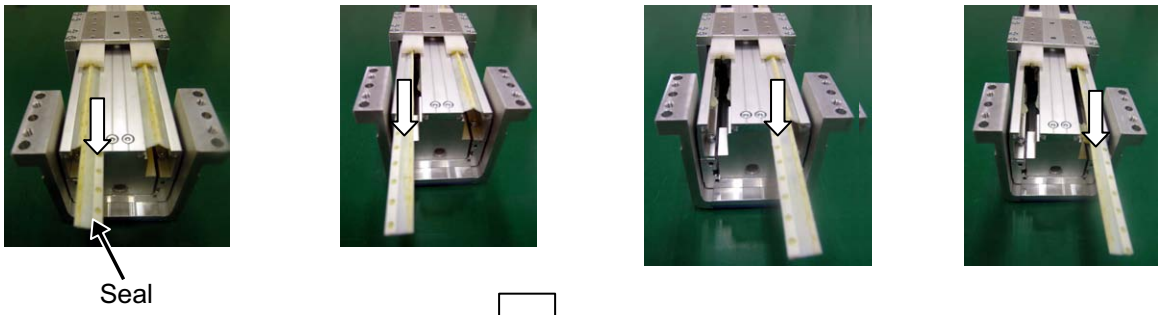
Tool to use: Hex wrench 2.5mm-sized

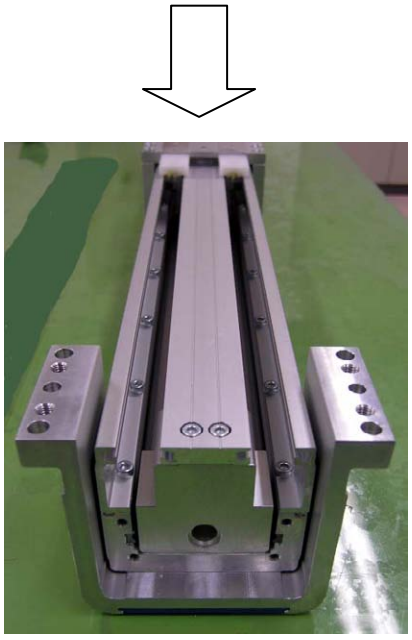
2) Slide the terminal caps to remove them.

Edge Cap

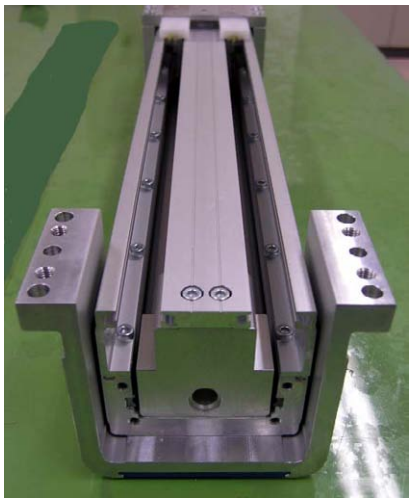


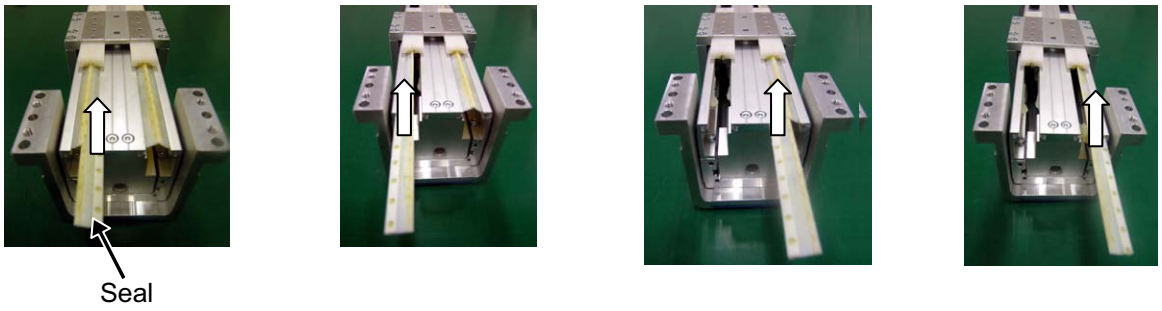
3) Pull the seals to take them out.



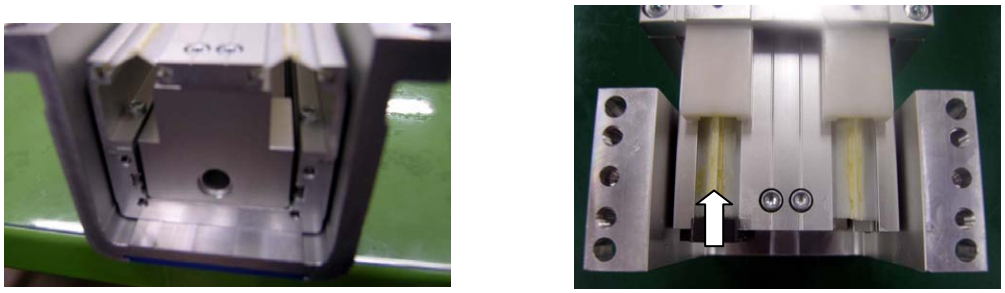


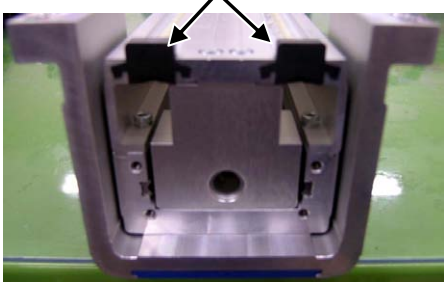
4) Insert the seals for replacement to attach them.



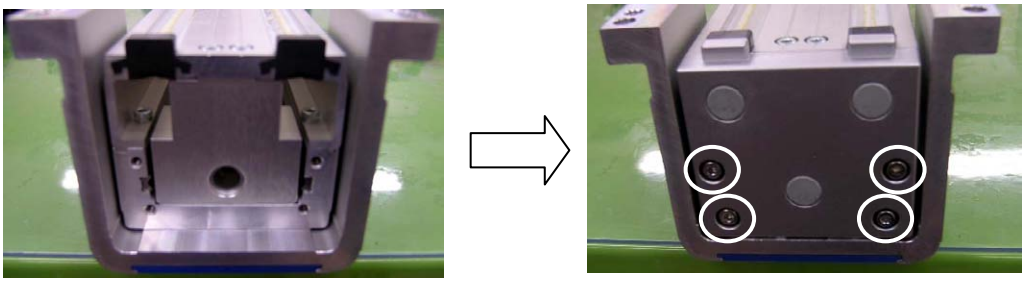


5) Slide in the terminal caps to attach them.





6) Tighten the four hex socket head cap screws to hold the cover on the side opposite to the motor (at the circled places) with a hex wrench to attach the cover.

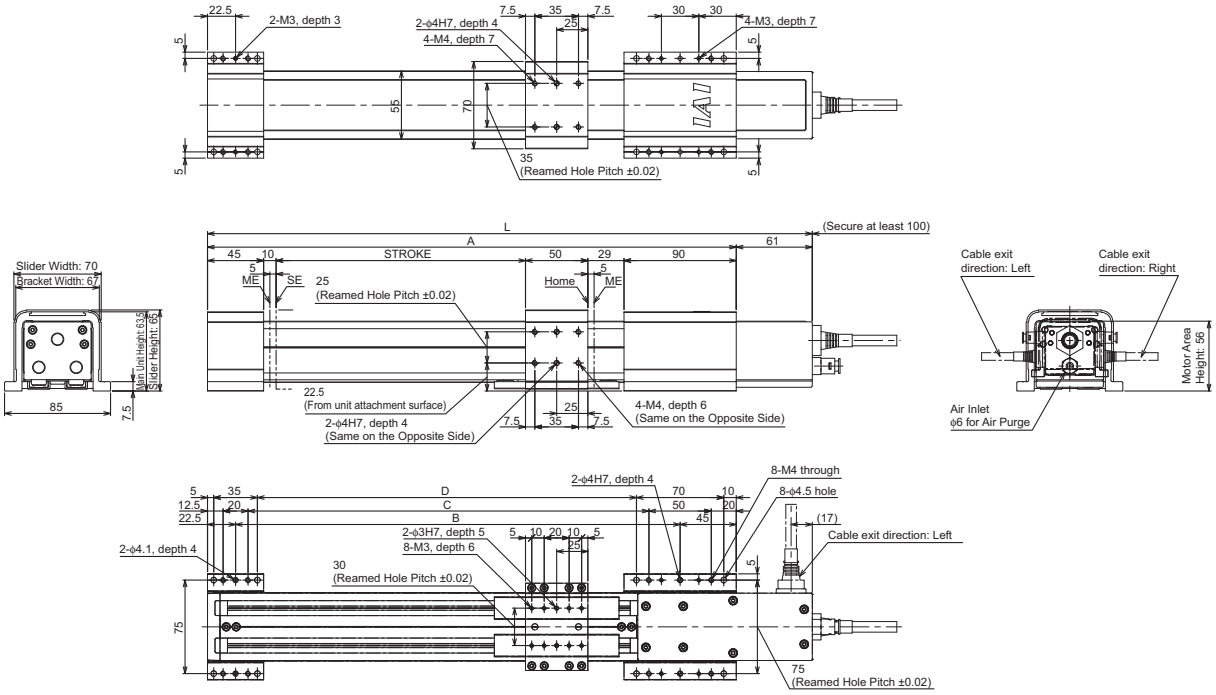


Tool to use: Hex wrench 2.5mm-sized

Tightening Torque : 88.7N•cm

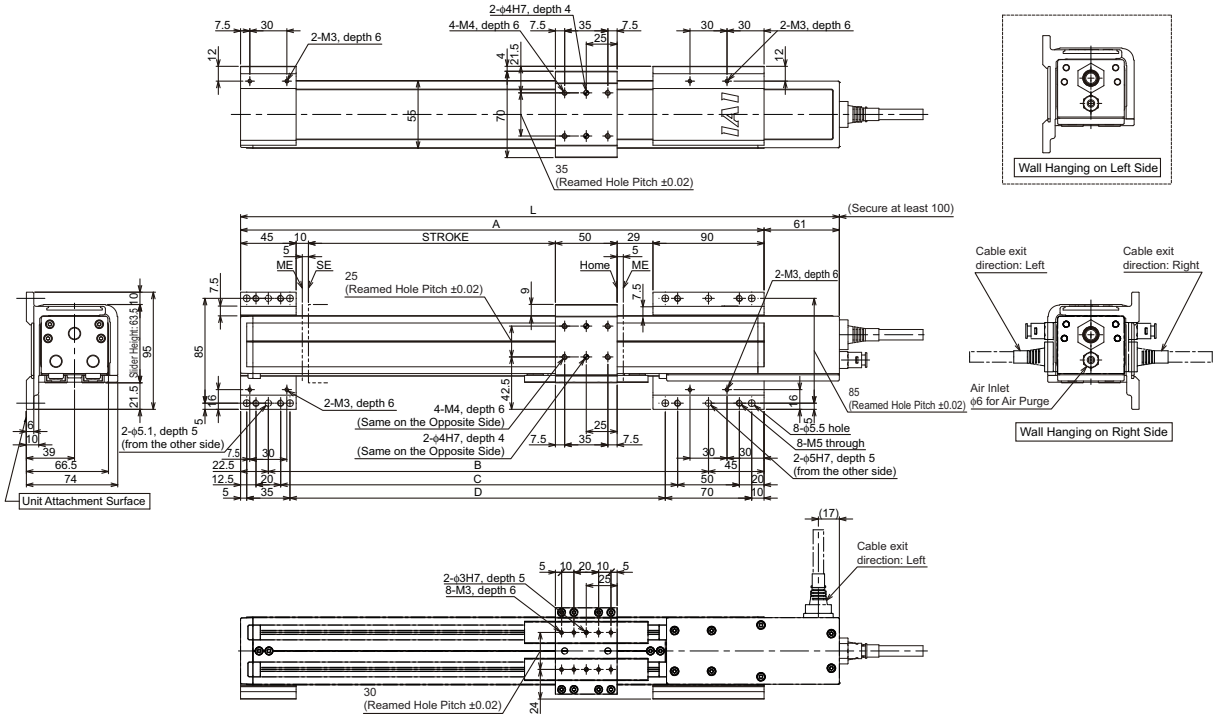
5. External Dimensions

[SA5 Standard Type]



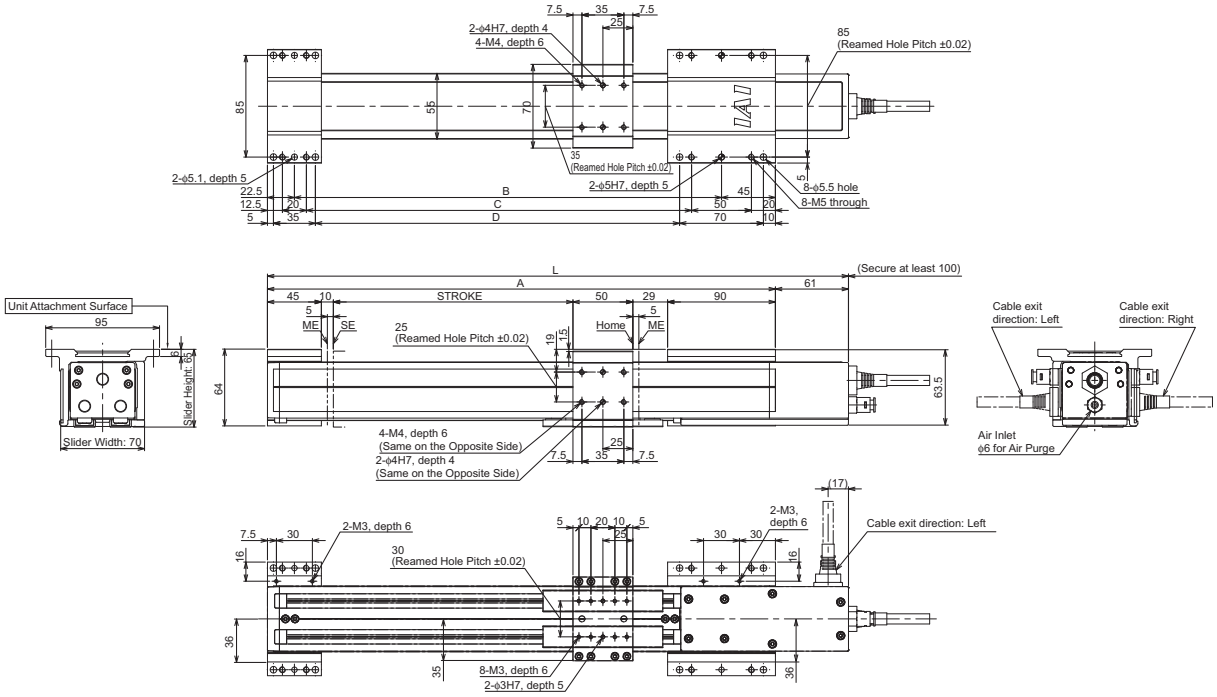
STROKE	L	A	B	C	D	Weight [kg]
100	385	324	256.5	221.5	204	2.8
150	435	374	306.5	271.5	254	2.9
200	485	424	356.5	321.5	304	3.1
250	535	474	406.5	371.5	354	3.2
300	585	524	456.5	421.5	404	3.4
350	635	574	506.5	471.5	454	3.5
400	685	624	556.5	521.5	504	3.7
450	735	674	606.5	571.5	554	3.8
500	785	724	656.5	621.5	604	4.0

[SA5 Wall-hang Type]



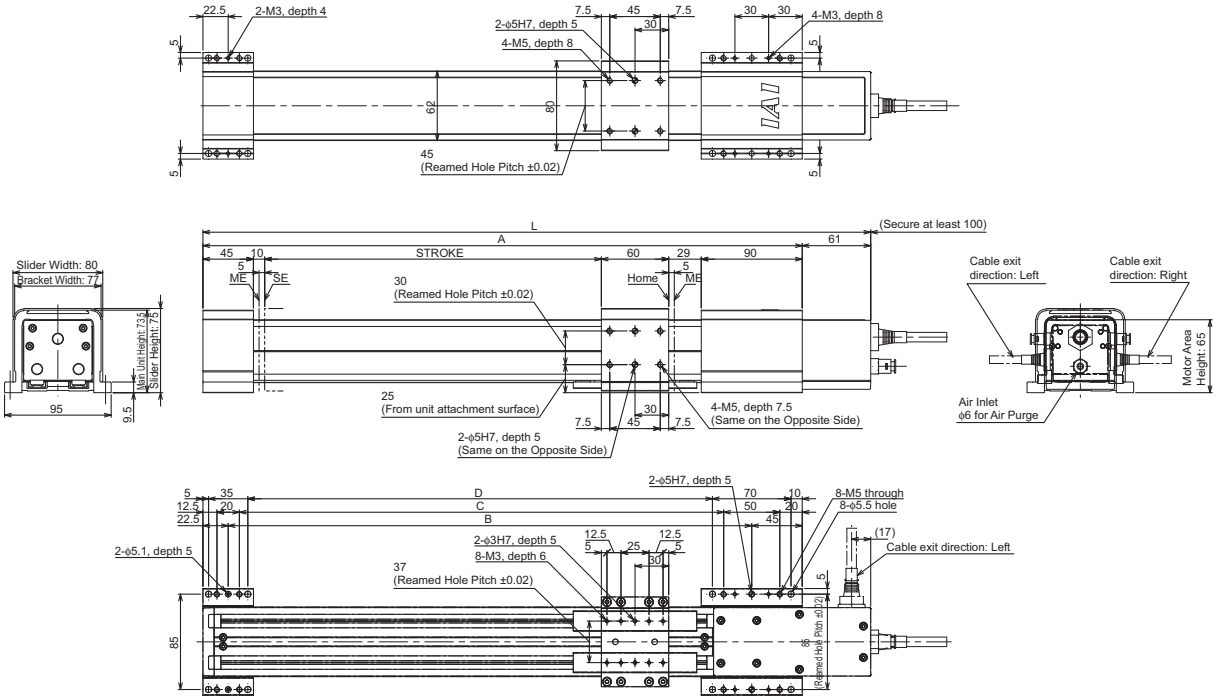
STROKE	L	A	B	C	D	Weight [kg]
100	385	324	256.5	221.5	204	2.8
150	435	374	306.5	271.5	254	2.9
200	485	424	356.5	321.5	304	3.1
250	535	474	406.5	371.5	354	3.2
300	585	524	456.5	421.5	404	3.4
350	635	574	506.5	471.5	454	3.5
400	685	624	556.5	521.5	504	3.7
450	735	674	606.5	571.5	554	3.8
500	785	724	656.5	621.5	604	4.0

[SA5 Ceiling Type]



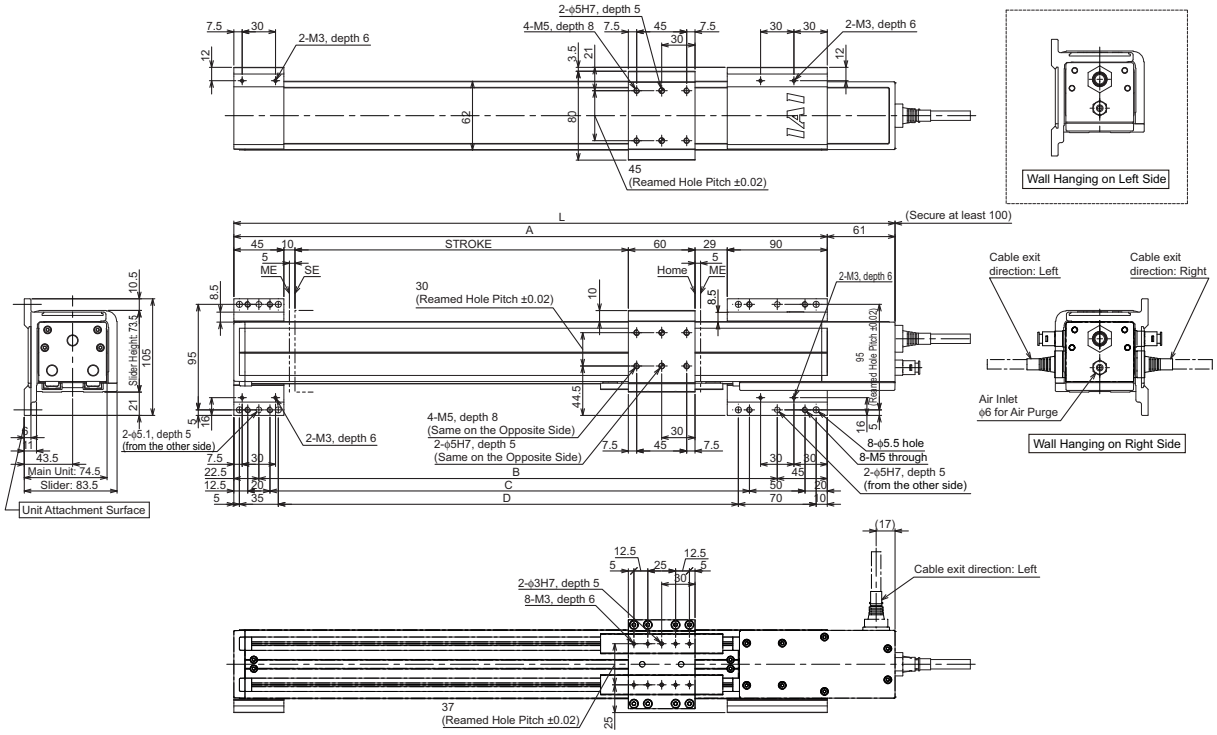
STROKE	L	A	B	C	D	Weight [kg]
100	385	324	256.5	221.5	204	2.8
150	435	374	306.5	271.5	254	2.9
200	485	424	356.5	321.5	304	3.1
250	535	474	406.5	371.5	354	3.2
300	585	524	456.5	421.5	404	3.4
350	635	574	506.5	471.5	454	3.5
400	685	624	556.5	521.5	504	3.7
450	735	674	606.5	571.5	554	3.8
500	785	724	656.5	621.5	604	4.0

[SA6 Standard Type]



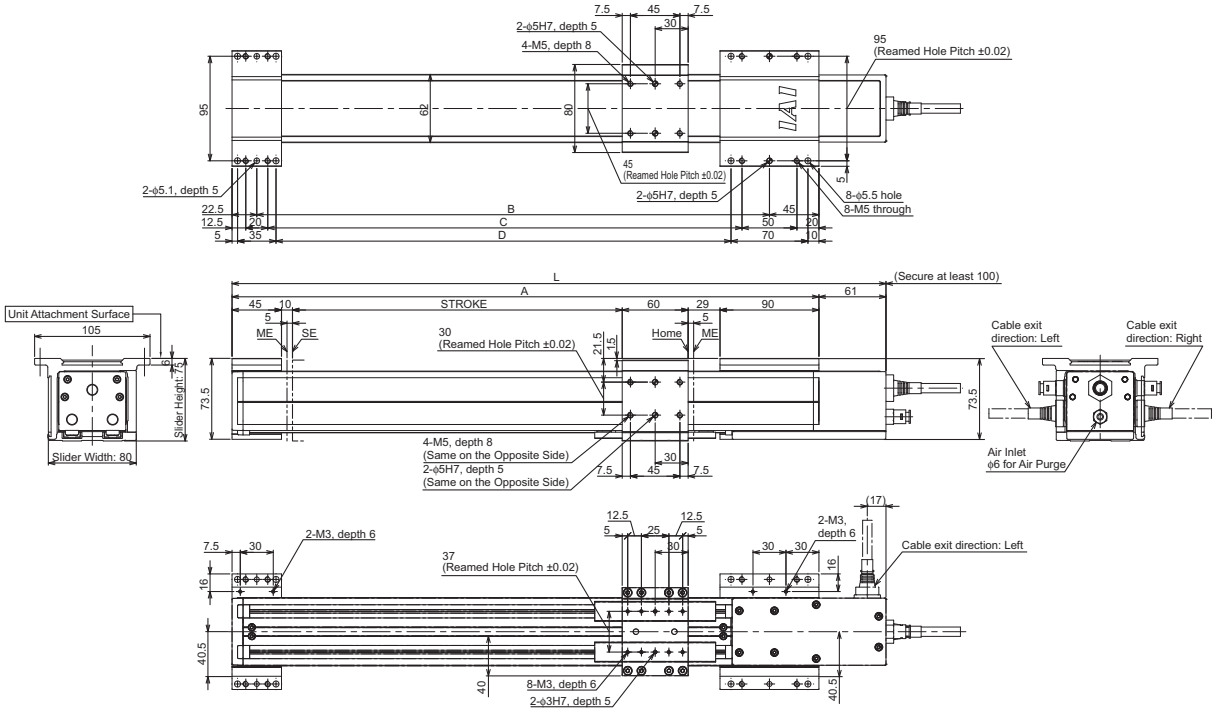
STROKE	L	A	B	C	D	Weight [kg]
100	395	334	266.5	231.5	214	3.8
150	445	384	316.5	281.5	264	4.1
200	495	434	366.5	331.5	314	4.3
250	545	484	416.5	381.5	364	4.5
300	595	534	466.5	431.5	414	4.7
350	645	584	516.5	481.5	464	4.9
400	695	634	566.5	531.5	514	5.1
450	745	684	616.5	581.5	564	5.3
500	795	734	666.5	631.5	614	5.5
550	845	784	716.5	681.5	664	5.8
600	895	834	766.5	731.5	714	6.0

[SA6 Wall-hang Type]



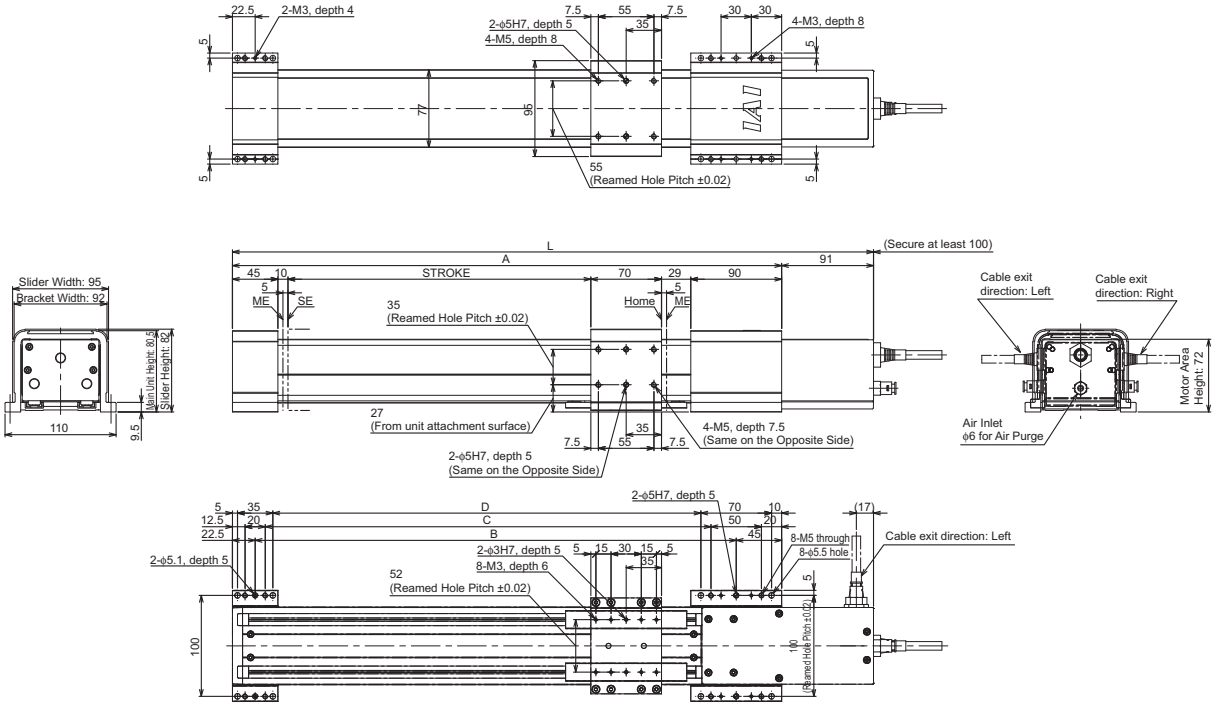
STROKE	L	A	B	C	D	Weight [kg]
100	395	334	266.5	231.5	214	3.8
150	445	384	316.5	281.5	264	4.1
200	495	434	366.5	331.5	314	4.3
250	545	484	416.5	381.5	364	4.5
300	595	534	466.5	431.5	414	4.7
350	645	584	516.5	481.5	464	4.9
400	695	634	566.5	531.5	514	5.1
450	745	684	616.5	581.5	564	5.3
500	795	734	666.5	631.5	614	5.5
550	845	784	716.5	681.5	664	5.8
600	895	834	766.5	731.5	714	6.0

[SA6 Ceiling Type]



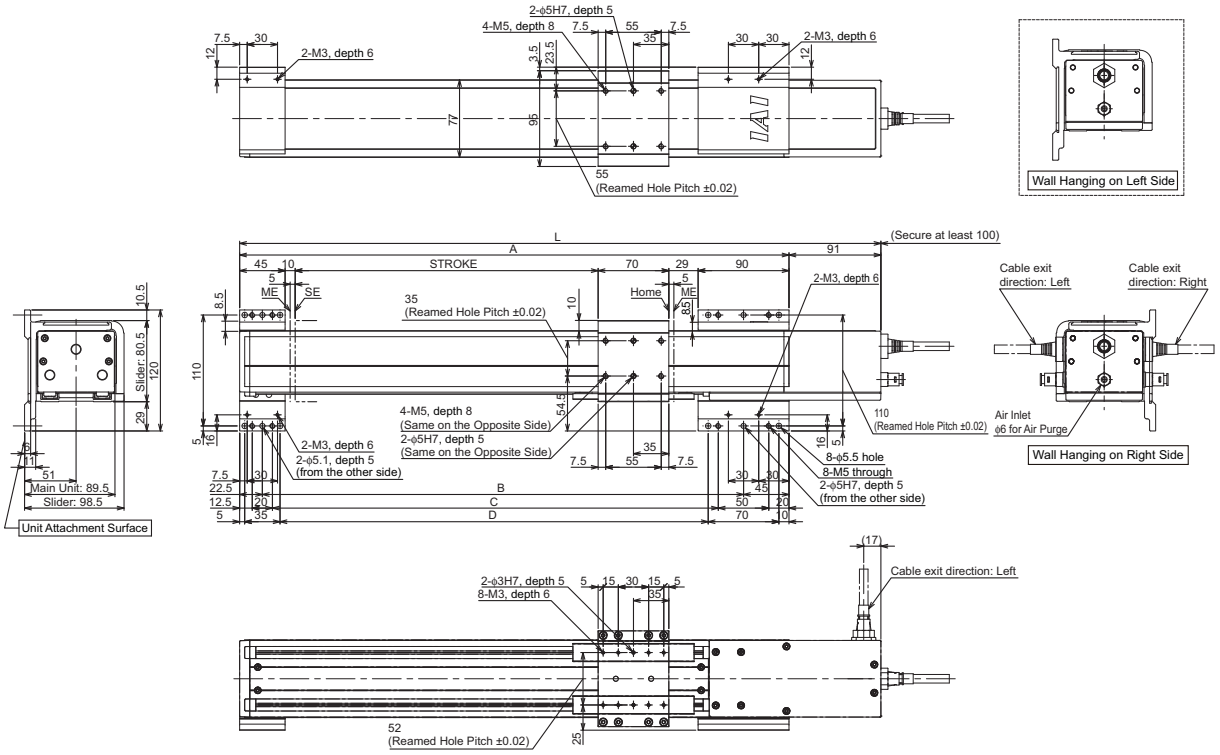
STROKE	L	A	B	C	D	Weight [kg]
100	395	334	266.5	231.5	214	3.8
150	445	384	316.5	281.5	264	4.1
200	495	434	366.5	331.5	314	4.3
250	545	484	416.5	381.5	364	4.5
300	595	534	466.5	431.5	414	4.7
350	645	584	516.5	481.5	464	4.9
400	695	634	566.5	531.5	514	5.1
450	745	684	616.5	581.5	564	5.3
500	795	734	666.5	631.5	614	5.5
550	845	784	716.5	681.5	664	5.8
600	895	834	766.5	731.5	714	6.0

[SA7 Standard Type]



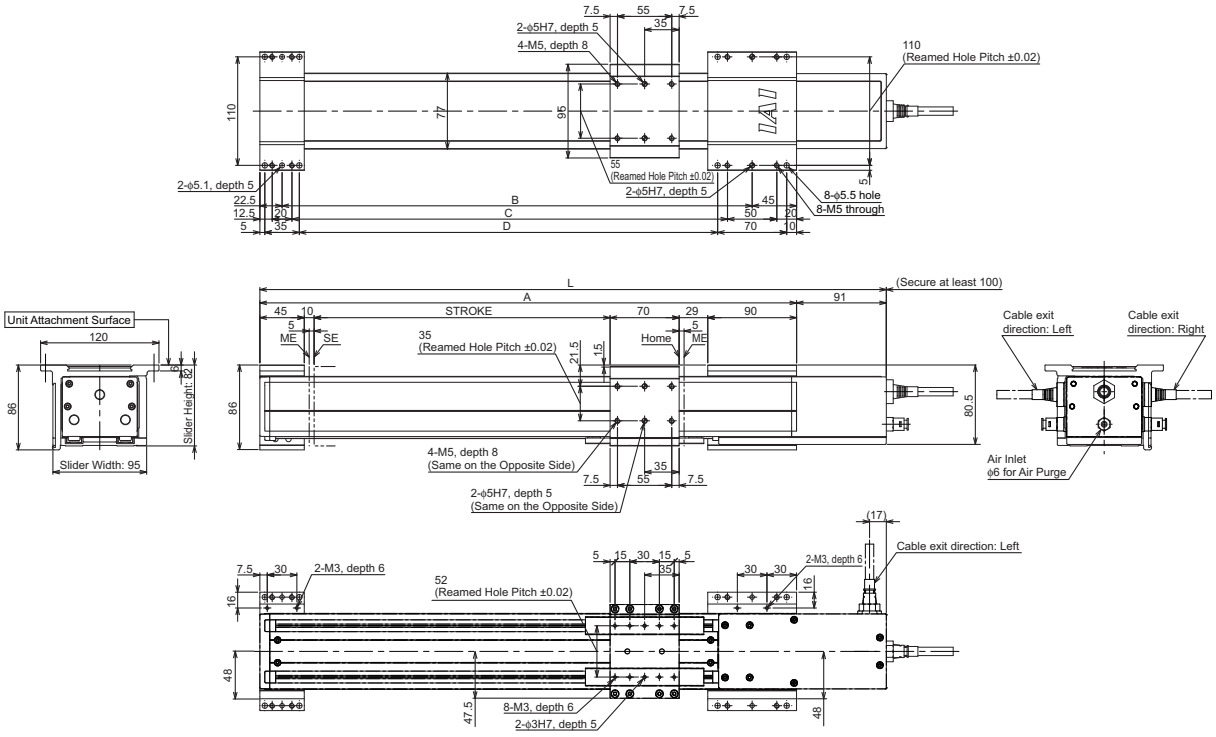
STROKE	L	A	B	C	D	Weight [kg]
100	435	344	276.5	241.5	224	5.9
150	485	394	326.5	291.5	274	6.2
200	535	444	376.5	341.5	324	6.5
250	585	494	426.5	391.5	374	6.8
300	635	544	476.5	441.5	424	7.1
350	685	594	526.5	491.5	474	7.4
400	735	644	576.5	541.5	524	7.6
450	785	694	626.5	591.5	574	7.9
500	835	744	676.5	641.5	624	8.2
550	885	794	726.5	691.5	674	8.5
600	935	844	776.5	741.5	724	8.8
650	985	894	826.5	791.5	774	9.0
700	1035	944	876.5	841.5	824	9.3

[SA7 Wall-hang Type]



STROKE	L	A	B	C	D	Weight [kg]
100	435	344	276.5	241.5	224	5.9
150	485	394	326.5	291.5	274	6.2
200	535	444	376.5	341.5	324	6.5
250	585	494	426.5	391.5	374	6.8
300	635	544	476.5	441.5	424	7.1
350	685	594	526.5	491.5	474	7.4
400	735	644	576.5	541.5	524	7.6
450	785	694	626.5	591.5	574	7.9
500	835	744	676.5	641.5	624	8.2
550	885	794	726.5	691.5	674	8.5
600	935	844	776.5	741.5	724	8.8
650	985	894	826.5	791.5	774	9.0
700	1035	944	876.5	841.5	824	9.3

[SA7 Ceiling Type]



STROKE	L	A	B	C	D	Weight [kg]
100	435	344	276.5	241.5	224	5.9
150	485	394	326.5	291.5	274	6.2
200	535	444	376.5	341.5	324	6.5
250	585	494	426.5	391.5	374	6.8
300	635	544	476.5	441.5	424	7.1
350	685	594	526.5	491.5	474	7.4
400	735	644	576.5	541.5	524	7.6
450	785	694	626.5	591.5	574	7.9
500	835	744	676.5	641.5	624	8.2
550	885	794	726.5	691.5	674	8.5
600	935	844	776.5	741.5	724	8.8
650	985	894	826.5	791.5	774	9.0
700	1035	944	876.5	841.5	824	9.3

6. Life

The mechanical life of the actuator is represented by that of the guide receiving the greatest moment load.Operation life of the linear guide is to be determined by the total driving distance which can reach without having 90% flaking (peeling on rail surface).
Operation life can be figured out with the calculation method shown below.

6.1 How to Calculate Operation Life

For the operation life of the linear guide, use the dynamic allowable moment stated in 1.2 Specifications, and figure out with the formula below.

$$L = \left(\frac{C_M}{M} \right)^3 \cdot 5000\text{km}$$

L : Operation life (km) C_M : Dynamic allowable moment (N・m)
M : Moment to work (N・m) 5000km : Standard rated life of ROBO Cylinder

In addition, have a calculation for the drop of life with the formula below if there is a concern that the life could drop due to the condition of vibration or way to be attached.

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{ws}}{f_w} \cdot \frac{1}{f\alpha} \right)^3 \cdot 5000\text{km}$$

L : Operation life (km) C_M : Dynamic allowable moment (N・m)
M : Moment to work (N・m) f_{ws} : Standard operational coefficient
f_w : Load coefficient $f\alpha$: Attachment coefficient
5000km : Standard rated life of ROBO Cylinder

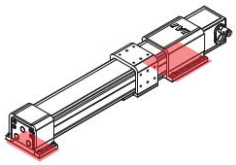
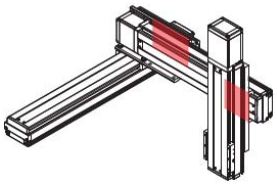
Explained below is regarding the standard operational coefficient f_{ws}, load coefficient f_w and attachment coefficient $f\alpha$.
Refer to the contents below to set them up.

[Standard operational coefficient f_{ws}]
For ROBO Cylinders described in this manual, f_{ws} = 1.2. It is a coefficient defined for each model, some models such as RCS3 high-speed type is 1.35.

[Load coefficient f_w]
It is a coefficient to consider the life drop due to operational conditions.

Load coefficient f_w	Operation Condition	Reference for acceleration/deceleration
1.0 to 1.5	Small vibration or impact in slow operation	0.6G or less

[Attachment coefficient f_α]
Attachment coefficient f_α is a coefficient to consider the life drop due to the condition of actuator attachment.

Attachment coefficient f_α	1.0	1.2	1.5
Attached condition	Attachment in whole area	Attachment on both ends	Attachment on spots
			

* As the figures are those in common for each manual, they are not for RCP4W slider type. Replace to figures for RCP4W slider type and select the attachment coefficient.
* Even when in attachment in whole area, and the actuator is seated in the whole length of the product, select 1.2 or 1.5 for the attachment coefficient depending on the position of screw fixing.
* For attachment in whole area, use all of the tapped holes (counterbored holes) on the seat surface to fix.

6.2 Operation Life

The operation life depends on the moment to work. With light load, it will be longer than 5,000km, the standard rated life. With no consideration of vibration and attachment condition, the operation life is 40,000km according to the calculation with formula in the previous page underassumption that 0.5 C_M (half of dynamic allowable moment) of moment is applied on. It shows that it can be 8 times longer than the standard rated life, which is 5,000km.

7. Warranty

7.1 Warranty Period

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

7.2 Scope of the Warranty

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

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

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

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

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

7.3 Honoring the Warranty

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

7.4 Limited Liability

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

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

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

(2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:
   [1] Medical equipment pertaining to maintenance or management of human life or health
   [2] A mechanism or mechanical equipment intended to move or transport people (such as a vehicle, railway facility or aviation facility)
   [3] Important safety parts of mechanical equipment (such as safety devices)
   [4] Equipment used to handle cultural assets, art or other irreplaceable items

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

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

Change History

Revision Date	Description of Revision
2012.06	First edition
2012.10	Second edition Pg. 41 Note added for scraper (seal) replacement reference timing
2013.05	Third edition Pg. 47 Food grade grease type Changed from Medallion FM Grease No.1 to Medallion FM Grease No.2
2015.04	Fourth edition Pg. 31 Dynamic allowable moment value changed Pg. 12, 38 Dedicated controller added Pg. 41 Change made to inspection schedule Pg. 48 Grease supply volume, Recommended grease gun added Pg. 85 Change made about life
2015.06	Edition 4B Pg. 46 Grease change due to production stop Albania Grease No.2 → Albania Grease S2 Mobilux 2 → Unirex N2

Manual No.: ME3722-4B (June 2015)

IAI
Quality and Innovation

IAI Corporation

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

Technical Support available in USA, Europe and China

IAI America, Inc.

Head Office: 2690 W. 237th Street, Torrance, CA 90505
TEL (310) 891-6015 FAX (310) 891-0815
Chicago Office: 110 East State Parkway, Schaumburg, IL 60173
TEL (847) 908-1400 FAX (847) 908-1399
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066
TEL (678) 354-9470 FAX (678) 354-9471
website: www.intelligentactuator.com

IAI Industrieroboter GmbH

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

IAI (Shanghai) Co., Ltd.

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

IAI Robot (Thailand) Co., Ltd.

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

15.06.000