

Belt-Driven Actuator

IFA-SA1L/SA2L/SA3L
IFA-SA1R/SA2R/SA3R
IFA-MA1L/MA2L/MA3L
IFA-MA1R/MA2R/MA3R

Instruction Manual

First Edition

ME3811-1C



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Please Read Before Use

Thank you for purchasing our product.

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

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

Please download the user's manual from our website.

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

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

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

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

[Important]

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

IFA Actuator Instruction Manual Configuration

Product Name	Instruction Manual Name	Control Number
IFA Long Belt Type	First Step Guide	ME3812
IFA Long Belt Type	Instruction Manual (this document)	ME3811
RCON System	RCON System Instruction Manual	ME0384
RSEL System	RSEL System Instruction Manual	ME0392
XSEL-RA/SA Controller	XSEL-RA/SA/RAX/SAX/RAXD/SAXD Controller Instruction Manual	ME0359
XSEL-P/Q Controller	XSEL-P/Q Controller Instruction Manual	ME0198
SCON-CB Controller	SCON-CB Controller Instruction Manual	ME0340
SSEL Controller	SSEL Controller Instruction Manual	ME0157
PC teaching software	IA-OS First Step Guide * Refer to the guidance feature stored in IA-OS for how to operate	ME0391
Touch Panel Teaching Pendant	TB-02/02D Applicable for Position Controller Instruction Manual	ME0355
Touch Panel Teaching Pendant	TB-02/02D Applicable for Program Controller Instruction Manual	ME0356
Touch Panel Teaching Pendant	TB-03 Applicable for Position Controller Instruction Manual	ME0376
Touch Panel Teaching Pendant	TB-03 Applicable for Program Controller Instruction Manual	ME0377
SEL Language Programming	SEL Language Programming Manual	ME0224

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Safety Guide

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

Safety Precautions for Our Products

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

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

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

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring • Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. • Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. • Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. • When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. • Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. • Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. (3) Grounding • The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. • For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). For detail, follow the description in an instruction manual of each controller or controller built-in actuator. • 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 removed cover or screws, and make sure to put the product back to the original condition after maintenance and inspection works. Use in incomplete condition may cause damage to the product or an injury. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.
9	Modification and Dismantle	• Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	• When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. • When removing the actuator for disposal, pay attention to drop of components when detaching screws. • Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	• Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device. • See Overseas Specifications Compliance Manual to check whether complies if necessary. • For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety. • Using the devise in a way not indicated by IAI may lose the protection performance equipped to the device.

Alert Indication

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

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

Precautions for Handling

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

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

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

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

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

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

Use within the allowable range for each item.

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

5. In operation back and forth continuously in a short distance (30mm or less), the oil layer of the grease may get removed.

As a guideline, in every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50 mm distance or more to regenerate the oil film.

Continued use of the actuator in that state may lead to breakdown.

In an extreme case, there may occur flaking on the guide.

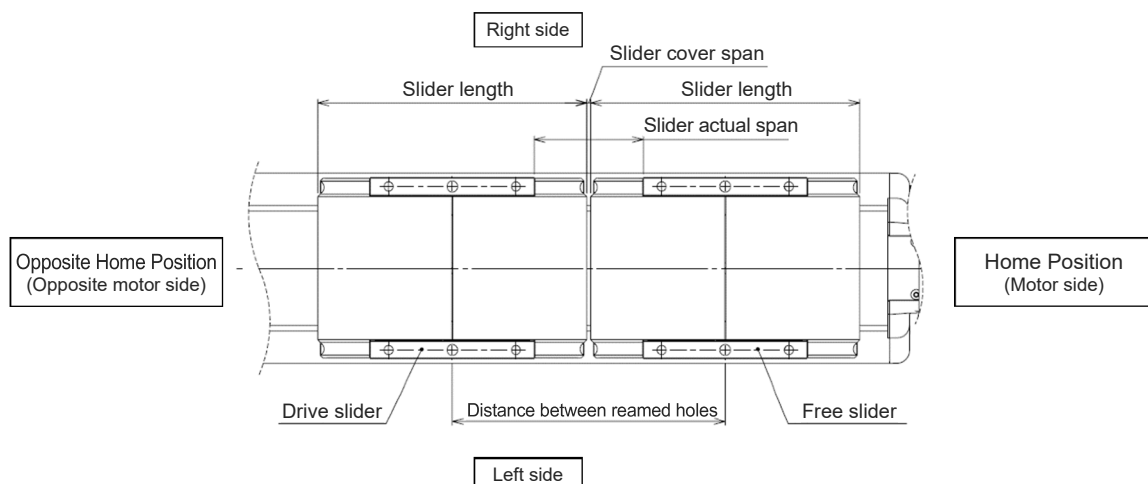
6. Do not attempt to have sliders collide with an obstacle at high speed.
7. Pressing operation cannot be performed.
8. The base oil separate from the grease may leak out from inside in some environments of use, installation postures or operational conditions.
Have a protection in case the base oil being applied can give a bad influence to the peripheral devices.
9. Make sure that the driving slider and the free slider are always linked while operation including during the home-return operation for the double slider type (option model code: W). Any operation without link of the slider could cause damage.
Also, make sure that the sliders are linked in the dimension of the slider cover span figured out of the effective stroke indicated at the order. Do not attempt to link the sliders in dimensions other than that as it should misalign the home position, which may disable normal operation.

Slider cover span = Nominal stroke (*) - Effective stroke - Slider length

* Nominal stroke is the effective stroke in the single slider.

10. The effective stroke for the double slider type should be shorter than the nominal stroke (*). Make sure not to make any operation above the effective stroke.

Effective stroke = Nominal stroke - (Slider length + Slider cover span)



International Standard Compliance

This actuator is complied with the following international standards.

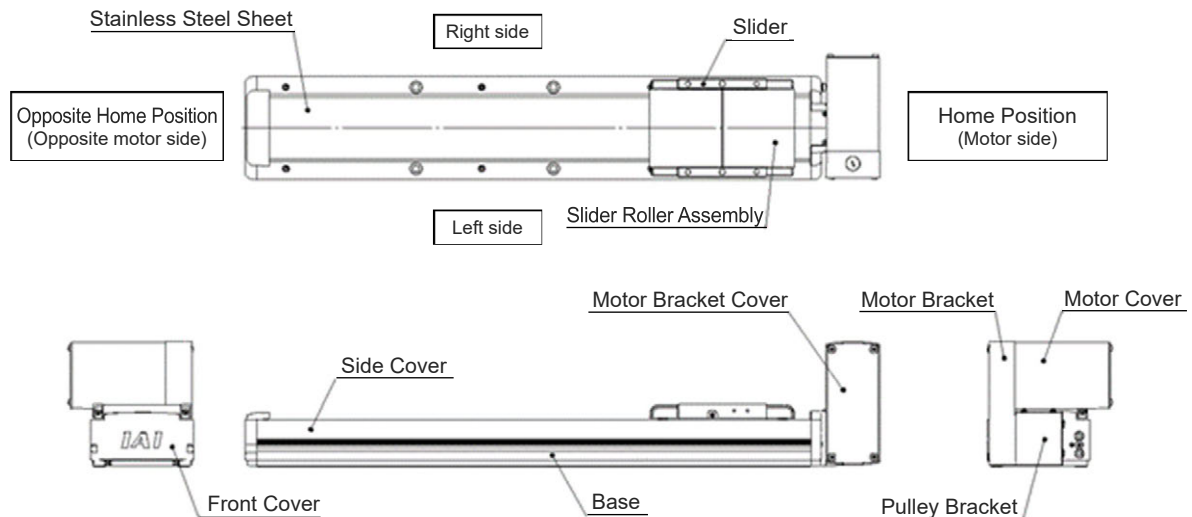
Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

CE Marking	RoHS3 Directive
○	○

○ : Complied in standard

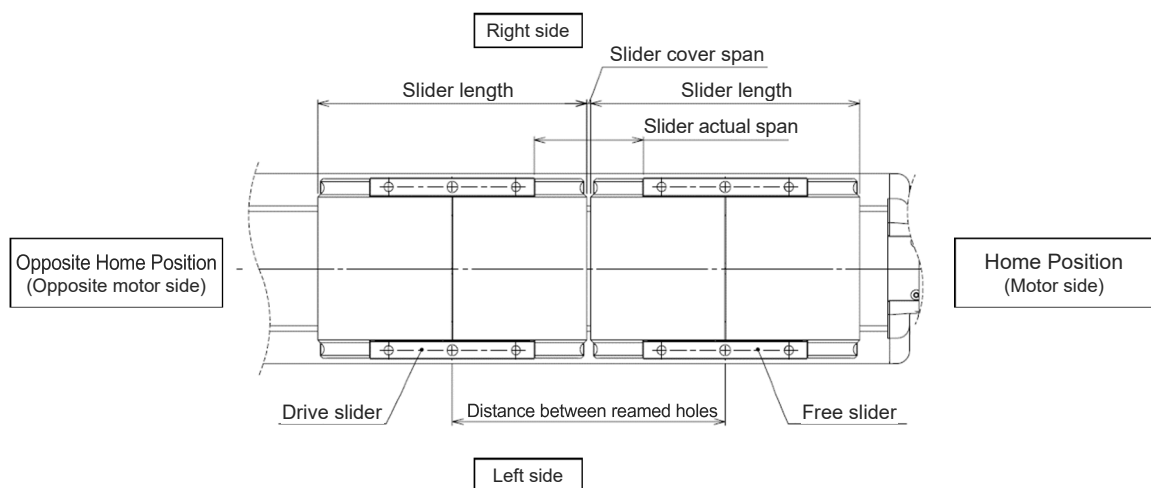
Part Names

In this manual, shows the layout of the right / left and the home position (motor side) / opposite home position (opposite motor side) with an actuator laid horizontally as shown in the figure below.



The figure shows IFA-SA1L.

[Double Slider Option]





Specifications

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1.1 Product Check

1.1.1 Parts

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

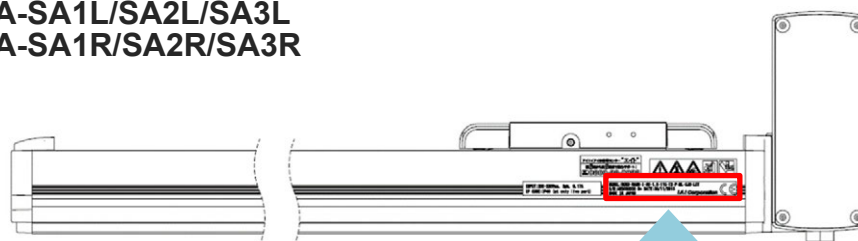
Body		Accessories (For IFA-MA only)
Qty 1		<u>Washer Dedicated for High-Tensile Bolt</u> <u>1 set</u> *The quantity may differ depending on the stroke.
		
Accessories		
<u>Motor Cable</u> <u>Qty 1</u>	<u>Encoder Cable</u> <u>Qty 1</u>	<u>Safety Guide</u> <u>Qty 1</u>
		

1.1.2 How to read the model nameplate

Model Code → **MODEL : IFA-SA1L-WA-100-500-T4-S-AQ**
 Serial Number → **S/N: B01000000 DATE: 24/08/2021**
MADE IN JAPAN **IAI Corporation** **CE**

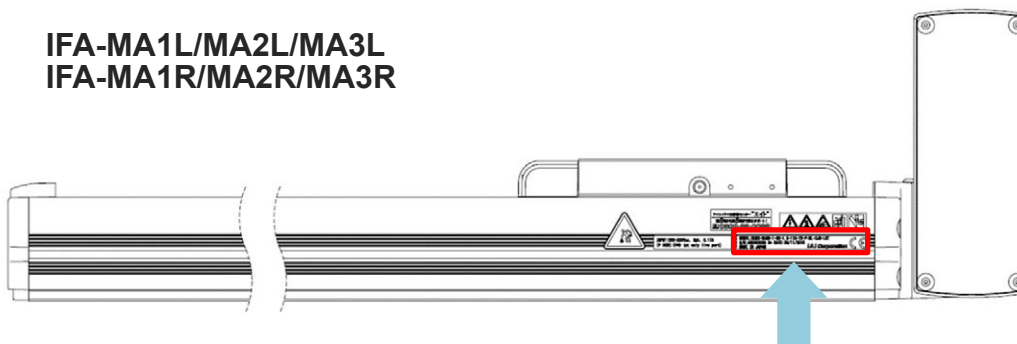
[Label Position]

IFA-SA1L/SA2L/SA3L
IFA-SA1R/SA2R/SA3R



MODEL : IFA-SA1L-WA-100-500-T4-S-AQ
 S/N: B01000000 DATE: 24/08/2021
 MADE IN JAPAN **IAI Corporation** **CE**

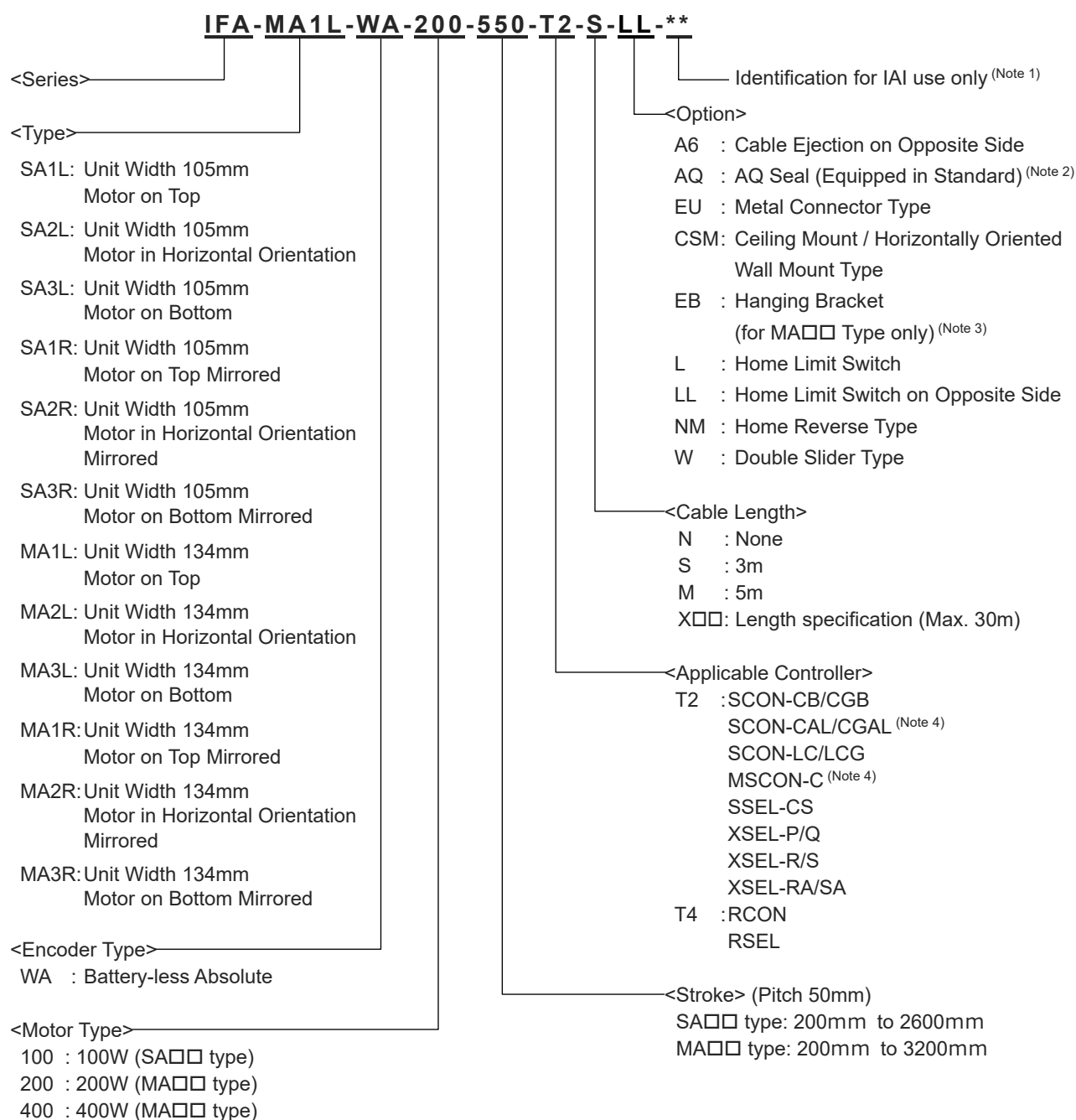
IFA-MA1L/MA2L/MA3L
IFA-MA1R/MA2R/MA3R



MODEL : IFA-MA1L-WA-200-800-T4-S-AQ
 S/N: B01000000 DATE: 24/08/2021
 MADE IN JAPAN **IAI Corporation** **CE**

* The label is attached on the opposite side for those with the home limit switch on the opposite end (-LL).

1.1.3 How to read the model number



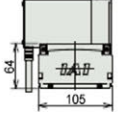
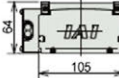
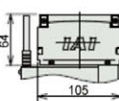
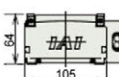
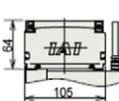
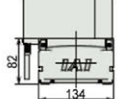
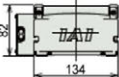
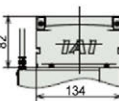
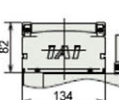
Note 1 Identification for IAI use only / This may be marked for the purpose of IAI. It is not an ID to describe the model code.

Note 2 Do not fail to select it as it is the equipment in standard.

Note 3 Options of the home limit switch (L) and the home limit switch on opposite side (LL) cannot be used together at the same time.

Note 4 The 400W type of IFA-MA is not capable of operation on SCON-CAL/CGAL or MSCON-C.

1.1.4 Product List

Type	Motor Orientation	Body Width	Motor Output (W)	Lead (mm)	Positioning Repeatability (mm)	Stroke (mm)	Max. Speed (mm/s)	Max. Payload in Horizontal (kg)
IFA	SA1L	Orientation in Top		100	28 or equivalent	± 0.04	200 to 1450 (Pitch 50mm)	20
								15
	SA2L	Horizontal Orientation		100	28 or equivalent	± 0.04	200 to 1450 (Pitch 50mm)	20
								15
	SA3L	Orientation in Bottom		100	28 or equivalent	± 0.04	200 to 1450 (Pitch 50mm)	20
								15
	SA1R	Orientation on Top Mirrored		100	28 or equivalent	± 0.04	200 to 1450 (Pitch 50mm)	20
								15
	SA2R	Horizontal Orientation Mirrored		100	28 or equivalent	± 0.04	200 to 1450 (Pitch 50mm)	20
								15
	SA3R	Orientation on Bottom Mirrored		100	28 or equivalent	± 0.04	200 to 1450 (Pitch 50mm)	20
								15
	MA1L	Orientation in Top		200	42 or equivalent	± 0.04	200 to 3200 (Pitch 50mm)	25 (Note 1)
				400				40
	MA2L	Horizontal Orientation		200	42 or equivalent	± 0.04	200 to 3200 (Pitch 50mm)	25 (Note 1)
				400				40
	MA3L	Orientation in Bottom		200	42 or equivalent	± 0.04	200 to 3200 (Pitch 50mm)	25 (Note 1)
				400				40
	MA1R	Orientation on Top Mirrored		200	42 or equivalent	± 0.04	200 to 3200 (Pitch 50mm)	25 (Note 1)
				400				40
	MA2R	Horizontal Orientation Mirrored		200	42 or equivalent	± 0.04	200 to 3200 (Pitch 50mm)	25 (Note 1)
				400				40
	MA3R	Orientation on Bottom Mirrored		200	42 or equivalent	± 0.04	200 to 3200 (Pitch 50mm)	25 (Note 1)
				400				40

Note 1: It is the value when the power supply voltage to the controller is 200V. It should be 17kg when the power supply voltage to the controller is 100V.

* The stroke and the maximum payload should differ for the double slider type. Refer to [1.2.2 Double Slider (Option)] for the details.

* When the home limit switch option (L/LL) is selected, the width dimension should be bigger by 12mm. Refer to [Chapter 5 External Dimensions] for the details.

1.2 Specifications

1.2.1 Single Slider

[1] IFA-SA□□-100

[Actuator Specifications 1]

Item	Contents
Motor (W)	100
Lead (mm)	28 equiv.
Max. Payload (kg)	Stroke 200 to 1450mm : 20 Stroke 1500 to 2600mm : 15
Max. Speed (mm/s)	2000
Rated Acceleration/Deceleration (G)	0.3
Max. Acceleration/Deceleration (G)	2.0
Rated Thrust (N)	53.5
Min. Stroke (mm)	200
Max. Stroke (mm)	2600
Stroke Pitch (mm)	50

[Actuator Specifications 2]

Item	Contents
Drive system	Timing Belt
Positioning repeatability	$\pm 0.04\text{mm}$
Lost motion	0.1mm or less
Base	Material: Dedicated Extruded Aluminum (A6063SS-T6 equiv.) Surface Treatment: White Anodizing
Linear guide	Linear Infinite Circulation Type
Static allowable moment ^(Note 2)	Ma: 109 N·m, Mb: 156 N·m, Mc: 255 N·m
Dynamic allowable moment ^(Note 1, 2)	Ma: 32.9 N·m, Mb: 47 N·m, Mc: 76.8 N·m
Ambient operating temperature/humidity	0 to 40°C, 85% RH or less (Non-condensing)
Protection class	IP20
Vibration resistance / Impact resistance	4.9m/s ²
International standard compliance	CE Marking, RoHS3 Directive
Motor type	AC servo motor
Encoder type	Battery-less absolute
Number of encoder pulse	16384 pulse/rev

Note 1 It is the value at 10,000km drive life and 90% of reliability.

Note 2 Even though the overhang load length or load moment is in the allowable range, abnormal vibration or noise may occur during operation as an influence of the way to mount the unit or a transportation object or the stiffness of the overhang mounting beam. Revise the conditions for operation in such cases.

For the details of moment directions and load overhang length, refer to the [following page].

(Note) The base oil separate from the grease may leak out from inside in some environments of use, installation postures or operational conditions.

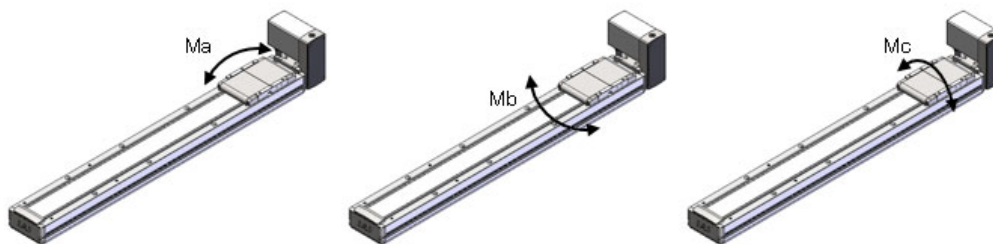
Have a protection in case the base oil being applied can give a bad influence to the peripheral devices.

Slider type moment direction

Ma: Pitching direction

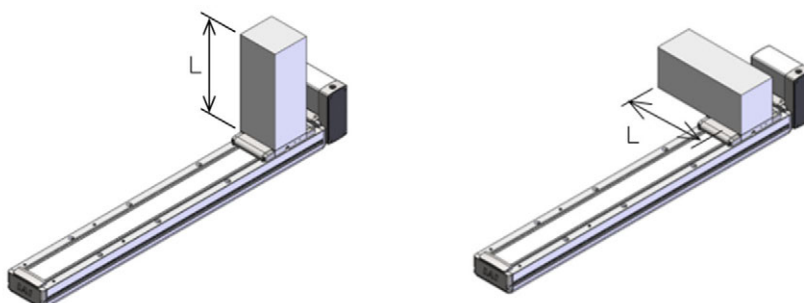
Mb: Yawing direction

Mc: Rolling direction



Load overhang length (L)

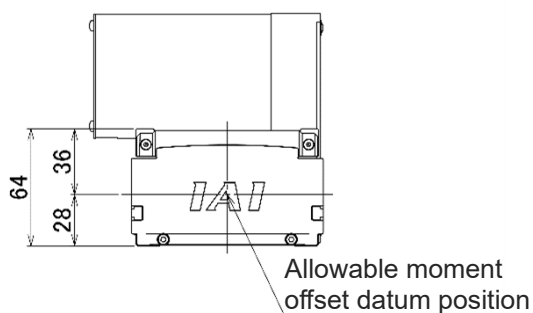
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.



- Reference for Overhang Load Length: 450mm or less

Moment Offset Datum Position

Take the position with the allow pointing as the datum position when calculating Ma and Mc moments.



Caution

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

[Payload for Each Acceleration]

Posture			Horizontal							
Lead (mm)	Max. Speed (mm/s)	Stroke (mm)	Acceleration (G)							
			0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
28	2000	200 to 1450	20	15.5	12.5	10	8.5	7.5	6.5	5.5
		1500 to 2600	15	15	12.5	10	8.5	7.5	6.5	5.5

Posture			Horizontal									
Lead (mm)	Max. Speed (mm/s)	Stroke (mm)	Acceleration (G)									
			1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
28	2000	200 to 1450	4.7	4.3	3.9	3.5	3.2	3	2.7	2.4	2.2	2
		1500 to 2600	4.7	4.3	3.9	3.5	3.2	3	2.7	2.4	2.2	2

**Caution**

- Do not attempt to set the acceleration/deceleration above the specification. It may cause to generate vibration, malfunction or shorten the product life.

[Stroke and Max. Speed]

Max. Speed (mm/s)	
Stroke	200 to 2600 mm (Every 50mm)
Max. Speed	2000

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- If the velocity is set below the minimum velocity, abnormal noise may occur or speed may get unstable. Do not attempt to set it below the minimum velocity.
- The minimum speed can be calculated with the equation below.

$$\text{Minimum speed (mm/s)} = \text{Lead (mm/r)} / 16384 \text{ (p/r)} \times 1000 \text{ (1/s)}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[2] IFA-MA□□-200/400**[Actuator Specifications 1]**

Item	Contents	
Motor (W)	200	400
Lead (mm)	42 equiv.	
Max. Payload (kg)	AC200V ^{*1} : 25 AC100V ^{*1} : 17	40
Max. Speed (mm/s)	3000	
Rated Acceleration/Deceleration (G)	0.3	
Max. Acceleration/Deceleration (G)	2.0	
Rated Thrust (N)	71.2	142.4
Min. Stroke (mm)	200	
Max. Stroke (mm)	3200	
Stroke Pitch (mm)	50	

*1 Power voltage on controller

[Actuator Specifications 2]

Item	Contents
Drive system	Timing Belt
Positioning repeatability	$\pm 0.04\text{mm}$
Lost motion	0.1mm or less
Base	Material: Dedicated Extruded Aluminum (A6063SS-T6 equiv.) Surface Treatment: White Anodizing
Linear guide	Linear Infinite Circulation Type
Static allowable moment ^(Note 2)	Ma: 259 N·m, Mb: 369 N·m, Mc: 604 N·m
Dynamic allowable moment ^(Note1, 2)	Ma: 81 N·m, Mb: 116 N·m, Mc: 189 N·m
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)
Protection class	IP20
Vibration resistance / Impact resistance	4.9m/s ²
International standard compliance	CE Marking, RoHS3 Directive
Motor type	AC servo motor
Encoder type	Battery-less absolute
Number of encoder pulse	16384 pulse/rev

Note 1 It is the value at 10,000km drive life and 90% of reliability.

Note 2 Even though the overhang load length or load moment is in the allowable range, abnormal vibration or noise may occur during operation as an influence of the way to mount the unit or a transportation object or the stiffness of the overhang mounting beam. Revise the conditions for operation in such cases.

For the details of moment directions and load overhang length, refer to the [following page].

(Note) The base oil separate from the grease may leak out from inside in some environments of use, installation postures or operational conditions.

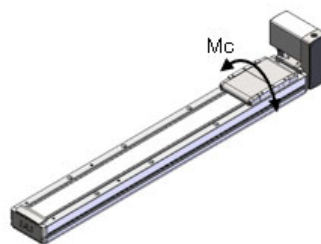
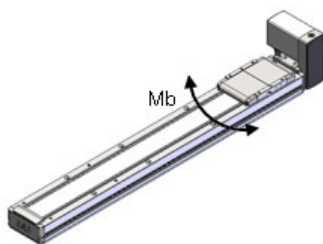
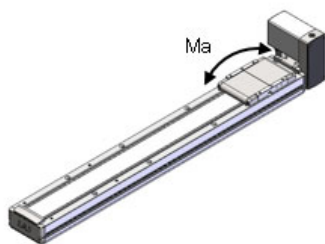
Have a protection in case the base oil being applied can give a bad influence to the peripheral devices.

Slider type moment direction

Ma: Pitching direction

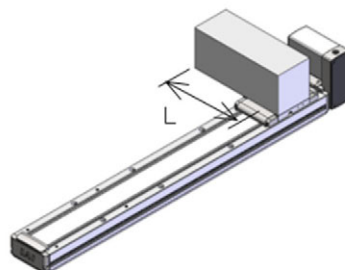
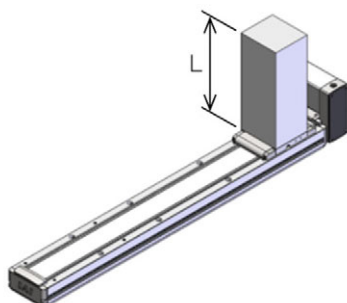
Mb: Yawing direction

Mc: Rolling direction



Load overhang length (L)

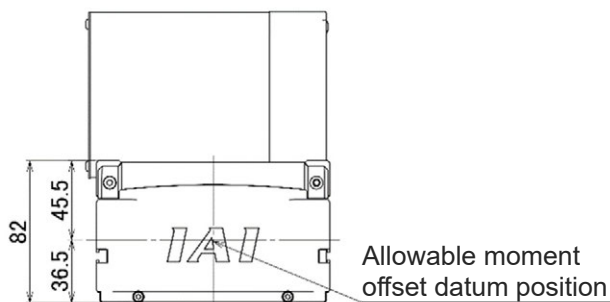
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.



- Reference for Overhang Load Length: 600mm or less

Moment Offset Datum Position

Take the position with the allow pointing as the datum position when calculating Ma and Mc moments.



Caution

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

[Payload for Each Acceleration]

Posture				Horizontal								
Lead (mm)	Max. Speed (mm/s)	Motor (W)	Controller Power Voltage	Acceleration (G)								
				0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1
42	3000	200	200V	25	18	14	11	9	7.5	6.5	5.5	4.6
			100V	17	11	8	6.5	5.5	4.5	4	3.5	3.2
		400	----	40	30	23	19	16	13	12	10	9

Posture				Horizontal								
Lead (mm)	Max. Speed (mm/s)	Motor (W)	Controller Power Voltage	Acceleration (G)								
				1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
42	3000	200	200V	3.8	3.2	2.6	2.3	2	1.7	1.4	1.2	1
			100V	2.9	2.7	2.6	2.3	2	1.7	1.4	1.2	1
		400	----	8	7	6.3	5.6	5	4.6	4.2	3.8	3.5

**Caution**

Do not attempt to set the acceleration/deceleration above the specification. It may cause to generate vibration, malfunction or shorten the product life.

[Stroke and Max. Speed]

Max. Speed (mm/s)	
Stroke	200 to 3200 mm (Every 50mm)
Max. Speed	3000

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- If the velocity is set below the minimum velocity, abnormal noise may occur or speed may get unstable. Do not attempt to set it below the minimum velocity.
- The minimum speed can be calculated with the equation below.

$$\text{Minimum speed (mm/s)} = \text{Lead (mm/r)} / 16384 \text{ (p/r)} \times 1000 \text{ (1/s)}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

1.2.2 Double Slider (Option)

[1] IFA-SA□□-100-□-W

[Actuator Specifications 1]

Item		Contents
Motor (W)		100
Lead (mm)		28 equiv.
Max. Payload (kg)		Nominal stroke 350 to 1450mm : 18 Nominal stroke 1500 to 2600mm : 13
Max. Speed (mm/s)		2000
Rated Acceleration/Deceleration (G)		0.3
Max. Acceleration/Deceleration (G)		2.0
Rated Thrust (N)		53.5
Slider Actual Span (mm)		60 (Min.) to 90 (Max.)
Slider Cover Span (mm)		2 (Min.) to 32 (Max.)
Distance between Reamed Holes (mm)		150 (Min.) to 180 (Max.)
Slider Length (mm)		148
Min. Nominal Stroke *1 (mm)		350
Max. Nominal Stroke *1 (mm)		2600
Min. Effective Stroke *2 (mm)	At Min. Span	200
	At Max. Span	220
Max. Effective Stroke *2 (mm)	At Min. Span	2450
	At Max. Span	2420
Stroke Pitch (mm)		50

*1 Nominal Stroke: Stroke for single slider

*2 Effective stroke = Nominal stroke - (Slider length + Slider cover span)

For the details of the effective stroke, refer to [5.1.4 IFA-SA□-W (Double-Slider Type)].

[Actuator Specifications 2]

Item		Contents
Drive system		Timing Belt
Positioning repeatability		$\pm 0.04\text{mm}$
Lost motion		0.1mm or less
Base		Material: Dedicated Extruded Aluminum (A6063SS-T6 equiv.) Surface Treatment: White Anodizing
Linear guide		Linear Infinite Circulation Type
Static allowable moment (Note 2)		Ma: 744 N·m, Mb: 1060 N·m, Mc: 510 N·m
Dynamic allowable moment (Note 1, 2)	At Min. Span	Ma: 182 N·m, Mb: 260 N·m, Mc: 125 N·m
	At Max. Span	Ma: 228 N·m, Mb: 325 N·m, Mc: 125 N·m
Ambient operating temperature/humidity		0 to 40°C, 85%RH or less (Non-condensing)
Protection class		IP20
Vibration resistance / Impact resistance		4.9m/s ²
International standard compliance		CE Marking, RoHS3 Directive
Motor type		AC servo motor
Encoder type		Battery-less absolute
Number of encoder pulse		16384 pulse/rev

Note 1 It is the value at 10,000km drive life and 90% of reliability.

Note 2 Even though the overhang load length or load moment is in the allowable range, abnormal vibration or noise may occur during operation as an influence of the way to mount the unit or a transportation object or the stiffness of the overhang mounting beam. Revise the conditions for operation in such cases.

For the details of moment directions and load overhang length, refer to the [following page].

(Note) The base oil separate from the grease may leak out from inside in some environments of use, installation postures or operational conditions.

Have a protection in case the base oil being applied can give a bad influence to the peripheral devices.

**Warning**

Any operation without link of the slider could cause damage.

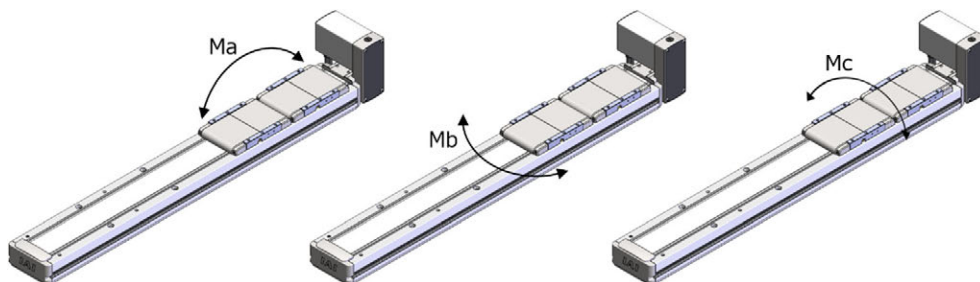
Do not attempt to link sliders with any dimension out of the slider cover span figured out from the effective stroke at the order.

Slider type moment direction

Ma: Pitching direction

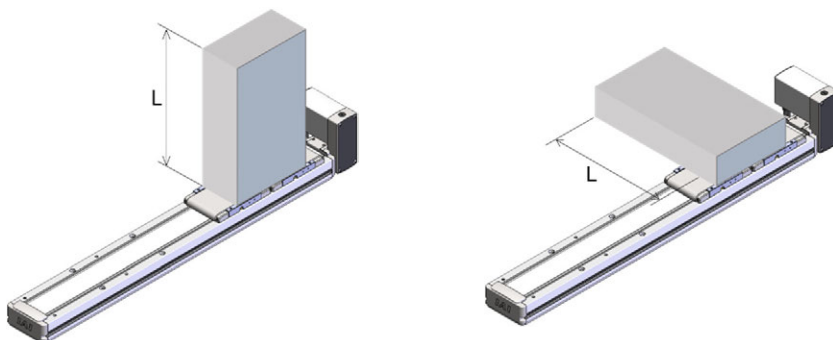
Mb: Yawing direction

Mc: Rolling direction



Load overhang length (L)

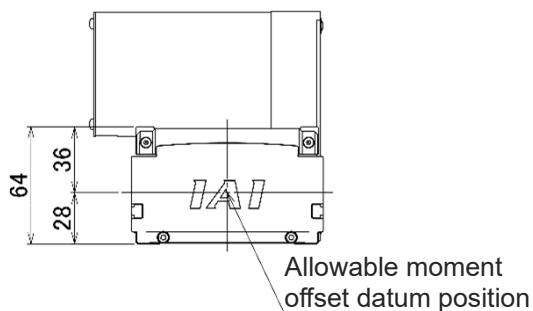
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.



- Reference for Overhang Load Length : At Min. Span : 1200mm or less,
At Max. Span: 1350mm or less

Moment Offset Datum Position

Take the position with the allow pointing as the datum position when calculating Ma and Mc moments.



Caution

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

[Payload for Each Acceleration]

Posture			Horizontal							
Lead (mm)	Max. Speed (mm/s)	Nominal stroke (mm)	Acceleration (G)							
			0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
28	2000	350 to 1450	18	13.5	10.5	8	6.5	5.5	4.5	3.5
		1500 to 2600	13	13	10.5	8	6.5	5.5	4.5	3.5

Posture			Horizontal									
Lead (mm)	Max. Speed (mm/s)	Nominal stroke (mm)	Acceleration (G)									
			1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
28	2000	350 to 1450	2.7	2.3	1.9	1.5	1.2	1	0.7	0.4	0.2	0
		1500 to 2600	2.7	2.3	1.9	1.5	1.2	1	0.7	0.4	0.2	0

**Caution**

- Do not attempt to set the acceleration/deceleration above the specification. It may cause to generate vibration, malfunction or shorten the product life.

[Stroke and Max. Speed]

Max. Speed (mm/s)	
Nominal stroke	350 to 2600 mm (Every 50mm)
Max. Speed	2000

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- If the velocity is set below the minimum velocity, abnormal noise may occur or speed may get unstable. Do not attempt to set it below the minimum velocity.
- The minimum speed can be calculated with the equation below.

$$\text{Minimum speed (mm/s)} = \text{Lead (mm/r)} / 16384 (\text{p/r}) \times 1000 (1/\text{s})$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[2] IFA-MA□□-200/400-□-W**[Actuator Specifications 1]**

Item		Contents	
Motor (W)		200	400
Lead (mm)		42 equiv.	
Max. Payload (kg)		AC200V ^{*1} : 21 AC100V ^{*1} : 13	36.5
Max. Speed (mm/s)		3000	
Rated Acceleration/Deceleration (G)		0.3	
Max. Acceleration/Deceleration (G)		2.0	
Rated Thrust (N)		71.2	142.4
Slider Actual Span (mm)		80 (Min.) to 120 (Max.)	
Slider Cover Span (mm)		10 (Min.) to 50 (Max.)	
Distance between Reamed Holes (mm)		200 (Min.) to 240 (Max.)	
Slider Length (mm)		190	
Min. Nominal Stroke ^{*2} (mm)		400	
Max. Nominal Stroke ^{*2} (mm)		3200	
Min. Effective Stroke ^{*3} (mm)	At Min. Span	200	
	At Max. Span	210	
Max. Effective Stroke ^{*3} (mm)	At Min. Span	3000	
	At Max. Span	2960	
Stroke Pitch (mm)		50	

*1 Power voltage on controller

*2 Nominal Stroke: Stroke for single slider

*3 Effective stroke = Nominal stroke - (Slider length + Slider cover span)

For the details of the effective stroke, refer to [5.1.8 IFA-MA□-W (Double-Slider Type)].

[Actuator Specifications 2]

Item		Contents
Drive system		Timing Belt
Positioning repeatability		± 0.04mm
Lost motion		0.1mm or less
Base		Material: Dedicated Extruded Aluminum (A6063SS-T6 equiv.) Surface Treatment: White Anodizing
Linear guide		Linear Infinite Circulation Type
Static allowable moment (Note 2)		Ma: 1760 N·m, Mb: 2520 N·m, Mc: 1210 N·m
Dynamic allowable moment (Note 1, 2)	At Min. Span	Ma: 448 N·m, Mb: 640 N·m, Mc: 307 N·m
	At Max. Span	Ma: 561 N·m, Mb: 801 N·m, Mc: 307 N·m
Ambient operating temperature/humidity		0 to 40°C, 85%RH or less (Non-condensing)
Protection class		IP20
Vibration resistance / Impact resistance		4.9m/s ²
International standard compliance		CE Marking, RoHS3 Directive
Motor type		AC servo motor
Encoder type		Battery-less absolute
Number of encoder pulse		16384 pulse/rev

Note 1 It is the value at 10,000km drive life and 90% of reliability.

Note 2 Even though the overhang load length or load moment is in the allowable range, abnormal vibration or noise may occur during operation as an influence of the way to mount the unit or a transportation object or the stiffness of the overhang mounting beam. Revise the conditions for operation in such cases.

For the details of moment directions and load overhang length, refer to the [following page].

(Note) The base oil separate from the grease may leak out from inside in some environments of use, installation postures or operational conditions.

Have a protection in case the base oil being applied can give a bad influence to the peripheral devices.

**Warning**

Any operation without link of the slider could cause damage.

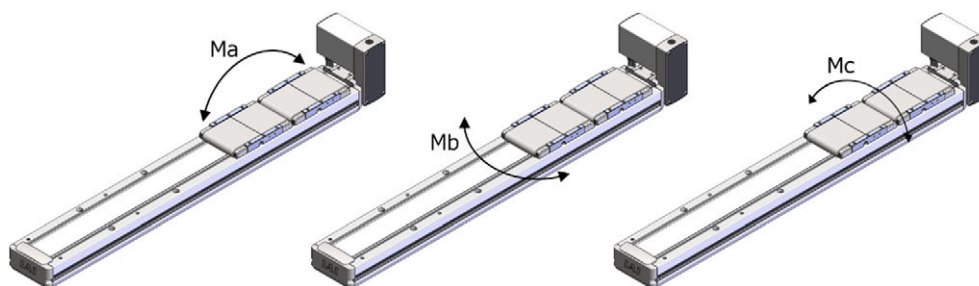
Do not attempt to link sliders with any dimension out of the slider cover span figured out from the effective stroke at the order.

Slider type moment direction

Ma: Pitching direction

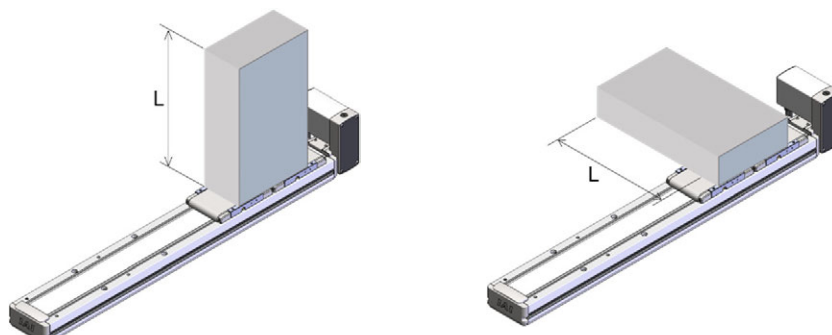
Mb: Yawing direction

Mc: Rolling direction



Load overhang length (L)

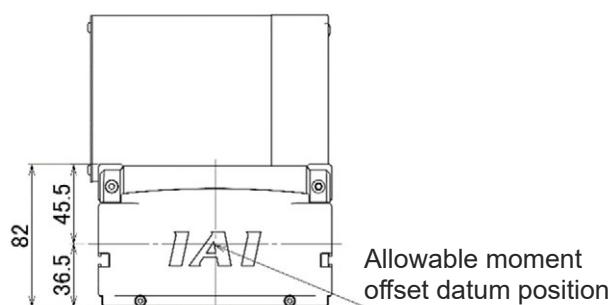
It is a reference for offset that enables an actuator to operate smoothly when a workpiece or bracket is offset from the actuator slider.



- Reference for Overhang Load Length : At Min. Span : 1600mm or less,
At Max. Span: 1800mm or less

Moment Offset Datum Position

Take the position with the allow pointing as the datum position when calculating Ma and Mc moments.



Caution

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

[Payload for Each Acceleration]

Posture				Horizontal									Payload (kg)
Lead (mm)	Max. Speed (mm/s)	Motor (W)	Controller Power Voltage	Acceleration (G)									
				0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	
42	3000	200	200V	21	14	10	7	5	3.5	2.5	1.5	0.6	
			100V	13	7	4	2.5	1.5	0.5	0	0	0	
		400	----	36.5	26.5	19.5	15.5	12.5	9.5	8.5	6.5	5.5	

Posture				Horizontal									Payload (kg)
Lead (mm)	Max. Speed (mm/s)	Motor (W)	Controller Power Voltage	Acceleration (G)									
				1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	
42	3000	200	200V	0	0	0	0	0	0	0	0	0	
			100V	0	0	0	0	0	0	0	0	0	
		400	----	4.5	3.5	2.8	2.1	1.5	1.1	0.7	0.3	0	

**Caution**

Do not attempt to set the acceleration/deceleration above the specification. It may cause to generate vibration, malfunction or shorten the product life.

[Stroke and Max. Speed]

Max. Speed (mm/s)	
Nominal stroke	400 to 3200 mm (Every 50mm)
Max. Speed	3000

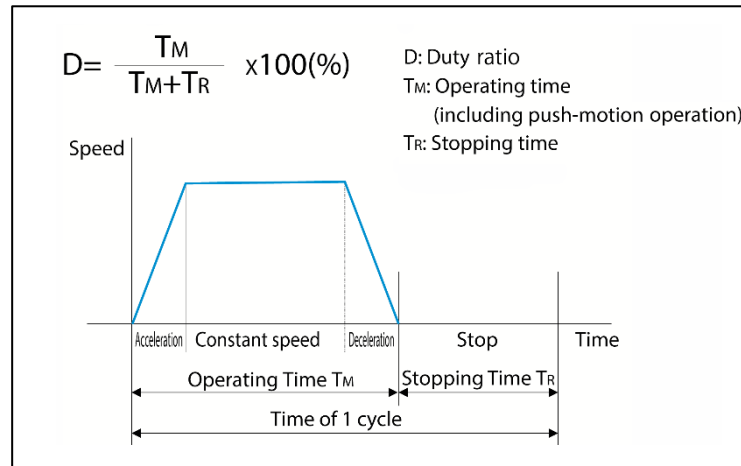
**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- If the velocity is set below the minimum velocity, abnormal noise may occur or speed may get unstable. Do not attempt to set it below the minimum velocity.
- The minimum speed can be calculated with the equation below.

$$\text{Minimum speed (mm/s)} = \text{Lead (mm/r)} / 16384 \text{ (p/r)} \times 1000 \text{ (1/s)}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

1.2.3 Duty Ratio

The duty ratio is the operating rate, shown in percent, of the actuator operating time within one cycle.



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

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

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

[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or below]

$$\text{Load Factor: LF} = \frac{M \times \alpha}{M_r \times 0.3} (\%)$$

Max. Payload at Acceleration 0.3G: M_r (kg)

Payload during Operation : M (kg)

Acceleration during Operation : α (G)

[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or above]

$$\text{Load Factor: LF} = \frac{M \times \alpha}{M_d \times \alpha} = \frac{M}{M_d} (\%)$$

Payload at Indicated Acceleration : M_d (kg)

Payload during Operation : M (kg)

Acceleration during Operation : α (G)

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

$$\text{Acceleration/deceleration time ratio } t_{od} = \frac{\text{Acceleration time during operation} + \text{deceleration time during operation}}{\text{Duration of operation}} (\%)$$

$$\text{Acceleration time} = \frac{\text{Velocity during operation (mm/s)}}{\text{Acceleration during operation (mm/s}^2\text{)}} (\text{sec})$$

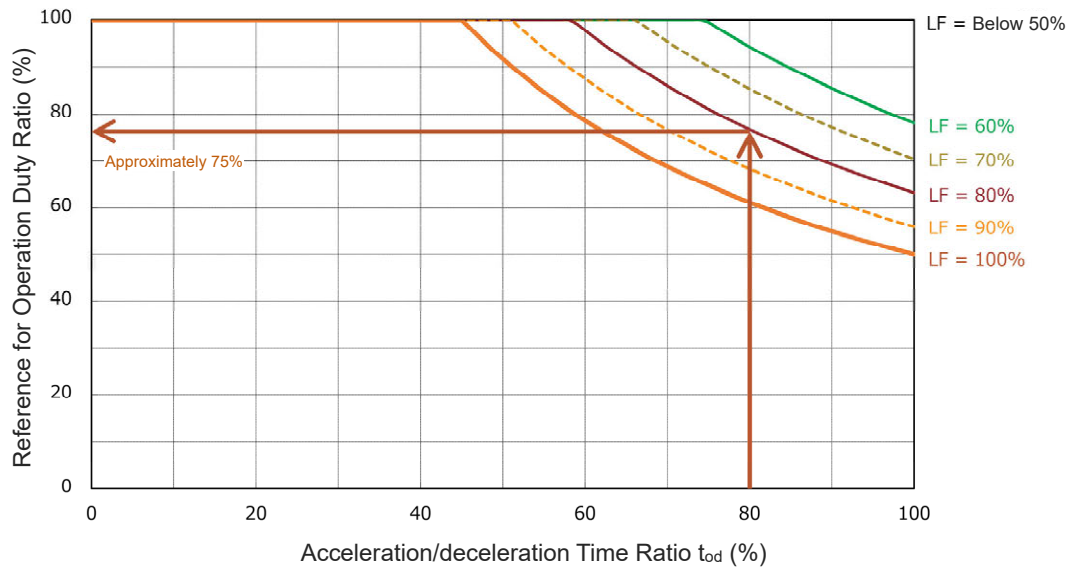
$$\text{Deceleration time} = \frac{\text{Velocity during operation (mm/s)}}{\text{Deceleration during operation (mm/s}^2\text{)}} (\text{sec})$$

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

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

3) Read a reference for duty ratio with the figured out "Load factor" and "Acceleration/deceleration time ratio".

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



1.3 Options

● : Available to Select × : Not Available to Select

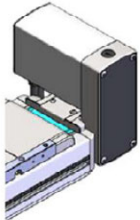
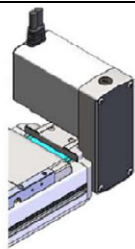
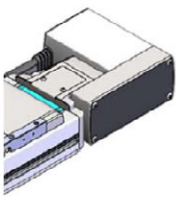
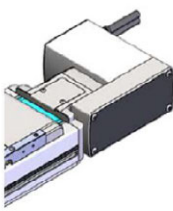
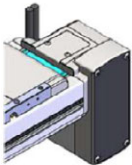
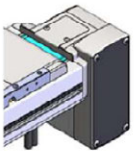
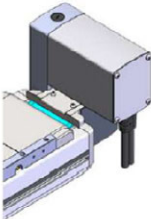
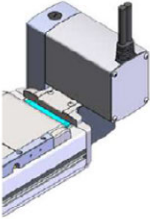
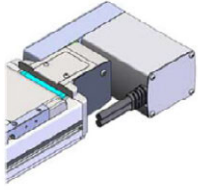
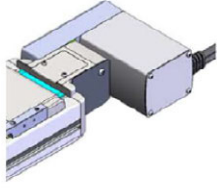
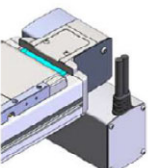
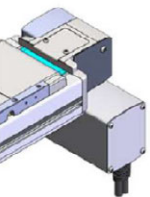
No.	Option Name	Model Code	IFA-SA	IFA-MA	
			100	200	400
1	Cable Ejection on Opposite Side	A6	●	●	●
2	AQ Seal (Note 1)	AQ	●	●	●
3	Ceiling Mount / Horizontally Oriented Wall Mount Type	CSM	●	●	●
4	Hanging Bracket (Note 2)	EB	×	●	●
5	Metal Connector Type	EU	●	●	●
6	Home Limit Switch	L	●	●	●
7	Home Limit Switch on Opposite Side	LL	●	●	●
8	Home Reverse Type	NM	●	●	●
9	Double Slider Type	W	●	●	●

Note 1: As it is the standard option, do not fail to select it.

Note 2: The home limit switch (L) and the home limit switch on opposite side (LL) cannot be used together at the same time.

1.3.1 Cable Ejection Opposite Type (Model Code: A6)

It is an option to have the direction to eject the cable on the opposite side.

SA1L/MA1L (Standard)	SA1L/MA1L·A6	SA2L/MA2L (Standard)	SA2L/MA2L·A6	SA3L/MA3L (Standard)	SA3L/MA3L·A6
					
SA1R/MA1R (Standard)	SA1R/MA1R·A6	SA2R/MA2R (Standard)	SA2R/MA2R·A6	SA3R/MA3R (Standard)	SA3R/MA3R·A6
					

1.3.2 AQ Seal (Model Code: AQ) (Standard Option)

AQ Seal is a lubricant unit using a lubricant component that lubricant oil is solidified with resin. As it is a porous component that contains high amount of lubricant oil, it possesses characteristics that ooze lubricant oil on its surface by capillary phenomenon. Lubricant oil can be supplied to the guides by pressing AQ Seal on them, which enables a maintenance-free experience in a long term by synergistic effect with usage of grease.

1.3.3 Ceiling Mount / Horizontally Oriented Wall Mount Type (Model Code: CSM)

It is an option that is to be selected when ceiling mount or horizontally oriented wall mount is to be conducted.

An actuator in the ceiling mount / horizontally oriented wall mount type should be able to use in the standard horizontal orientation.



Caution

There may be a case that noise of hitting the stainless steel sheet comes from inside the actuator when operation is made in the ceiling mount or horizontally oriented wall mount. It is because the belt vibrates during acceleration/deceleration operation of the slider and contacts the stainless steel sheet.

There is no functional problem with this noise. If the noise comes on your mind, readjust the tensile force strength of the long belt or reduce the acceleration/deceleration.

1.3.4 Hanging Bracket (Model Code: EB)

It is an option to enable to attach eyebolts at four places on an actuator and lift the actuator up for transportation. There are eyebolts, attachment brackets, hex socket head cap screws and hex nuts enclosed.

Plate nuts and hex socket head cap screws should be attached on the unit.

Refer to [2.1.3 Transportation using hanging brackets] for the details.

1.3.5 Metal Connector Type (Model Code: EU)

The connectors on the motor cable / encoder cable will be a metal connector instead of plastic connector.

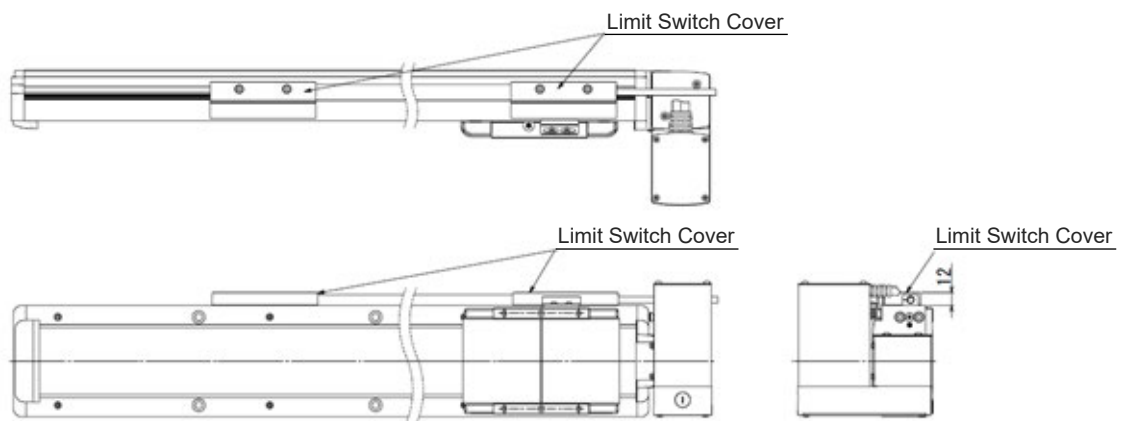
1.3.6 Home Limit Switch (Model Code: L)

Home Limit Switch on Opposite Side (Model Code: LL)

The normal home-return operation adopts the "pressing system" that the Z-phase is detected after operation reversed by pressing a slider towards the stopper and make it as the home position. The home limit switch is the option to have this reversing operation not with the pressing but with proximity sensors. It should be used when it requires to increase the certainty such as to prevent detection of the mechanical end due to such reason as interference of another device during the home-return operation.

By selecting this option, there should be proximity sensors equipped for three purposes, for home position detection (HOME), over-travel on side opposite motor (+0T) and over-travel on the motor side (-0T) (HOME and -0T are the integrated twin sensor). Be aware that, if the sensors are moved in a large amount, the stroke may get shortened.

When the positions of the home limit switch and the attachment of the cover are on the right, it is the standard type and the option model code is L. When the limit switch is located on the left side, the option model code should be LL.



1.3.7 Home Reverse Type (Model Code: NM)

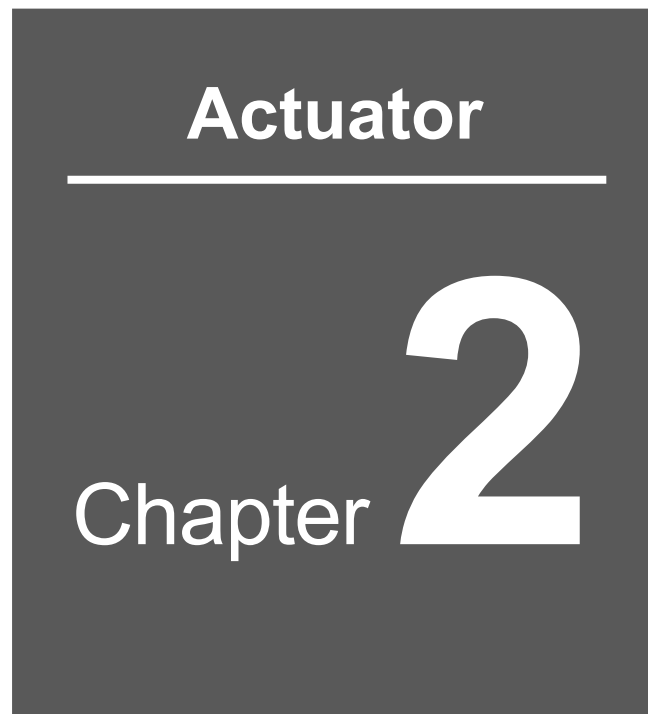
Although the home position should ordinary be placed at the "Home Position" in the appearance figure, it is available to make it placed on the opposite side ("S.E" of appearance figure) in accordance with layout of equipment.

(As the position of the home position is adjusted on delivery, it is necessary to have an adjustment if there is a request to change the position of the home after it is delivered.)

1.3.8 Double Slider Type (Model Code: W)

It is an option to add a free slider that is not connected to a belt.

By having double sliders, it is capable of increasing the moment and load overhang length. Refer to [1.2.2 Double Slider (Option)] for the details.



Installation

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2.1.2	Handling after unpacking	2-1
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2.1 Precautions for Transportation

2.1.1 Handling the package

Unless otherwise specified, delivery should be made with each unit packaged separately.

- Pay attention not to hit or drop them.
The package is not specially designed to withstand dropping or shock due to collision.
- Do not have a single operator to carry a heavy package. Use an appropriate method for transportation.
- Keep the unit in horizontal position for storage or transportation.
- Do not step on the package.
- Do not put anything that could deform the package on it.

2.1.2 Handling after unpacking

- An actuator should not be carried by holding at a cable or moved by pulling a cable.
- Hold the base part when carrying the main body of an actuator. Do not attempt to grab only the front cover, pulley bracket, motor bracket or motor cover during transportation.
- Pay attention not to hit it during transportation.
- Do not attempt to apply excessive force on any part on an actuator. Pay attention not to apply force especially on the stainless steel sheet.

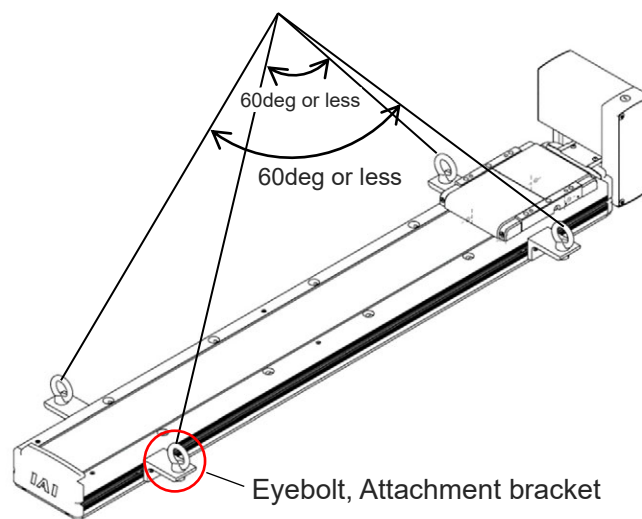
→ For the names of each part, refer to [Part Names] on page Intro-11.

2.1.3 Transportation using hanging brackets (for Hanging bracket option)

When handling an actuator out of packaging, attach hanging brackets to have a crane lift the actuator up hanging at four points with four ropes. At that moment, follow the caution notes below to perform transportation.

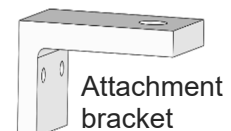
Also, the hanging brackets should be taken off after transportation is finished.

- Pay attention to the actuator balance during transportation, and carry it calmly without apply vibration or impact.
- In case the carried actuator has dropped, becoming crushed under it could cause serious injury. Do not attempt to go under the hanged load.
- Use a hoist and ropes capable enough with margin to carry the actuator weight.
* Hoist: A small device used for lifting or lowering a load or transporting a load by means of a lift-wheel
- Keep the hanging angle at 60deg or less when lifting.
- Make sure that an operator who has appropriate certificates operate the transportation when equipment or method that requires specific qualifications is necessary.
- Affix cables so they would not get pinched.



[Enclosed Parts List]

Components	Quantity	Remark
Attachment Bracket	4	
Eyebolt M10	4	
Hex Nut M10	4	
Hex Socket Head Cap Screw M4 × 10	8	
Plate Nut	4	Mounted on Unit
Hex Socket Head Cap Screw M3 × 4	4	Mounted on Unit



[How to Attach Hanging Bracket]

Attach the hanging brackets at four places following the procedures below.

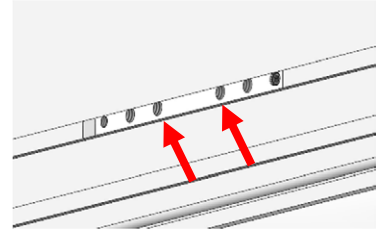
- (1) Affix a bracket on a plate nut held on the T-shaped groove using screws.

Use the two tapped holes inside on the plate nut.

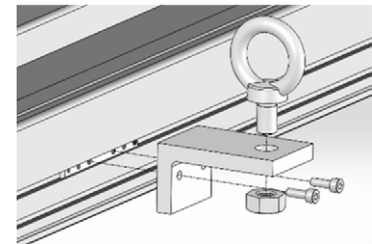
Screw to be Used : Hex Socket Head Cap Screw

M4 × 10...2 pieces

Recommended Tightening Torque : 3.59 N·m

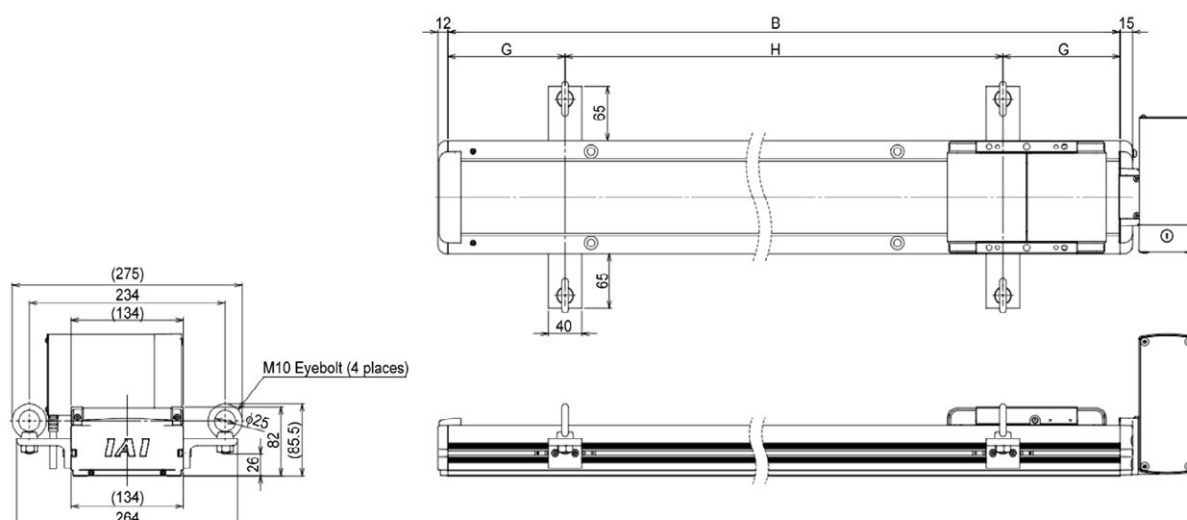


- (2) Affix an eyebolt on the bracket using a hex nut.
Tighten up the eyebolt so the seat surface of it sits on the bracket tightly.
Adjust the orientation of the eyebolt as required.



- (3) Do the steps of (1) and (2) at four places.

[Dimensions with Hanging Brackets Attached]



<IFA-M>

Unit (mm)

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
G	40	40	50	60	70	80	90	110	120	130	140	150	160	170	180	190	200
H	468	518	548	578	608	638	668	678	708	738	768	798	828	858	888	918	948

Stroke	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850
G	220	230	240	250	260	270	280	290	300	310	330	340	350	360	370	380	390
H	958	988	1018	1048	1078	1108	1138	1168	1198	1228	1238	1268	1298	1328	1358	1388	1418

Stroke	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700
G	400	410	420	440	450	460	470	480	490	500	510	520	540	550	560	570	580
H	1448	1478	1508	1518	1548	1578	1608	1638	1668	1698	1728	1758	1768	1798	1828	1858	1888

Stroke	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200
G	590	600	610	620	630	650	660	670	680	690
H	1918	1948	1978	2008	2038	2048	2078	2108	2138	2168

$$B = 2 \times G + H \text{ (mm)}$$

2.1.4 Handling when assembled into machinery (system)

When transporting an actuator installed in a machinery equipment (system) in the whole equipment, pay attention to the following things.

- Secure sliders to prevent sudden movement during transport.
- When the tip of an actuator is overhanged, affix it appropriately so the tip would not swing larger than external vibration.
- When the equipment is to be transported without affixing the tip, have it not to apply impact of 0.3G or more.
- When hanging up a machinery equipment (system), pay attention not to apply load to an actuator or connector box. Also, be cautious about cables so they would not be forcefully deformed.

2.2 Installation and Storage/Preservation Environment

Usage is possible in environments of pollution degree 3 or equivalent.

Pollution Degree 3: Conductive pollution or dry nonconductive pollution, which could become conductive due to expected condensation. (IEC60664-1)

2.2.1 Installation environment

Avoid the following locations for installation.

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

- Where the unit receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 0 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds 85% RH
- Where the unit receives direct sunlight
- Where the unit is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of dust, salt or iron (at levels exceeding those typical of an assembly plant)
- Where the unit is subject to splashed water or oil (including oil mist or cutting fluid) or chemical solutions
- Where the body receives impact or vibration
- Where the altitude is more than 2,000 m

Provide sufficient work space for maintenance and inspection work as stated below.

- Space to replenish grease
 - Space to replace the motor or timing belt
- For details, refer to [Chapter 4 Maintenance and Inspection].

If the unit is used in any of the following locations, provide sufficient shielding measures.

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

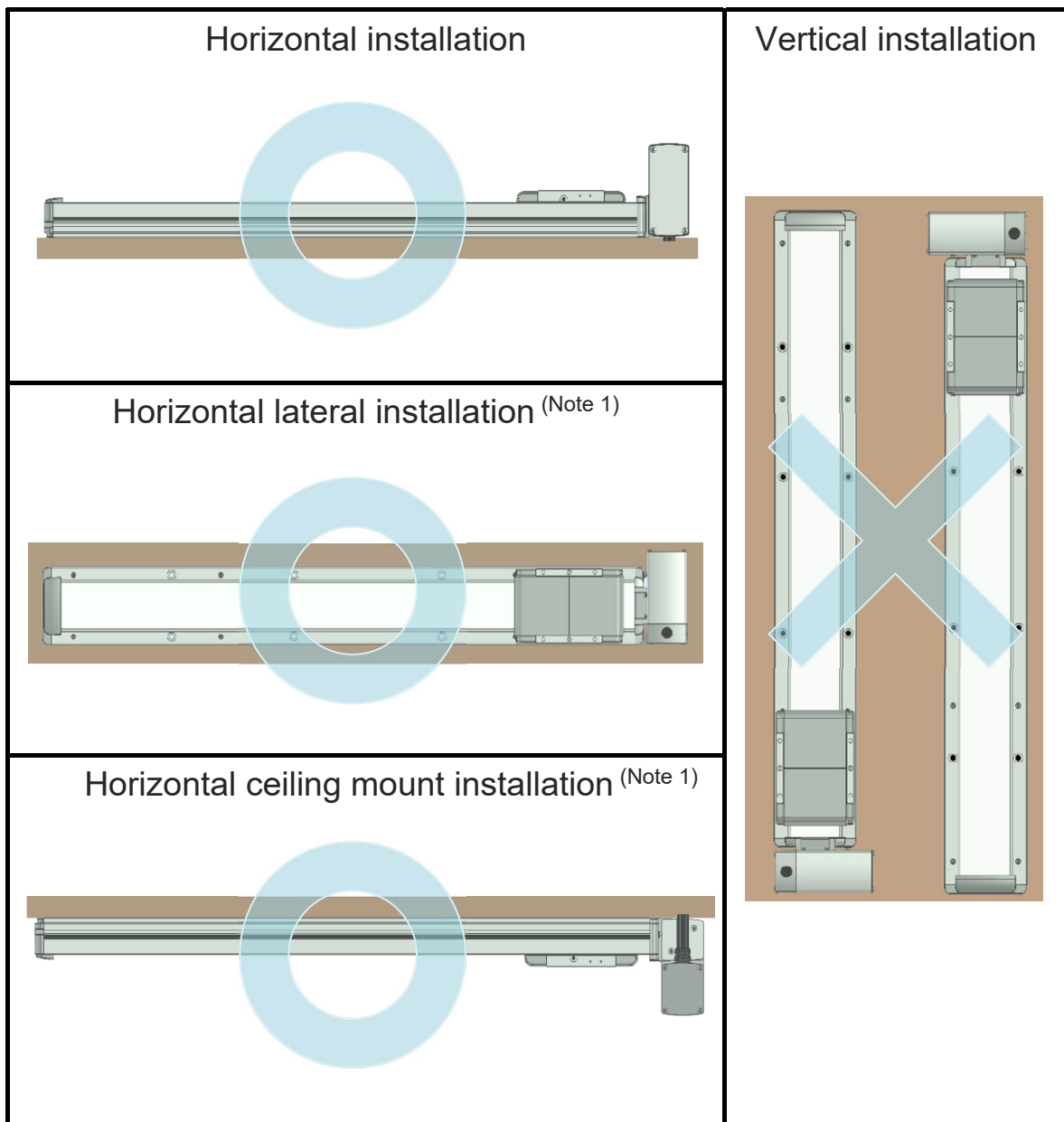
2.2.2 Storage/preservation environment

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

2.3 How to Install

2.3.1 Mounting orientation

There are some restrictions in the posture of actuator installation. The figure below with a mark of ○ should be available.



Note 1 Select the ceiling mount / horizontally oriented wall mount type (CSM).



Caution

Although, an actuator in the ceiling mount / horizontal wall mount type are available to use in the standard horizontal orientation, an actuator not in the ceiling mount / horizontal wall mount type is not available for installation in the ceiling mount / horizontal wall mount.

2.3.2 Precautions regarding stainless steel sheet

- During installation and transport, do not grasp or press on the stainless steel sheet. Otherwise, this may lead to stainless steel sheet damage.
- There is a concern that looseness or misalignment on the stainless steel sheet may occur. Especially the ceiling mount / horizontal wall mount causes high possibility of the stainless steel sheet getting looseness and misalignment. Continued usage in this orientation may lead to damage to the stainless steel sheet.
- Adjust the stainless steel sheet if slackness or misalignment occurs.
- Keep adhesive, paint, and other viscous material off the stainless steel sheet. Such material adhering to the stainless steel sheet can lead to defective slider operation or sheet damage. Avoid installation in environments of this kind, or take safety measures to prevent adhesion.

2.3.3 Fixing bolt

- Screws and positioning pins to affix the unit should be prepared by the user.
- Use hex socket head cap screws for male screws to attach the base.
- It is recommended to use high-tensile screws with ISO-10.9 or more.
- Secure the following values for the effective length of thread engagement of a screw and a female thread.
When Female Thread is Steel → Same length as nominal diameter
When Female Thread is Aluminum → 1.5 times of nominal diameter
- In order to protect the base, use a washer dedicated for high-tensile screw (accessory) when a screw is M8 or more. (otherwise the seat face may buckle.) Also, do not use a general spring washer.
- Unless otherwise specified for tightening torque, tighten screws with torque described in the table below.
For installation of the main unit, apply the torque for "When screw seat is aluminum".

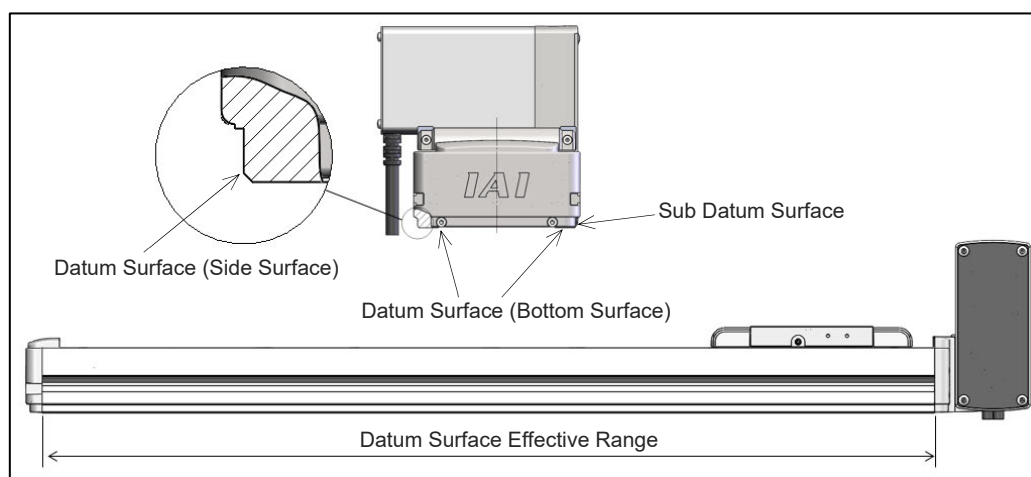
Fixing Screw Nominal Diameter	Tightening Torque	
	When screw seat is steel	When screw seat is aluminum
M6	12.3 N·m	5.4 N·m
M8	30.0 N·m	11.5 N·m

2.3.4 Installation surface

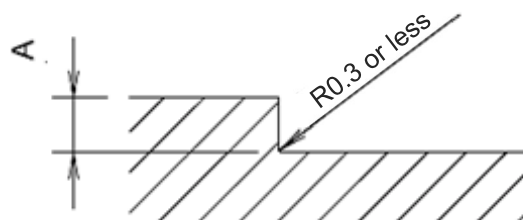
- The body mounting surface should be a machined surface or a plane with similar accuracy, with flatness within 0.05 mm/m.
- The mounting frame should have a structure rigid enough to prevent the generation of vibration.
- Also consider the necessary space for maintenance work such as actuator replacement and inspection.
- The bottom surface and the right surface when viewed from the motor end on the main unit are the datum surfaces for the drive accuracy of a slider. Utilize these surfaces for installation when drive accuracy is required.

The flatness required for the datum surface on the sub datum surface on the left side when viewed from the motor end should be 0.1mm or less.

- The base should basically be affixed on the whole area of it using all of the through holes. Affixing it partially only with some of the through holes may cause warpage of the base and increase the slide resistance. It may also cause an error.



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



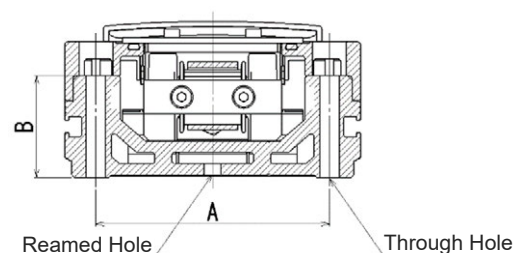
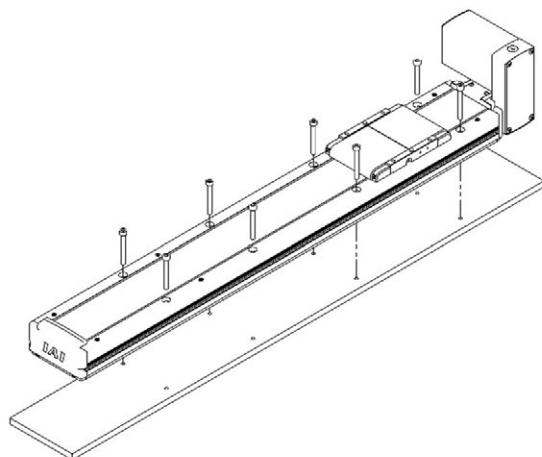
A dimension (mm)
3 to 5

2.3.5 Body mounting

There are through holes equipped on the base of this actuator.

Affix the actuator from the top using these through holes.

For the details of the positions, quantity and dimensions of the through holes, refer to [Chapter 5 External Dimensions].



Type	Dimension (mm)		Attachment Hole Diameter (mm)
	A	B	
IFA-SA	83	36	φ7 Thru, φ12 Counterbore Dept. 12
IFA-MA	109	48	φ9 Thru, φ16 Counterbore Dept. 12

If it is necessary to have repeatability in reinstallation after taking it off, utilize the reamed hole and oblong hole.

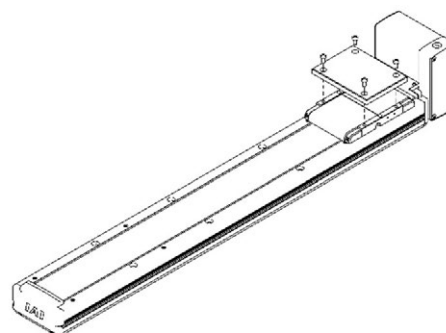
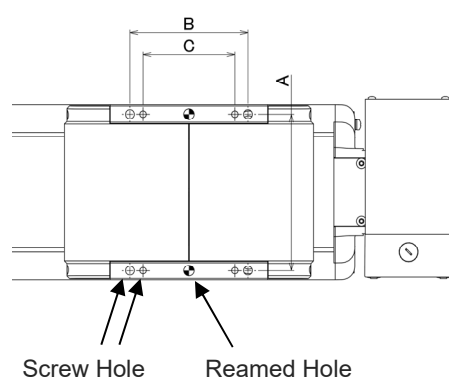
When fine adjustment of angles, etc. is required, consider using only the reamed hole.

For the details of the positions of the reamed hole and oblong hole, refer to [Chapter 5 External Dimensions].

Type	Reamed Hole	Oblong Hole
IFA-SA	φ6H7 Dept.6	$6^{+0.012}_0 \times 8$ Dept. 6
IFA-MA	φ8H7 Dept.6	$8^{+0.015}_0 \times 10$ Dept. 6

2.3.6 Mounting transported objects

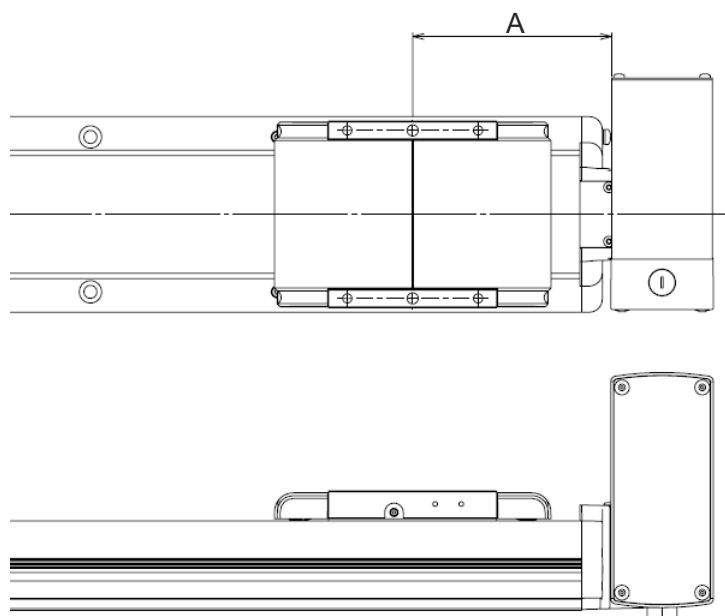
- Use the tapped mounting holes on the top surface of the slider to fix transported objects.
- There are 2 reamed holes on the top surface of the slider.
Use these reamed holes if repeated attaching and detaching is required.
- If fine-tuning of perpendicularity, etc. is required, use one of the reamed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



Type	Dimension (mm)			Reamed Hole	Screw Hole	Qty of Screw Holes
	A	B	C			
IFA-SA	90	70	—	φ6H7 Dept. 10	M6 Dept. 15	4
IFA-MA	120	90	70	φ8H7 Dept. 10	Screw Hole B: M8 Dept. 20	4
					Screw Hole C: M6 Dept. 20	4

[Distance from Slider Center to Motor Cover at Mechanical End: A]

The motor on top type has the motor (motor cover) hanged out of the top of the slider. Pay attention not to have the transported object interfered with the motor part.



Type	A (mm)
IFA-SA	96
IFA-MA	124



Caution

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



Notice

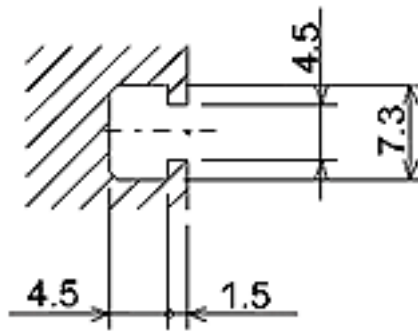
- The mounting bolts are to be prepared by the customer.
- The use of high-strength bolts of ISO-10.9 or higher is recommended.

2.3.7 Mounting connector box and T-slot

- There are T-shaped slots for M4 on the side of the base for all the types so the connectors box or guide rails necessary for combination can be attached.

When the wiring kit is used for combination, utilize these T-shaped slots.

Also, utilize them for any purpose such as attaching a sensor or for wire layout.



Notice

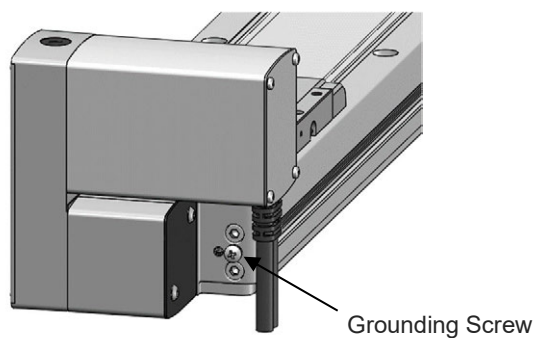
- It is recommended to have a square nut to be used in the T-shaped slots, however, an ordinary hex nut is also available for use. The users need to prepare themselves.

When attaching, pay attention to the length of screws so the tip of a screw would not touch the bottom of the T-shaped slot.

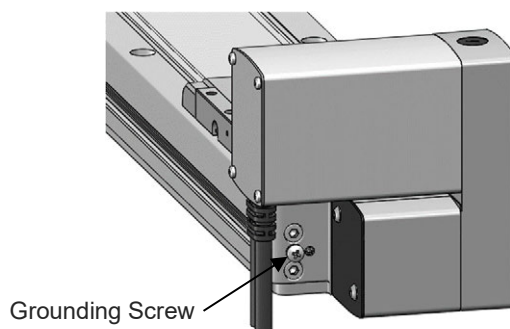
2.3.8 Connecting ground

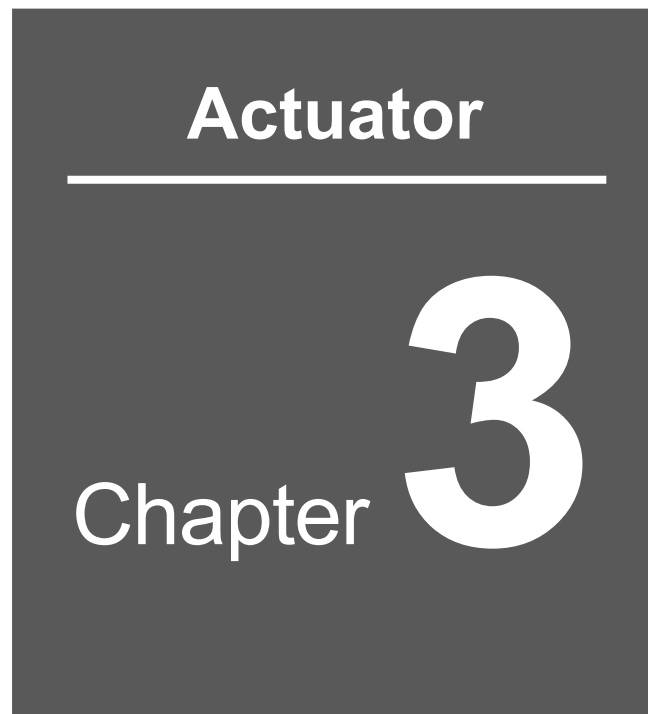
In order to avoid electric shock, connect the grounding on the grounding screw on the main unit of an actuator.

For IFA-SA□L and IFA-MA□L, connect it on the grounding screw (M4) on the right side of the motor.



For IFA-SA□R and IFA-MA□R, connect it on the grounding screw (M4) on the left side of the motor.





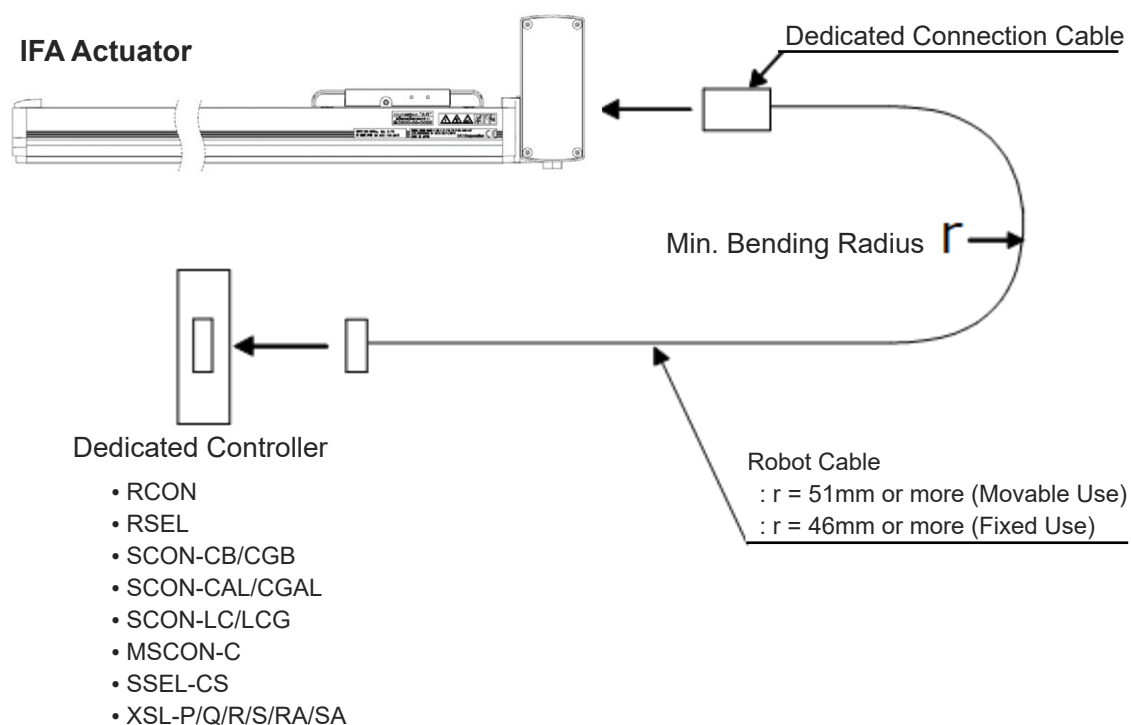
Connecting with the Controller

3.1	Connecting with the Controller	3-1
3.2	Motor / Encoder Cable.....	3-2
3.2.1	Motor Robot Cable (For RCON and RSEL Controller Connection)	3-2
3.2.2	Motor Robot Cable (For Controller Connection Other than RCON and RSEL) ·	3-3
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3.3	Caution in Wiring Process	3-6

3.1 Connecting with the Controller

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

Consult with IAI when a change is required for the specifications of the dedicated cable.



Dedicated Cable

For RCON and RSEL Controller Connection

- Motor Robot Cable : CB-X2-MA□□□□
- Encoder Robot Cable : CB-X1-PA□□□□
- Encoder Robot Cable Equipped with LS : CB-X1-PLA□□□□

For Controller Connection Other than RCON and RSEL

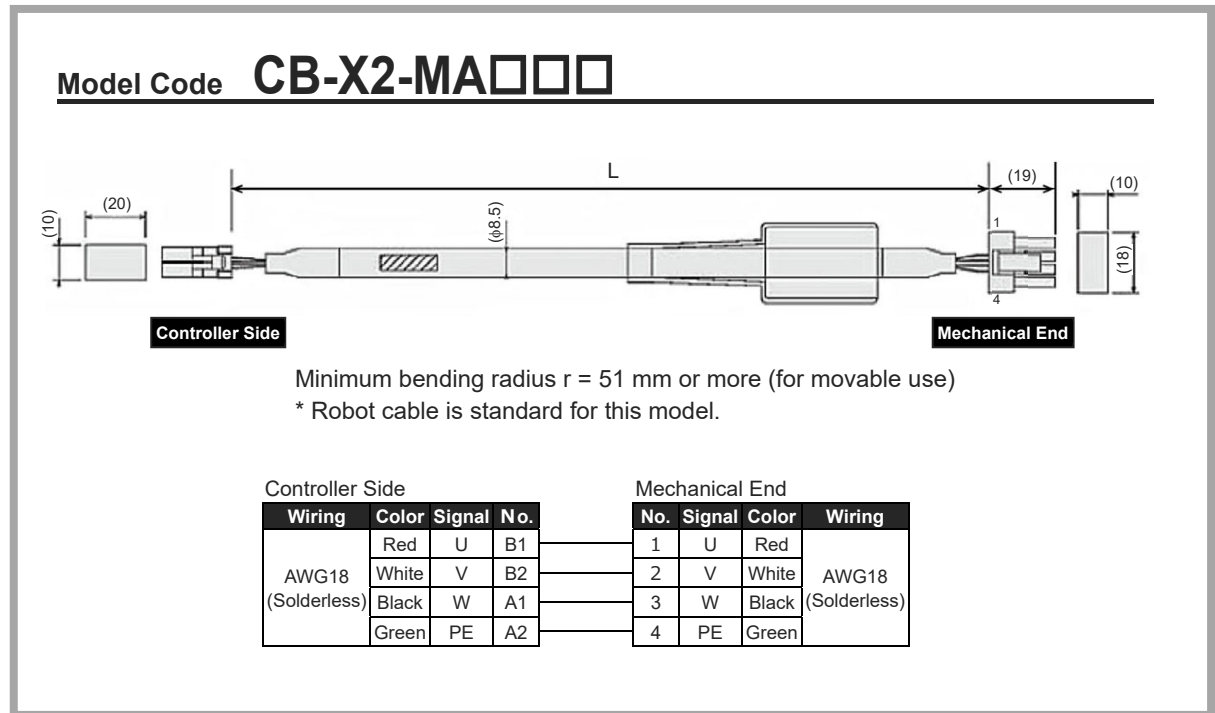
- Motor Robot Cable : CB-X-MA□□□□
- Encoder Robot Cable : CB-X1-PA□□□□
- Encoder Robot Cable Equipped with LS : CB-X1-PLA□□□□

* Cable length goes into □□□. e.g. 080 = 8, 30m at max.

Refer to [3.2 Motor / Encoder Cable] for details of each cable.

3.2 Motor / Encoder Cable

3.2.1 Motor Robot Cable (For RCON and RSEL Controller Connection)



- The cable length is available from 1m to 30m.
Specify the length in increments of 1m.
- The following shows a sample model number.

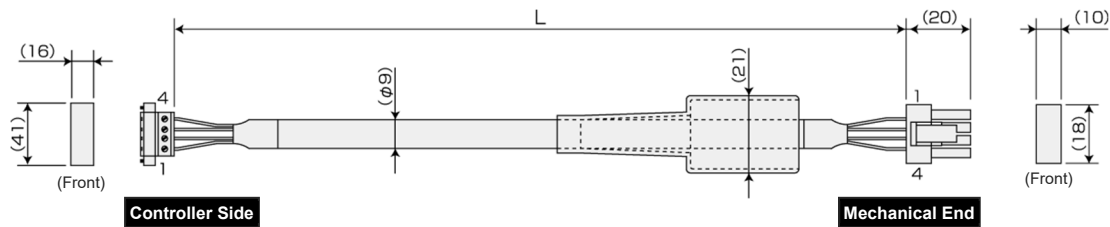
Cable length 1m → CB-X2-MA010

Cable length 3m → CB-X2-MA030

Cable length 10m → CB-X2-MA100

3.2.2 Motor Robot Cable (For Controller Connection Other than RCON and RSEL)

Model Code **CB-X-MA□□□**



Minimum bending radius $r = 51$ mm or more (for movable use)
* Robot cable is standard for this model.

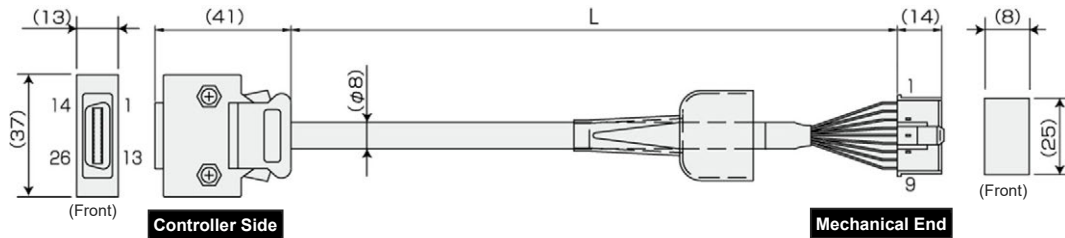
Controller Side				Mechanical End			
Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
AWG18 (Screwing)	Green	PE	1	1	U	Red	AWG18 (Solderless)
	Red	U	2	2	V	White	
	White	V	3	3	W	Black	
	Black	W	4	4	PE	Green	

- The cable length is available from 1m to 30m.
Specify the length in increments of 1m.
- The following shows a sample model number.

Cable length 1m → CB-X-MA010
Cable length 3m → CB-X-MA030
Cable length 10m → CB-X-MA100

3.2.3 Encoder Robot Cable

Model Code **CB-X1-PA□□□□**



Minimum bending radius $r = 44$ mm or more (for movable use)

* Robot cable is standard for this model.

Controller Side

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

Shield is to be cramp connected on hood

Mechanical End

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

Drain wire and braid shield

- The cable length is available from 1m to 30m.

Specify the length in increments of 1m.

- The following shows a sample model number.

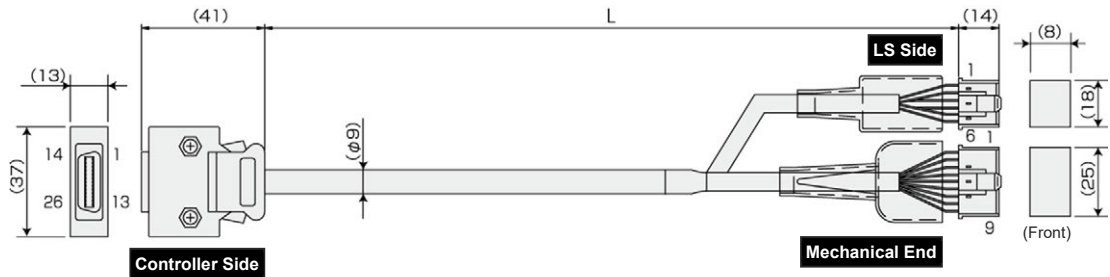
Cable length **1m** → CB-X1-PA**010**

Cable length **3m** → CB-X1-PA**030**

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

3.2.4 Encoder Robot Cable Equipped with LS

Model Code **CB-X1-PLA□□□**



Controller Side

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

Shield is to be cramp connected on hood

LS Side

No.	Signal	Color	Wiring
1	E24V	White/Blue	AWG26 (Solderless)
2	0V	White/Yellow	
3	LS	White/Red	
4	CREEP	White/Black	
5	OT	White/Purple	
6	RSV	White/Gray	

Mechanical End

No.	Signal	Color	Wiring
1	BAT+	Purple	AWG26 (Solderless)
2	BAT—	Gray	
3	SD	Orange	
4	SD	Green	
5	VCC	Red	
6	GND	Black	
7	FGD	Drain	
8	BK—	Blue	
9	BK+	Yellow	

(White/blue of cable color shows sheath color / isolator color)

Drain wire and braid shield

- The cable length is available from 1m to 30m.
Specify the length in increments of 1m.
- The following shows a sample model number.

Cable length 1m → CB-X1-PLA010
Cable length 3m → CB-X1-PLA030
Cable length 10m → CB-X1-PLA100

3.3 Caution in Wiring Process



Caution

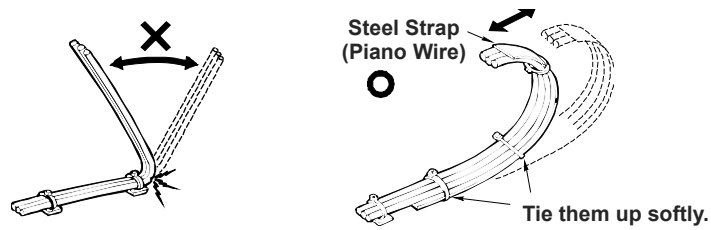
For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure, or an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

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

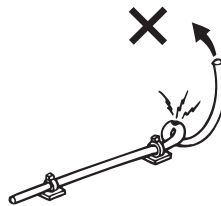


Caution

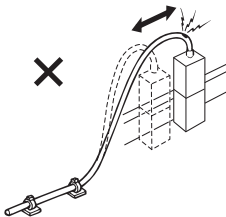
Have a sufficient radius for bending, and avoid a bend concentrating on one point.



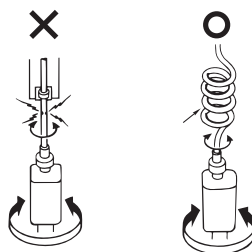
Do not let the cable bend, kink or twist.



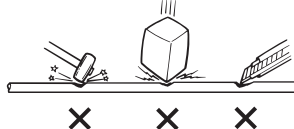
Do not attempt to pull a cable with excessive force.



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



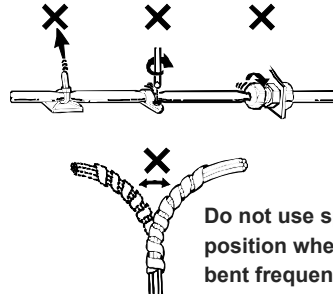
Pay attention not to pinch, dent or scratch a cable.





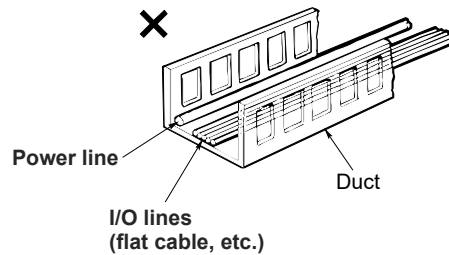
Caution

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



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

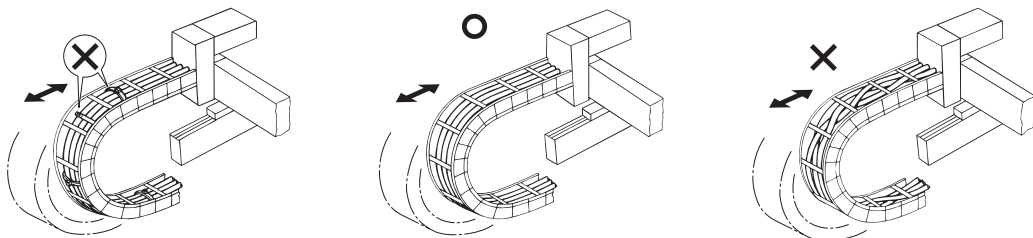
PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.

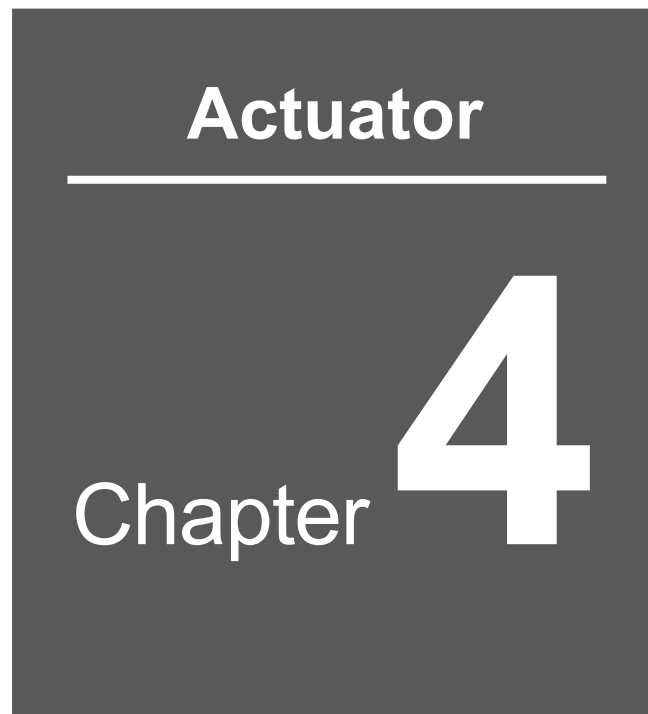


Caution

Follow the instructions below when using a cable carrier.

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





Maintenance and Inspection

4.1	Precautions for Maintenance and Inspection Work	4-1
4.2	Inspection Items and Schedule	4-2
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4.3	Visual Inspection Items	4-4
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4.1 Precautions for Maintenance and Inspection Work

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



Caution

- Do not climb on or put anything on the actuator.
Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life.
- Check that the power is OFF before conducting any maintenance or inspections.
- Be careful not to lose the cover or any removed screws.
- Be sure to return the product to the original condition after maintenance and inspection work. Mounting in an incomplete state may cause injuries or damage to the product.
- Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion under any circumstances.

4.2 Inspection Items and Schedule

Follow the maintenance inspection schedule below.

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

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



Inspection Period	External Inspection	Internal Inspection	Greasing ^(Note 1)
Start of work inspection	○	—	—
1-month inspection	○	—	—
3-month inspection	—	—	○
6-month inspection	○	○ ^(Note 2)	Depends on grease supply timing (guideline)
Every 6 months thereafter	○	○ ^(Note 2)	

Note 1 In operation back and forth continuously in distance at 30mm or less, the oil layer of the grease may get run out.

As a reference, run the actuator back and forth for five rounds in distance at 50mm or more in every 5,000 or 10,000 rounds of back and forth operation. The oil layer will recover.

Note 2 Check the condition of grease and if there is remarkable contamination, wipe it off and supply grease.

4.2.1 Grease supply timing (Guideline)

Supply grease at the timing of whichever comes first, the operation distance or months described below,

Maximum operating speed (mm/s)	Grease supply timing (Guideline)	
	Operation distance	Months
0 to 750	1,250km	12 months
Over 750 to 1500	2,500km	
Over 1500 to 3000	5,000km	



Notice

- First, be sure to wipe off the old grease, and then supply new grease.
- The degradation speed of grease may differ depending on the operating environment (temperature, humidity and ambient atmosphere).
It is recommended to shorten the grease supply period if the actuator is used under poor environmental conditions such as high temperatures, high humidity or dusty atmospheres.
- Also, it is recommended to improve the environmental conditions in case the grease changes color notably due to poor operating conditions.
- Base oil may separate from the grease due to the mounting orientation or operating conditions.
Base oil may also leak from the inside of the actuator to the exterior through gaps.
Check visually for oil drips when supplying grease.
Wipe it off in case of any dripping.
- An actuator stored for 6 months or more may suffer from grease degradation.
Supply grease before the start of use.
→ For details, refer to [4.5 Greasing Method].

4.3 Visual Inspection Items

Check the following items in the appearance visual inspection.

Refer to [4.6 How to Replace Components] for detailed information about specific component replacement and adjustment methods.

4.3.1 External visual inspection

Inspection Items	Maintenance Work
Is abnormal noise or vibration generated?	Take a counter action referring to [Troubleshooting in Controller Instruction Manual].
Are actuator mounting bolts loose?	Tighten them further.
Is the cable scratched?	Replace if the damage is severe.
Is the connector loose?	Re-insert correctly.
Is grease dripping out?	Clean up any drips. Replenish the grease.
Is the stainless steel sheet scratched?	Replace the sheet if there is a scratch.
Is the stainless steel sheet misaligned or slack?	Adjust the alignment and hang.

* The base oil of grease may leak out of a gap on an actuator in some environmental condition. Clean it up as necessary.

Turn the power off, take off the stainless steel sheet and have a visual inspection.

Check the following items in the internal inspection.

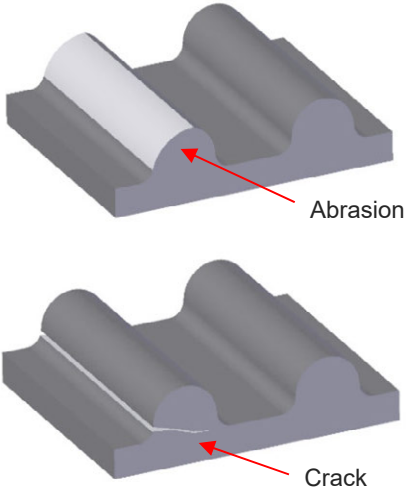
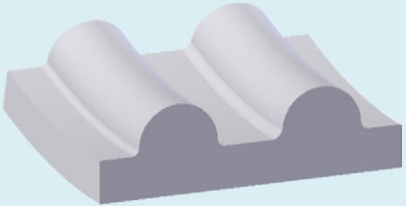
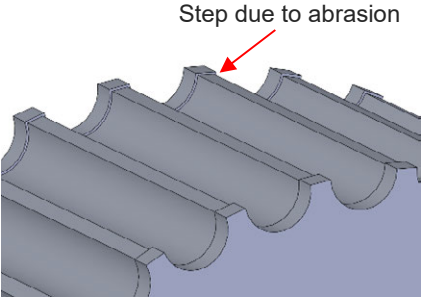
Refer to [4.6 How to Replace Components] for detailed information about specific component replacement and adjustment methods.

4.3.2 Internal visual inspection

Inspection Items	Maintenance Work
Is there any looseness or abrasion powder occurred?	There is a concern of damage on a belt or guide. Consult with IAI.
Has foreign matter penetrated inside?	Remove the foreign matter, clean, and inspect the interior for any damage.
Is there any problem in lubricant condition of grease on a guide? (Even if the grease is brown, lubrication is adequate if the running surface is shiny)	Wipe away the old grease, then replenish with new grease.
Is dust or foreign matter adhered to the guide?	Replenish with new grease after cleaning.
Refer to the inspection items in the following page to check the condition of a belt.	—

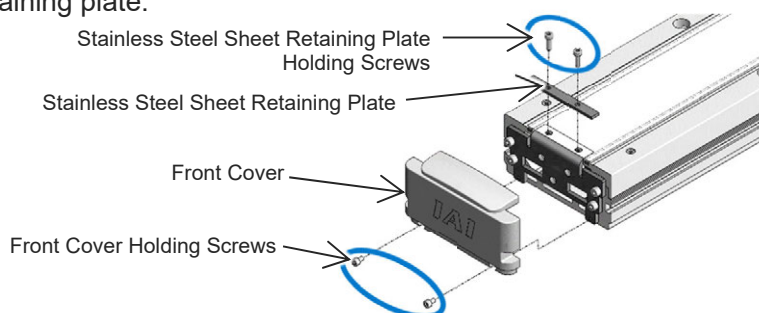
The period of replacement for the belt cannot be simply determined as the durability of the belt can be affected by the duration of operation significantly.

As the belt gets deteriorated in duration of use such as abrasion, it is required that you have inspection on the points stated below.

Inspection Items	Maintenance Work
Is the belt significantly worn out on the teeth area? Is there any crack on the teeth area? Is there any chipped tooth? 	Replace the belt in case any of those stated on the left is found. → Refer to [4.6.3 Replacing and adjusting belt].
Is the belt hardened, softened or deformed (shrunk or expanded)? 	Replace the belt in case any of those stated on the left is found. → Refer to [4.6.3 Replacing and adjusting belt].
Is there any significant abrasion on pulley teeth? 	When abnormality stated on the left is found: → Consult with IAI.

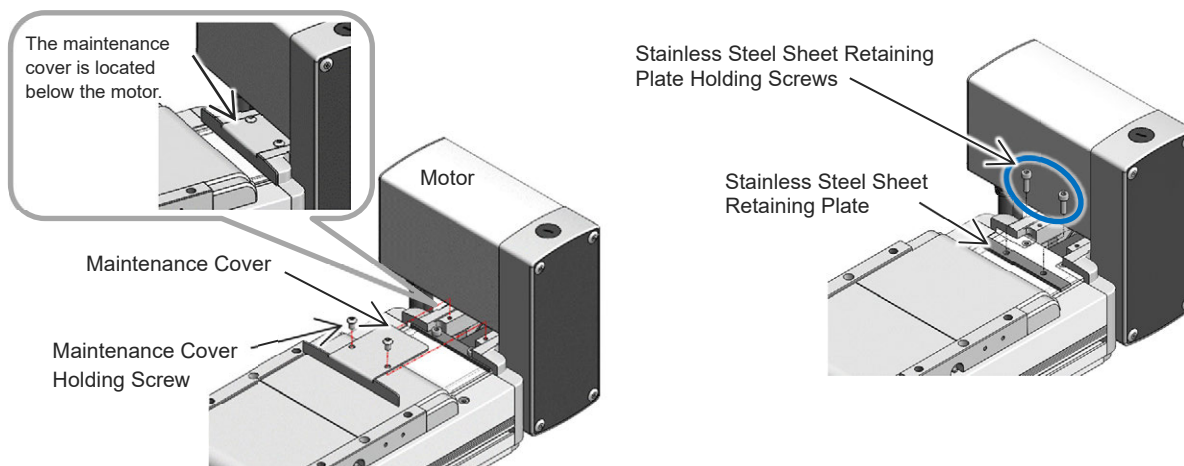
Procedure for Internal Inspection

- 1 Remove the front cover holding screws to take the front cover off.
The front cover is to be shifted up once and then pulled out horizontally.
Remove the screws holding the stainless steel sheet retaining plate to take off the stainless steel sheet retaining plate.



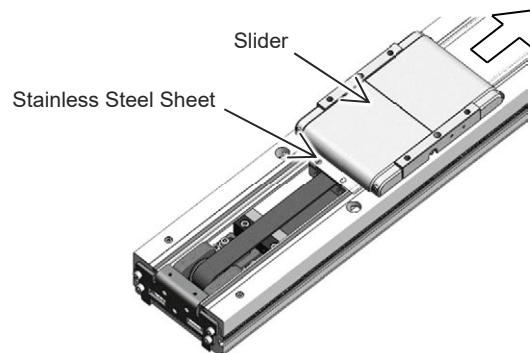
Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Stainless Steel Sheet Retaining Plate Holding Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	2	1.5
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	2	3.6
Front Cover Holding Screw	IFA-SA IFA-MA	Hex Socket Head Cap Screw M3 × 5	2	0.5

- 2 Remove the maintenance cover holding screws on the motor end to take the maintenance cover off. Remove the screws holding the stainless steel sheet retaining plate to take off the stainless steel sheet retaining plate.

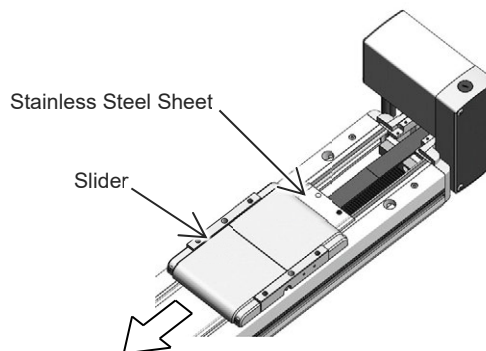


Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Stainless Steel Sheet Retaining Plate Holding Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	2	1.5
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	2	3.6
Maintenance Cover Holding Screw	IFA-SA	Hex Socket Button Head Screw M3 × 5	2	0.8
	IFA-MA	Hex Socket Button Head Screw M4 × 5	2	1.8

- 3** Move the stainless steel sheet to the motor side and inspect inside.
* Pay attention not to have the stainless steel sheet come out of the slider.



- 4** Move the stainless steel sheet to the side opposite the motor side and inspect inside.
* Pay attention not to have the stainless steel sheet come out of the slider.



- 5** Once the inspection is finished, assemble the unit in back order.

When an inspection is to be conducted on a belt continuously after the internal inspection, have the maintenance cover and the stainless steel sheet left off to have the inspection.

Procedure for Belt Inspection

Check it visually with the maintenance cover, motor bracket cover and the stainless steel sheet taken off.

As the durability of a timing belt may get affected by its operational conditions largely, the period of replacing cannot be easily defined.

There is a bending life of several million times in general.

As degradation of the timing belt proceeds along the time of use, it is necessary to have the belt replaced regularly in period reference as shown below.

- When remarkable wear-out is found on teeth or edge of a belt
- When there is damage such as crack on the teeth or back of a belt

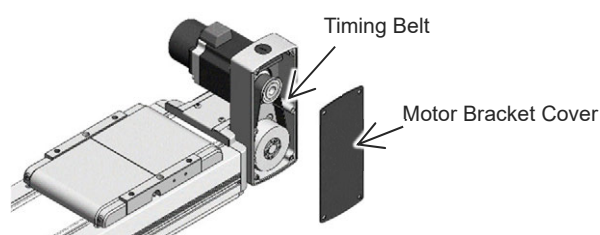
Also, as the toothed belt strengthened with core wires is difficult to determine degradation by appearance or looseness due to elongation, it is recommended to define a regular period of replacement in advance in use in high acceleration condition.

Replacement Belt Model Code (○○○ represents stroke)

Type	Timing Belt Model Code	Long Belt Model Code
IFA-SA	TB-IFA-SA	LB-IFA-SA-○○○
IFA-MA	TB-IFA-MA	LB-IFA-MA-○○○

[1] Timing Belt

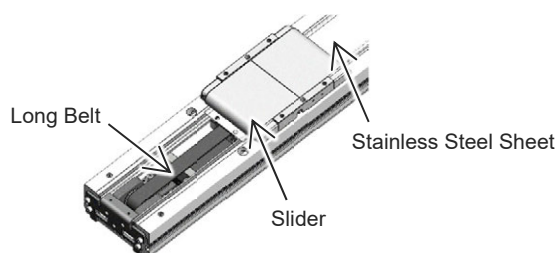
Take off the motor bracket cover in the procedure of 1 and 2 in [4.6 How to Replace Parts "4.6.3 [1] How to Replace Timing Belt"] and have inspection on the timing belt.



[2] Long Belt

Slide away the stainless steel sheet in the procedure from 1 to 4 in [4.3 Visual Inspection Items "Procedure for Internal Inspection"] and have inspection on the long belt.

* Pay attention not to have the stainless steel sheet come out of the slider.



4.4 Cleaning

4.4.1 External cleaning

- Clean exterior surfaces as necessary.
- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air, as it may cause dust to get in through gaps.
- Do not use petroleum-based solvents as they can harm resin and painted surfaces.
- When contamination is heavy, soak a soft cloth with neutral detergent or alcohol and wipe it off softly.

4.4.2 Internal cleaning

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

4.5 Greasing Method

[1] **Grease used:** Use lithium based grease equivalent.

Type	Grease used	
	Model Code	Manufacturer
IFA-SA	Daphne Grease MP No. 2	Idemitsu Kosan Co., Ltd.
IFA-MA		



Caution

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

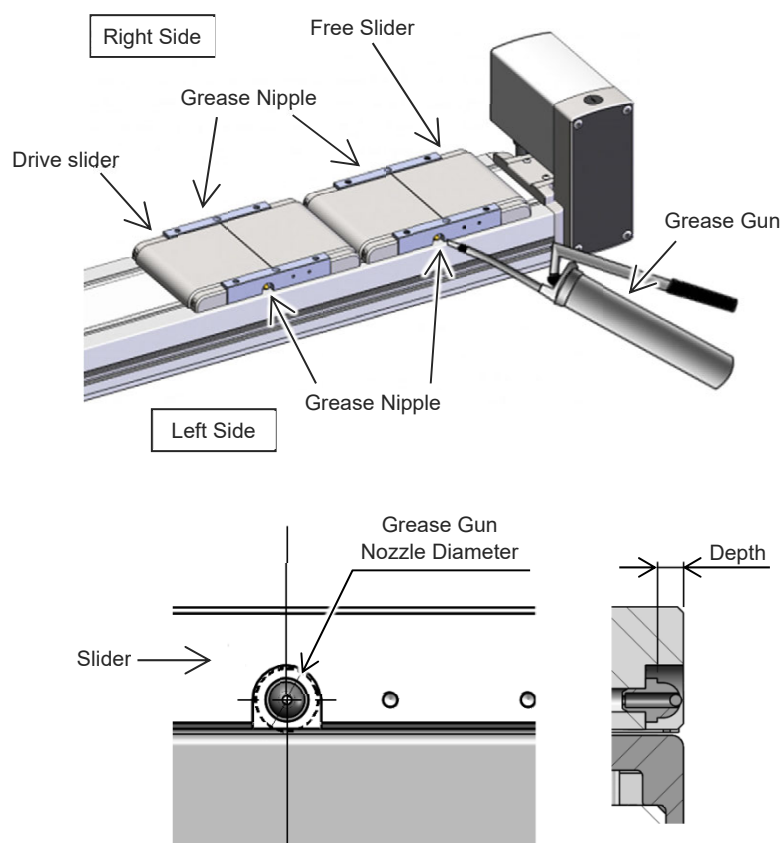
[2] How to Supply Grease to Guide

Grease is to be supplied at the grease nipples on the sides of the sliders with a grease gun. There are grease nipples on a slider, one each on both sides of it. The grease nipple on the right side supplies to the guide on the right side while the grease nipple on the left supplies to the guide on the left.

Make sure to supply grease on the grease nipple on the both sides.

Move the slider several times after supplying grease so the grease spreads evenly.

For the double-slider type, supply grease also on the grease nipples on the free slider.



Type	Grease Supply Volume on One Side (cc) (reference)	Grease Nipple Diameter (mm)	Grease Gun Nozzle Diameter (mm)	Depth (mm)
IFA-SA	1 to 1.5	φ3.5	φ9 or less	4
IFA-MA	2 to 2.5	φ6	φ12 or less	4.5

Recommended grease gun and nozzle

Grease Gun	Manufacturer
Mounting Screw: R1/8 (Example) GC-57K	Yamada Corporation

Nozzle	Manufacturer
N type + U type dedicated nozzle N type U type dedicated nozzle Connect N type to the tip of U type dedicated nozzle, and attach it on the grease gun to use. N type U type dedicated nozzle Grease gun attachment screw R1/8	THK



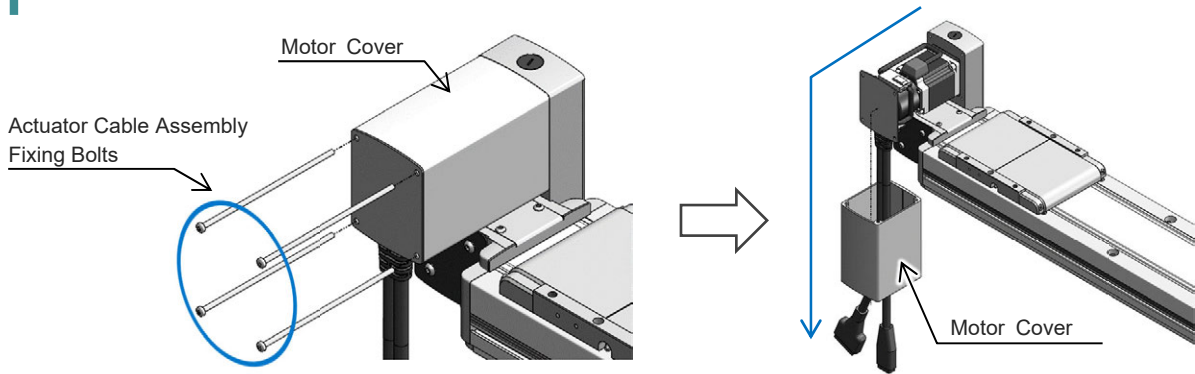
Caution

- Excessive supply of grease should increase the sliding resistance thus increase load on a motor, which may drop its performance.
- In case grease gets in to an eye, rinse it for 15 minutes with clean water and immediately go to see the doctor to have an appropriate treatment.
- After grease supplying work, wash hands well with water and soap.

4.6 How to Replace Components

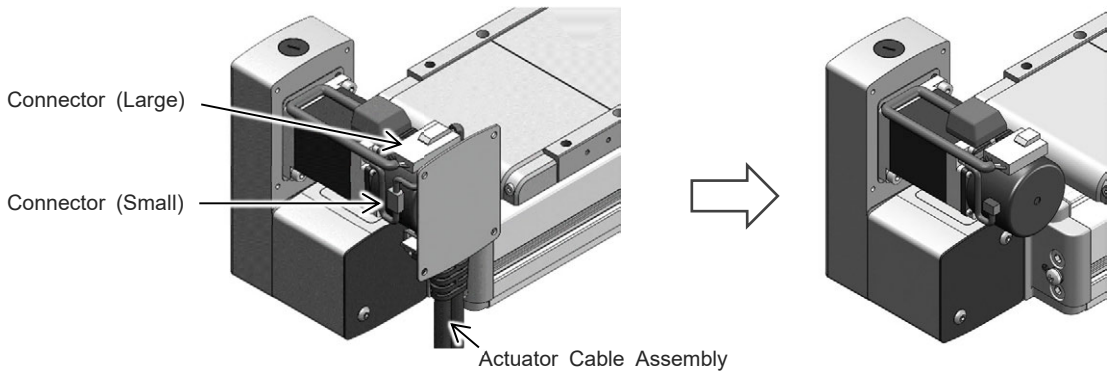
4.6.1 Replacing motor unit assembly

- 1** Remove the bolts holding the actuator cable assembly to take the motor cover off.

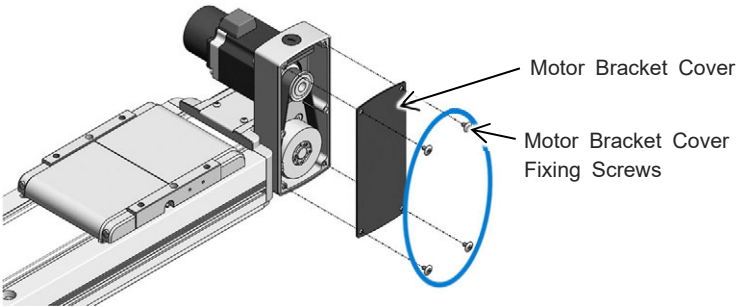


Part Name	Type	Screw	Quantity
Actuator Cable Assembly Fixing Bolt	IFA-SA	Cross Recessed Pan Head Machine Screw M3 × 100	4
	IFA-MA (200W)	Cross Recessed Pan Head Machine Screw M3 × 110	4
	IFA-MA (400W)	Cross Recessed Pan Head Machine Screw M3 × 135	4

- 2** Take off the connector (large) and connector (small) on the cable connector and take off the actuator cable assembly.

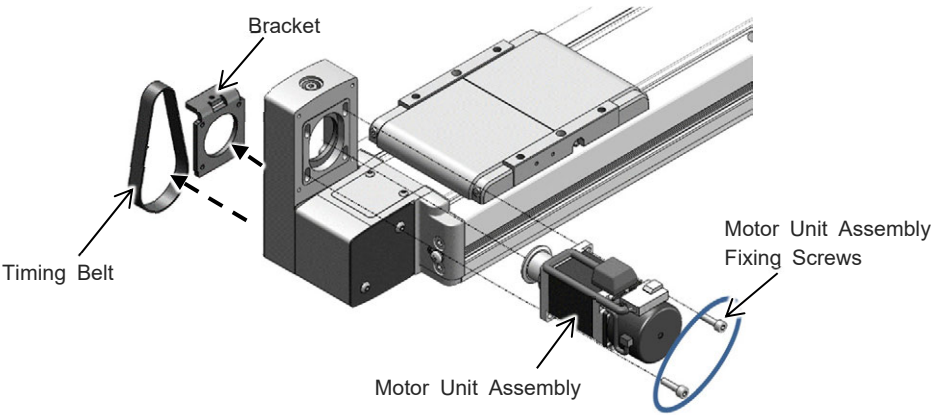


3 Remove the screws holding the motor bracket cover to take the motor bracket cover off.



Part Name	Type	Screw	Quantity
Motor Bracket Cover Fixing Screw	IFA-SA	Thin Head TP Type M3 × 5	4
	IFA-MA	Thin Head TP Type M4 × 5	4

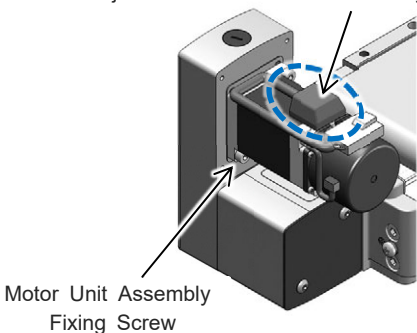
4 Remove the screws holding the motor unit assembly to take off the motor unit assembly. The timing belt and bracket should come off together.



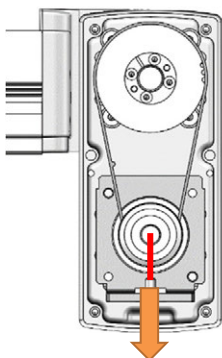
Part Name	Type	Screw	Quantity
Motor Unit Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2
	IFA-MA	Hex Socket Head Cap Screw M5 × 20	4

- 5** Put on the motor unit assembly for replacement.
- Set the motor unit assembly with its cable ejection (circled with broken line) orienting towards the arrow () shown in the figure below and have the assembly affixed loosely with the fixing screws.
- Move the slider to the specified point (Dimension A on the home side shown in the figure below) before hanging the timing belt.
- Orient the alignment mark on the motor towards the arrow ().
- Hang the timing belt on the pulley (small) and then to the pulley (large) on the other side.

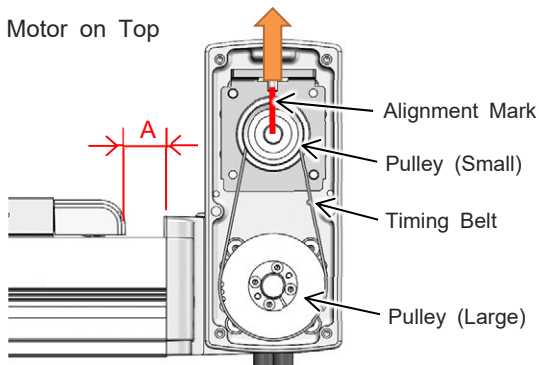
Cable Ejection on Motor Unit Assembly



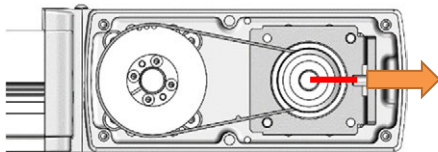
Motor on Bottom



Motor on Top



Motor in Horizontal Orientation



Dimension A indicates a dimension from the end of the base to the end of the slider.

Type	A (mm)	
	Standard Home Orientation	Home Reverse Type
IFA-SA	15.5	127.5
IFA-MA	15.5	140.5

Replacement Motor Unit Assembly Model Codes

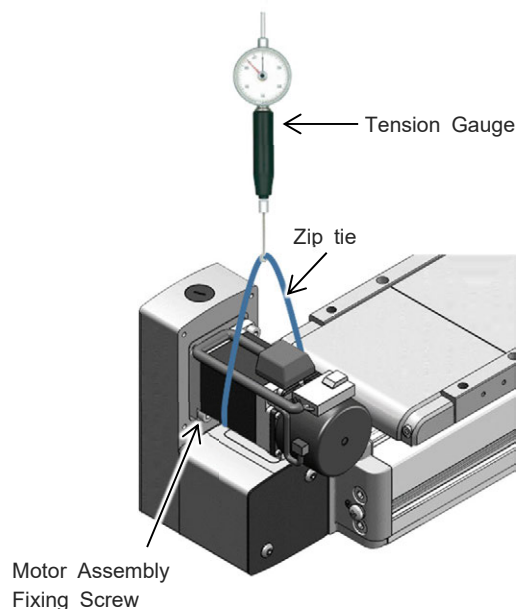
Type	Motor Unit Assembly Model Code
IFA-SA	M-IFA-TMA100-WA-PU
IFA-MA (200W)	M-IFA-TMA200-WA-PU
IFA-MA (400W)	M-IFA-TMA400-WA-PU

6 Adjust the tension of the timing belt.

Hang a Zip tie on the motor assembly and pull with a tension gauge.

Once the tensile strength has reached the specification shown below, tighten up the motor assembly fixing screws to hold the motor assembly while the tensile strength is kept.

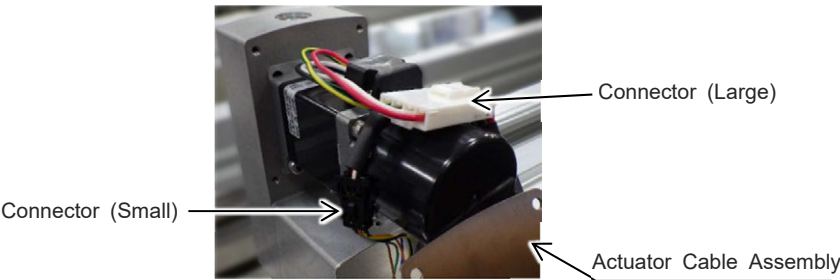
* Pay attention to the cables so they would not get pinched.



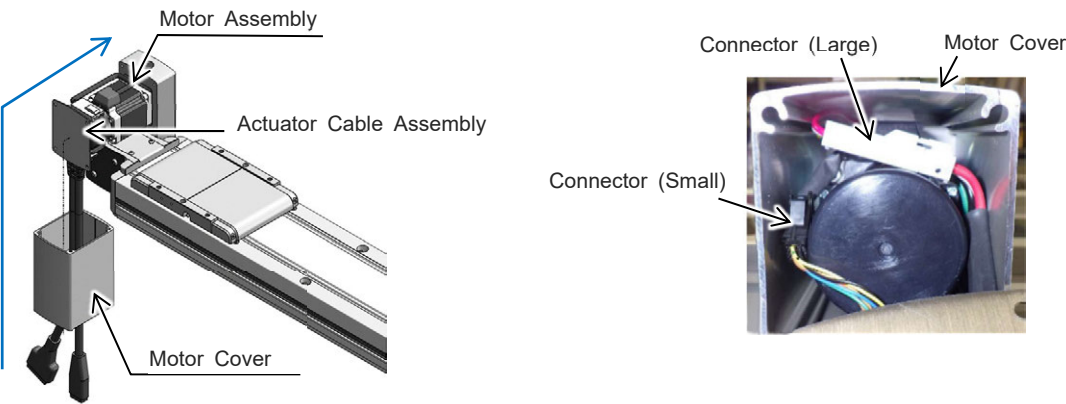
Part Name	Type	Tensile Strength (N)
Timing Belt Tension	IFA-SA	84 to 104
	IFA-MA	139 to 179

Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Motor Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2	1.8
	IFA-MA	Hex Socket Head Cap Screw M5 × 20	4	3.4

7 Put on the connector (large) and connector (small) on the actuator cable assembly.



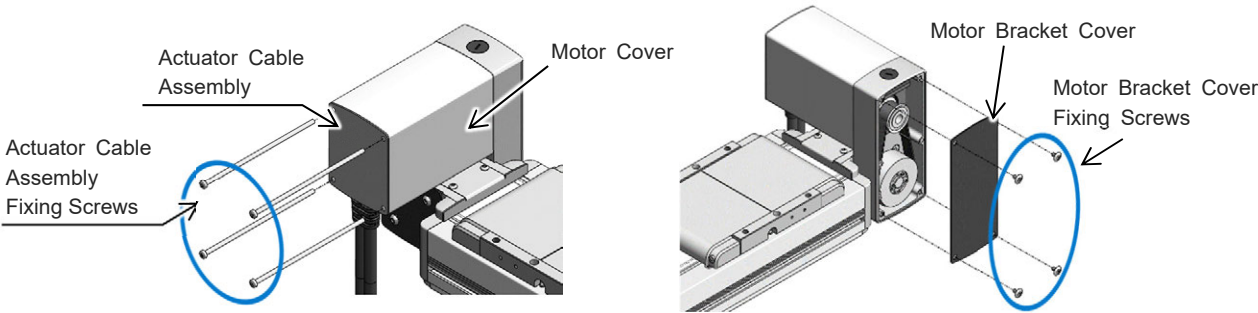
Put the actuator cable assembly through the motor cover and put it over the motor assembly.



Affix the motor cover and actuator cable assembly with the fixing bolts.

Affix the motor bracket cover with the fixing screws.

* Pay attention to the cables so they would not get pinched.

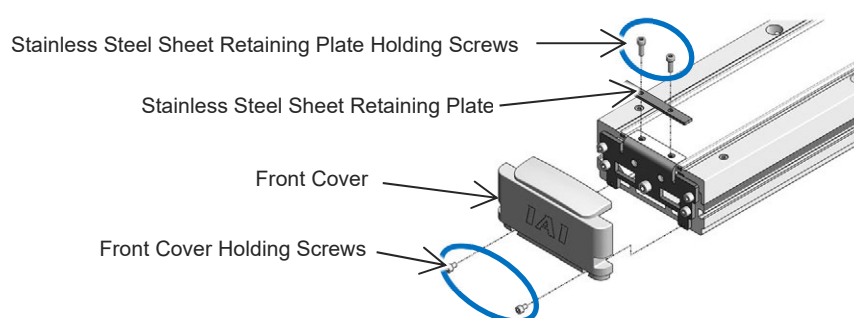


Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Motor Bracket Cover Fixing Screw	IFA-SA	Thin Head TP Type M3 × 5	4	0.7
	IFA-MA	Thin Head TP Type M4 × 5	4	1.6
Actuator Cable Assembly Fixing Bolt	IFA-SA	Cross Recessed Pan Head Machine Screw M3 × 100	4	0.4
	IFA-MA (200W)	Cross Recessed Pan Head Machine Screw M3 × 110	4	0.4
	IFA-MA (400W)	Cross Recessed Pan Head Machine Screw M3 × 135	4	0.4

4.6.2 Replacing stainless steel sheet

* Replacement work can be performed with a workpiece loaded on the slider.

- 1 Remove the screws holding the front cover to take the front cover off.
The front cover is to be shifted up once and then pulled out horizontally.
Remove the screws holding the stainless steel sheet retaining plate to take off the stainless steel sheet retaining plate.

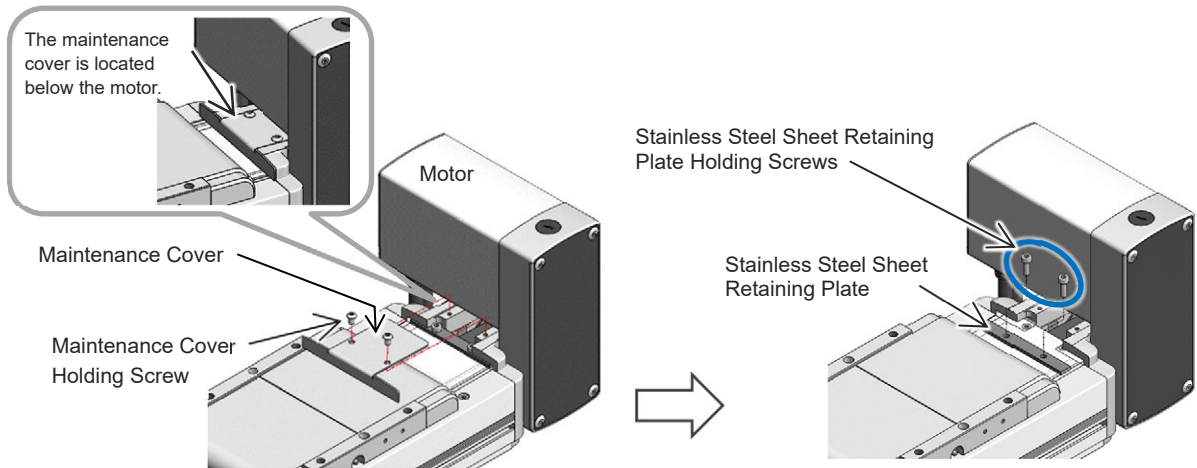


Part Name	Type	Screw	Quantity
Stainless Steel Sheet Retaining Plate Holding Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	2
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	2
Front Cover Holding Screw	IFA-SA IFA-MA	Hex Socket Head Cap Screw M3 × 5	2

Replacement Stainless Steel Sheet Model Code (000 represents stroke)

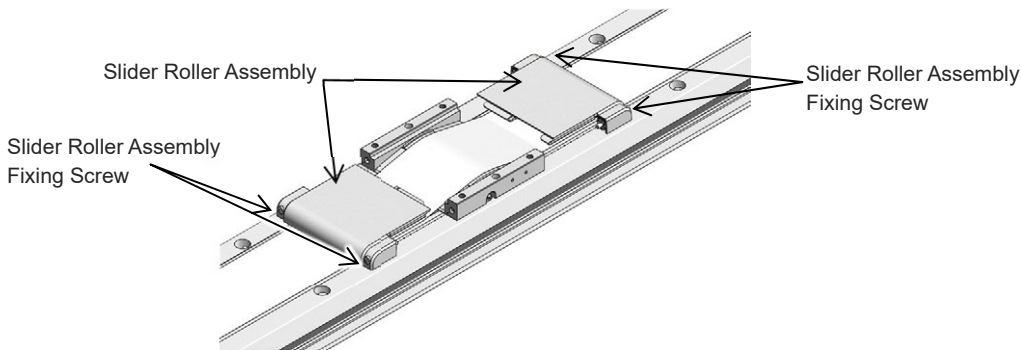
Type	Stainless Steel Sheet Model Code
IFA-SA	ST-IFA-SA-000
IFA-MA	ST-IFA-MA-000
IFA-SA-W (Double-Slider)	ST-IFA-SAD-000
IFA-SA-W (Double-Slider)	ST-IFA-MAD-000

- 2** Remove the screws holding the maintenance cover on the motor end to take the maintenance cover off.
- Remove the screws holding the stainless steel sheet retaining plate to take off the stainless steel sheet retaining plate.



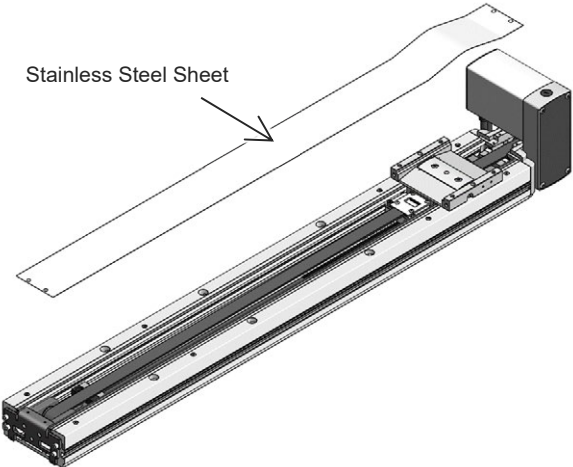
Part Name	Type	Screw	Quantity
Stainless Steel Sheet Retaining Plate Holding Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	2
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	2
Maintenance Cover Holding Screw	IFA-SA	Hex Socket Button Head Screw M3 × 5	2
	IFA-MA	Hex Socket Button Head Screw M4 × 5	2

- 3** Loosen the screws holding the slider roller assembly on the right and left little by little on one side after another to take off the slider roller assembly.

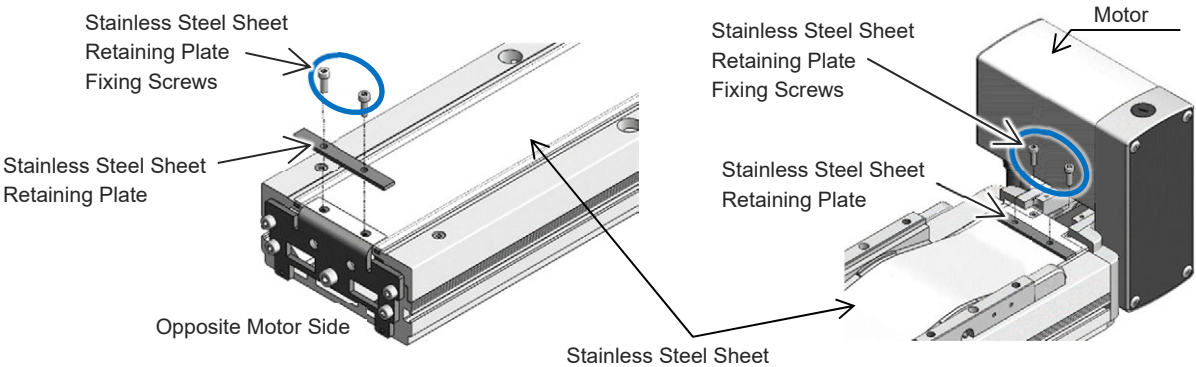
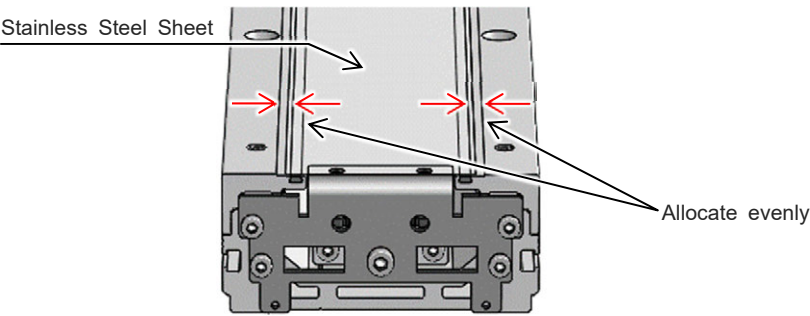


Part Name	Type	Screw	Quantity
Slider Roller Assembly Fixing Screw (Fall Prevention Type)	IFA-SA	Hex Socket Head Cap Screw M3 × 30	4
	IFA-MA	Hex Socket Head Cap Screw M4 × 35	4

4 Take the stainless steel sheet off and put another stainless steel sheet for replacement.

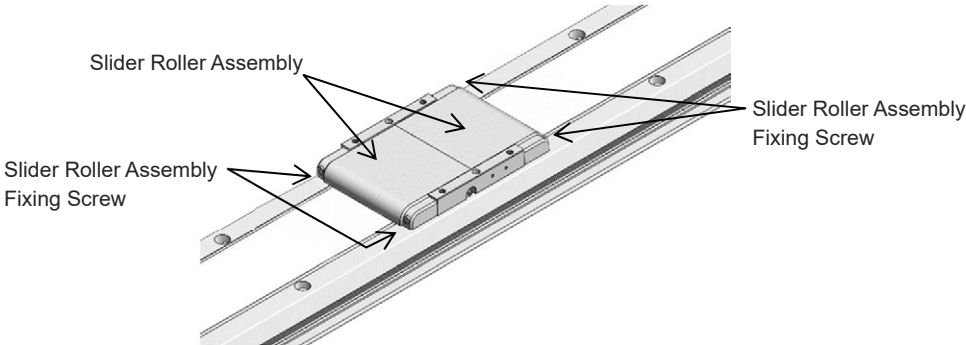


5 Install the stainless steel sheet so the right and left sides of the sheet get even and allocated straightly. Tighten the stainless steel sheet retaining plates on the side opposite motor and on the motor side loosely together with the stainless steel sheet with the screws to hold the stainless steel sheet retaining plates.



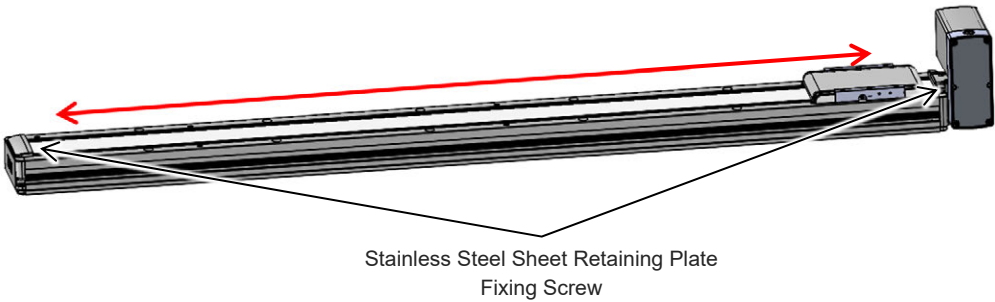
Part Name	Type	Screw	Quantity
Stainless Steel Sheet Retaining Plate Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	4
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	4

6 Hold the slider roller assembly with the fixing screws.



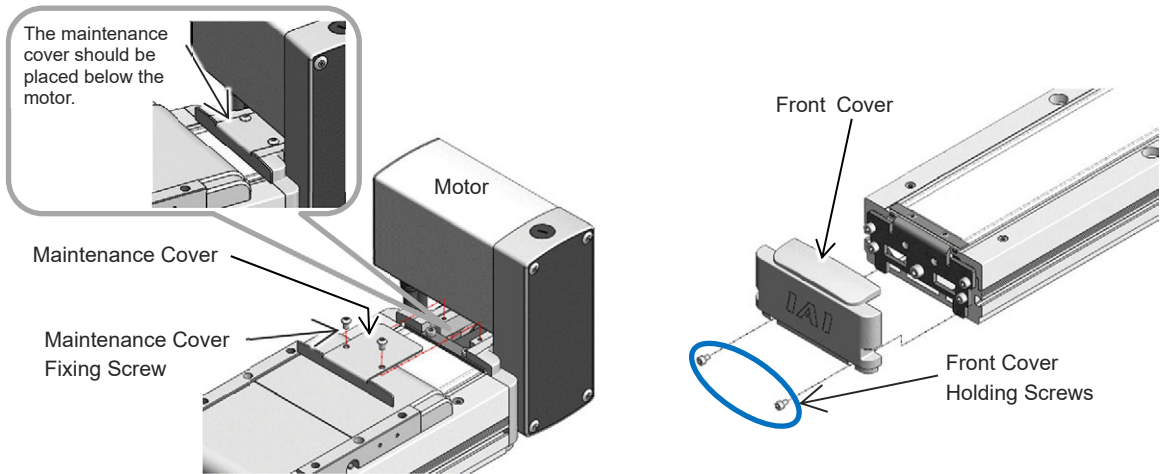
Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Slider Roller Assembly Fixing Screw (Fall Prevention Type)	IFA-SA	Hex Socket Head Cap Screw M3 × 30	4	1.5
	IFA-MA	Hex Socket Head Cap Screw M4 × 35	4	3.6

7 Move the slider in the entire stroke to confirm that there is no warpage, offset or lifting on the stainless steel sheet. If there is no problem, fully tighten the stainless steel sheet retaining plate fixing screws.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Stainless Steel Sheet Retaining Plate Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	4	1.5
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	4	3.6

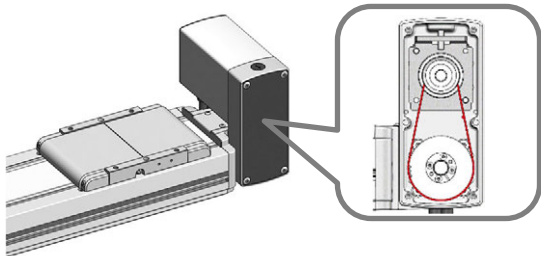
8 Attach the maintenance cover and the front cover.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Maintenance Cover Fixing Screw	IFA-SA	Hex Socket Button Head Screw M3 × 5	2	0.8
	IFA-MA	Hex Socket Button Head Screw M4 × 5	2	1.8
Front Cover Holding Screw	IFA-SA IFA-MA	Hex Socket Head Cap Screw M3 × 5	2	0.5

4.6.3 Replacing and adjusting belt

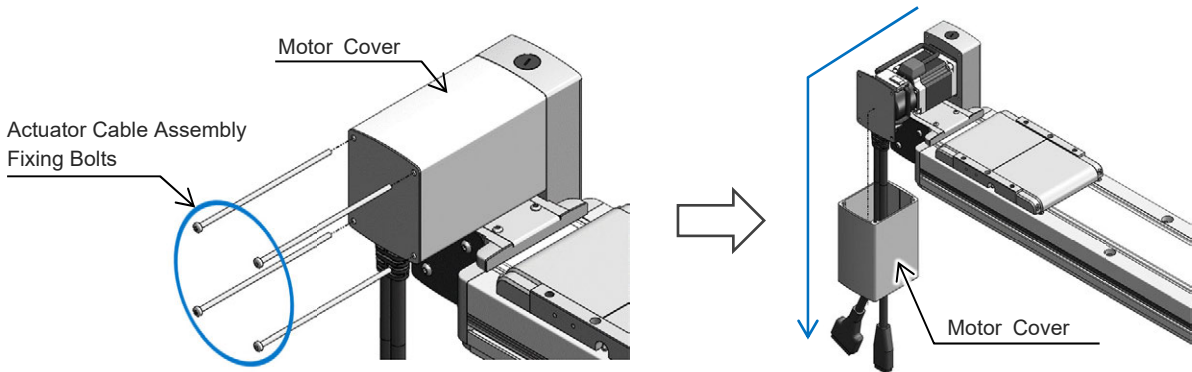
[1] How to Replace Timing Belt



Replacement Timing Belt Model Codes

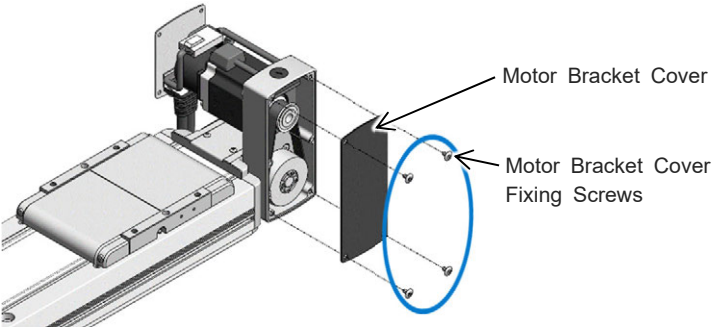
Type	Maintenance Parts Model Code
IFA-SA	TB-IFA-SA
IFA-MA	TB-IFA-MA

- 1 Remove the bolts holding the actuator cable assembly to take the motor cover off.



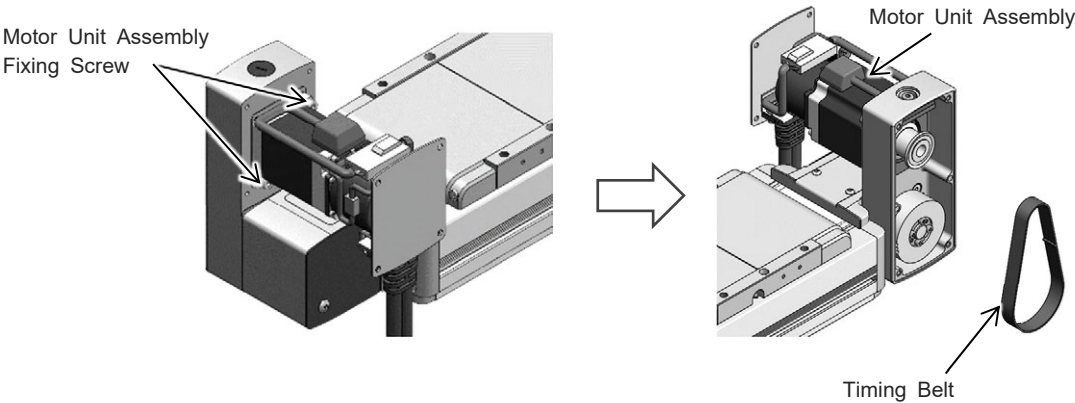
Part Name	Type	Screw	Quantity
Actuator Cable Assembly Fixing Bolt	IFA-SA	Cross Recessed Pan Head Machine Screw M3 × 100	4
	IFA-MA (200W)	Cross Recessed Pan Head Machine Screw M3 × 110	4
	IFA-MA (400W)	Cross Recessed Pan Head Machine Screw M3 × 135	4

2 Remove the screws holding the motor bracket cover to take the motor bracket cover off.



Part Name	Type	Screw	Quantity
Motor Bracket Cover Fixing Screw	IFA-SA	Thin Head TP Type M3 × 5	4
	IFA-MA	Thin Head TP Type M4 × 5	4

3 Loosen the screws holding the motor unit assembly to take off the timing belt.



Part Name	Type	Screw	Quantity
Motor Unit Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2
	IFA-MA	Hex Socket Head Cap Screw M5 × 20	4

4

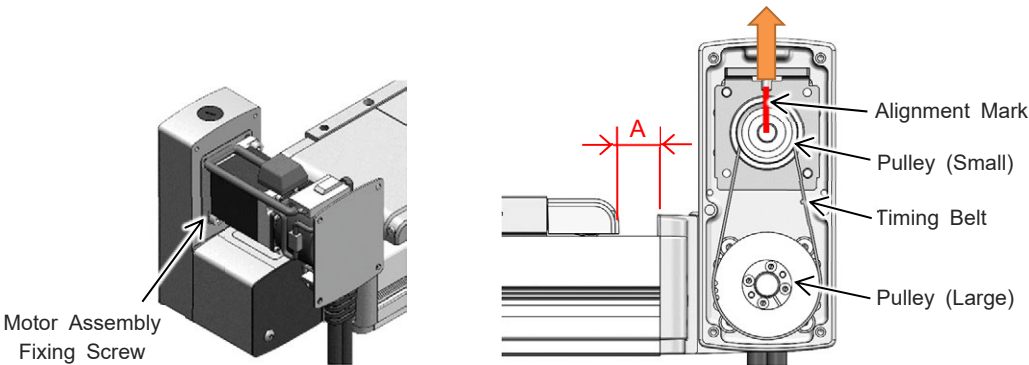
Attach a new timing belt.

Fixed it loosely screws to hold the motor unit assembly.

Move the slider to the specified point (Dimension A on the home side shown in the figure below) before hanging the timing belt.

Orient the alignment mark on the motor towards the arrow (➡).

Hang the timing belt on the pulley (small) and then to the pulley (large) on the other side.



Dimension A indicates a dimension from the end of the base to the end of the slider.

Type	A (mm)	
	Standard Home Orientation	Home Reverse Type
IFA-SA	15.5	127.5
IFA-MA	15.5	140.5

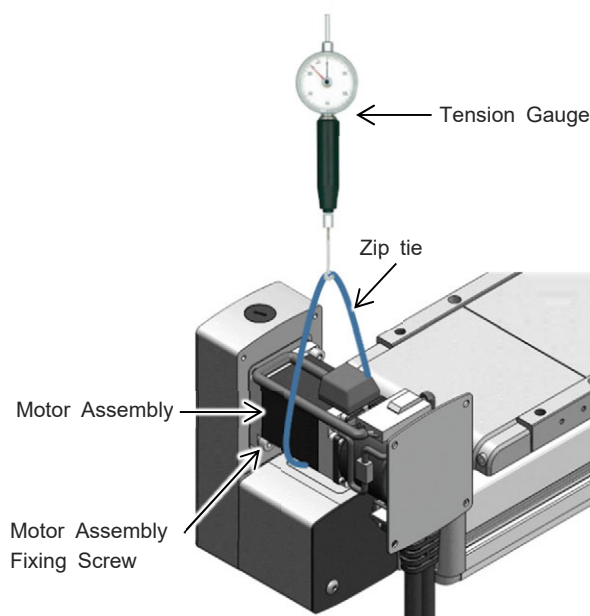
5

Adjust the tension of the timing belt.

Hang a Zip tie on the motor assembly and pull with a tension gauge.

Once the tensile strength has reached the specification shown below, tighten up the motor assembly fixing screws to hold the motor assembly while the tensile strength is kept.

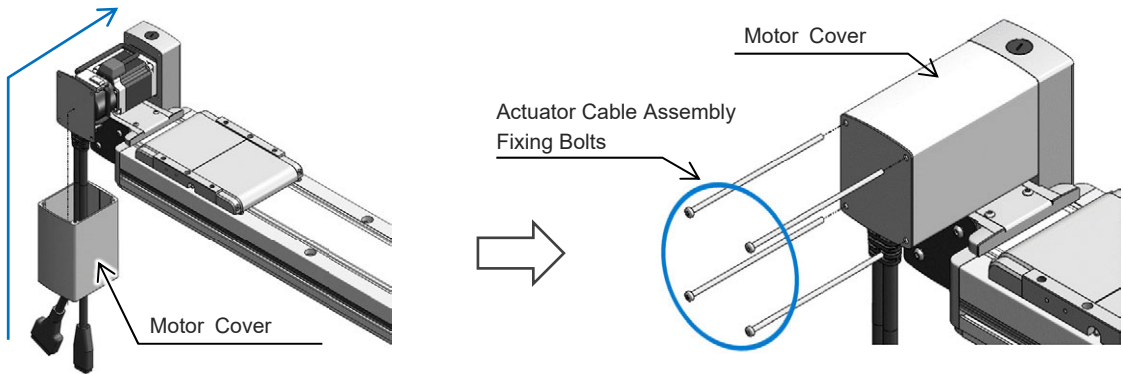
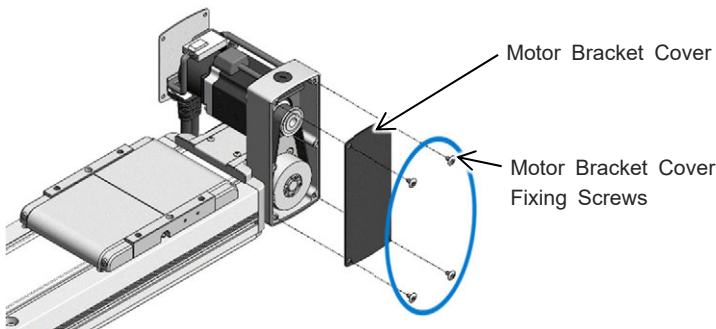
* Pay attention to the cables so they would not get pinched.



Part Name	Type	Tensile Strength (N)
Timing Belt Tension	IFA-SA	84 to 104
	IFA-MA	139 to 179

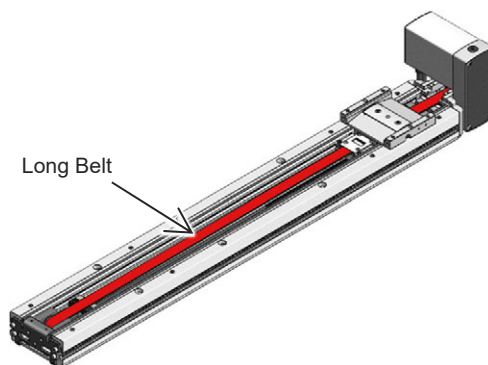
Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Motor Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2	1.8
	IFA-MA	Hex Socket Head Cap Screw M5 × 20	4	3.4

- 6 Attach the motor bracket cover and motor cover that were taken off.
* Pay attention to the cables so they would not get pinched.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Motor Bracket Cover Fixing Screw	IFA-SA	Thin Head TP Type M3 × 5	4	0.7
	IFA-MA	Thin Head TP Type M4 × 5	4	1.6
Actuator Cable Assembly Fixing Bolt	IFA-SA	Cross Recessed Pan Head Machine Screw M3 × 100	4	0.4
	IFA-MA (200W)	Cross Recessed Pan Head Machine Screw M3 × 110	4	0.4
	IFA-MA (400W)	Cross Recessed Pan Head Machine Screw M3 × 135	4	0.4

[2] Replacing Long Belt

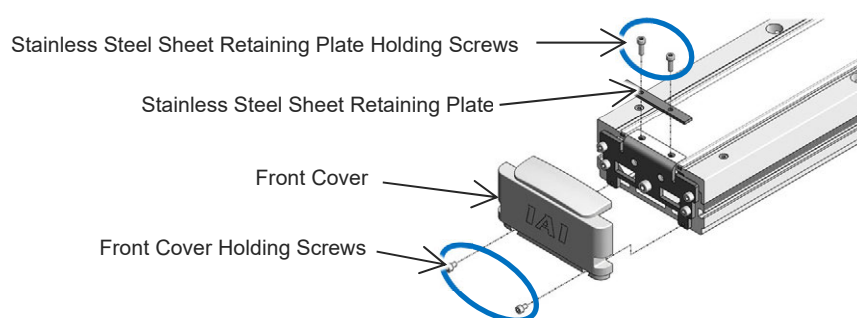


Replacement Long Belt Model Code (OOO represents stroke)

Type	Maintenance Parts Model Code
IFA-SA	LB-IFA-SA000
IFA-MA	LB-IFA-MA000

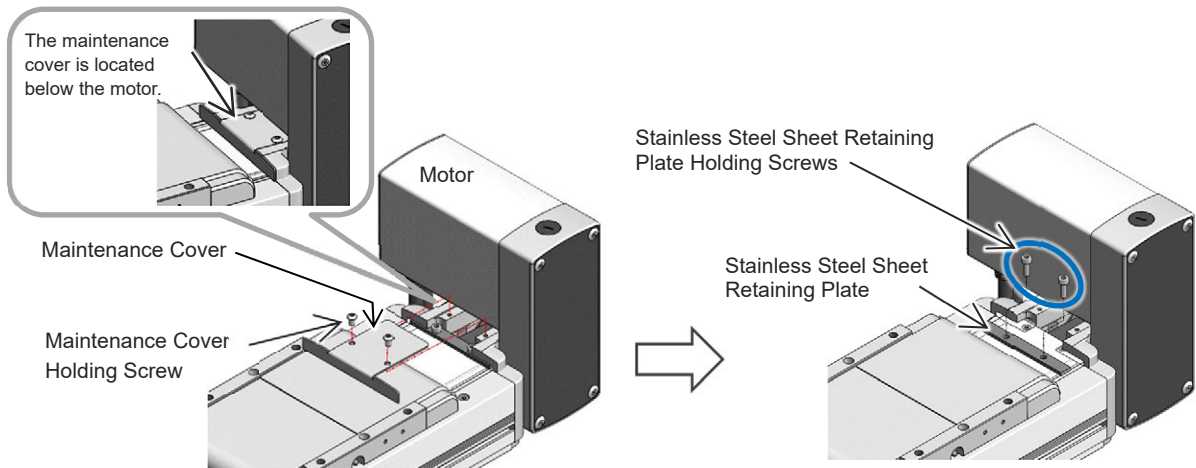
- * Replacement work can be performed with a workpiece loaded on the slider.
- * When a workpiece is in a size not exceeding the slider in the moving direction, Step 5 and 6 can be skipped. In that case, use a hex wrench (equipped with ball-point). Refer to [Step 7]

- 1 Remove the screws holding the front cover to take the front cover off.
The front cover is to be shifted up once and then pulled out horizontally.
Remove the screws holding the stainless steel sheet retaining plate to take off the stainless steel sheet retaining plate.



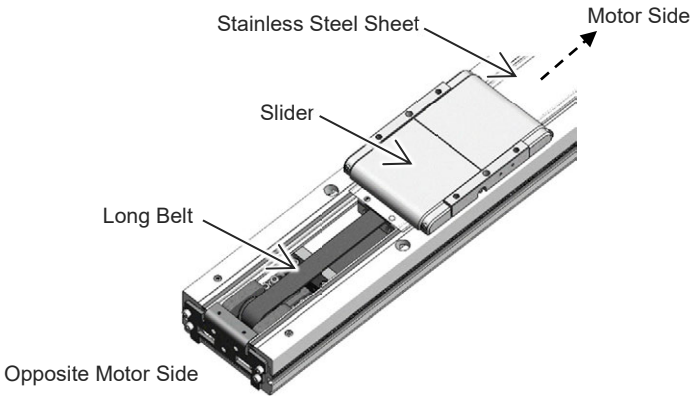
Part Name	Type	Screw	Quantity
Stainless Steel Sheet Retaining Plate Holding Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	2
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	2
Front Cover Holding Screw	IFA-SA IFA-MA	Hex Socket Head Cap Screw M3 × 5	2

- 2** Remove the screws holding the maintenance cover on the motor end to take the maintenance cover off.
- Remove the screws holding the stainless steel sheet retaining plate to take off the stainless steel sheet retaining plate.

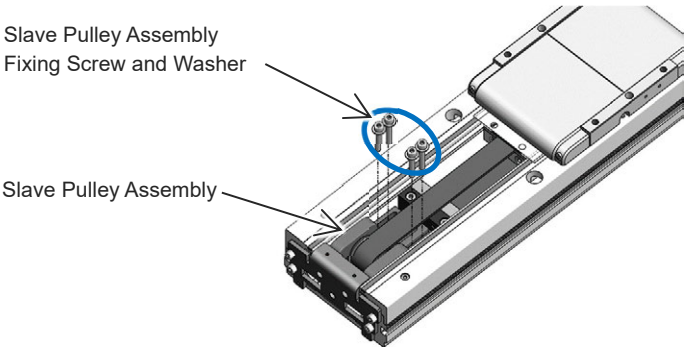


Part Name	Type	Screw	Quantity
Stainless Steel Sheet Retaining Plate Holding Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	2
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	2
Maintenance Cover Holding Screw	IFA-SA	Hex Socket Button Head Screw M3 × 5	2
	IFA-MA	Hex Socket Button Head Screw M4 × 5	2

- 3** Pull the stainless steel sheet to the motor side so the long belt inside can be seen.
- * Pay attention to the stainless steel sheet so that it would not come out of the slider.

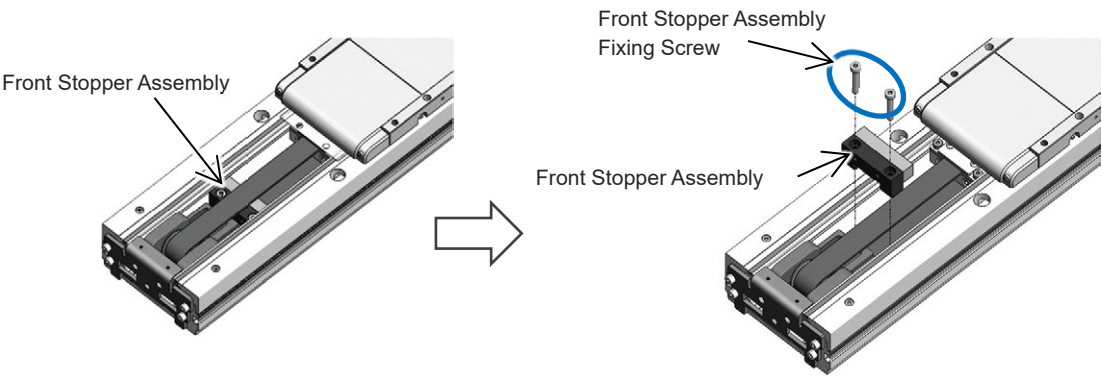


4 Remove screws and washers holding the slave pulley assembly.



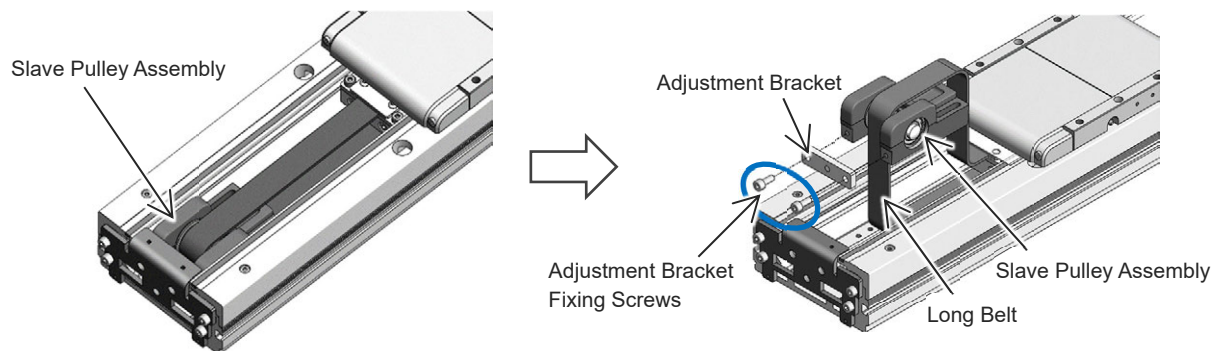
Part Name	Type	Screw	Quantity
Slave Pulley Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 25 Washer φ4.5 × φ10 × 0.8	4
	IFA-MA	Hex Socket Head Cap Screw M5 × 25 Washer φ5.5 × φ12 × 0.8	4

5 Remove the screws holding the front stopper assembly to take the front stopper assembly off.



Part Name	Type	Screw	Quantity
Front Stopper Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 25	2
	IFA-MA	Hex Socket Head Cap Screw M5 × 25	2

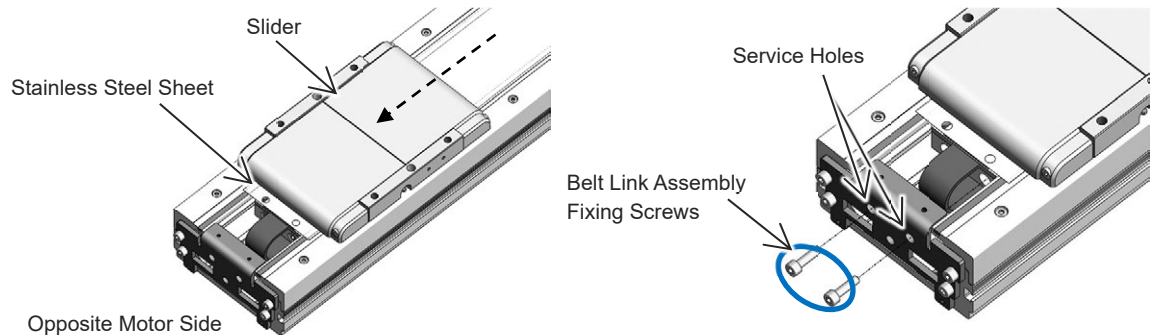
- 6 Push up the slave pulley assembly, remove the screws holding the adjustment bracket and take the slave pulley assembly off the long belt.



Part Name	Type	Screw	Quantity
Adjustment Bracket Fixing Screw	IFA-SA IFA-MA	Hex Socket Head Cap Screw M4 × 10	2

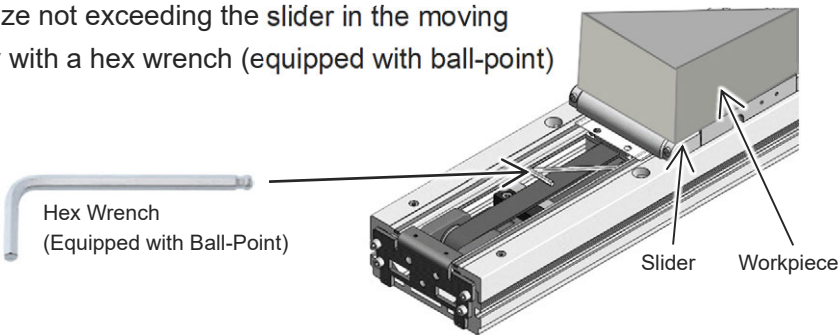
- 7 Take off the belt link assembly placed below the stainless steel sheet. Move the slider to the side opposite the motor to a position where a hex wrench can reach the screws holding the belt link assembly. Put the hex wrench through the service holes to take off the screws.

* Pay attention to the stainless steel sheet so that it would not come out of the slider.

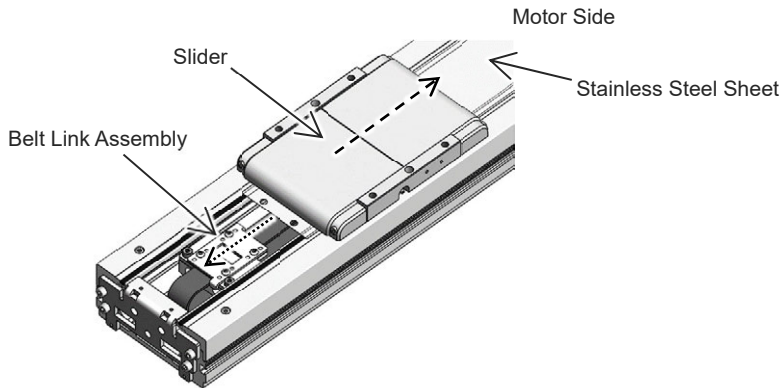


Part Name	Type	Screw	Quantity
Belt Link Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2
	IFA-MA	Hex Socket Head Cap Screw M5 × 15	2

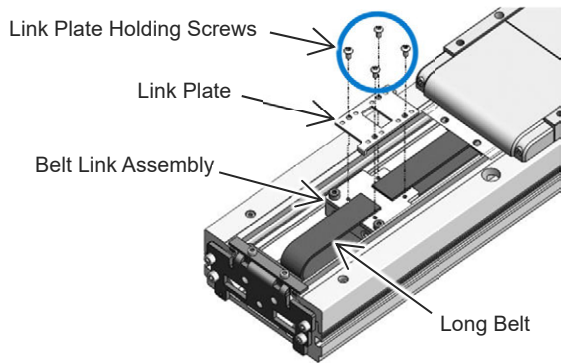
- * When a workpiece is in a size not exceeding the slider in the moving direction, taking out directly with a hex wrench (equipped with ball-point) also available.



- 8
- The belt link assembly should get separated from the slider. Move the slider to the motor side so the belt link assembly can be seen.
* Pay attention to the stainless steel sheet so that it would not come out of the slider.



- 9
- Remove the screws holding the link plate to take link plate off.
* At this moment, confirm that there is no tension applied on the long belt.



Part Name	Type	Screw	Quantity
Link Plate Holding Screw	IFA-SA	Hex Socket Button Head Screw M3 × 6	4
	IFA-MA	Hex Socket Button Head Screw M4 × 8	4

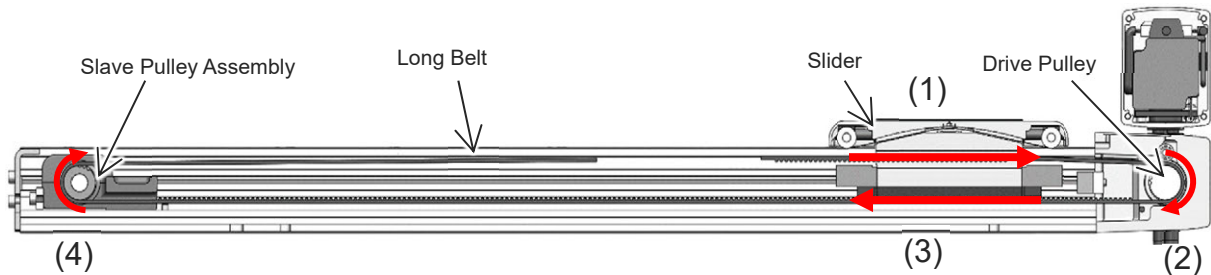
10 Put a new long belt through. There are two ways to put the belt through.

[How to Put Through 1]

Pull the existing long belt completely.

Put a long belt for replacement through in the order from (1) to (4). (Refer below for the double-slider)

* Push the belt in when putting the belt through at (2).



● For Double-Slider

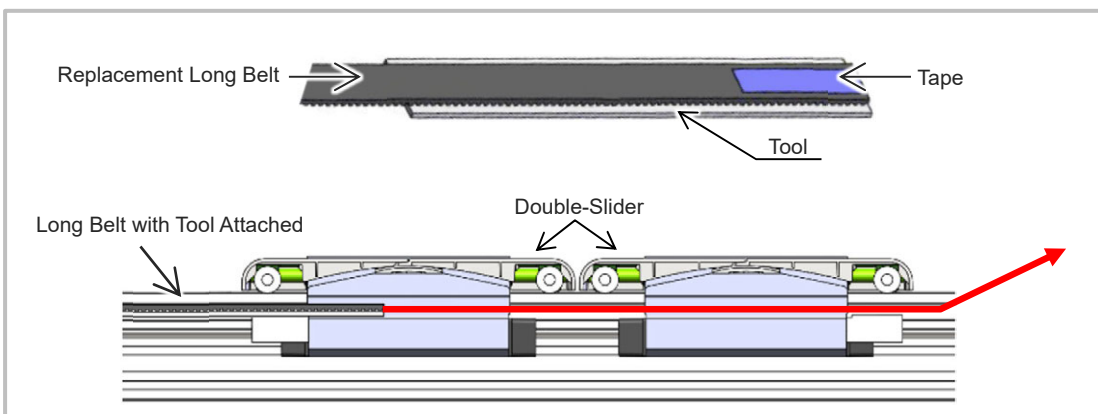
Put a tool on the long belt before putting it through at (1) (slider).

Tool: Sheet-shaped tool with

length 300 to 500mm × width 20 to 30mm × thickness 1 to 3mm (such as a ruler)

Adhere it on the replacement long belt with adhesive tape.

- Wipe the oil off the surface well to adhere tape.
- If adhesion of adhesive tape is weak or it is short, it may come off on the way.

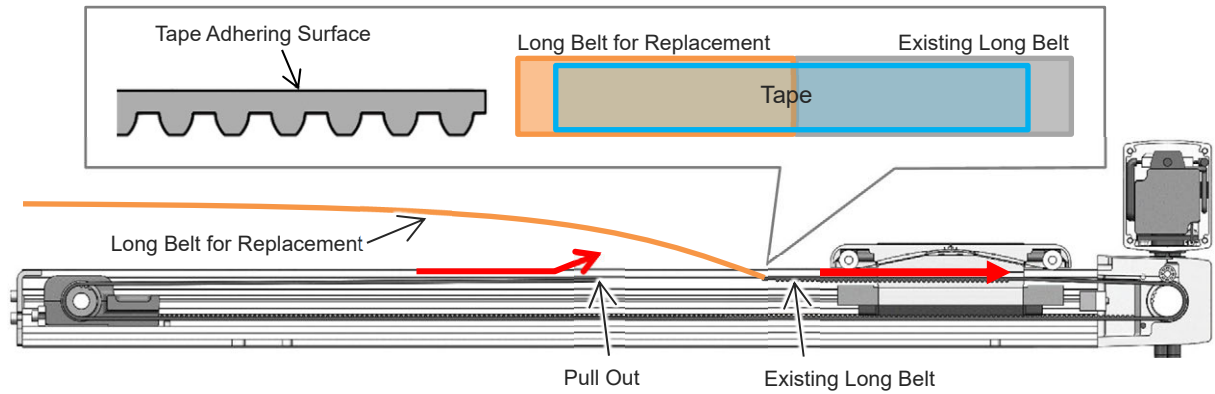


When the tool come out completely of the double-slider, take the tool off the long belt and put the long belt through in the order from (2) to (4).

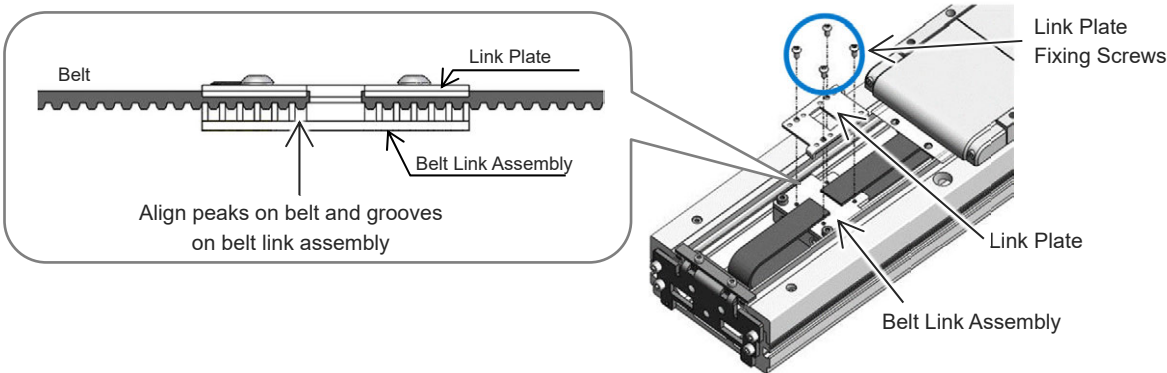
[How to Put Through 2]

Adhere a long belt for replacement to the existing long belt at the edge of each with adhesive tape, and then pull it together to replace the belt.

- Wipe the oil off the surface well to adhere tape.
- Pull the long belt hardly when pulling it out. If adhesion of adhesive tape is weak or it is short, it may come off on the way.
- Have Tape not to exceed the width of the belt.



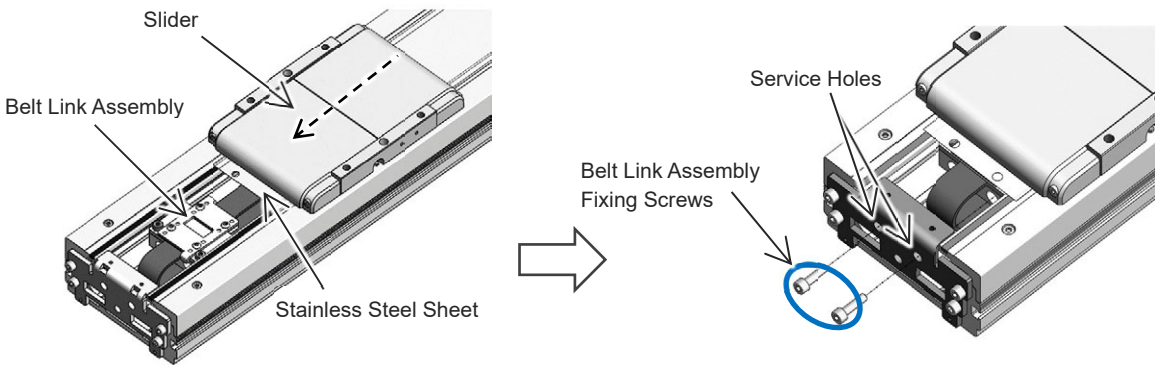
11 Align the peaks on the long belt and the grooves on the belt link assembly, pinch the belt with the link plates and affix them with the link plate fixing screws.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Link Plate Fixing Screws	IFA-SA	Hex Socket Button Head Screw M3 × 6	4	1
	IFA-MA	Hex Socket Button Head Screw M4 × 8	4	1.9

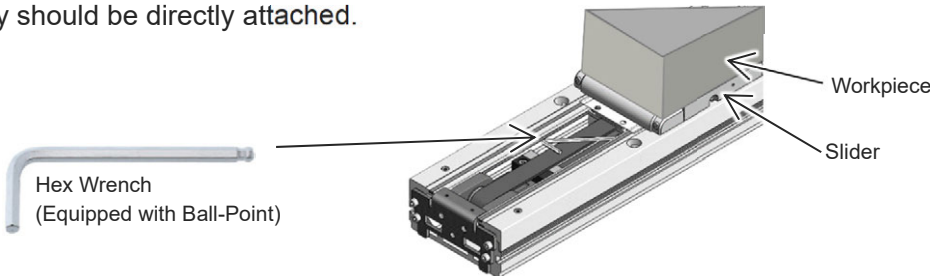
12 Move the slider to the side opposite the motor to a position where a hex wrench can reach the screws holding the belt link assembly. Put the hex wrench through the service holes to affix the screws.

* Pay attention to the stainless steel sheet so that it would not come out of the slider.

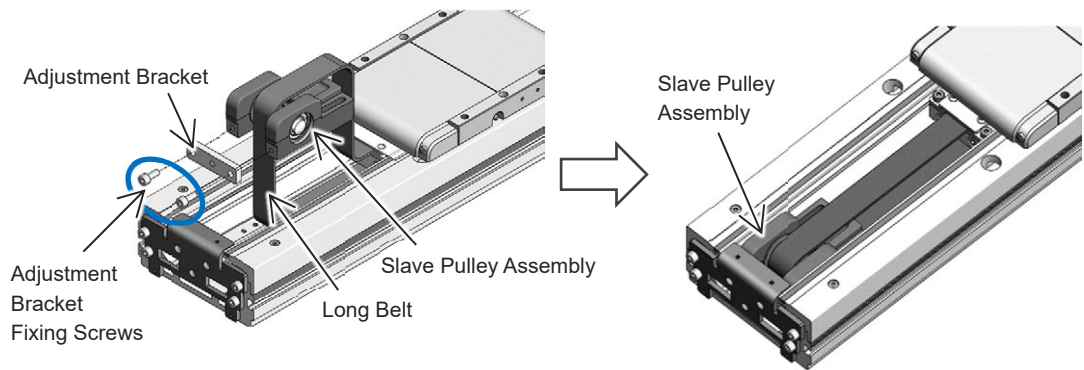


Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Belt Link Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2	3.6
	IFA-MA	Hex Socket Head Cap Screw M5 × 15	2	7.3

* If they were taken off directly with a hex wrench (equipped with ball-point) in Step 7, they should be directly attached.

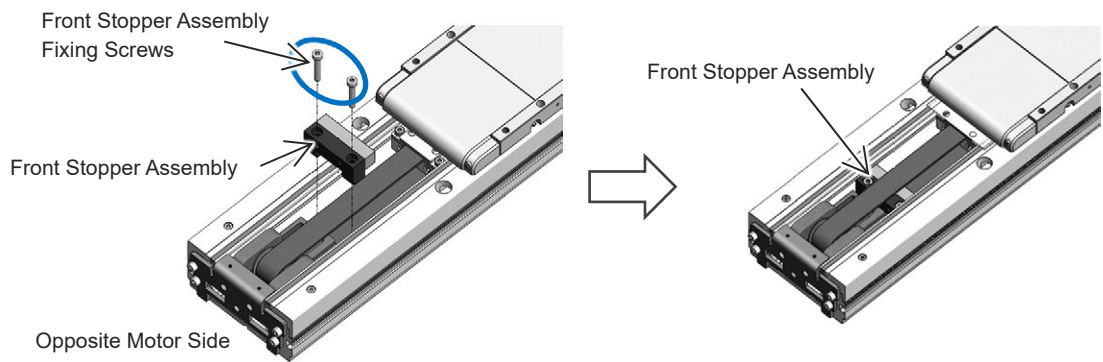


- 13** Attach the slave pulley assembly to the long belt.
Apply the slave pulley on the long belt, and affix it with the screws to hold the adjustment bracket.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Adjustment Bracket Fixing Screw	IFA-SA IFA-MA	Hex Socket Head Cap Screw M4 × 10	2	3.6

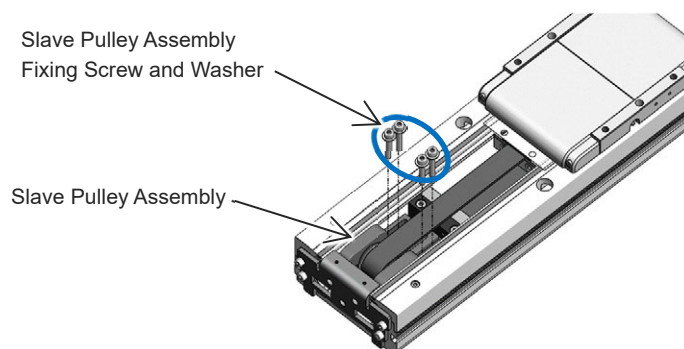
- 14** Push the front stopper assembly towards the side opposite the motor and affix it with screws to hold the front stopper assembly.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Front Stopper Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 25	2	3.6
	IFA-MA	Hex Socket Head Cap Screw M5 × 25	2	7.3

15

Tighten the screws and washers to hold the slave pulley assembly loosely.

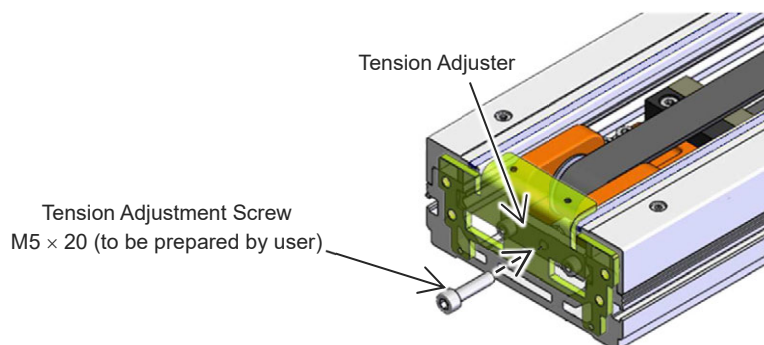


16

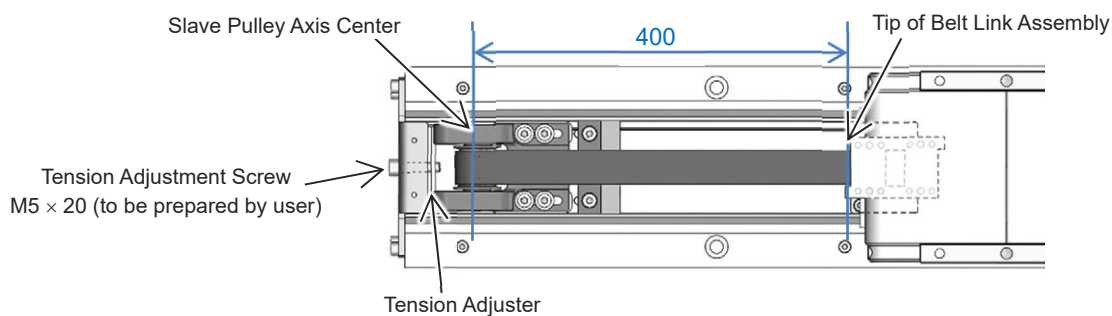
Adjust the tension of the long belt.

(Example of Tension Adjustment: When the distance from the center of the slave pulley axis to the tip of the belt link assembly is set at 400mm/When the stroke is 350mm or less, replace it from 400mm to 250mm.)

- (1) Screw in a screw M5 × 20 (to be prepared by user) for tension adjustment at the screw hole on the adjustment bracket until the screw reaches the tension adjuster.



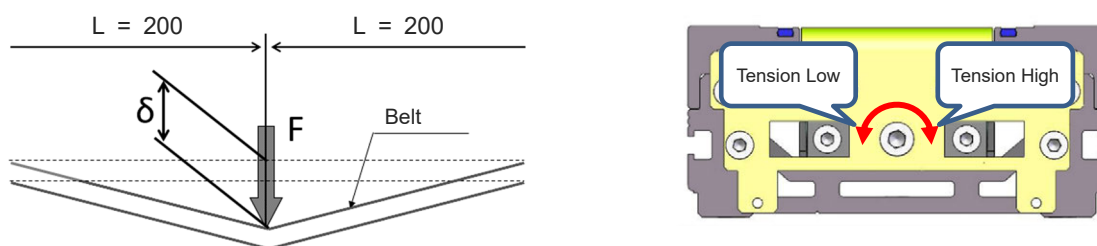
- (2) Set the distance from the center of the slave pulley axis to the tip of the belt link assembly at 400mm.



- (3) Turn the tension adjustment screw to make the deflection load in the center of the belt as shown in the table below when pressing on it with a tension gauge to adjust the tension of the long belt.

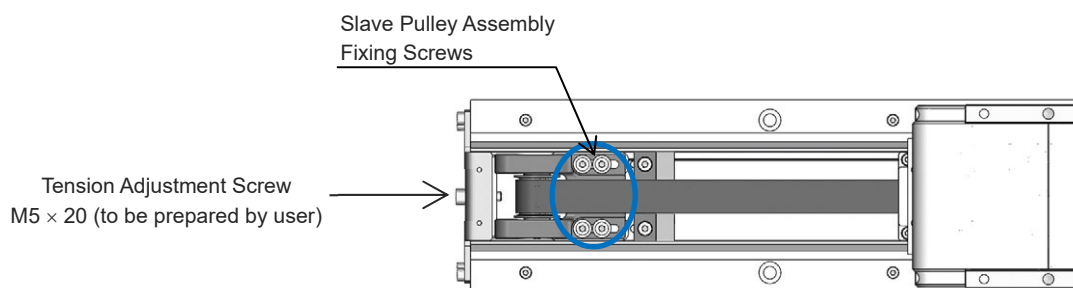
(Turn the tension adjustment screw clockwise and the slave pulley assembly should be pulled.)

(As the deflection δ should vary depending on Dimension L, it is required to figure out the deflection with the formula below.)



Type	Deflection Load: F	Deflection: δ
IFA-SA	0.8kgf $\pm 10\%$	$\delta = 0.032 \times L$ $= 6.4\text{mm}$
IFA-MA	2.0kgf $\pm 5\%$	

- (4) Once the tension is adjusted, affix the slave pulley assembly and take off the tension adjustment screw.

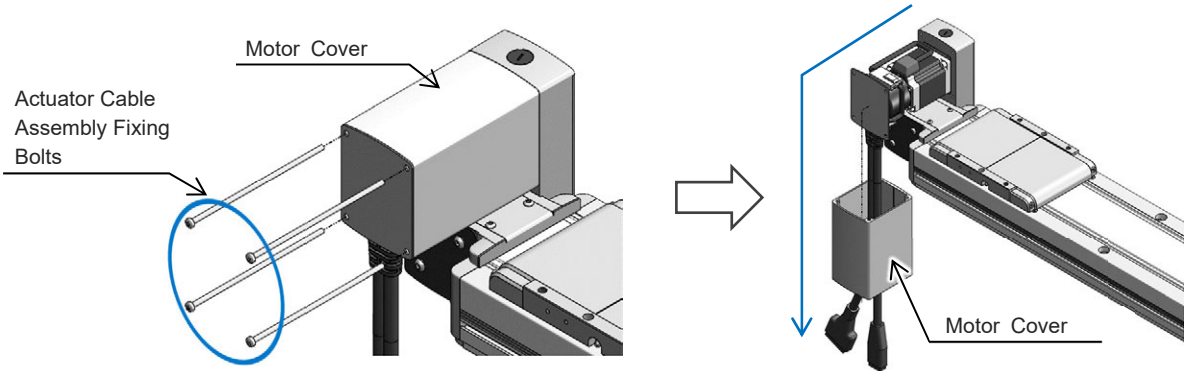


Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Slave Pulley Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 x 25	4	3.6
		Washer $\phi 4.5 \times \phi 10 \times 0.8$		
	IFA-MA	Hex Socket Head Cap Screw M5 x 25	4	7.3
		Washer $\phi 5.5 \times \phi 12 \times 0.8$		

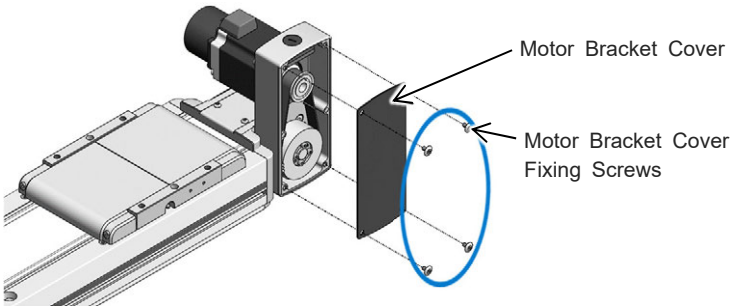
17

Adjustment of the home position should be performed.

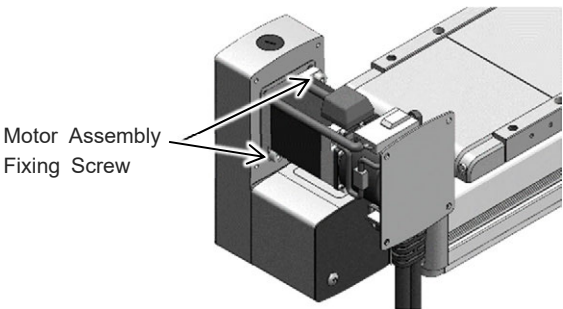
- (1) Remove the bolts holding the actuator cable assembly to take the motor cover off.



- (2) Remove the screws holding the motor bracket cover to take the motor bracket cover off.

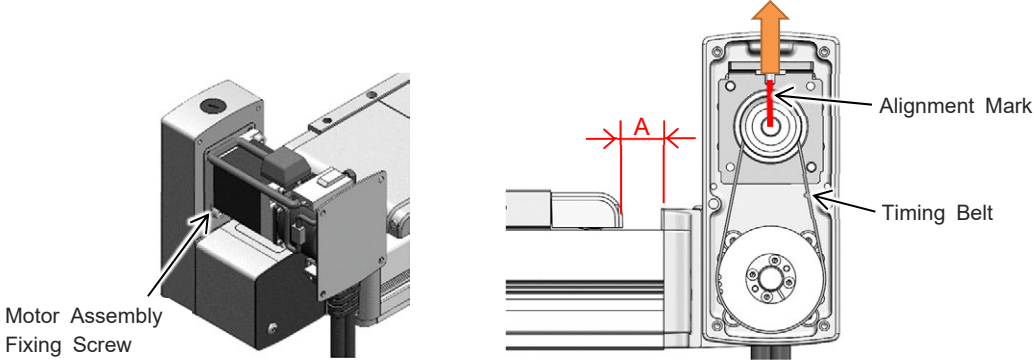


- (3) Loosen the screws holding the motor assembly.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Motor Bracket Cover Fixing Screw	IFA-SA	Thin Head TP Type M3 × 5	4	0.7
	IFA-MA	Thin Head TP Type M4 × 5	4	1.6
Motor Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2	1.8
	IFA-MA	Hex Socket Head Cap Screw M5 × 20	4	3.4

- (4) Move the slider to the specified point (Dimension A on the home side shown in the figure below).
Orient the alignment mark on the motor towards the arrow ().

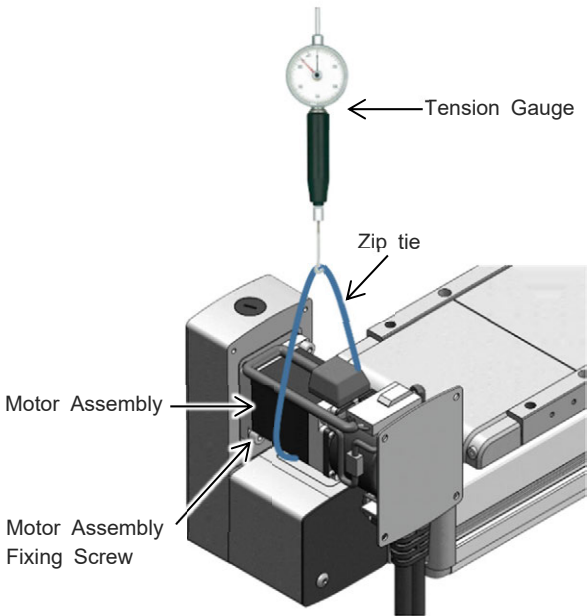


Dimension A indicates a dimension from the end of the base to the end of the slider.

Type	A (mm)	
	Standard Home Orientation	Home Reverse Type
IFA-SA	15.5	127.5
IFA-MA	15.5	140.5

18 Adjust the tension of the timing belt.

- (1) Hang a Zip tie on the motor assembly and pull with a tension gauge.
- Once the tensile strength has reached the specification shown below, tighten up the motor assembly fixing screws to hold the motor assembly while the tensile strength is kept.
- * Pay attention to the cables so they would not get pinched.

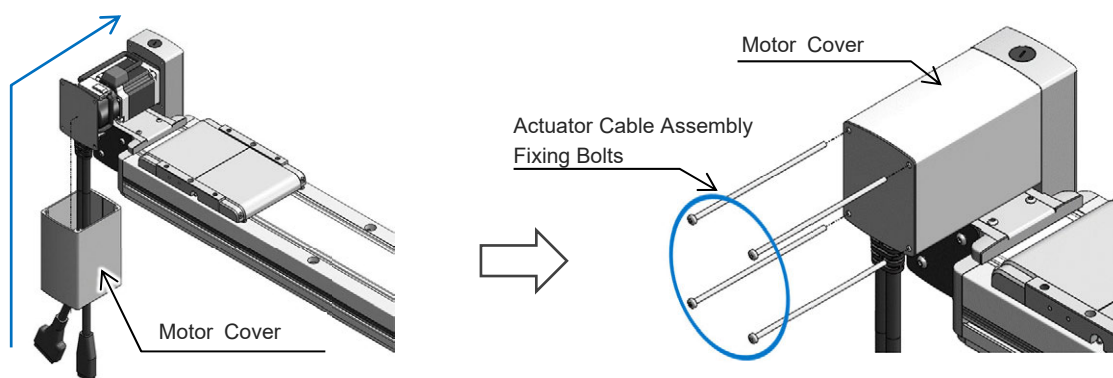
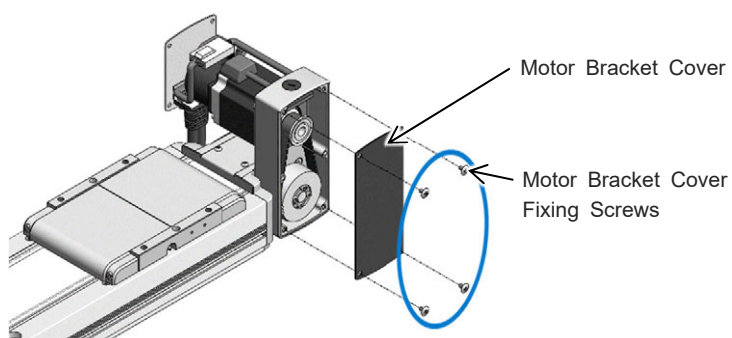


Part Name	Type	Tensile Strength (N)
Timing Belt Tension	IFA-SA	84 to 104
	IFA-MA	139 to 179

Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Motor Assembly Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M4 × 15	2	1.8
	IFA-MA	Hex Socket Head Cap Screw M5 × 20	4	3.4

(2) Attach the motor bracket cover and motor cover.

* Pay attention to the cables so they would not get pinched.

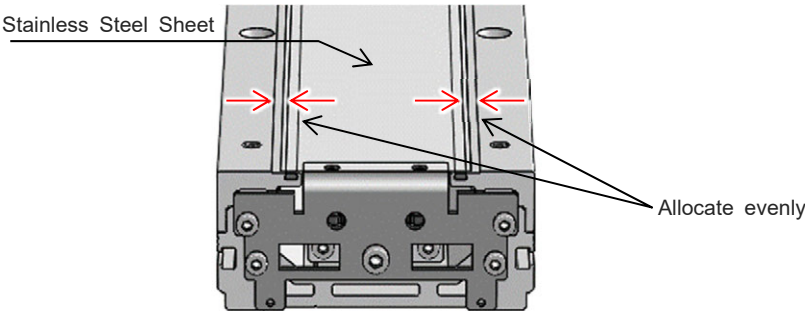


Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Motor Bracket Cover Fixing Screw	IFA-SA	Thin Head TP Type M3 × 5	4	0.7
	IFA-MA	Thin Head TP Type M4 × 5	4	1.6
Actuator Cable Assembly Fixing Bolt	IFA-SA	Cross Recessed Pan Head Machine Screw M3 × 100	4	0.4
	IFA-MA (200W)	Cross Recessed Pan Head Machine Screw M3 × 110	4	0.4
	IFA-MA (400W)	Cross Recessed Pan Head Machine Screw M3 × 135	4	0.4

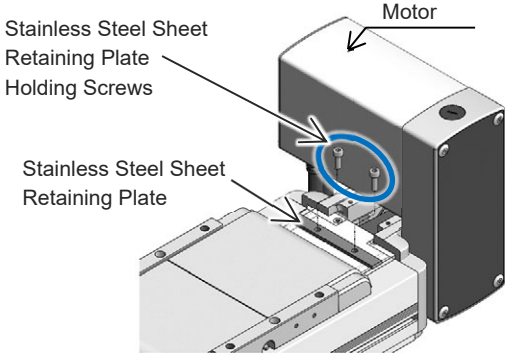
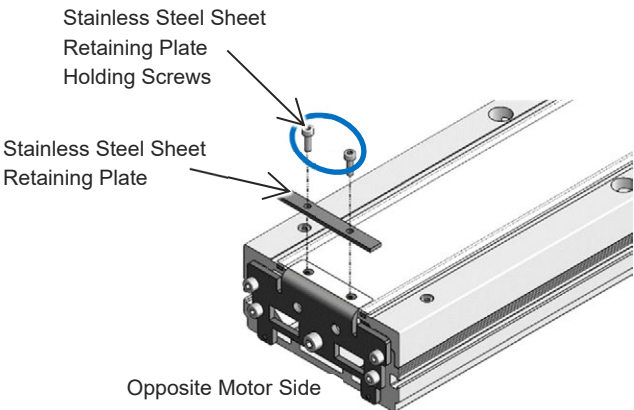
19

Apply a stainless steel sheet.

- (1) Install the stainless steel sheet so the right and left sides of the sheet get even and allocated straightly.



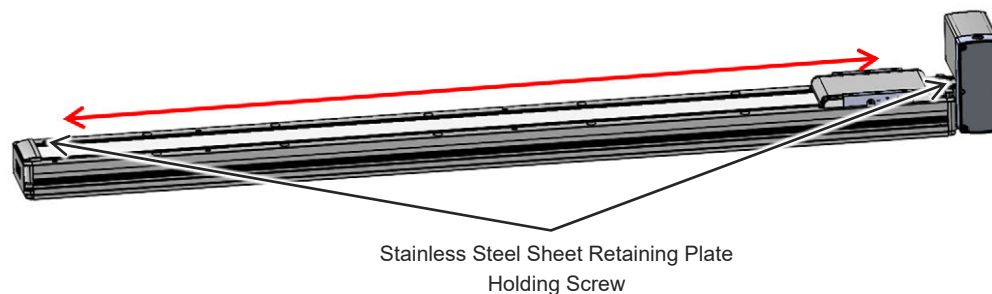
- (2) Tighten the stainless steel sheet retaining plates on the side opposite motor and on the motor side loosely together with the stainless steel sheet with the screws to hold the stainless steel sheet retaining plates.



Part Name	Type	Screw	Quantity
Stainless Steel Sheet Retaining Plate Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	4
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	4

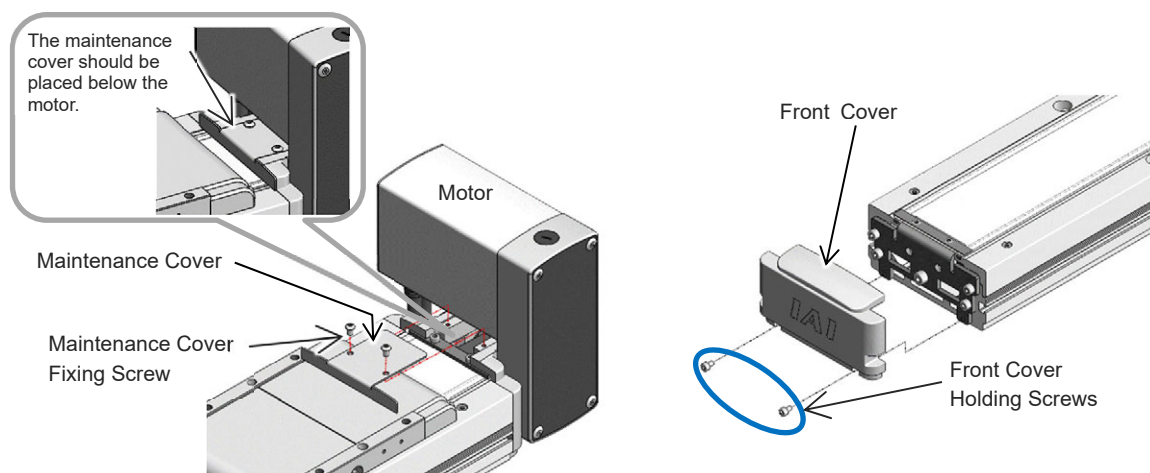
4.6 How to Replace Components

- (3) Move the slider in the entire stroke to confirm that there is no warpage, offset or lifting on the stainless steel sheet. If there is no problem, fully tighten the stainless steel sheet retaining plate fixing screws.

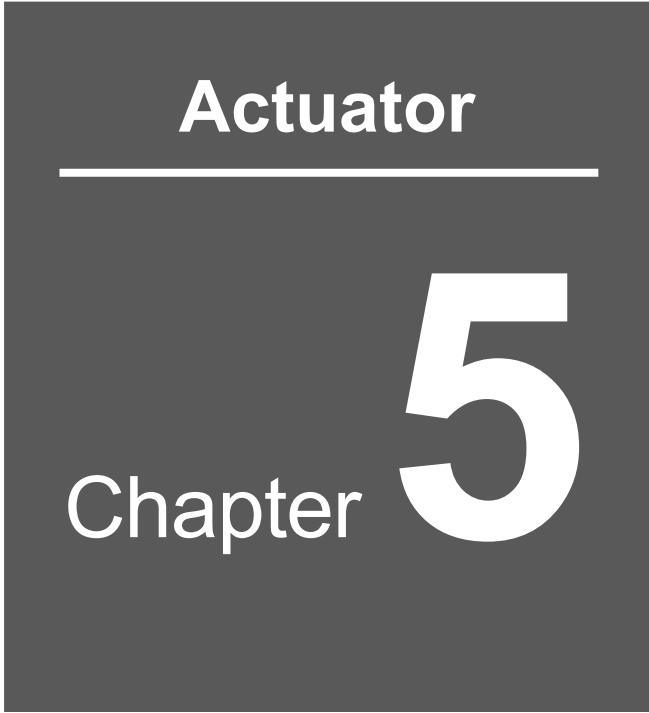


Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Stainless Steel Sheet Retaining Plate Fixing Screw	IFA-SA	Hex Socket Head Cap Screw M3 × 10	4	1.5
	IFA-MA	Hex Socket Head Cap Screw M4 × 10	4	3.6

- (4) Attach the maintenance cover and the front cover.



Part Name	Type	Screw	Quantity	Tightening Torque (N·m)
Maintenance Cover Fixing Screw	IFA-SA	Hex Socket Button Head Screw M3 × 5	2	0.8
	IFA-MA	Hex Socket Button Head Screw M4 × 5	2	1.8
Front Cover Holding Screw	IFA-SA IFA-MA	Hex Socket Head Cap Screw M3 × 5	2	0.5



External Dimensions

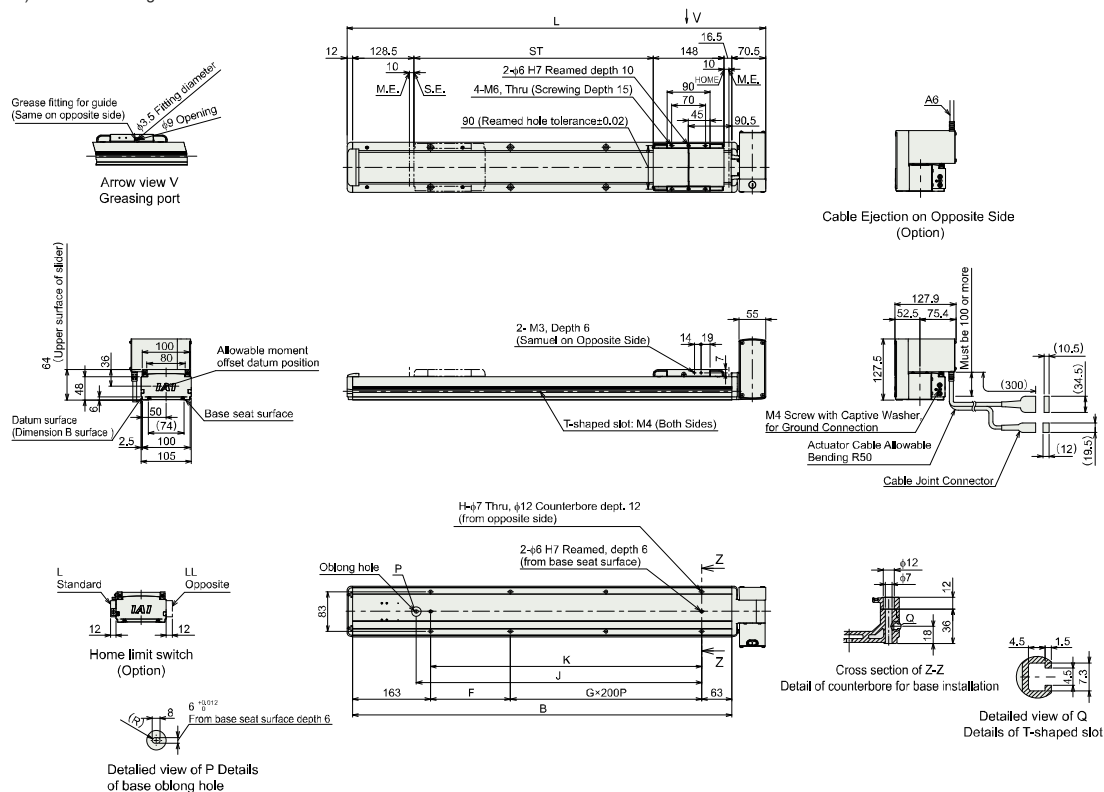
- 5.1 External Dimensions 5-1
 - 5.1.1 IFA-SA1 (Motor on Top) 5-1
 - 5.1.2 IFA-SA2 (Motor in Horizontal Orientation) 5-2
 - 5.1.3 IFA-SA3 (Motor on Bottom) 5-3
 - 5.1.4 IFA-SA□-W (Double Slider Type)..... 5-4
 - 5.1.5 IFA-MA1-200W/400W (Motor on Top) 5-5
 - 5.1.6 IFA-MA2-200W/400W (Motor in Horizontal Orientation)··· 5-6
 - 5.1.7 IFA-MA3-200W/400W (Motor on Bottom) 5-7
 - 5.1.8 IFA-MA□-W (Double Slider Type) 5-8

5.1.1 IFA-SA1 (Motor on Top)

ST: Stroke, M.E.: Mechanical end
S.E.: Stroke end

(Note) Be aware that changing the home orientation should require a return of the product for adjustment.

(Note) Shown in the figure below is SA1L.



Unit : mm

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400
L	575.5	625.5	675.5	725.5	775.5	825.5	875.5	925.5	975.5	1025.5	1075.5	1125.5	1175.5	1225.5	1275.5	1325.5	1375.5	1425.5	1475.5	1525.5	1575.5	1625.5	1675.5	1725.5	1775.5
B	493	543	593	643	693	743	793	843	893	943	993	1043	1093	1143	1193	1243	1293	1343	1393	1443	1493	1543	1593	1643	1693
F	67	117	167	217	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267
G	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7
H	6	6	6	6	8	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18
J	297	347	397	447	497	547	597	647	697	747	797	847	897	947	997	1047	1097	1147	1197	1247	1297	1347	1397	1447	1497
K	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267	1317	1367	1417	1467

Stroke	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600
L	1825.5	1875.5	1925.5	1975.5	2025.5	2075.5	2125.5	2175.5	2225.5	2275.5	2325.5	2375.5	2425.5	2475.5	2525.5	2575.5	2625.5	2675.5	2725.5	2775.5	2825.5	2875.5	2925.5	2975.5
B	1743	1793	1843	1893	1943	1993	2043	2093	2143	2193	2243	2293	2343	2393	2443	2493	2543	2593	2643	2693	2743	2793	2843	2893
F	117	167	217	67	117	167	217	67	117	167	217	67	117	167	217	67	117	167	217	67	117	167	217	67
G	7	7	7	8	8	8	8	9	9	9	9	10	10	10	10	11	11	11	11	12	12	12	12	13
H	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30
J	1547	1597	1647	1697	1747	1797	1847	1897	1947	1997	2047	2097	2147	2197	2247	2297	2347	2397	2447	2497	2547	2597	2647	2697
K	1517	1567	1617	1667	1717	1767	1817	1867	1917	1967	2017	2067	2117	2167	2217	2267	2317	2367	2417	2467	2517	2567	2617	2667

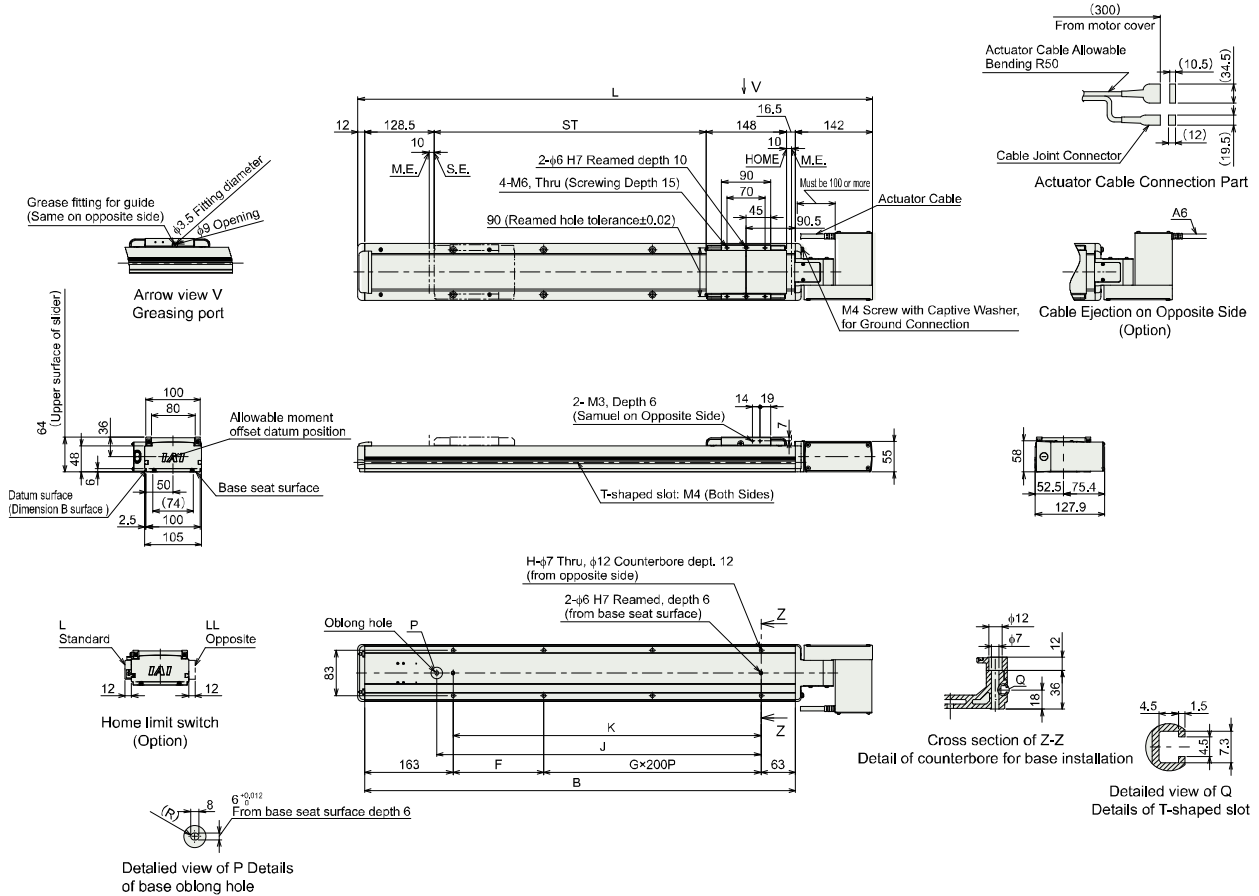
Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400
Mass (kg)	6.0	6.3	6.6	7.0	7.3	7.6	7.9	8.3	8.6	8.9	9.2	9.5	9.9	10.2	10.5	10.8	11.2	11.5	11.8	12.1	12.4	12.8	13.1	13.4	13.7

Stroke	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600
Mass (kg)	14.1	14.4	14.7	15.0	15.4	15.7	16.0	16.3	16.7	17.0	17.3	17.6	17.9	18.3	18.6	18.9	19.2	19.6	19.9	20.2	20.5	20.9	21.2	21.5

5.1.2 IFA-SA2 (Motor in Horizontal Orientation)

- (Note) Join the motor cable and encoder cable to the cable joint connector.
- (Note) After the home-return operation gets conducted, the slider should move to the mechanical end. Pay attention to interference to peripherals.
- (Note) Be aware that changing the home orientation should require a return of the product for adjustment.
- (Note) Shown in the figure below is SA2L.

ST: Stroke, M.E.: Mechanical end
S.E.: Stroke end



■Dimensions for Each Stroke

Unit : mm

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400
L	647	697	747	797	847	897	947	997	1047	1097	1147	1197	1247	1297	1347	1397	1447	1497	1547	1597	1647	1697	1747	1797	1847
B	493	543	593	643	693	743	793	843	893	943	993	1043	1093	1143	1193	1243	1293	1343	1393	1443	1493	1543	1593	1643	1693
F	67	117	167	217	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267
G	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7
H	6	6	6	6	8	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18
J	297	347	397	447	497	547	597	647	697	747	797	847	897	947	997	1047	1097	1147	1197	1247	1297	1347	1397	1447	1497
K	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267	1317	1367	1417	1467

Stroke	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600
L	1897	1947	1997	2047	2097	2147	2197	2247	2297	2347	2397	2447	2497	2547	2597	2647	2697	2747	2797	2847	2897	2947	2997	3047
B	1743	1793	1843	1893	1943	1993	2043	2093	2143	2193	2243	2293	2343	2393	2443	2493	2543	2593	2643	2693	2743	2793	2843	2893
F	117	167	217	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267
G	7	7	7	8	8	8	8	9	9	9	9	9	10	10	10	10	11	11	11	11	12	12	12	13
H	18	18	18	20	20	20	20	22	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	30
J	1547	1597	1647	1697	1747	1797	1847	1897	1947	1997	2047	2097	2147	2197	2247	2297	2347	2397	2447	2497	2547	2597	2647	2697
K	1517	1567	1617	1667	1717	1767	1817	1867	1917	1967	2017	2067	2117	2167	2217	2267	2317	2367	2417	2467	2517	2567	2617	2667

■Weight for Each Stroke

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400
Mass (kg)	6.0	6.3	6.6	7.0	7.3	7.6	7.9	8.3	8.6	8.9	9.2	9.5	9.9	10.2	10.5	10.8	11.2	11.5	11.8	12.1	12.4	12.8	13.1	13.4	13.7

Stroke	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600
Mass (kg)	14.1	14.4	14.7	15.0	15.4	15.7	16.0	16.3	16.7	17.0	17.3	17.6	17.9	18.3	18.6	18.9	19.2	19.6	19.9	20.2	20.5	20.9	21.2	21.5

5.1 External Dimensions

5.1.3 IFA-SA3 (Motor on Bottom)

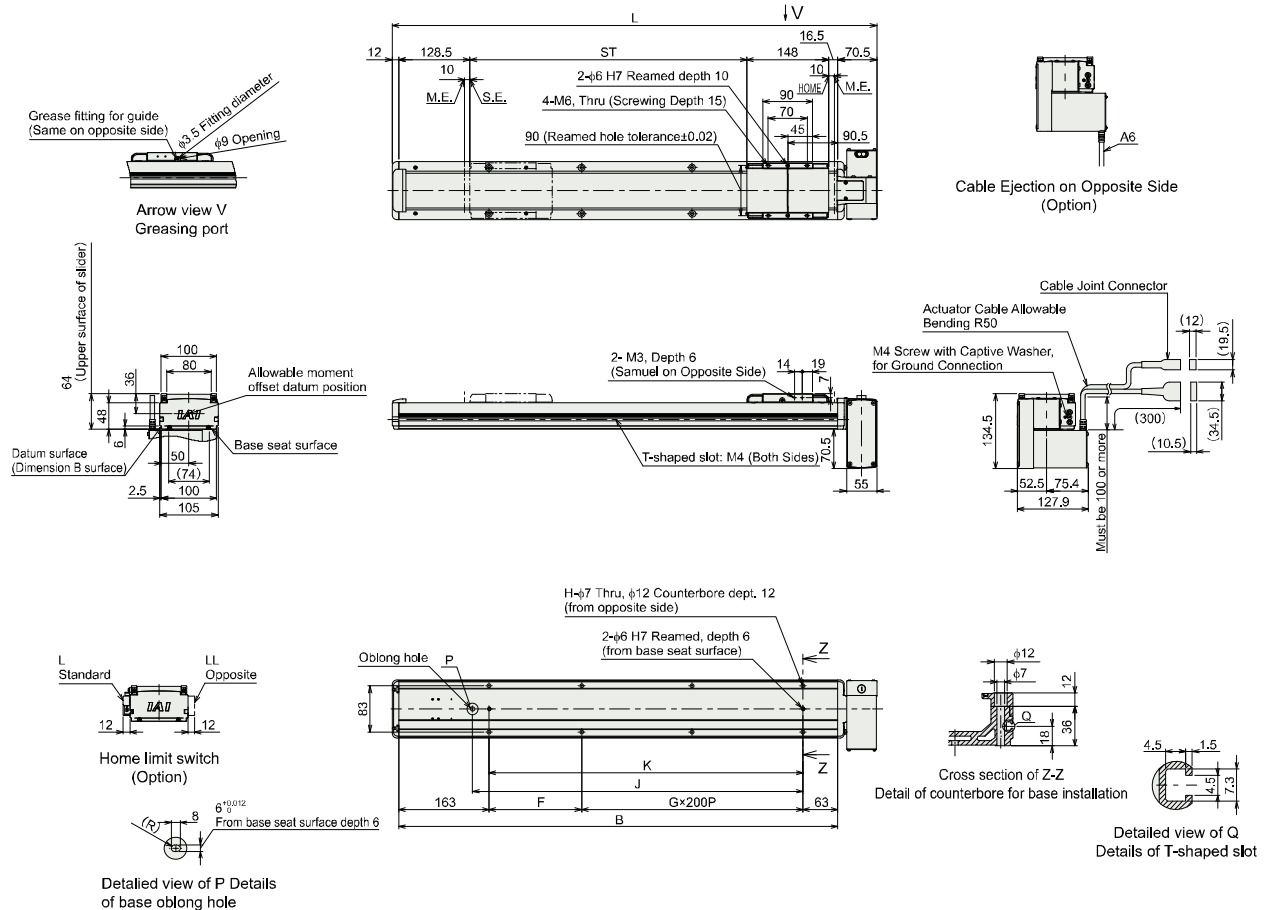
(Note) Join the motor cable and encoder cable to the cable joint connector.

(Note) After the home-return operation gets conducted, the slider should move to the mechanical end. Pay attention to interference to peripherals.

(Note) Be aware that changing the home orientation should require a return of the product for adjustment.

(Note) Shown in the figure below is SA3L.

ST: Stroke, M.E.: Mechanical end
S.E.: Stroke end



■Dimensions for Each Stroke

Unit : mm

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400
L	575.5	625.5	675.5	725.5	775.5	825.5	875.5	925.5	975.5	1025.5	1075.5	1125.5	1175.5	1225.5	1275.5	1325.5	1375.5	1425.5	1475.5	1525.5	1575.5	1625.5	1675.5	1725.5	1775.5
B	493	543	593	643	693	743	793	843	893	943	993	1043	1093	1143	1193	1243	1293	1343	1393	1443	1493	1543	1593	1643	1693
F	67	117	167	217	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267
G	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7
H	6	6	6	6	8	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18
J	297	347	397	447	497	547	597	647	697	747	797	847	897	947	997	1047	1097	1147	1197	1247	1297	1347	1397	1447	1497
K	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267	1317	1367	1417	1467

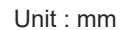
Stroke	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600
L	1825.5	1875.5	1925.5	1975.5	2025.5	2075.5	2125.5	2175.5	2225.5	2275.5	2325.5	2375.5	2425.5	2475.5	2525.5	2575.5	2625.5	2675.5	2725.5	2775.5	2825.5	2875.5	2925.5	2975.5
B	1743	1793	1843	1893	1943	1993	2043	2093	2143	2193	2243	2293	2343	2393	2443	2493	2543	2593	2643	2693	2743	2793	2843	2893
F	117	167	217	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967	1017	1067	1117	1167	1217	1267
G	7	7	7	8	8	8	8	9	9	9	9	10	10	10	10	11	11	11	11	12	12	12	12	13
H	18	18	18	20	20	20	20	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30
J	1547	1597	1647	1697	1747	1797	1847	1897	1947	1997	2047	2097	2147	2197	2247	2297	2347	2397	2447	2497	2547	2597	2647	2697
K	1517	1567	1617	1667	1717	1767	1817	1867	1917	1967	2017	2067	2117	2167	2217	2267	2317	2367	2417	2467	2517	2567	2617	2667

■Weight for Each Stroke

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400
Mass (kg)	6.0	6.3	6.6	7.0	7.3	7.6	7.9	8.3	8.6	8.9	9.2	9.5	9.9	10.2	10.5	10.8	11.2	11.5	11.8	12.1	12.4	12.8	13.1	13.4	13.7

Stroke	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600
Mass (kg)	14.1	14.4	14.7	15.0	15.4	15.7	16.0	16.3	16.7	17.0	17.3	17.6	17.9	18.3	18.6	18.9	19.2	19.6	19.9	20.2	20.5	20.9	21.2	21.5

ST: Stroke, M.E.: Mechanical end
S.E.: Stroke end



ST: Stroke, M.E.: Mechanical end
S.E.: Stroke end



5 External Dimensions

Unit : mm

Stroke	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200
L	2299.5	2349.5	2399.5	2449.5	2499.5	2549.5	2599.5	2649.5	2699.5	2749.5	2799.5	2849.5	2899.5	2949.5	2999.5	3049.5	3099.5	3149.5	3199.5	3249.5	3299.5	3349.5	3399.5	3449.5	3499.5	3549.5	3599.5	3649.5	3699.5	3749.5
B	2098	2148	2198	2248	2298	2348	2398	2448	2498	2548	2598	2648	2698	2748	2798	2848	2898	2948	2998	3048	3098	3148	3198	3248	3298	3348	3398	3448	3498	3548
F	61	111	161	211	61	111	161	211	61	111	161	211	61	111	161	211	61	111	161	211	61	111	161	211	61	111	161	211	61	111
G	9	9	9	9	10	10	10	10	10	11	11	11	12	12	12	12	13	13	13	13	14	14	14	14	15	15	15	15	16	16
H	22	22	22	22	24	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	32	32	32	32	34	34	34	34	36	36
J	1891	1941	1991	2041	2091	2141	2191	2241	2291	2341	2391	2441	2491	2541	2591	2641	2691	2741	2791	2841	2891	2941	2991	3041	3091	3141	3191	3241	3291	3341
K	1861	1911	1961	2011	2061	2111	2161	2211	2261	2311	2361	2411	2461	2511	2561	2611	2661	2711	2761	2811	2861	2911	2961	3011	3061	3111	3161	3211	3261	3311

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700
200W Mass (kg)	10.8	11.3	11.8	12.3	12.8	13.3	13.8	14.3	14.9	15.4	15.9	16.4	16.9	17.4	17.9	18.4	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.6	24.1	24.6	25.1	25.6	26.1
400W Mass (kg)	11.2	11.7	12.2	12.7	13.2	13.8	14.3	14.8	15.3	15.8	16.3	16.8	17.3	17.9	18.4	18.9	19.4	19.9	20.4	20.9	21.4	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.1	26.6

Stroke	1750	1800	1850	1900	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200	
200W Mass (kg)	26.6	27.1	27.7	28.2	28.7	29.2	29.7	30.2	30.7	31.2	31.8	32.3	32.8	33.3	33.8	34.3	35.3	35.9	36.4	36.9	37.4	37.9	38.4	38.9	39.4	40.0	40.5	41.0	41.5	
400W Mass (kg)	27.1	27.6	28.1	28.6	29.1	29.6	30.2	30.7	31.2	31.7	32.2	32.7	33.2	33.7	34.2	34.8	35.3	35.8	36.3	36.8	37.3	37.8	38.3	38.9	39.4	40.0	40.5	41.0	41.4	41.9

5.1 External Dimensions

5.1.7 IFA-MA3-200W/400W (Motor on Bottom)

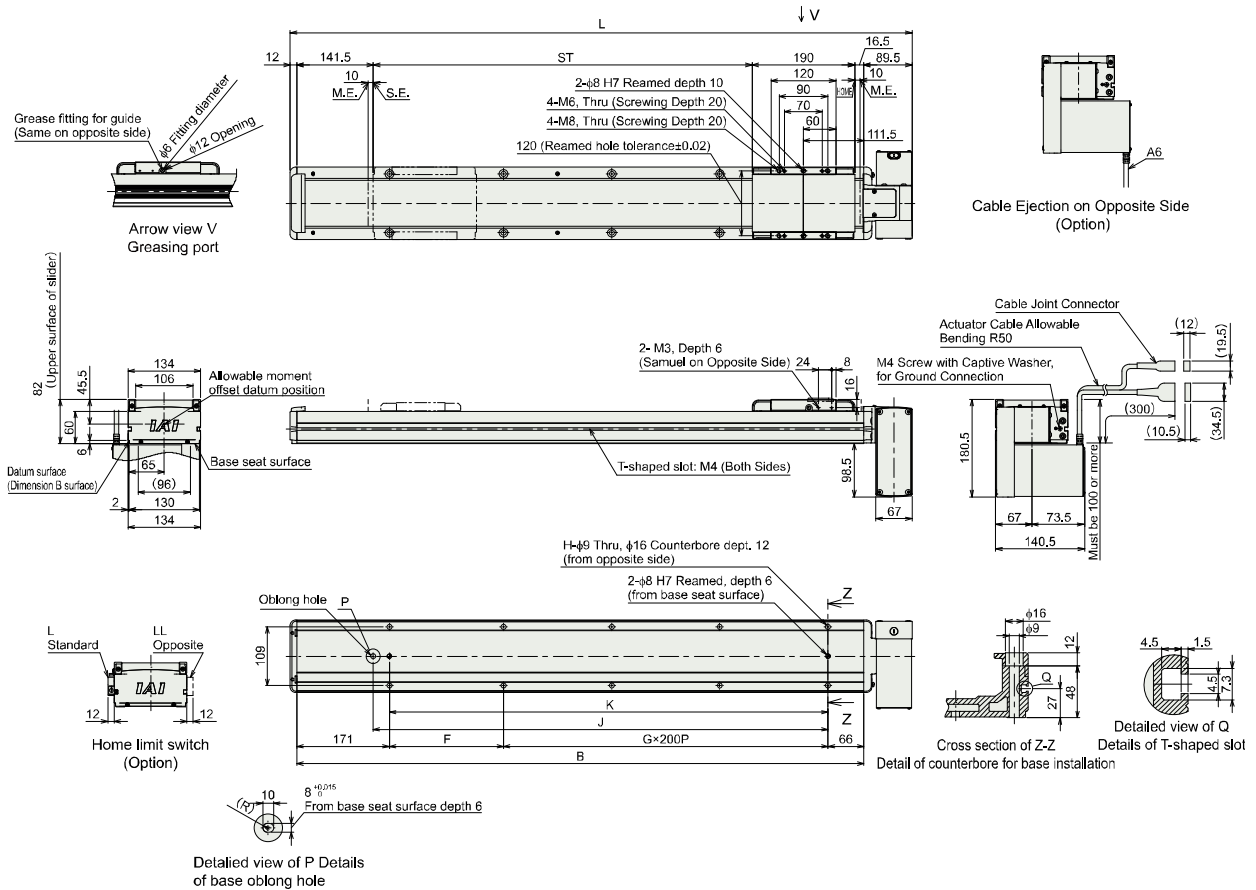
(Note) Join the motor cable and encoder cable to the cable joint connector.

(Note) After the home-return operation gets conducted, the slider should move to the mechanical end. Pay attention to interference to peripherals.

(Note) Be aware that changing the home orientation should require a return of the product for adjustment.

(Note) Shown in the figure below is MA3L.

ST: Stroke, M.E.: Mechanical end
S.E.: Stroke end



■Dimensions for Each Stroke

Unit : mm

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700
L	649.5	699.5	749.5	799.5	849.5	899.5	949.5	999.5	1049.5	1099.5	1149.5	1199.5	1249.5	1299.5	1349.5	1399.5	1449.5	1499.5	1549.5	1599.5	1649.5	1699.5	1749.5	1799.5	1849.5	1899.5	1949.5	1999.5	2049.5	2099.5	2149.5
B	548	598	648	698	748	798	848	898	948	998	1048	1098	1148	1198	1248	1298	1348	1398	1448	1498	1548	1598	1648	1698	1748	1798	1848	1898	1948	1998	2048
F	111	161	211	261	311	361	411	461	511	561	611	661	711	761	811	861	911	961	1011	1061	1111	1161	1211	1261	1311	1361	1411	1461	1511	1561	1611
G	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8
H	6	6	6	8	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14	16	16	16	16	18	18	18	18	20	20	20	20
J	341	391	441	491	541	591	641	691	741	791	841	891	941	991	1041	1091	1141	1191	1241	1291	1341	1391	1441	1491	1541	1591	1641	1691	1741	1791	1841
K	311	361	411	461	511	561	611	661	711	761	811	861	911	961	1011	1061	1111	1161	1211	1261	1311	1361	1411	1461	1511	1561	1611	1661	1711	1761	1811

Stroke	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200
L	2199.5	2249.5	2299.5	2349.5	2399.5	2449.5	2499.5	2549.5	2599.5	2649.5	2699.5	2749.5	2799.5	2849.5	2899.5	2949.5	2999.5	3049.5	3099.5	3149.5	3199.5	3249.5	3299.5	3349.5	3399.5	3449.5	3499.5	3549.5	3599.5	3649.5
B	2098	2148	2198	2248	2298	2348	2398	2448	2498	2548	2598	2648	2698	2748	2798	2848	2898	2948	2998	3048	3098	3148	3198	3248	3298	3348	3398	3448	3498	3548
F	61	111	161	211	261	311	361	411	461	511	561	611	661	711	761	811	861	911	961	1011	1061	1111	1161	1211	1261	1311	1361	1411	1461	1511
G	9	9	9	9	10	10	10	10	11	11	11	11	12	12	12	12	13	13	13	13	14	14	14	14	15	15	15	15	16	16
H	22	22	22	22	24	24	24	24	26	26	26	26	28	28	28	28	30	30	30	30	32	32	32	32	34	34	34	34	36	36
J	1891	1941	1991	2041	2091	2141	2191	2241	2291	2341	2391	2441	2491	2541	2591	2641	2691	2741	2791	2841	2891	2941	2991	3041	3091	3141	3191	3241	3291	3341
K	1861	1911	1961	2011	2061	2111	2161	2211	2261	2311	2361	2411	2461	2511	2561	2611	2661	2711	2761	2811	2861	2911	2961	3011	3061	3111	3161	3211	3261	3311

■Weight for Each Stroke

Stroke	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700
200W Mass (kg)	10.8	11.3	11.8	12.3	12.8	13.3	13.8	14.3	14.9	15.4	15.9	16.4	16.9	17.4	17.9	18.4	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.6	24.1	24.6	25.1	25.6	26.1
400W Mass (kg)	11.2	11.7	12.2	12.7	13.2	13.8	14.3	14.8	15.3	15.8	16.3	16.8	17.3	17.9	18.4	18.9	19.4	19.9	20.4	20.9	21.4	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5	26.1	26.6

Stroke	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200
200W Mass (kg)	26.6	27.1	27.7	28.2	28.7	29.2	29.7	30.2	30.7	31.2	31.8	32.3	32.8	33.3	33.8	34.3	34.8	35.3	35.9	36.4	36.9	37.4	37.9	38.4	38.9	39.4	40.0	40.5	41.0	41.5
400W Mass (kg)	27.1	27.6	28.1	28.6	29.1	29.6	30.2	30.7	31.2	31.7	32.2	32.7	33.2	33.7	34.2	34.8	35.3	35.8	36.3	36.8	37.3	37.8	38.3	38.9	39.4	39.9	40.4	40.9	41.4	41.9

ST: Stroke, M.E.: Mechanical end
S.E.: Stroke end



Actuator

Chapter 6

Life

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6.1.1	How to calculate operation life	6-1
6.1.2	Relation between operation life and moment	6-3

6.1 Concept of Life for Belt Type

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

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

Operation life can be calculated with the method shown below.

6.1.1 How to calculate operation life

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

$$L = \left(\frac{C_M}{M} \right)^3 \times 10,000 \text{ km}$$

L : Operation life (km)
C_M: Dynamic allowable moment (N·m)
M : Moment acting (N·m)
10,000 km : Standard rated life of IFA

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

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{ws}}{f_w} \cdot \frac{1}{f_\alpha} \right)^3 \times 10,000 \text{ km}$$

L : Operation life (km)
C_M: Dynamic allowable moment (N·m)
M : Moment acting (N·m)
10,000 km : Standard rated life of IFA
f_{ws} : Standard load coefficient
f_w : Load coefficient
f_α : Mounting coefficient

For "Standard load coefficient fws", "Load coefficient fw" and "Mounting coefficient fa", refer to the contents below for configuration and selection.

[Standard load coefficient : fws]

For IFA described in this manual, calculate with fws = 1.2.

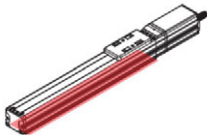
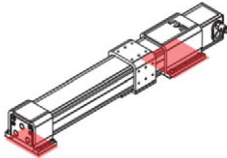
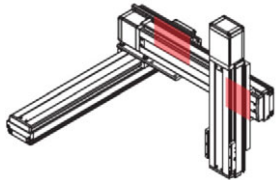
[Load coefficient : fw]

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

Load coefficient fw	Operating conditions	Guideline for acceleration/deceleration
1.0 to 1.5	Low vibration/impact, slow operation	1.0G or less
1.5 to 2.0	There is middle level vibration or shock, Sudden brake or sudden acceleration	1.0G to 2.0G

[Mounting coefficient : fa]

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

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

- The figures of actuators used in the explanation above are in common for all the instruction manuals. They are not IFA. Replace with IFA and select the installation coefficient.
- Even when seated over the total length of the product, select 1.2 or 1.5 for the mounting coefficient depending on the position of screw fixing and not "fixing over the entire surface".
- It is defined as "fixed on entire surface" only when the unit is fixed using all the screw holes equipped on the seat surface.

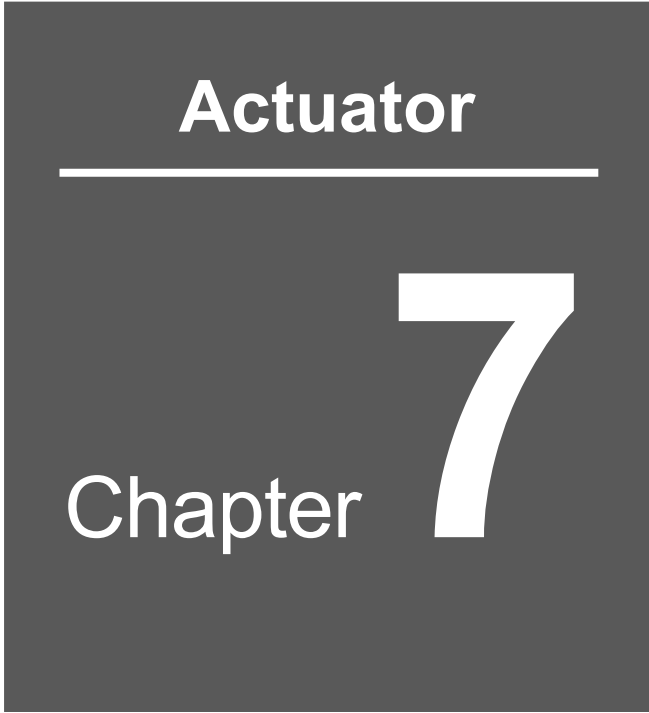
6.1.2 Relation between operation life and moment

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

With a light load, it may be longer than 10,000 km, the standard rated life.

With no consideration of vibration and mounting conditions, the operation life is 80,000 km according to the calculation with the formula on the previous page, assuming that $0.5 C_M$ (half of dynamic allowable moment) of moment is applied.

We see that it can be 8 times longer than the standard rated life, which is 10,000 km.



Warranty

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7.1 Warranty Period

Whichever of the following periods is shorter:

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

7.2 Scope of the Warranty

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

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

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

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

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

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

7.3 Honoring the Warranty

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

7.4 Limited Liability

- (1) We assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.
- (2) We assume no liability for any program or control method created by the customer to operate our product or for the results of any such program or control method.

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

- (1) If our product is combined with another product or any system, equipment, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc.
In such a case we assume no liability for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications.
Contact IAI if you must use our product for any of these applications:
 - (a) Medical equipment used to maintain, control or otherwise affect human life or physical health
 - (b) Mechanisms and machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)
 - (c) Machinery components essential for safety (safety devices etc.)
 - (d) Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact IAI in advance if our product is to be used in any condition or environment that differs from that specified in the catalog or instruction manual.

7.6 Other Items Excluded from Warranty

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

- (1) Guidance for mounting/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

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IAI Corporation

Head Office: 1210 Ihara Shimizu-KU Shizuoka City Shizuoka 424-0114, Japan
TEL +81-54-364-5105 FAX +81-54-364-2589
website: www.iai-robot.co.jp/

IAI America, Inc.

Head Office: 2690 W. 237th Street, Torrance, CA 90505
TEL +1-310-891-6015 FAX +1-310-891-0815
Chicago Office: 110 East State Parkway, Schaumburg, IL 60173
TEL +1-847-908-1400 FAX +1-847-908-1399
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066
TEL +1-678-354-9470 FAX +1-678-354-9471
website: www.intelligentactuator.com

Technical Support available in Europe

IAI Industrieroboter GmbH

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany
TEL +49(0)6196-88950 FAX +49(0)6196-889524
website: www.iai-automation.com

Technical Support available in Great Britain



Duttons Way, Shadsworth Business Park, Blackburn, Lancashire, BB1 2QR, United Kingdom
TEL +44(0) 1254-685900
website: www.lcautomation.com

IAI (Shanghai) Co., Ltd.

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shang hai 200030, China
TEL +86-21-6448-4753 FAX +86-21-6448-3992
website: www.iai-robot.com

IAI Robot (Thailand) Co., Ltd.

825 PhairojKijja Tower 7th Floor, Debaratana RD., Bangna Nuea, Bangna, Bangkok 10260, Thailand
TEL +66-2-361-4458 FAX +66-2-361-4456
website: www.iai-robot.co.th