IAI
Quality and Innovation

ROBO CYLINDER

ROBO Cylinder®

Products designed for use in secondary battery production processes

Wide Slider Type

RCS4B-WSA10C/WSA10R/
WSA12C/WSA12R/
WSA14C/WSA14R/
WSA16C/WSA16R

Instruction Manual First Edition ME3852-1A



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IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

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

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

Please downloaded 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.

ME3852-1A

RCS4B Wide Slider Type Instruction Manual Configuration

Product name	Instruction manual name	Control number
RCS4B Wide Slider Type	Instruction Manual (this document)	ME3852
RCON System	RCON System Instruction Manual	ME0384
RSEL System	RSEL System Instruction Manual	ME0392
SCON2 Controller	SCON2 Controller Instruction Manual	ME0458
SCON-CB/CGB Controller	SCON-CB/CGB Controller Instruction Manual	ME0340
SCON-CAL/CGAL Controller	SCON-CAL/CGAL Controller Instruction Manual	ME0243
MSCON-C Controller	MSCON-C Controller Instruction Manual	ME0306
SSEL-CS Controller	SSEL-CS Controller Instruction Manual	ME0157
XSEL2 Controller	XSEL2 Controller Instruction Manual	ME0478
XSEL-P/Q Controller	XSEL-P/Q Controller Instruction Manual	ME0148
XSEL-RA/SA Controller	XSEL-RA/SA Controller Instruction Manual	ME0359
PC software	IA-OS First Step Guide * Refer to the guidance feature stored in IA-OS for how to operate	ME0391
PC Teaching Software for XSEL	IA-101-X-MW/IA-101-X-USBMW Instruction Manual	ME0154
Touch Panel Teaching Pendant TB-02/02D	Applicable for Position Controller Instruction Manual	ME0355
	Applicable for Program Controller Instruction Manual	ME0356
Touch Panel Teaching Pendant TB-03	Applicable for Position Controller Instruction Manual	ME0376
	Applicable for Program Controller Instruction Manual	ME0377

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Safety Guide

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

Safety Precautions for Our Products

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

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

No.	Operation Description	Description
2	Transportation	● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. ● When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers. ● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. ● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are screw 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 100 Ω 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 moment	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life. In extreme cases, flaking may occur on the guide or ball screw.
Overhang load length		Mounting a load with an overhang length greater than the allowable values may lead to vibration or abnormal noise.

5. If return operations are continued over a short distance, they may rapidly degrade the film of grease.
   Continuous return operation within a distance less than 30mm may cause the grease film to degrade rapidly.
   As a guideline, in every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film. Continued use of the actuator in that state may lead to breakdown.
   In extreme cases, flaking may occur on the guide or ball screw.

6. Do not attempt to have sliders collide with an obstacle at high speed.
   This may damage the coupling or other mechanical parts.

7. In some conditions of environment of use, postures of installation and conditions of operation, the base oil separated from the grease may come out of ROBO Cylinder.
   It is recommended to have a protection in case the peripheral devices could get influence of the base oil.

International Standard Compliance

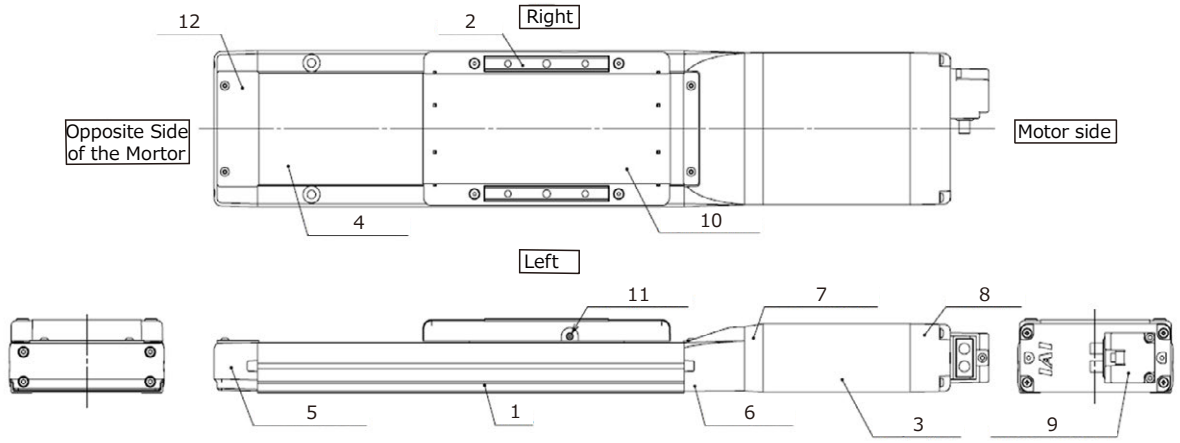
The ROBO Cylinder complies with the following overseas standards.
Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

CE Marking	RoHS3 Directive
○	○

Names of the Parts

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

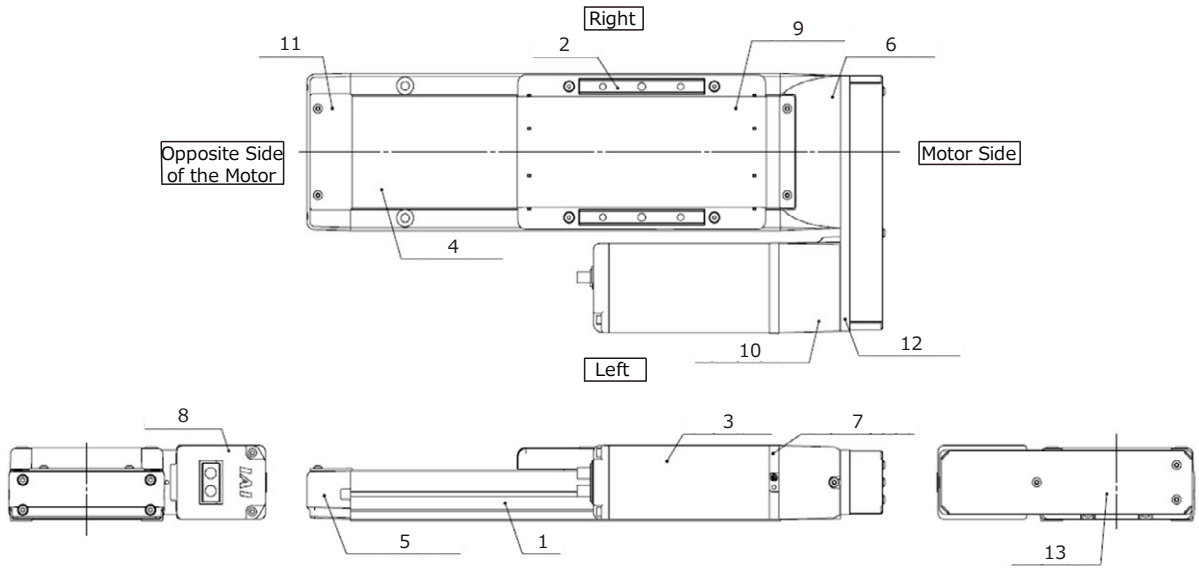
Standard Type Motor Straight Type



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Motor cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Front bracket	Aluminum die-casting	Decorative Surface Coating
6	Rear bracket	Aluminum die-casting	Decorative Surface Coating
7	Motor bracket	Aluminum die-casting	Decorative Surface Coating
8	Motor end cover	Aluminum die-casting	Decorative Surface Coating
9	Connector bracket	Aluminum die-casting	Decorative Surface Coating
10	Slider cover	Plastic	—
11	Grease nipple	Stainless Steel	—
12	Sheet retainer	Aluminum Alloy	White Anodizing Treatment

Standard Type Motor Reversing Type



[Main Component Materials]

No.	Name	Materials	Surface Treatment
1	Base	Aluminum Alloy	White Anodizing Treatment
2	Slider	Aluminum Alloy	White Anodizing Treatment
3	Motor cover	Aluminum Alloy	White Anodizing Treatment
4	Stainless steel sheet	Stainless Steel	—
5	Front bracket	Aluminum die-casting	Decorative Surface Coating
6	Rear bracket	Aluminum die-casting	Decorative Surface Coating
7	Motor bracket	Aluminum die-casting	Decorative Surface Coating
8	Motor end cover	Aluminum die-casting	Decorative Surface Coating
9	Slider cover	Plastic	—
10	Coupling cover	Plastic	—
11	Sheet retainer	Aluminum Alloy	White Anodizing Treatment
12	Reverse Plate	Rolled Steel (WRA16R is aluminum die-cast)	Electroless Nickel Plating
13	Pulley cover	Stainless Steel	—

ROBO Cylinder

Chapter 1

Specifications

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1.1 Checking the Product

1.1.1 Parts

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

<table>
<tr><th>Body</th><th colspan="2">Accessories</th></tr>
<tr><td>Actuator Quantity 1
</td><td>Motor Cable Quantity 1
</td><td>Encoder Cable Quantity 1
</td></tr>
<tr><th colspan="3">Accessories</th></tr>
<tr><td>Cross Recessed Pan Head Screw with Captive Washer M3×6 Quantity 2

For affixing ground cable
</td><td>Zip ties Quantity 2

For clamping connector cover

* Refer to International Application Manual (ME0287) for how to use it.</td><td>Safety Guide Quantity 1

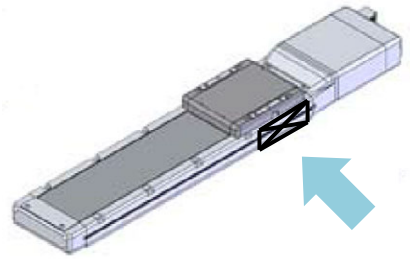
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1.1.2 How to Read the Model Nameplate

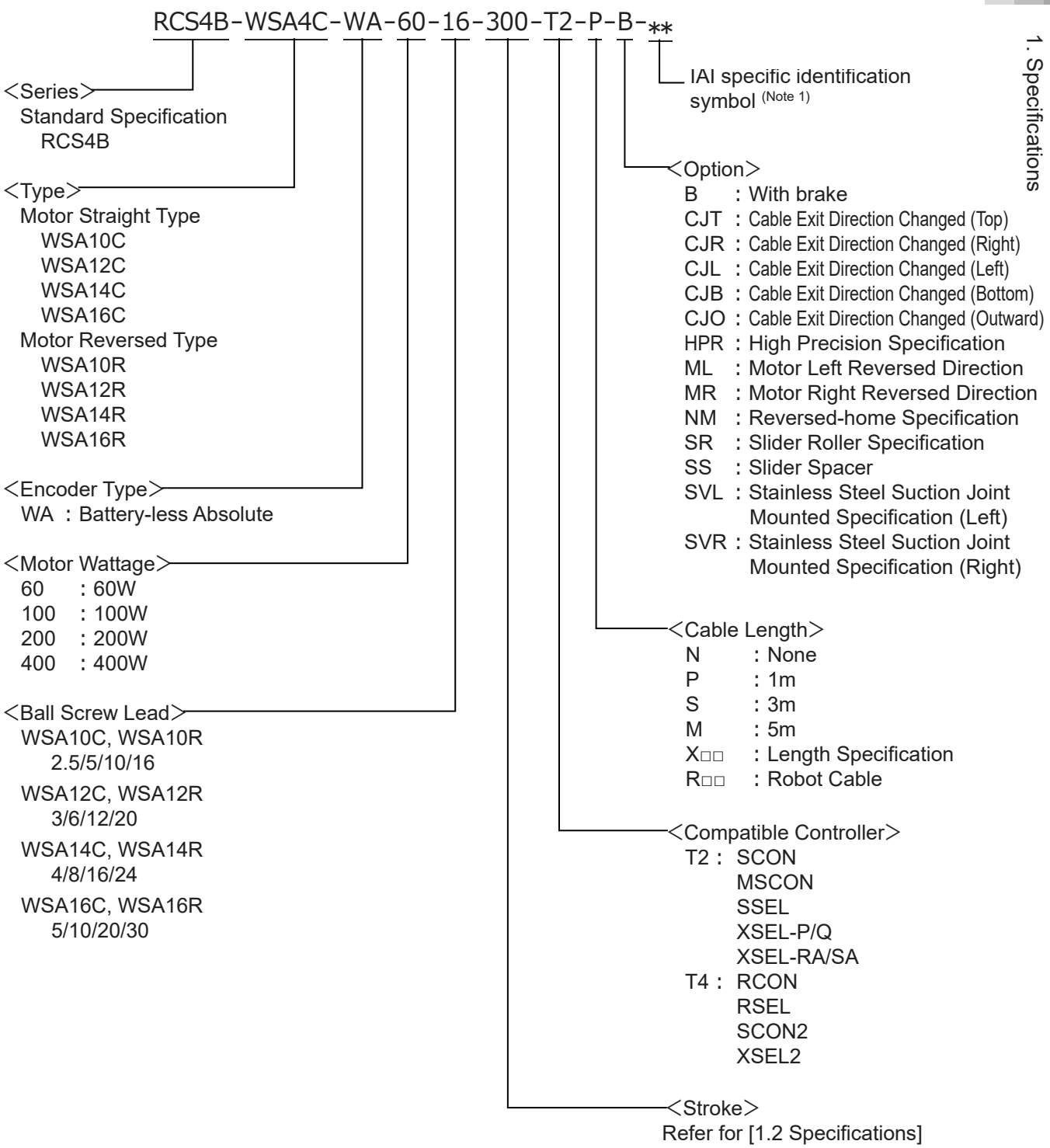
Model→
Serial number→

MODEL:RCS4B-WSA10C-WA-60-16-300-T2-P-B-CJR
S/N:A50000001 DATE:06/30/2026
INPUT:DC24V MADE IN JAPAN
IAI Corporation CE

[Nameplate Position]



1.1.3 How to Read the Model Number



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

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

1.2 Specifications

1.2.1 Specifications

[1] RCS4B-WSA4C

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
16	5	–	53
10	11	2	85
5	19	3.5	170
2.5	28	7	340

[Stroke and Max Speed] Unit: [mm/s]

Lead [mm]	50 to 350 [Every 50mm]	400 [mm]	450 [mm]	500 [mm]
16	960	930	775	660
10	600	590	490	415
5	300	290	245	205
2.5	150	145	120	100

Caution

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

[Payload by Acceleration]

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

(Note) For Lead 16, there is no setting of the maximum payload type against the speed and acceleration to reduce the payload for vertical orientation. Use the slider type.

Lead 16

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	5	5	3.5	3	2	–	–	–	–	–
960	5	5	3.5	3	2	–	–	–	–	–

Lead 10

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	11	11	8.5	8.5	4	2	2	2	2	1.5
600	11	11	8.5	8.5	4	2	2	2	2	1.5

Lead 5

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	19	19	14	12.5	–	3.5	3.5	3.5	3.5	–
300	19	19	14	12.5	–	3.5	3.5	3.5	3.5	–

Lead 2.5

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	28	21	12.5	–	–	7	7	4	–	–
150	28	21	12.5	–	–	7	7	4	–	–

Caution

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

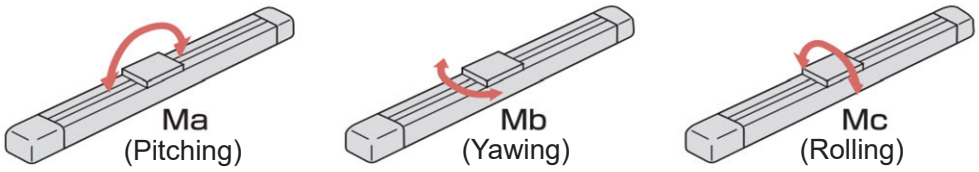
[Actuator Specifications]

Item	Content
Drive System	Ball Screw Φ8mm, Rolled C10
Positioning Repeatability (*1)	±0.01mm [±0.005mm]
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 271 N•m, Mb direction: 271 N•m, Mc direction: 553 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction: 65.4 N•m, Mb direction: 65.4 N•m, Mc direction: 134 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

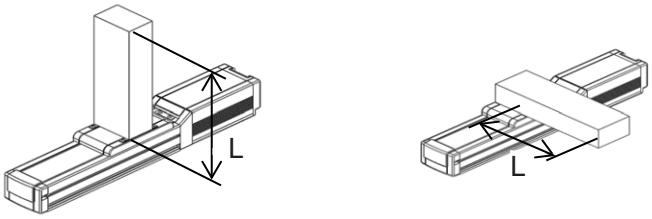
・Overhang load length guideline: 500mm or less

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

Moment Direction of Slider Type

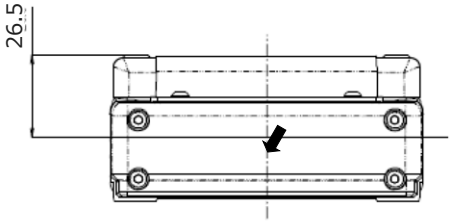


Overhang load length of Slider Type (L = 500mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

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

[2] RCS4B-WSA12C

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
20	10.5	2	85
12	17.5	5.5	142
6	31.5	10.5	283
3	38.5	10.5	566

[Stroke and Max Speed]

Unit: [mm/s]

Lead [mm]	50 to 450 [Every 50mm]	500 [mm]	550 [mm]	600 [mm]	650 [mm]	700 [mm]	750 [mm]	800 [mm]
20	1200	1130	970	840	740	650	580	520
12	720	610	535	465	405	355	315	285
6	360	310	265	230	200	175	155	140
3	180	150	130	115	100	85	75	70

Caution

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

[Payload by Acceleration]

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

Lead 20

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	10.5	7	5.5	4	3	2	2	1.5	1.5	1.5
1200	10.5	7	5.5	4	3	2	2	1.5	1.5	1.5

Lead 12

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	17.5	17.5	14	10.5	10.5	5.5	5.5	5.5	4	4
720	17.5	17.5	14	10.5	10.5	5.5	5.5	5.5	4	4

Lead 6

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	31.5	28	21	14	–	10.5	10.5	8.5	7	–
360	31.5	28	21	14	–	10.5	10.5	8.5	7	–

Lead 3

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	38.5	21	10.5	–	–	10.5	7	4	–	–
180	38.5	21	10.5	–	–	10.5	7	4	–	–

Caution

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

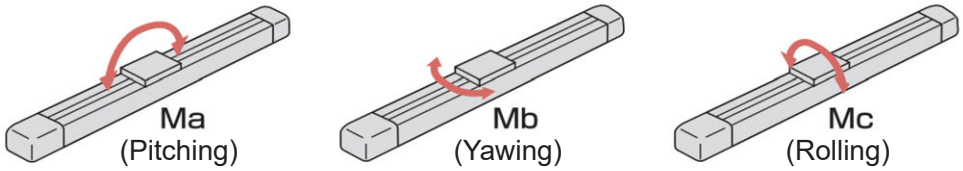
[Actuator Specifications]

Item	Content
Drive System	Ball Screw Φ10mm, Rolled C10
Positioning Repeatability (*1)	±0.01mm [±0.005mm]
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 311 N•m, Mb direction: 311 N•m, Mc direction: 827 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction: 87.5 N•m, Mb direction: 87.5 N•m, Mc direction: 233 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

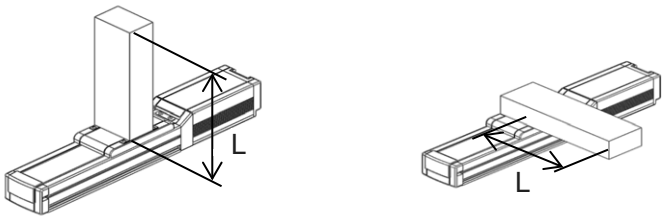
・Overhang load length guideline: 450mm or less

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

Moment Direction of Slider Type

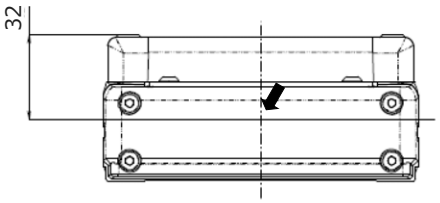


Overhang load length of Slider Type (L = 450mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

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

[3] RCS4B-WSA14C

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
24	14	1.5	142
16	31.5	5.5	214
8	45.5	7	427
4	56	17.5	855

[Stroke and Max Speed] Unit: [mm/s]

Lead [mm]	50 to 450 [Every 50mm]	500 [mm]	550 [mm]	600 [mm]	650 [mm]	700 [mm]	750 [mm]	800 [mm]
24	1440	1420	1220	1060	930	830	740	665
16	960	920	790	690	610	550	490	440
8	480	460	400	350	305	270	240	215
4	240	230	200	170	150	135	120	105

Caution

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

[Payload by Acceleration]

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

Lead 24

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	14	10.5	10.5	7	3.5	1.5	1.5	1.5	1.5	1.5
1440	14	10.5	10.5	7	3.5	1.5	1.5	1.5	1.5	1.5

Lead 16

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	31.5	21	14	14	12.5	5.5	5.5	5.5	5.5	5.5
960	31.5	21	14	14	12.5	5.5	5.5	5.5	5.5	5.5

Lead 8

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	45.5	35	28	28	–	7	7	7	7	–
480	45.5	35	28	28	–	7	7	7	7	–

Lead 4

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	56	42	21	–	–	17.5	14	8.5	–	–
240	56	42	21	–	–	17.5	14	8.5	–	–

Caution

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

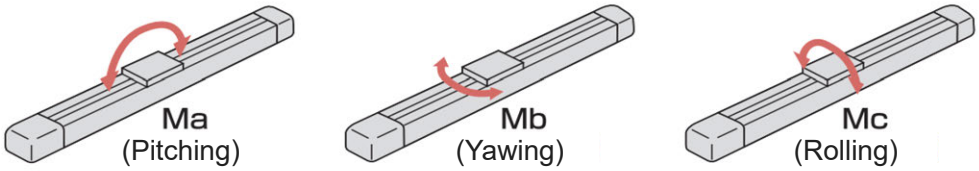
[Actuator Specifications]

Item	Content
Drive System	Ball Screw Φ12mm, Rolled C10
Positioning Repeatability (*1)	±0.01mm [±0.005mm]
Lost Motion	0.1 mm or less
Allowable static moment	Ma direction:462 N•m,Mb direction:462 N•m,Mc direction:1170 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction:122 N•m,Mb direction:122 N•m,Mc direction:308 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

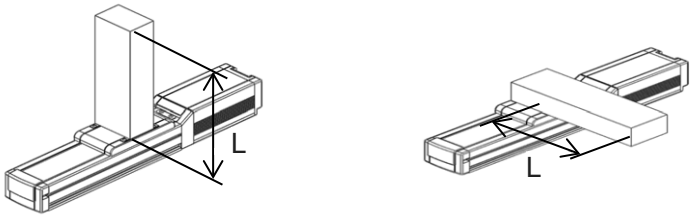
・Overhang load length guideline: 550mm or less

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

Moment Direction of Slider Type

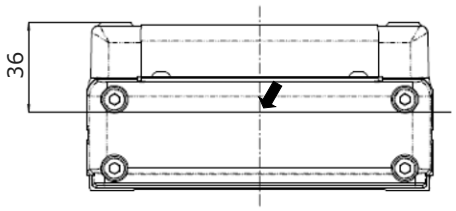


Overhang load length of Slider Type (L = 550mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

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

[4] RCS4B-WSA16C

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
30	21	8.5	226
20	42	14	339
10	56	24.5	678
5	70	35	1357

[Stroke and Max Speed]

Unit: [mm/s]

Lead [mm]	50 to 550 [Every 50mm]	600 [mm]	650 [mm]	700 [mm]	750 [mm]	800 [mm]	850 [mm]	900 [mm]	950 [mm]	1000 [mm]	1050 [mm]	1100 [mm]
30	1800	1680	1480	1320	1180	1060	960	870	790	730	670	620
20	1200	1120	990	880	780	715	645	590	535	490	450	415
10	600	560	490	440	395	355	320	290	265	240	225	205
5	300	280	240	220	195	175	160	145	130	120	110	100

Caution

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

[Payload by Acceleration]

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

Lead 30

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

Lead 20

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	42	28	17.5	15.5	14	14	10.5	10.5	8.5	7
1200	42	28	17.5	15.5	14	14	10.5	10.5	8.5	7

Lead 10

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

Lead 5

Orientation	Horizontal					Vertical				
Speed [mm/s]	Acceleration [G]									
	0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
0	70	56	56	–	–	35	31.5	21	–	–
300	70	56	56	–	–	35	31.5	21	–	–

Caution

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

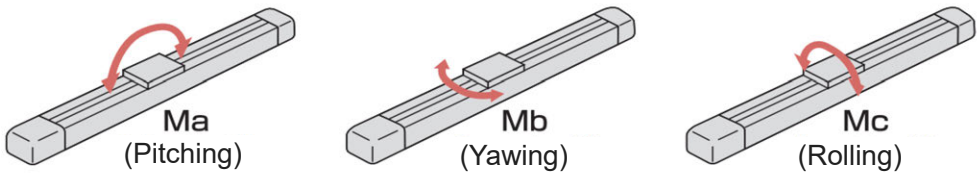
[Actuator Specifications]

Item	Content
Drive System	Ball Screw Φ16mm, Rolled C10
Positioning Repeatability (*1)	±0.01mm [±0.005mm]
Lost Motion	0.1mm or less
Allowable static moment	Ma direction:642 N•m, Mb direction:642 N•m, Mc direction:1610 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction:161 N•m, Mb direction:161 N•m, Mc direction:404 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

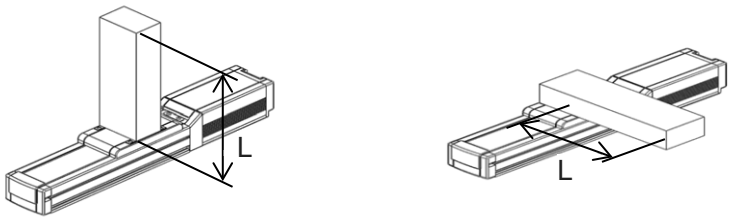
・Overhang load length guideline: 650mm or less

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

Moment Direction of Slider Type

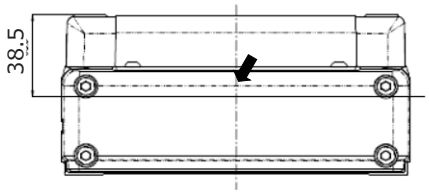


Overhang load length of Slider Type (L = 650mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

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

[5] RCS4B-WSA10R

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
16	5	–	53
10	11	2	85
5	19	3.5	170
2.5	28	7	340

[Stroke and Max Speed] Unit: [mm/s]

Lead [mm]	50 to 350 [Every 50mm]	400 [mm]	450 [mm]	500 [mm]
16	960	930	775	660
10	600	590	490	415
5	300	290	245	205
2.5	150	145	120	100

Caution

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

[Payload by Acceleration]

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

(Note) For Lead 16, there is no setting of the maximum payload type against the speed and acceleration to reduce the payload for vertical orientation. Use the slider type.

Lead 16

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	5	5	3.5	3	–	–	–	–
960	5	5	3.5	3	–	–	–	–

Lead 10

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	11	11	8.5	8.5	2	2	2	2
600	11	11	8.5	8.5	2	2	2	2

Lead 5

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	19	19	14	12.5	3.5	3.5	3.5	3.5
300	19	19	14	12.5	3.5	3.5	3.5	3.5

Lead 2.5

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	28	21	12.5	–	7	7	4	–
150	28	21	12.5	–	7	7	4	–

Caution

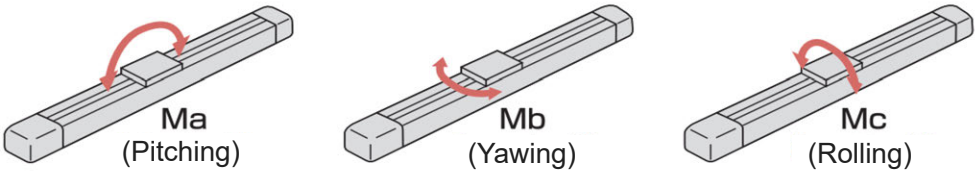
- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

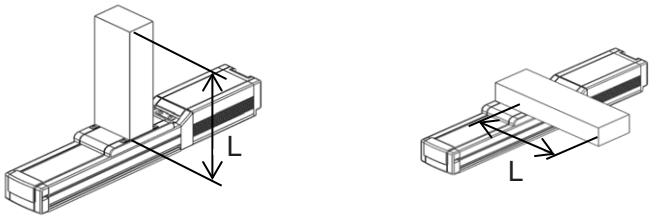
Item	Content
Drive System	Ball Screw Φ8mm, Rolled C10
Positioning Repeatability	±0.01mm
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 271 N•m, Mb direction: 271 N•m, Mc direction: 553 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction: 65.4 N•m, Mb direction: 65.4 N•m, Mc direction: 134 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

・Overhang load length guideline: 500mm or less

Moment Direction of Slider Type

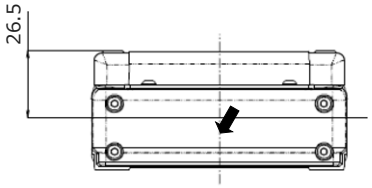


Overhang load length guideline (L = 500mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

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

[6] RCS4B-WSA12R

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
20	9	2	85
12	16	5.5	142
6	30	10.5	283
3	38.5	10.5	566

[Stroke and Max Speed] Unit: [mm/s]

Lead [mm]	50 to 450 [Every 50mm]	500 [mm]	550 [mm]	600 [mm]	650 [mm]	700 [mm]	750 [mm]	800 [mm]
20	1200	1130	970	840	740	650	580	520
12	720	610	535	465	405	355	315	285
6	360	310	265	230	200	175	155	140
3	180	150	130	115	100	85	75	70

Caution

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

[Payload by Acceleration]

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

Lead 20

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	9	7	5.5	4	2	2	1.5	1.5
1200	9	7	5.5	4	2	2	1.5	1.5

Lead 12

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	16	16	11	10.5	5.5	5.5	5.5	4
720	16	16	11	10.5	5.5	5.5	5.5	4

Lead 6

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	30	28	21	14	10.5	10.5	8.5	7
360	30	28	21	14	10.5	10.5	8.5	7

Lead 3

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	38.5	21	10.5	–	10.5	7	4	–
180	38.5	21	10.5	–	10.5	7	4	–

Caution

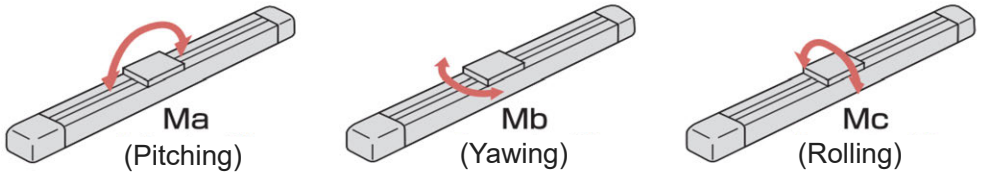
- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

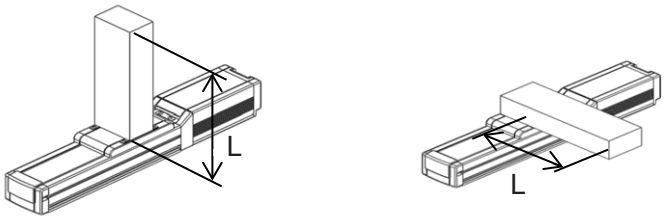
Item	Content
Drive System	Ball Screw Φ10mm, Rolled C10
Positioning Repeatability	±0.01mm
Lost Motion	0.1 mm or less
Allowable static moment	Ma direction: 311 N•m, Mb direction: 311 N•m, Mc direction: 827 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction: 87.5 N•m, Mb direction: 87.5 N•m, Mc direction: 233 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

・Overhang load length guideline: 450mm or less

Moment Direction of Slider Type

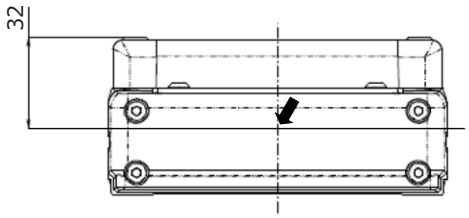


Overhang load length guideline (L = 450mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

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

[7] RCS4B-WSA14R

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
24	14	1.5	142
16	31.5	5.5	214
8	45.5	7	427
4	52.5	17.5	855

[Stroke and Max Speed] Unit: [mm/s]

Lead [mm]	50 to 450 [Every 50mm]	500 [mm]	550 [mm]	600 [mm]	650 [mm]	700 [mm]	750 [mm]	800 [mm]
24	1440	1420	1220	1060	930	830	740	665
16	960	920	790	690	610	550	490	440
8	480	460	400	350	305	270	240	215
4	240	230	200	170	150	135	120	105

Caution

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

[Payload by Acceleration]

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

Lead 24

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	14	10.5	10.5	7	1.5	1.5	1.5	1.5
1440	14	10.5	10.5	7	1.5	1.5	1.5	1.5

Lead 16

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	31.5	21	14	14	5.5	5.5	5.5	5.5
960	31.5	21	14	14	5.5	5.5	5.5	5.5

Lead 8

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	45.5	35	28	28	7	7	7	7
480	45.5	35	28	28	7	7	7	7

Lead 4

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	52.5	42	21	–	17.5	14	8.5	–
240	52.5	42	21	–	17.5	14	8.5	–

Caution

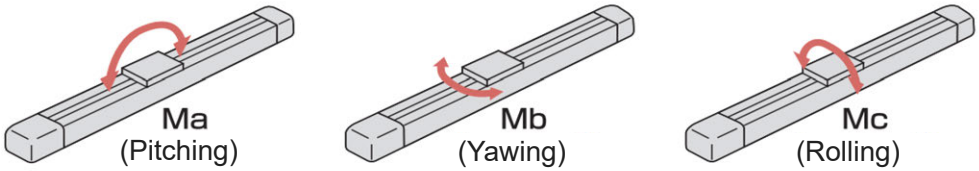
- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

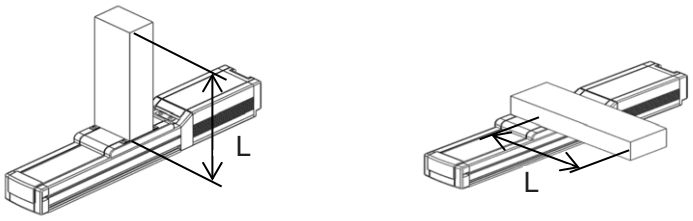
Item	Content
Drive System	Ball Screw Φ12mm, Rolled C10
Positioning Repeatability	±0.01mm
Lost Motion	0.1mm or less
Allowable static moment	Ma direction:462 N•m, Mb direction:462 N•m, Mc direction:1170 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction:122 N•m, Mb direction:122 N•m, Mc direction:308 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C 85%RH or less (Non-condensing)

・Overhang load length guideline: 550mm or less

Moment Direction of Slider Type

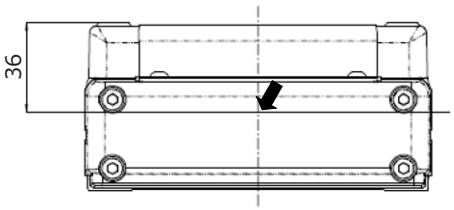


Overhang load length guideline (L = 550mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

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

[8] RCS4B-WSA16R

[Lead and Payload]

Lead [mm]	Max. Payload		Rated Thrust [N]
	Horizontal [kg]	Vertical [kg]	
30	21	8.5	226
20	42	12.5	339
10	56	24.5	678
5	70	35	1357

[Stroke and Max Speed]

Unit: [mm/s]

Lead [mm]	50 to 550 [Every 50mm]	600 [mm]	650 [mm]	700 [mm]	750 [mm]	800 [mm]	850 [mm]	900 [mm]	950 [mm]	1000 [mm]	1050 [mm]	1100 [mm]
30	1800	1680	1480	1320	1180	1060	960	870	790	730	670	620
20	1200	1120	990	880	780	715	645	590	535	490	450	415
10	600	560	490	440	395	355	320	290	265	240	225	205
5	300	280	240	220	195	175	160	145	130	120	110	100

Caution

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

[Payload by Acceleration]

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

Lead 30

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

Lead 20

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	42	28	17.5	15.5	12.5	10.5	10.5	8.5
1200	42	28	17.5	15.5	12.5	10.5	10.5	8.5

Lead 10

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

Lead 5

Orientation	Horizontal				Vertical			
Speed [mm/s]	Acceleration [G]							
	0.3	0.5	0.7	1.0	0.3	0.5	0.7	1.0
0	70	70	56	–	35	31.5	21	–
300	70	70	56	–	35	31.5	21	–

Caution

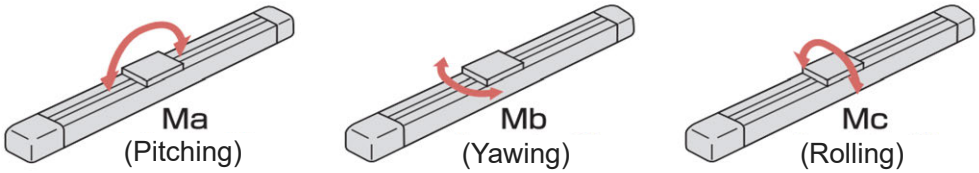
- Do not set any value above the allowable range for acceleration/deceleration. This may lead to vibration, breakdown, or shortened product life.

[Actuator Specifications]

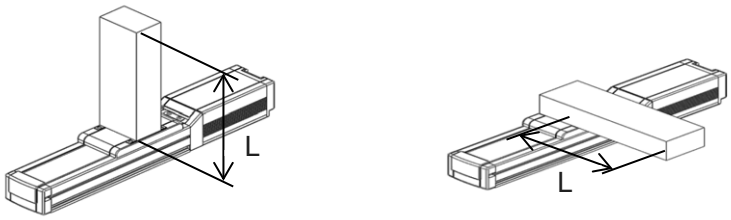
Item	Content
Drive System	Ball Screw Φ16mm, Rolled C10
Positioning Repeatability	±0.01mm
Lost Motion	0.1mm or less
Allowable static moment	Ma direction: 642 N•m, Mb direction: 642 N•m, Mc direction: 1610 N•m
Allowable dynamic moment Reference rated life 5000km	Ma direction: 161 N•m, Mb direction: 161 N•m, Mc direction: 404 N•m
No. of Encoder Pulses	16384 pulse/rev
Ambient operating temperature/humidity	10 to 40°C, 85%RH or less (Non-condensing)

・Overhang load length guideline: 650mm or less

Moment Direction of Slider Type

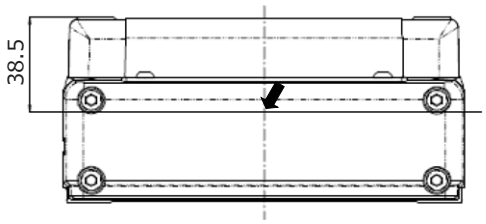


Overhang load length guideline (L = 650mm or less)



Ma direction **Mb•Mc direction**

* For calculation of Ma and Mc moments, take the position pointed with an arrow as the datum.



Caution

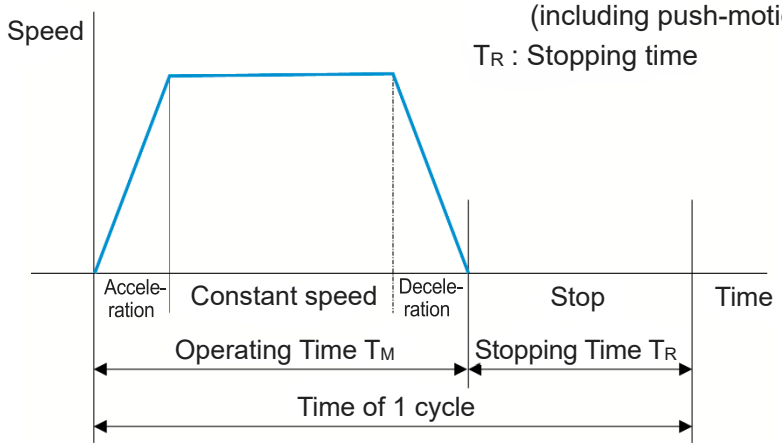
- If the actuator is used with excessive allowable moment and overhang load, it may not only lead to abnormal noise and vibration but also significantly reduce the life of the actuator.

1.2.2 Duty ratio

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

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

D : Duty ratio
T_M : Operating time
(including push-motion operation)
T_R : Stopping time



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

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

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

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

Load Factor: $LF = \frac{M \times \alpha}{M_r \times 0.3}$ [%]

Max. Payload at Acceleration 0.3G : M_r [kg]
Payload during Operation : M [kg]
Acceleration during Operation : α [G]

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

Load Factor: $LF = \frac{M \times \alpha}{M_d \times \alpha} = \frac{M}{M_d}$ [%]

Payload at Indicated Acceleration : M_d [kg]
Payload during Operation : M [kg]
Acceleration during Operation : α [G]

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

Acceleration / Deceleration Time Ratio t_{od} =

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

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

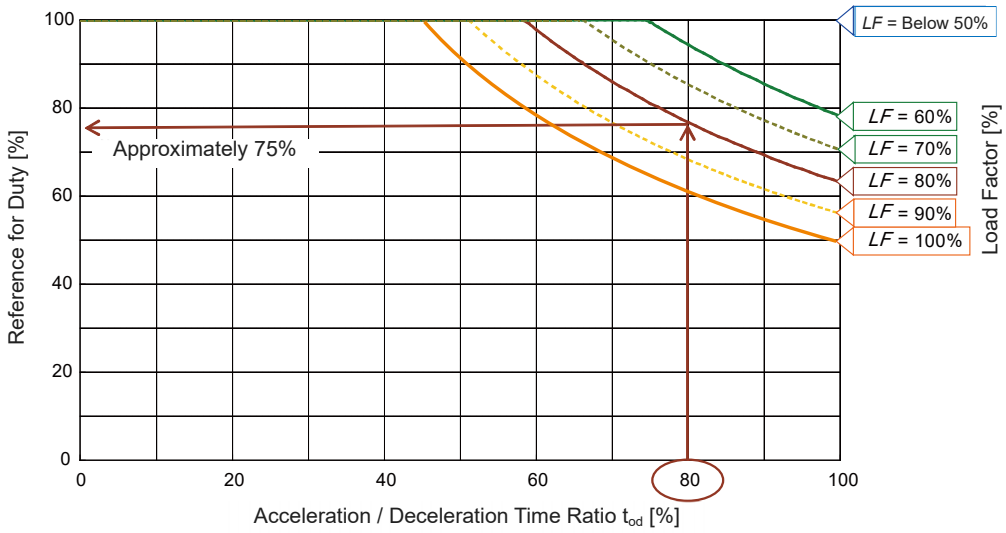
$$\text{Acceleration [mm/s}^2\text{]} = \text{Acceleration [G]} \times 9{,}800\text{mm/s}^2$$

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

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

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

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



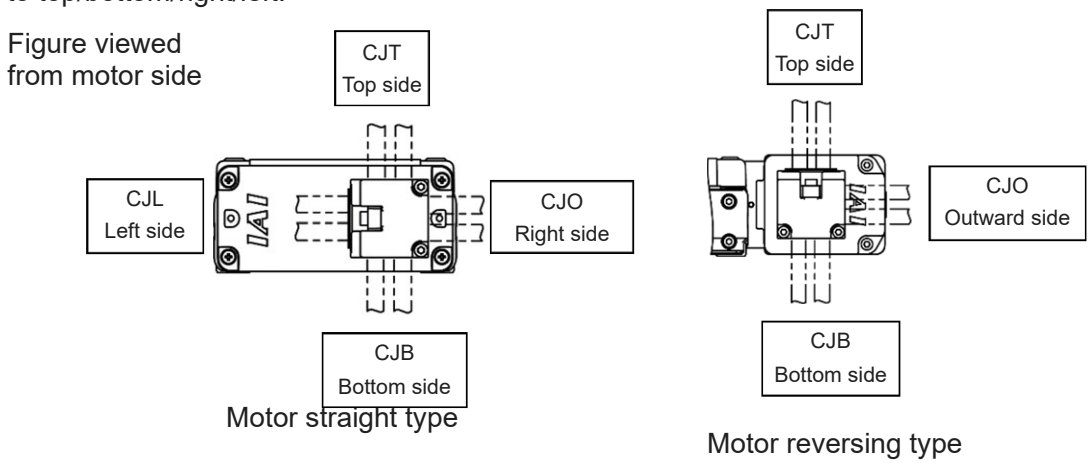
1.3 Options

1.3.1 With Brake (Model Code: B)

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

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

The orientation of the motor / encoder cable to be installed on the actuator unit can be changed to top/bottom/right/left.

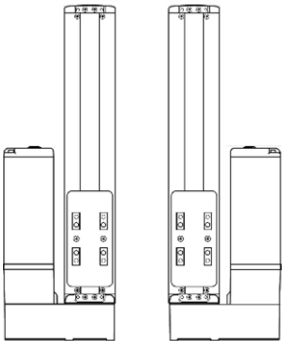


1.3.3 High Precision Specifications (Model Code: HPR)

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

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

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



ML (Left reversed)　　MR (Right reversed)

1.3.5 Reversed-home Specification (Model Code: NM)

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

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

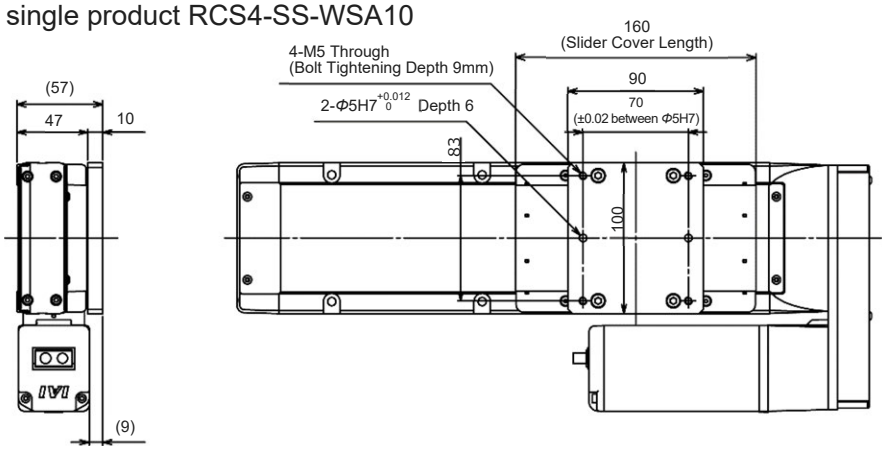
1.3.6 Slider Roller Specification (Model Code: SR)

The structure of the slider in the standard type can be changed to the roller structure same as the one in the cleanroom type.
If it gets chosen to have the slider roller type, the appearance and dimensions of the slider cover should become the same as the cleanroom type.

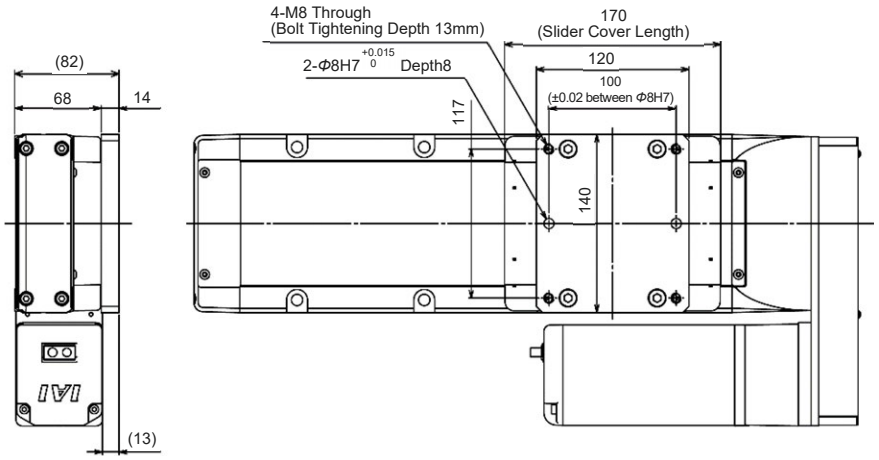
1.3.7 Slider Spacer (Model Code: SS)

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

RCS4-WSA10R
Model number of single product RCS4-SS-WSA10



RCS4-WSA14R
Model number of single product RCS4-SS-WSA14



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

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

ROBO Cylinder

Chapter 2

Installation and Operation

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2.1 Precautions for transportation

[Handling the package]

- Do not damage or drop the package.
  The package is not specially designed to withstand dropping or shock due to collision.
- Keep the unit in horizontal orientation for stationary positioning or transportation.
- Do not climb onto the package.
- Do not put anything that could deform the package on it.



[Handling after unpacking]

- Hold the base part when you carry the unit.
- Do not carry the unit by its motor cover or stainless steel sheet.
- Do not damage or drop the package during transportation.
- Do not apply excessive force to any part.
  For the names of each part, refer to “Names of the Parts” on page Intro-11 and 12.



[Handling when assembled into machinery (system)]

- Secure sliders to prevent sudden movement during transport.
- If the body or any moving part is overhanging, fix it appropriately to avoid large wobbles due to external vibration. When transporting without fixing the tip, do not apply impact of 0.3G or more.
- When suspending machinery (system) with ropes, be careful not to catch the rope on the body or cable.

2.2 Installation and storage/preservation environment

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

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

2.2.1 Installation environment

In general, the installation environment should be one in which an operator can work without protective gear.
The actuator should be installed in a location other than those specified below.

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

Provide sufficient work space for the following maintenance and inspection.

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

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

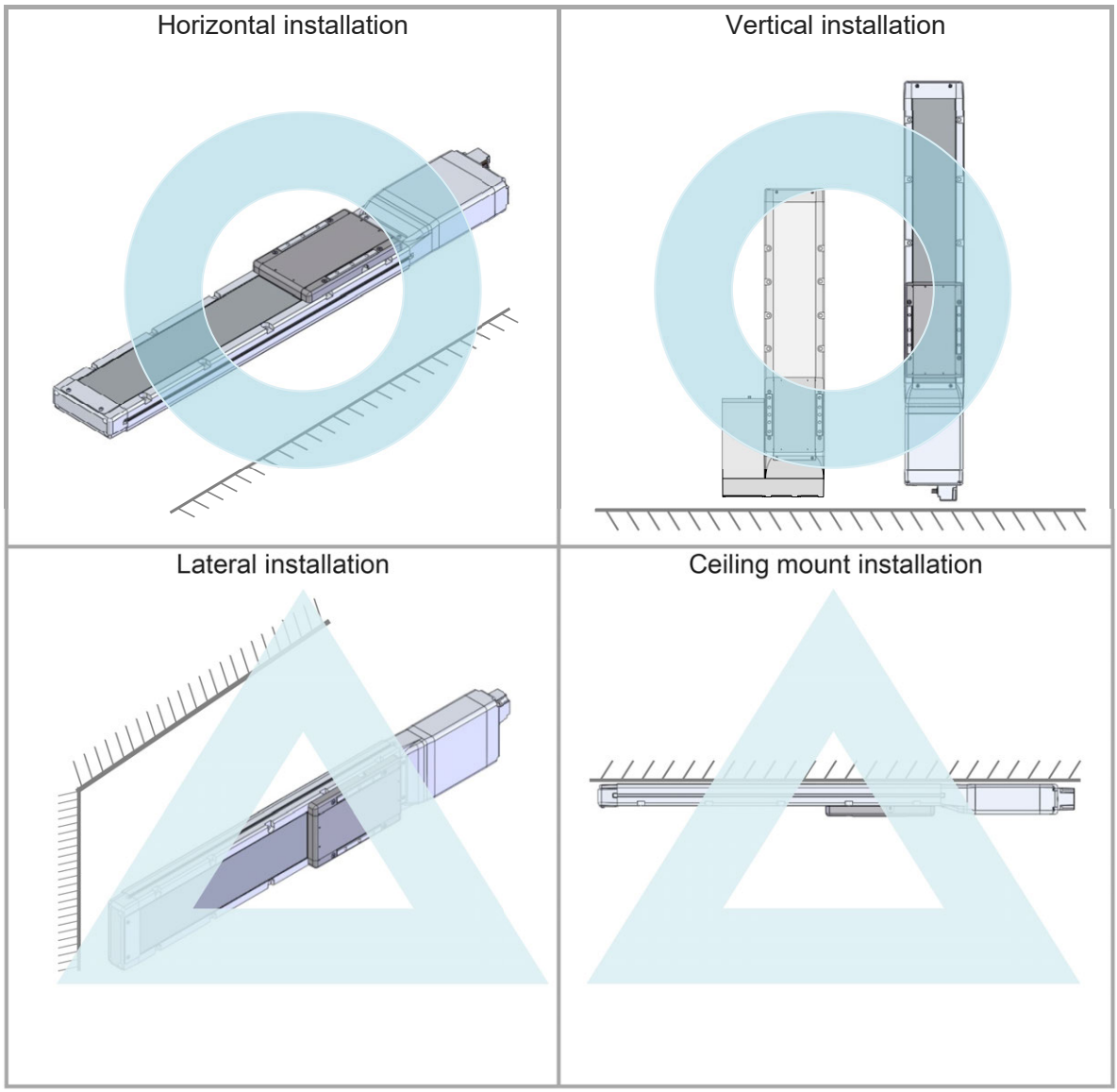
- Where noise generates due to static electricity, etc.
- Where the actuator is subject to a strong electric or magnetic field
- Where the actuator is subject to ultraviolet ray or radiation

2.2.2 Storage/preservation environment

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

2.3 Installation

2.3.1 Mounting orientation



Caution

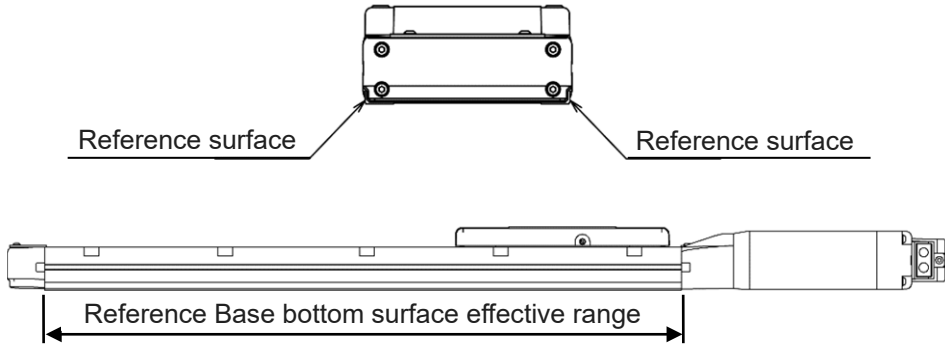
- Install the unit with the motor on the top side when it is installed vertically for Motor Straight Type.
- When the motor is installed at the bottom, the grease may get separated and the base oil could flow into the motor, which could cause malfunction of the controller, motor or encoder.
  Therefore it is not recommended to install it with the motor on the bottom side.
  Consider the motor reversed type when it is necessary to install the motor at the bottom.

2.3.2 Precautions regarding stainless steel sheet

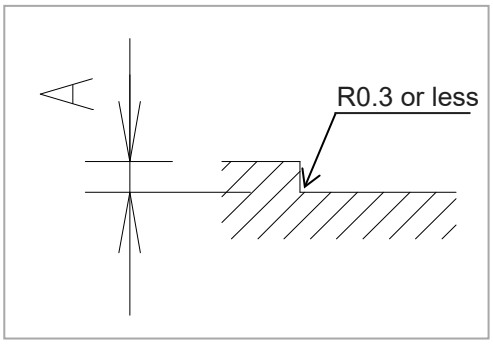
- During installation and transport, do not grasp or press on the stainless steel sheet. Otherwise, this may lead to stainless steel sheet damage.
- Although lateral or ceiling installation is possible, it may cause slackness or misalignment of the stainless steel sheet.
  Continued usage in this orientation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

2.3.3 Installation surface

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



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

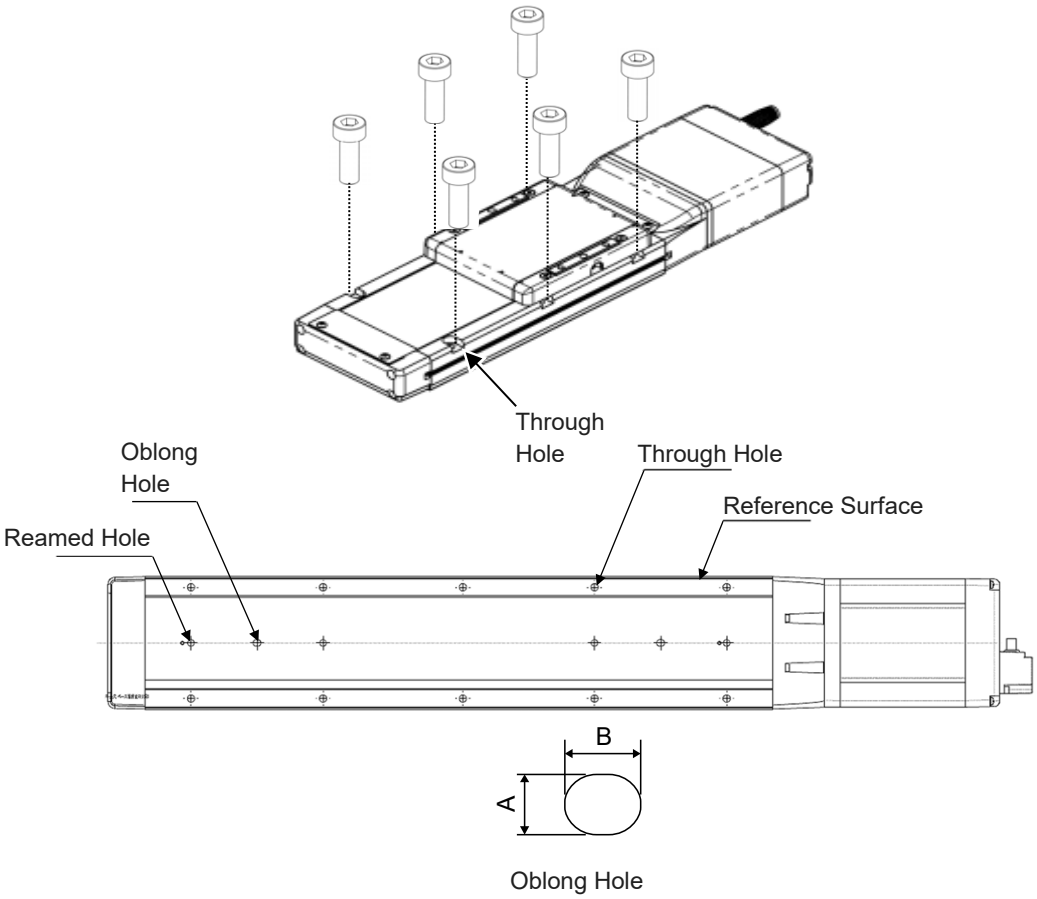


A Dimensions	
WSA10, WSA12, WSA14, WSA16	3 to 5mm

2.3.4 Body mounting

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

This actuator has the through holes for mounting so it can be fixed from the top of the base.
There are reamed holes and oblong holes for positioning pins.
(Note) In the case of Strokes 50 and 100, oblong holes are not provided.



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

Model Name	Through Hole	Mounting Bolt	Tightening Torque
WSA10C WSA10R	Φ5.5 Through, Φ11 counterbore	M5	3.42N·m
WSA12C WSA12R	Φ6.6 Through, Φ12.5 counterbore	M6	5.36N·m
WSA14C WSA14R	Φ9 Through, Φ16.5 counterbore	M8	11.48N·m
WSA16C WSA16R	Φ9 Through, Φ16.5 counterbore	M8	11.48N·m

Model Name	Through Hole	Tightening Torque
WSA10C, WSA10R	Φ5H7 Depth 5	A: $5\,^{+0.012}_{0}$ B: 6 Depth 5mm or less
WSA12C, WSA12R	Φ6H7 Depth 6	A: $6\,^{+0.012}_{0}$ B: 7 Depth 6mm or less
WSA14C, WSA14R	Φ8H7 Depth 9	A: $8\,^{+0.015}_{0}$ B: 9 Depth 9mm or less
WSA16C, WSA16R	Φ8H7 Depth 9	A: $8\,^{+0.015}_{0}$ B: 9 Depth 9mm or less

Caution

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

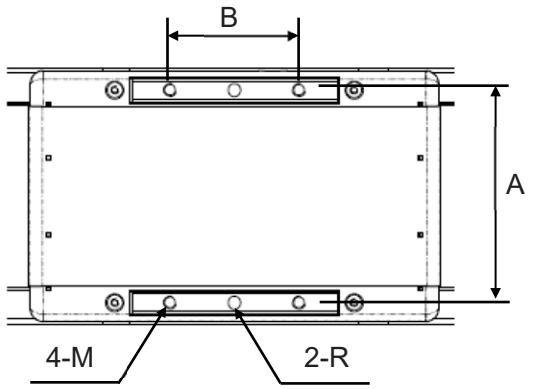
Notice

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

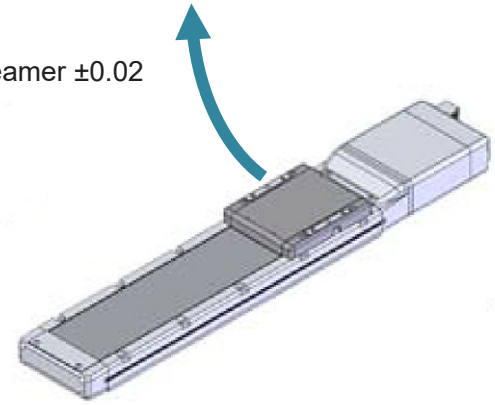
2.3.5 Mounting transported objects

[For WSA10C/R, WSA12C/R and WSA14C/R]

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



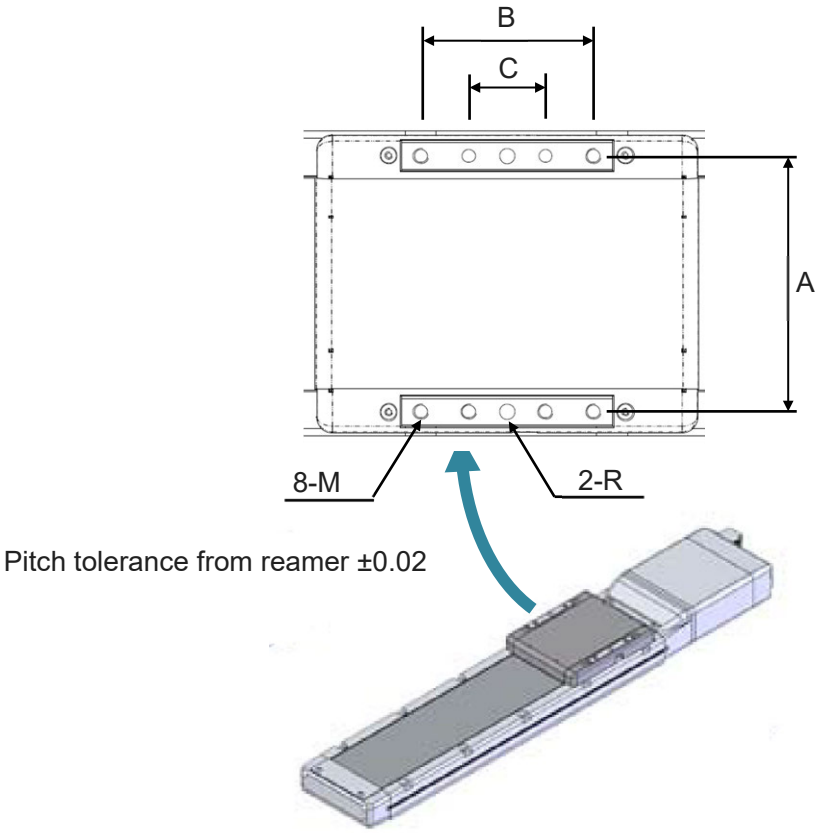
Pitch tolerance from reamer ±0.02



Model Name	A	B	Reamed Hole	Screw Hole M	Mounting Bolt	
					Bolt Nominal Diameter	Tightening Torque
WSA10C, WSA10R	83	50	Φ5H7 Depth 5	M5 Depth 14	M5	3.42N·m
WSA12C, WSA12R	101	50	Φ6H7 Depth 6	M6 Depth 18	M6	5.36N·m
WSA14C, WSA14R	117	70	Φ8H7 Depth 8	M8 Depth 22	M8	11.5N·m

[For WSA16C/R]

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



Model Name	A	B	C	Reamed Hole	Screw Hole M	Mounting Bolt	
						Bolt Nominal Diameter	Tightening Torque
WSA16C, WSA16R	134	90	40	Φ8H7 Depth 8	M8 Depth 24.5	M8	11.5N·m

Caution

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

Notice

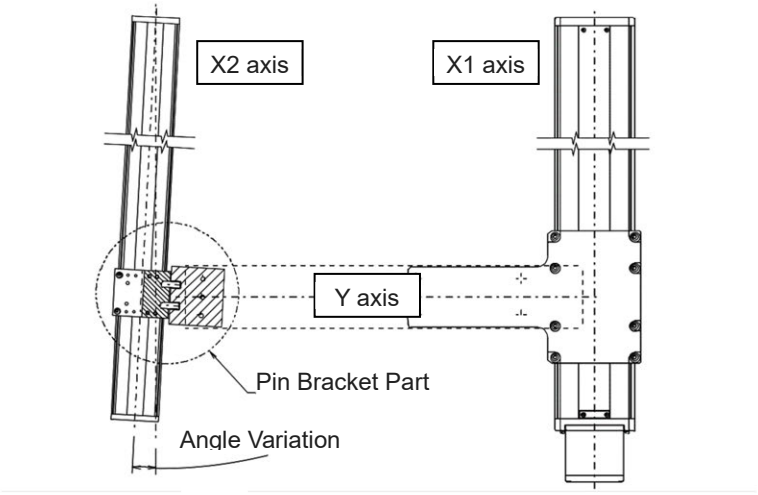
- The mounting bolts are to be prepared by the customer.
- The use of high-strength bolts of ISO-10.9 or higher is recommended.

2.4 Caution for Operation

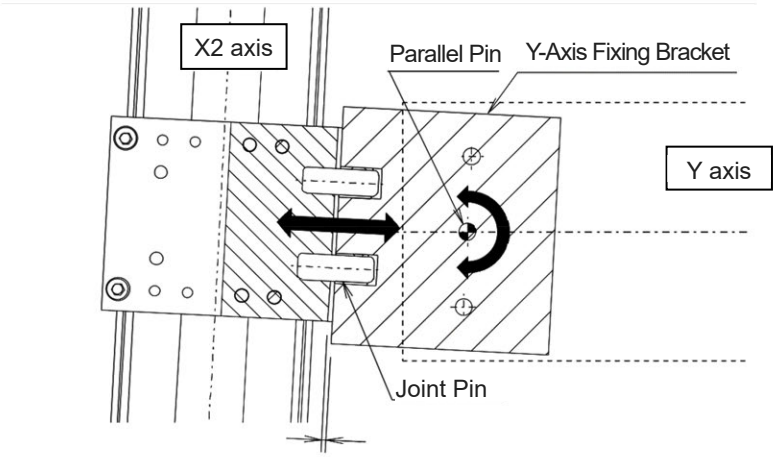
1) In case that excess vibration is applied to a transported object due to such reasons as the overhang of the transported object is long, have an external guide to reduce the vibration.

2) When constructing gantry structure with using the external guide, be careful to the traveling parallelism between the external guide and the actuator. Also, for the joint to the external guide, use such item as a pin bracket which possesses degree of freedom so the assembly variation can be absorbed.

<<Top View for Gantry Assembly>>



<< Detail of Pin Bracket Part >>



ROBO Cylinder

Chapter 3

Connecting with the Controller

3.1 Connecting with the Controller ····· 3-1

3.2 Motor Encoder Cable ····· 3-5

3.2.1 Motor cable (Compatible controller T2) ····· 3-5

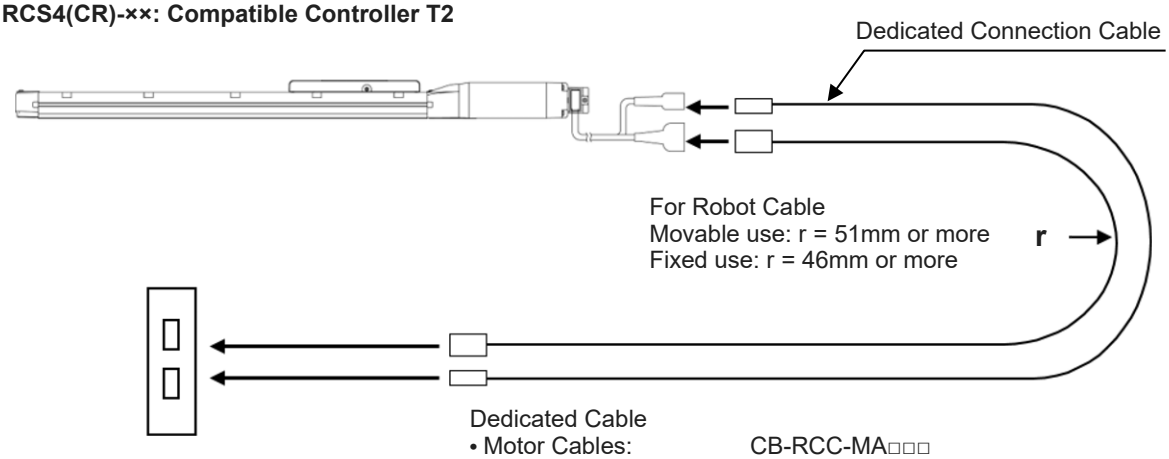
3.2.2 Motor cable (Compatible controller T4) ····· 3-6

3.2.3 Encoder Cable ····· 3-7

3.1 Connecting with the Controller

As the connection cable for the controller and the actuator, use the IAI-dedicated connection cable.
Please consult with IAI if you require a different kind of cable than the one supplied.

RCS4(CR)-××: Compatible Controller T2

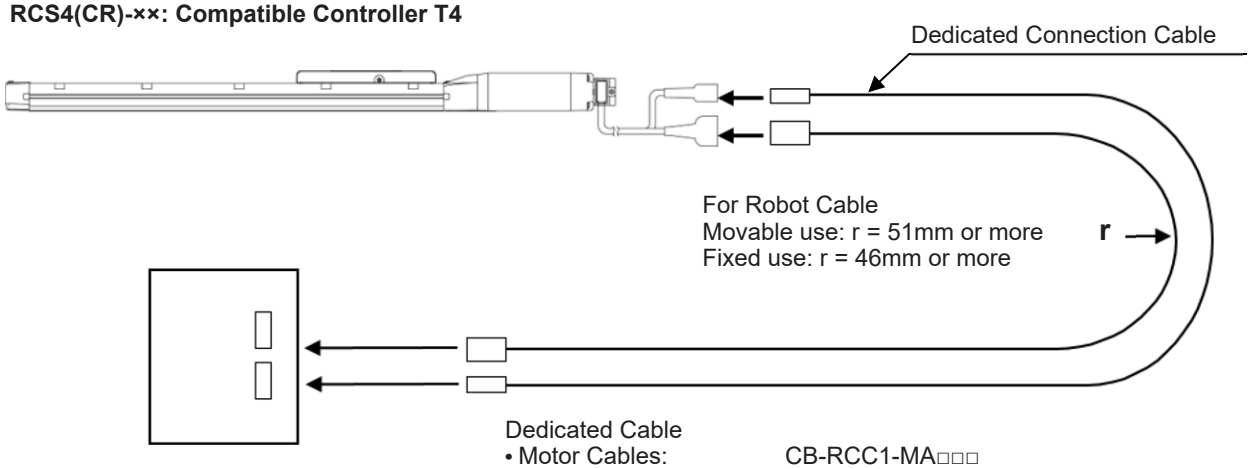


Dedicated Cable
- Motor Cables: CB-RCC-MA□□□
- Motor Robot Cables: CB-RCC-MA□□□-RB
- Encoder Robot Cables: CB-X1-PA□□□

* □□□ represents the cable length. The longest corresponds to 20m.
e.g.) 080 = 8m

Compatible Controller
- SCON-CB/CGB
- SCON-CAL/CGAL
- SCON-LC/LCG
- MSCON-C
- SSEL-CS
- XSEL-P/Q/R/S/RA/SA

RCS4(CR)-××: Compatible Controller T4



Dedicated Cable
- Motor Cables: CB-RCC1-MA□□□
- Motor Robot Cables: CB-X2-MA□□□
- Encoder Robot Cables: CB-X1-PA□□□

* □□□ represents the cable length. The longest corresponds to 20m.
e.g.) 080 = 8m

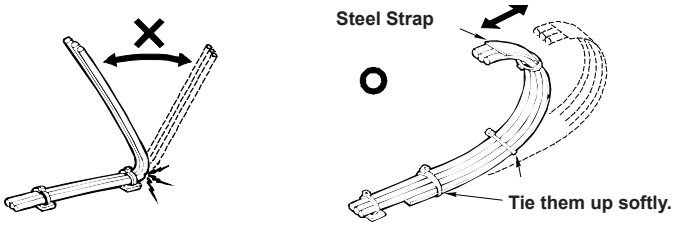
Compatible Controller
- RCON
- RSEL
- SCON2
- XSEL2

Caution

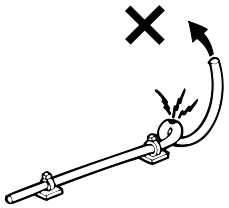
- For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure, or an operation error, but also electric shock or electric leakage, or may even cause a fire.
- The actuator cable out of the motor unit is a robot cable.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or re-joint it.
- Hold the dedicated cable to avoid mechanical force being applied to the terminals and connectors.
- Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
- When a dedicated cable is to be used at a movable part, use a robot cable.
- Do not attempt to use a dedicated cable with its bending radius at or less than the allowable bending radius.
- Make certain that the connectors are plugged properly. Insufficient connection may cause an operation error, thus it is extremely risky.
- Do not lay out the cables to where the machine runs over them.
- Pay attention to the cable layout so it would not hit peripherals during an operation. In case it does, have an appropriate protection such as a cable carrier.
- When a cable is used hanging on the ceiling, prevent an environment that the cable swings with acceleration or wind velocity.
- Make sure there is not too much friction inside the cable storage equipment.
- Do not apply radiated heat to power line or cables.

Caution

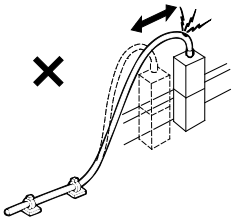
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



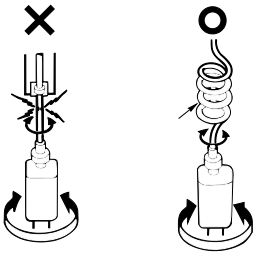
- Do not let the cable bend, kink or twist.



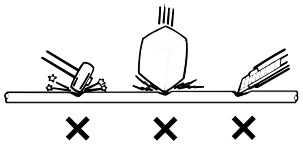
- Do not pull the cable with a strong force.



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

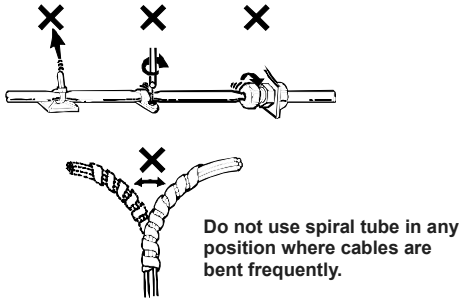


- Do not pinch, drop a heavy object onto or cut the cable.

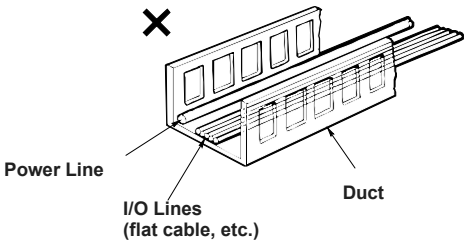


Caution

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

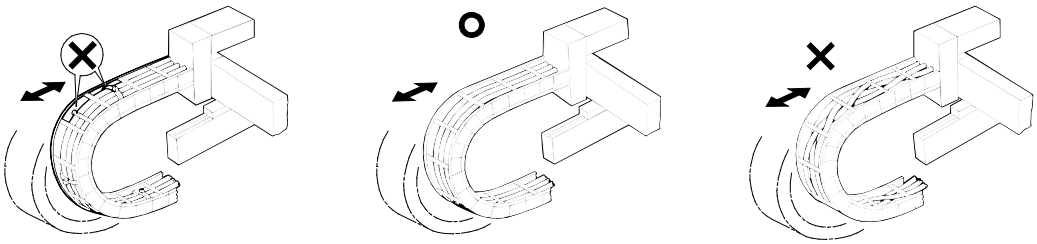


- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable carrier

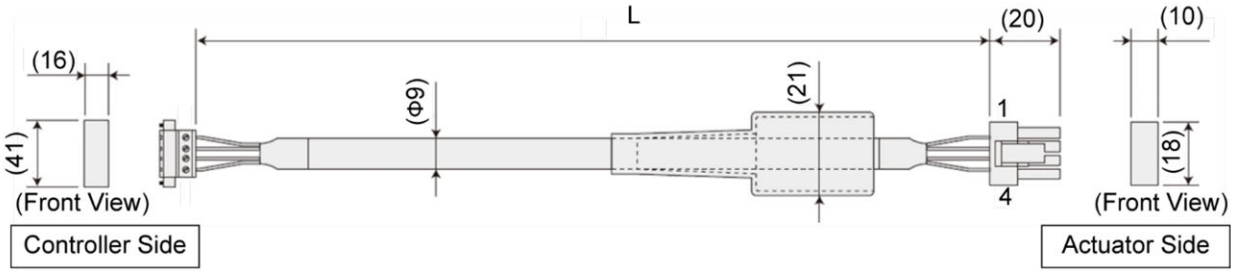
- If there is an indication to the cable for the space factor in a cable carrier, refer to the wiring instruction given by the supplier when storing the cable in the cable carrier.
- Avoid the cables to get twined or twisted in the cable carrier, and also to have the cables move freely and do not tie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



3.2 Motor Encoder Cable

3.2.1 Motor cable (Compatible Controller T2)

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



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

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

Wire Size	Color	Signal	No.
0.75sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

SLP-04V (JST)

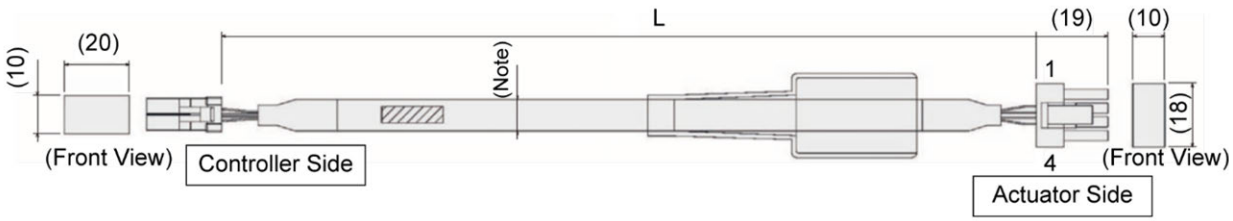
No.	Signal	Color	Wire Size
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

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

  Cable length **1**m CB-RCC-MA**010** (-RB)
  Cable length **3**m CB-RCC-MA**030** (-RB)
  Cable length **10**m CB-RCC-MA**100** (-RB)

3.2.2 Motor cable (Compatible Controller T4)

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



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

(Note) It should be Φ7.6 for a cable not for robot use.
It should be Φ8.5 for a robot cable.

F35FDC-04V-K (JST)

Wire Size	Color	Signal	No.
0.75sq (Crimped)	Red	U	B1
	White	V	B2
	Black	W	A1
	Green	PE	A2

SLP-04V (JST)

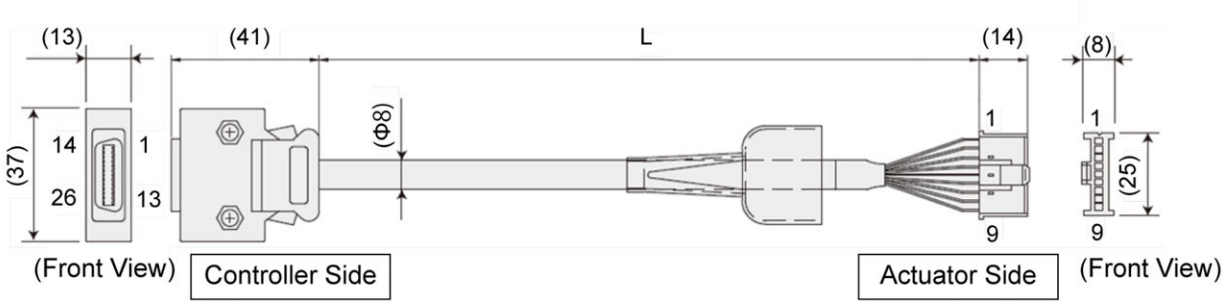
No.	Signal	Color	Wire Size
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

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

  Cable length **1**m CB-RCC1-MA**010**
  Cable length **3**m CB-RCC1-MA**030**
  Cable length **10**m CB-RCC1-MA**100**

3.2.3 Encoder Cable

Model code: CB-X1-PA□□□ (Robot cable)



Minimum bending radius = 44mm (for movable use)
* It is only robot cable available to use inside the cable carrier

10126-3000PE (Sumitomo Electric 3M)

Wire Size	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
Clamp the shield to the hood			

XMP-09V (JST)

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

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

  Cable length **1**m CB-X1-PA**010**
  Cable length **3**m CB-X1-PA**030**
  Cable length **10**m CB-X1-PA**100**

ROBO Cylinder

Chapter 4

Maintenance and Inspection

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4.2 Inspection schedule ·····4-3
4.2.1 Inspection item and schedule ·····4-3
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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.

Warning

- Do not climb on or put anything on the actuator.
  Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life.
- Before releasing the brake, make sure to check there is nothing that will interfere with moving parts within the operation range.
- The slider may fall, possibly injuring the operator or people nearby and damaging the actuator, workpiece or equipment.

Caution

- Check that the power to the actuator is OFF before conducting any maintenance or inspections.
- Be careful not to lose the cover or any removed screws.
  Be sure to return the product to the original condition after maintenance and inspection work.
  Mounting in an incomplete state may cause injuries or damage to the product.
- Keep in mind that the edges of the stainless steel sheet can cause injuries. Always wear gloves when working on it.
- Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion under any circumstances.
- The grease film may run out if the actuator performs return operation continuously over a distance of 30mm or less. As a guideline, every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film. The ball screw or guide may be damaged if the oil film runs out.

Notice

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

4.2 Inspection schedule

Follow the maintenance inspection schedule below.
It is assumed that the equipment is operating 8 hours per day.
If the equipment is running continuously night and day or otherwise running at a high operating rate, inspect more often as needed.

4.2.1 Inspection item and schedule

* Stainless steel sheet life guideline: 5,000km

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

4.2.2 Grease supply timing (Guideline)

Perform grease supply when it has reached to either the operation distance or spent months described in the table below.

Maximum operating speed [mm/s]	Grease supply timing (Guideline)	
	Operation distance	Months
0 to 750 or less	1,250km	6 months
Over 750 to 1500	2,500km	
Over 1500 to 1800	5,000km	

4.3 Visual inspection

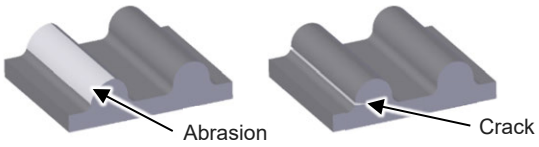
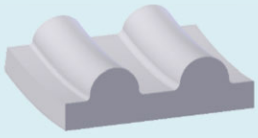
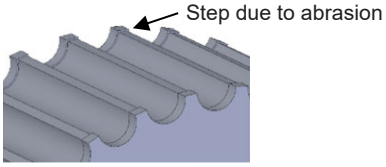
Refer to [4.6 How to replace components] for detailed information about specific component replacement and adjustment methods.

4.3.1 External visual inspection

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

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 play or dust generated?	The ball screw guide may be damaged. Contact IAI.
Has foreign matter penetrated inside?	Remove the foreign matter, clean, and inspect the interior for any damage.
Is the ball screw or guide grease not lubricating well? (Even if the grease is brown, lubrication is adequate if the running surface is shiny)	Wipe away the old grease, then replenish with new grease.
Is dust or foreign matter adhered to the ball screw or guide?	Replenish with new grease after cleaning.
Is the timing belt significantly worn out on the teeth area? Is there any crack on the teeth area? Is there any chipped tooth? 	Replace the timing belt in case any of those stated on the left is found. Refer to [4.6 How to replace components 4.6.2 Timing Belt replacement/adjustment].
Is the timing belt hardened, softened or deformed (shrunk or expanded)? 	Replace the timing belt in case any of those stated on the left is found. Refer to [4.6 How to replace components 4.6.2 Timing Belt replacement/adjustment].
Is there any significant abrasion on pulley teeth? 	When abnormality stated on the left is found: Consult with IAI.

Caution

- Do not damage the stainless steel sheet by bending it forcefully during internal inspection.
- Do not tug on the stainless steel sheet or in any way attempt to reposition it.
  Change in the attached condition may cause the sheet to be mounted unevenly or impact the product life.
- Keep in mind that the edges of the stainless steel sheet can cause injuries. Always wear gloves when working on it.
- A timing belt generally possesses several million times of bending life. However, the durability could vary tremendously depending on the operational conditions, thus it is not easy to define the period for replacement.
- As degradation of a timing belt such as abrasion progresses as time of use goes by, it is necessary to be replaced regularly in the events shown below as a reference.
  • When teeth or an edge of the belt is worn out remarkably
  • When a swell is occurred on the belt due to such as adhesion oil
  • When there is damage such as a crack on teeth or back of the belt occurred
- As it is difficult to define degradation of the core wires retaining the strength of a tooth belt from the appearance or looseness due to elongation, it is recommended to set up a regular period for replacement in advance in use under conditions with high fatigue on the core wires in high acceleration and deceleration.

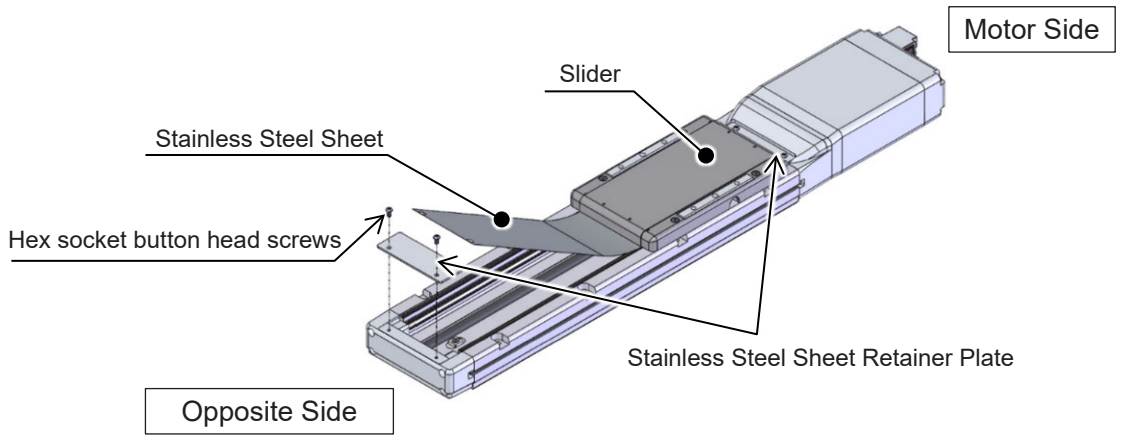
[Internal inspection method]

♦ Preparation

- Torque Wrench or Hex Wrench with 2mm of Parallel Faces Width (WSA10)
  with 2.5mm of Parallel Faces Width (WSA12/14/16)
- Clean Cloth (for Wiping)
- Protection Gear (e.g. Cotton Work Gloves)

♦ Procedure

1. Move the slider to the motor side or the side opposite the motor.
2. Remove the hex socket button head screws (2 pcs) either on the motor side or the side opposite the motor to take off the stainless steel sheet retaining plate.
3. Pick up the stainless steel sheet to have an inspection and clean it up if necessary.
4. After finishing the inspection, build it up in the back order.



*Pay attention not to bend the stainless steel sheet forcefully or damage it.

Type	Bolt	Tightening Torque
WSA10	M3×6×4 pcs	0.74N·m
WSA12/WSA14/WSA16	M4×8×4 pcs	1.7N·m

[Timing Belt inspection method]

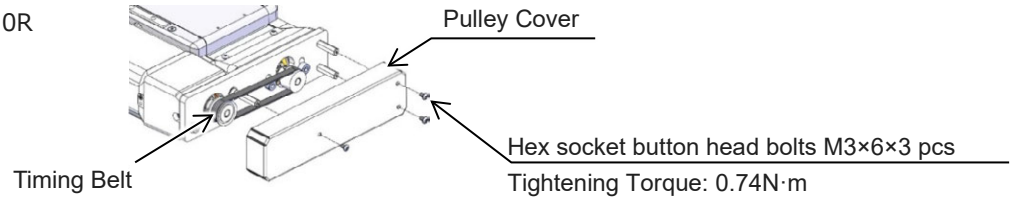
♦ Preparation

- Torque Wrench or Hex Wrench with 2mm of Parallel Faces Width

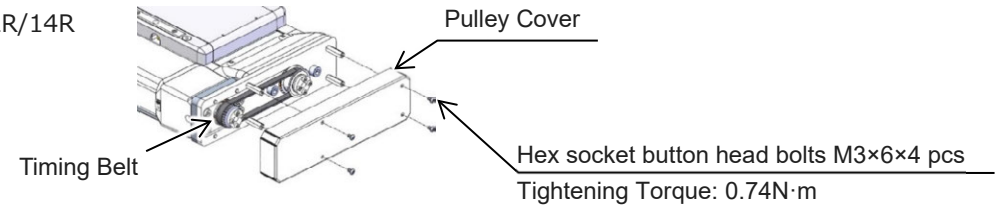
♦ Procedure

1. Remove the hex socket button head bolts or hex socket flat head bolts to take off the pulley cover.
2. Check the condition of the timing belt visually.
3. Attach the pulley cover with the hex socket button head bolts or hex socket flat head bolts.

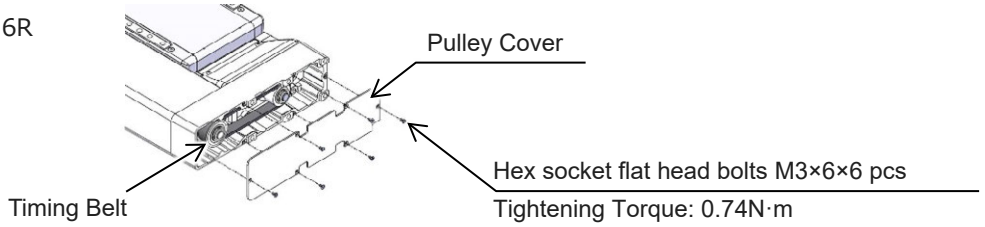
WSA10R



WSA12R/14R



WSA16R



4.4 Cleaning

4.4.1 External cleaning

- Clean exterior surfaces as necessary.
- For the rod type, if grease base oil etc. drips on the rod sliding surface and its periphery, wipe it off with a soft cloth, etc.
- 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.
- To remove severe buildup, wipe gently with a soft cloth soaked in a neutral detergent or alcohol.

4.4.2 Internal cleaning

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

4.5 Grease supply

[1] Grease used

Type	Oil Supply Point	During Maintenance	Default
WSA10 WSA12 WSA14 WSA16	Ball screw	IAI CORPORATION IAGR-LDP01-400	IAI CORPORATION IAGR-LDP01-400
	Guide		

Caution

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

[2] Greasing method: Ball screw/guide

♦ Preparation

- Torque Wrench or Hex Wrench with 2mm of Parallel Faces Width (WSA10)
  with 2.5mm of Parallel Faces Width (WSA12/14/16)
- Clean Cloth (for Wiping)
- Protection Gear (e.g. Cotton Work Gloves)
- Grease

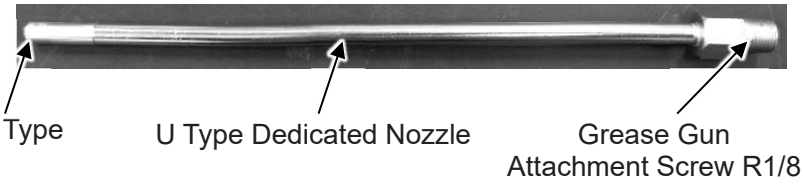
Type	Amount of Grease Supply (Reference)	Grease Nipple Diameter
WSA10C, WSA10R	1.5 cc to 2.0 cc	Φ3.5
WSA12C, WSA12R	1.5 cc to 2.0 cc	Φ6.0
WSA14C, WSA14R	2.0 cc to 2.5 cc	
WSA16C, WSA16R	3.0 cc to 3.5 cc	

* The amount of grease supply (reference) shows the amount on one point of the grease nipples.

- Grease gun

Recommended Grease Gun and Nozzle

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

Nozzle	Suppler
◎Connect N type to the tip of U type dedicated nozzle, and attach it on the grease gun to use.  	THK

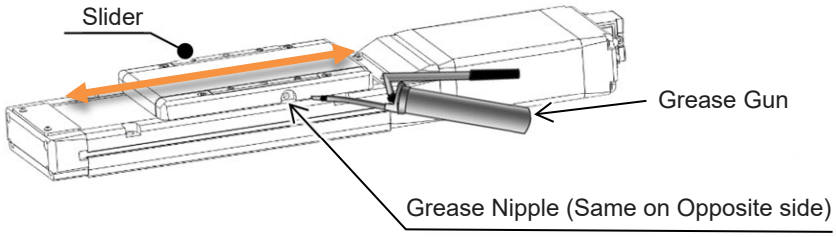
Caution

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

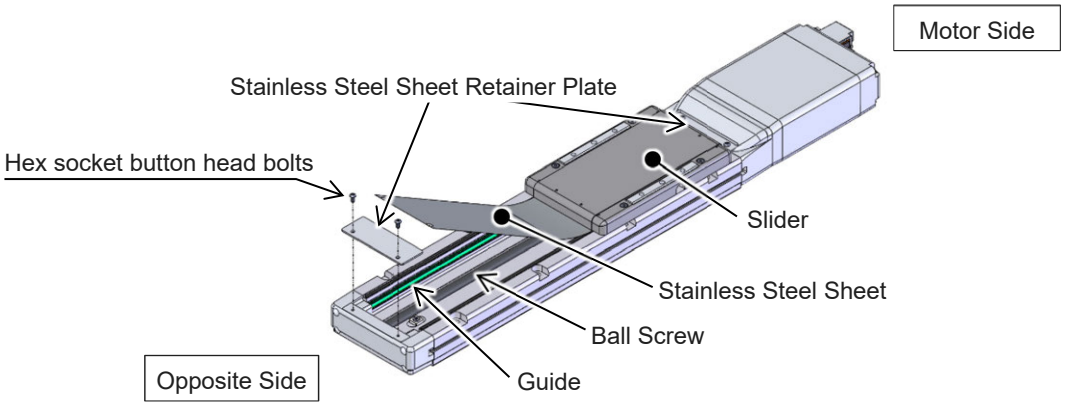
There are grease nipples equipped on the sides of the slider.
Grease supply on the right side of the grease nipple can supply to the guide on the right side and the left side of the grease nipple to the guide on the left side.
Grease supply on the ball screw can be conducted on both of the right and left sides of the grease nipples.

♦ Greasing procedure

1. Supply grease on the grease nipple with a grease gun.
2. Move the slider with hand (Note1) several times to spread the grease.



3. Move the slider to the motor side or the side opposite the motor and remove the hex socket button head bolts (2 pcs) to take off the stainless steel sheet retaining plate.
   Peal the stainless steel sheet and check the ball screw and guides to confirm that they are glossy with the oil of the grease. If the grease is not spread out enough, supply grease again.
4. Wipe off excess grease.
5. Put the stainless steel sheet back on and attach the stainless steel sheet retaining plate with the hex socket button head bolts (2 pcs).



Type	Bolt	Tightening Torque
WSA10	M3×6×4 pcs	0.74N·m
WSA12/WSA14/WSA16	M4×8×4 pcs	1.9N·m

Note1: It is difficult to move a slider with hand for an actuator with low lead.
Do not attempt to move it forcefully. Join a controller and operate it with the jog operation.

4.6 How to replace components

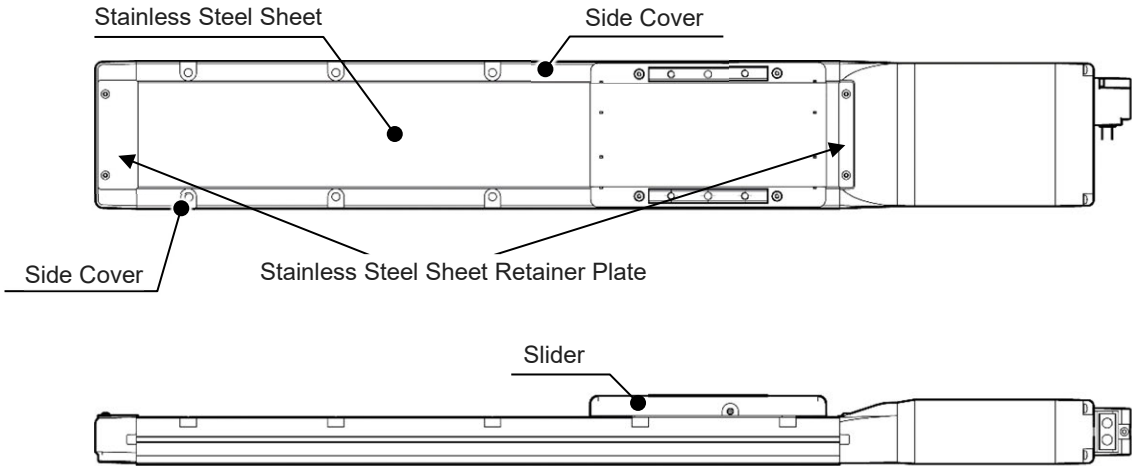
4.6.1 Stainless steel sheet replacement/adjustment

♦ Preparation

- Hex Wrench with 2mm of Parallel Faces Width (WSA10)
  with 2.5mm of Parallel Faces Width (WSA12/14/16)
- Tape
- Scale
- Clean Cloth (for Wiping)
- Alcohol (for Wiping)
- Protection Gear (e.g. Cotton Work Gloves)
- Replacement stainless steel sheet

Type	Stainless steel sheet model
RCS4-WSA10C/WSA10R	ST-6WA10- (Stroke)
RCS4-WSA12C/WSA12R	ST-6WA12- (Stroke)
RCS4-WSA14C/WSA14R	ST-6WA14- (Stroke)
RCS4-WSA16C/WSA16R	ST-6WA16- (Stroke)

♦ Names of the Parts



Caution

- Make sure that there is no misalignment or slack in the stainless steel sheet. This may lead to damage to the stainless steel sheet.
- Do not attempt to touch the stainless steel sheet with bare hand. It may cause injury.

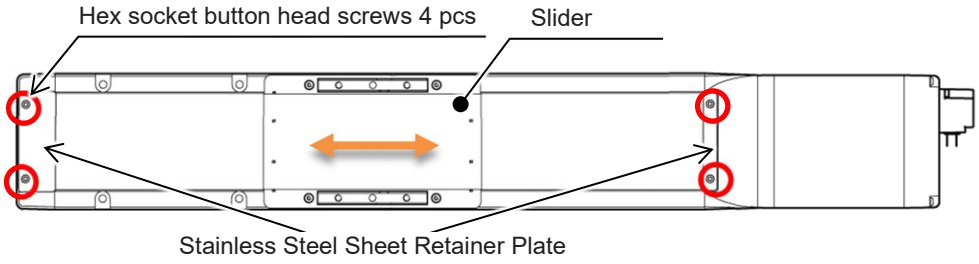
Notice

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

[Stainless steel sheet replacement method] * The image shows WSA10C

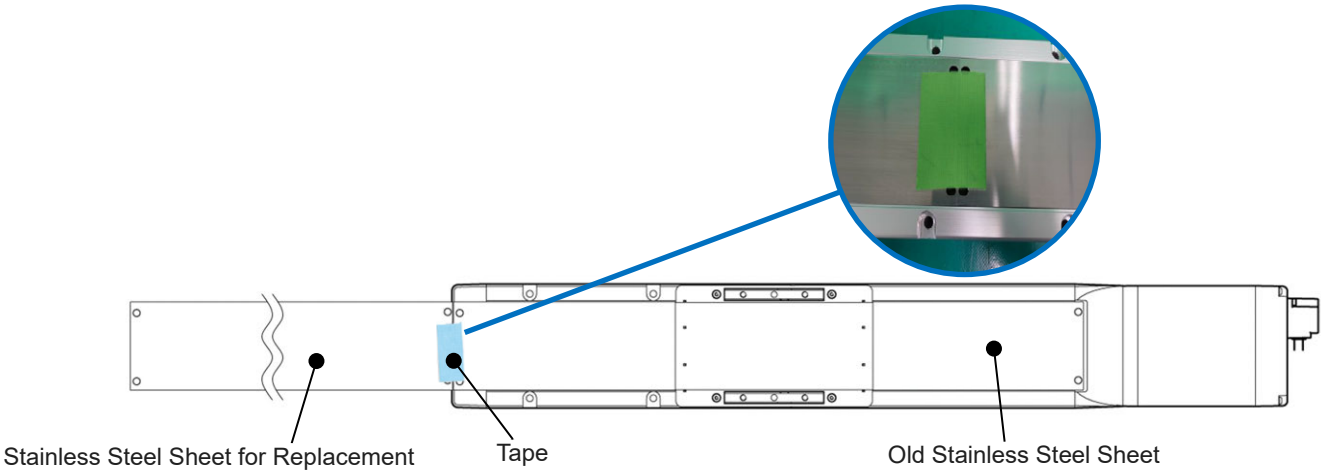
1. Move the slider to the center of the actuator.

2. Remove the hex socket button head screws (4 pcs) to take off the stainless steel sheet retaining plate.

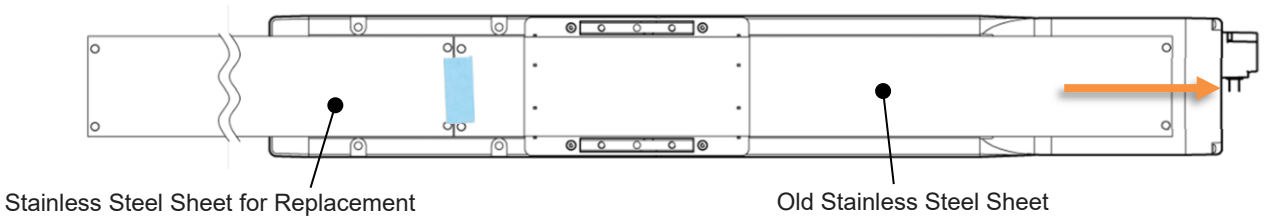


Type	Bolt
WSA10	M3×6×4 pcs
WSA12/WSA14/WSA16	M4×8×4 pcs

3. Adhere a stainless steel sheet for replacement on the old stainless steel sheet with adhesive tape.
   * The width of the tape should be equal or less than the width of the stainless steel sheet
   * Pay special attention not to have the stainless steel sheets duplicated
   * Pay special attention on tape so it would not peal off when pulled

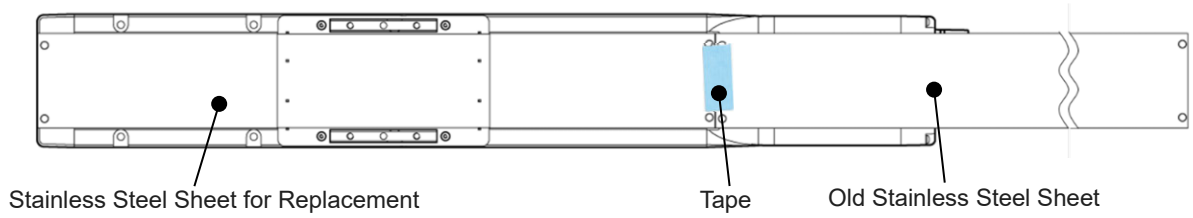


4. Pull the old stainless steel sheet at the end that is not fixed with tape.
   * Pay special attention not to make damage or dent on the stainless steel sheet for replacement

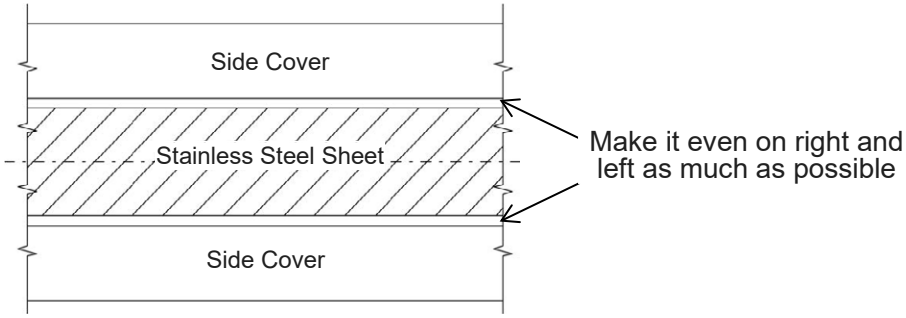


5. Once the stainless steel sheet is swapped with the replacement one, peal the tape off.

* Pay special attention not to make damage on the stainless steel sheet for replacement



6. Make sure the clearances between the stainless steel sheet for replacement and the steps on the right and left of the side cover are even as much as possible, and have it straight so it would not have any pop up.

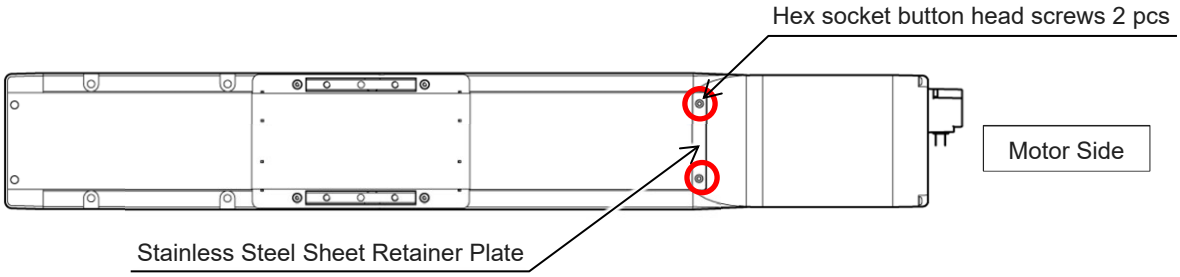


Clearance between Stainless Steel Sheet and Steps on Side Cover (Reference)

Type	Clearance [mm]
WSA10	0.9
WSA12	1
WSA14	0.8
WSA16	0.8

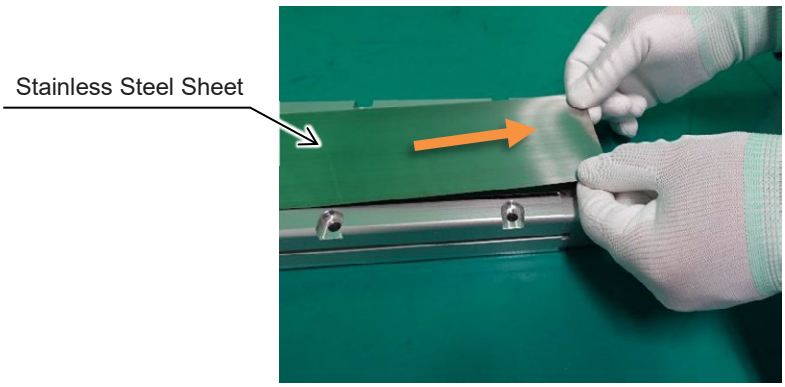
7. Attach the stainless steel sheet retaining plate on the motor side with the hex socket button head screws (2 pcs).

* The two screws should be tighten up by turns to apply force evenly

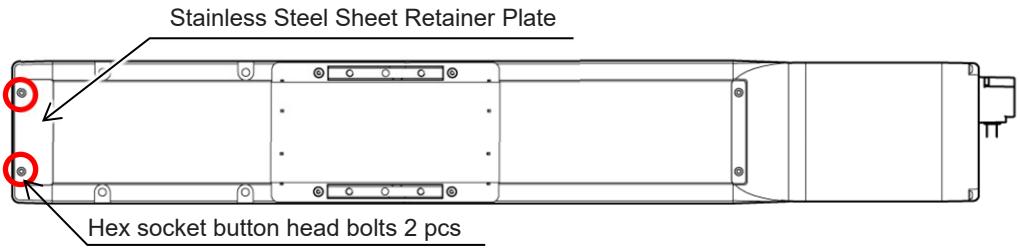


Type	Bolt	Tightening Torque
WSA10	M3x6x2 pcs	0.74N·m
WSA12/WSA14/WSA16	M4x8x2 pcs	1.9N·m

8. Hold the stainless steel sheet at the edge on the opposite side of the motor, pull it straight and release the sheet slowly along the side cover. (The sheet goes back for around 0.5mm by natural.)
Reference of Tensile Force: Approx. 10N

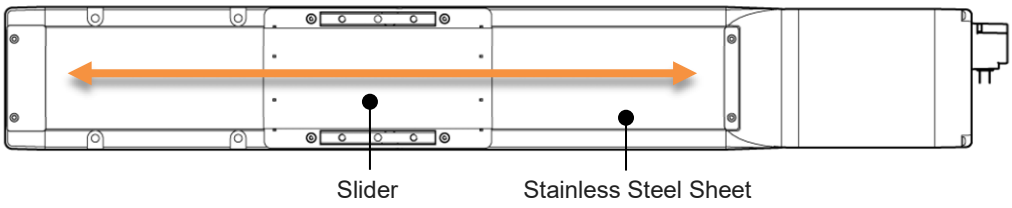


9. Attach the stainless steel sheet retaining plate on the opposite side of the motor with the hex socket button head bolts (2 pcs).
* The two bolts should be tighten up by turns to apply force evenly



Type	Bolt	Tightening Torque
WSA10	M3x6x2 pcs	0.74N·m
WSA12/WSA14/WSA16	M4x8x2 pcs	1.9N·m

10. Move the slider with hand* back and forth for about three times in the entire range of the stroke to make sure that there is not area popped up.
Wipe on the surface of the stainless steel sheet with a clean cloth and alcohol.



* In case it is difficult to move the actuator manually with hand for such models as low lead types and those equipped with a brake, turn on power to the controller and use a teaching pendant or the PC teaching software to move it in speed at approximately 20mm/s.

4.6.2 Timing Belt replacement/adjustment

♦ Preparation

- Torque Wrench or Hex Wrench with 2mm/3mm of Parallel Faces Width (WSA10R/12R)
  with 2mm/4mm of Parallel Faces Width (WSA14R)
  with 4mm of Parallel Faces Width (WSA16R)
- Phillips screwdriver (WSA16R)
- Tension Gauge
- String such as long cable band
- Replacement Timing Belt

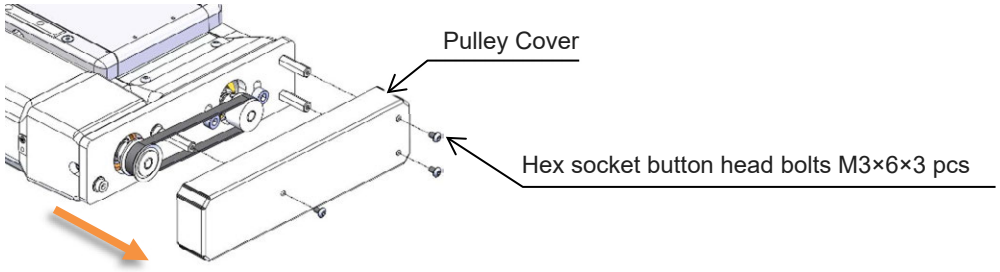
Type	Model
WSA10R	TB-RCS4-WSRA10R
WSA12R	TB-RCS4-WSRA12R
WSA14R	TB-RCS4-WSRA14R
WSA16R	TB-RCP6-WSRA16R

[Timing Belt replacement method]

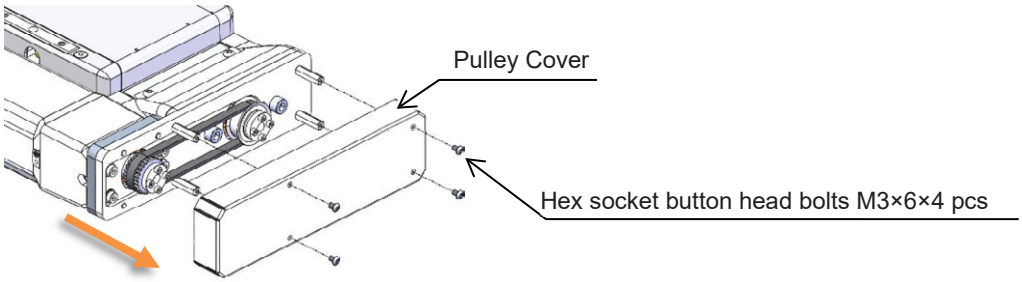
♦ WSA10R, WSA12R, WSA14R

1. Remove the hex socket button head bolts to take off the pulley cover.

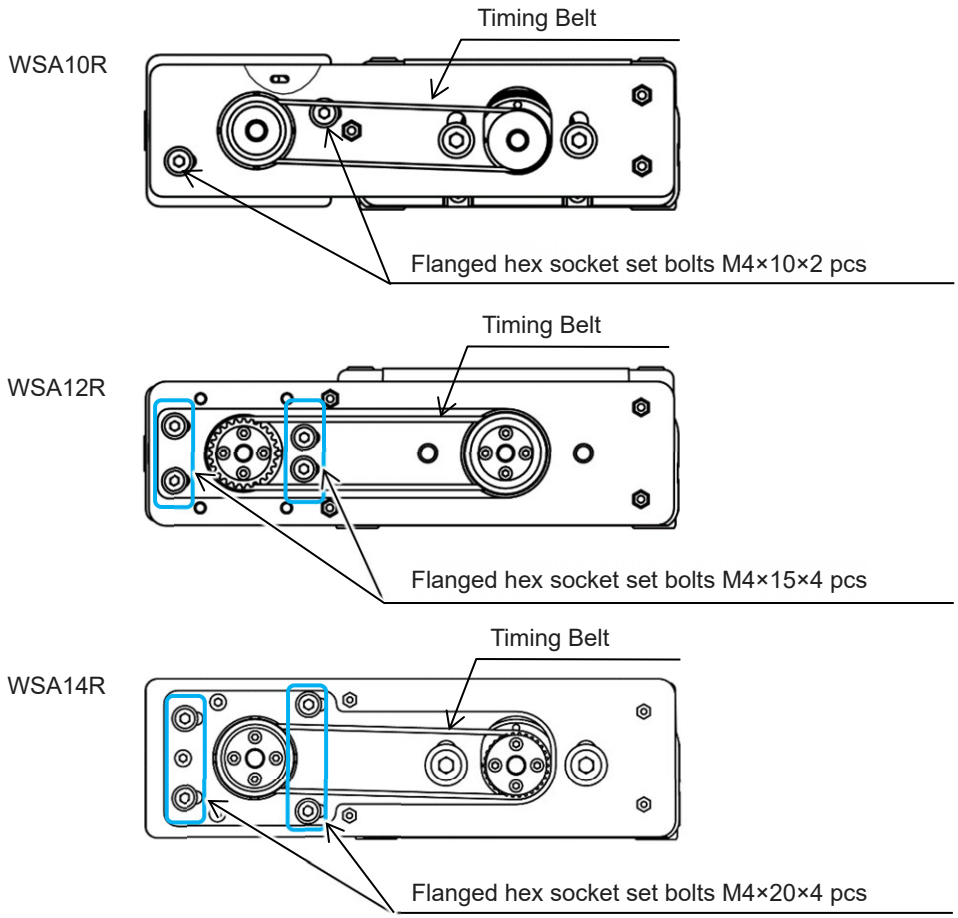
WSA10R



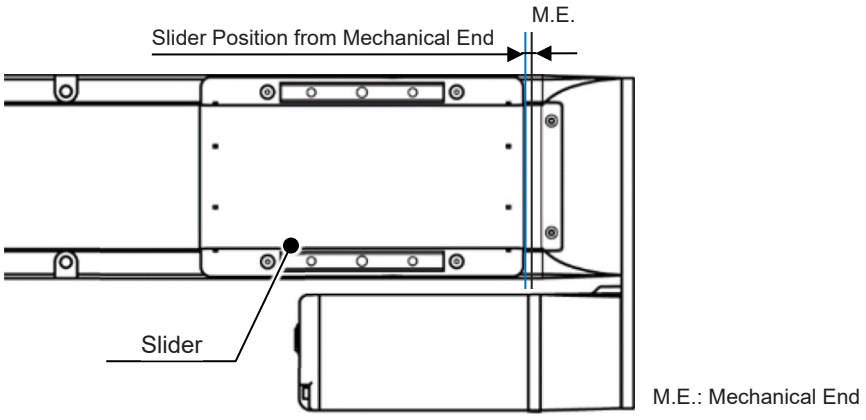
WSA12R/14R



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



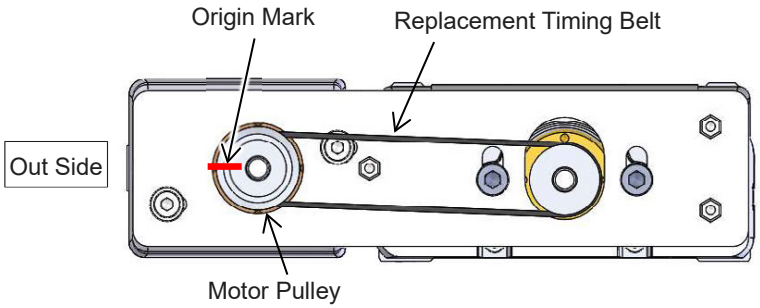
3. Move the slider away from the mechanical end (a position where slider hits) for the specified distance and retain that position.



Slider Position from Mechanical End

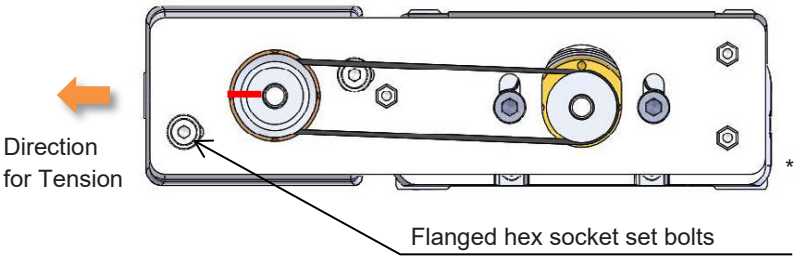
Type	Slider Position [mm]
WSA10R, WSA14R	2
WSA12R	2.5

4. Confirm that the 0-point mark put on the motor pulley is orienting outward and attach a timing belt for replacement between the pulleys.



* The image shows WSA10R

5. Hang such as a cable band on the motor unit and apply the specified load (tensile force) with using a tension gauge.
While the load is applied, tighten up the flanged hex socket set bolts.



* The image shows WSA10R

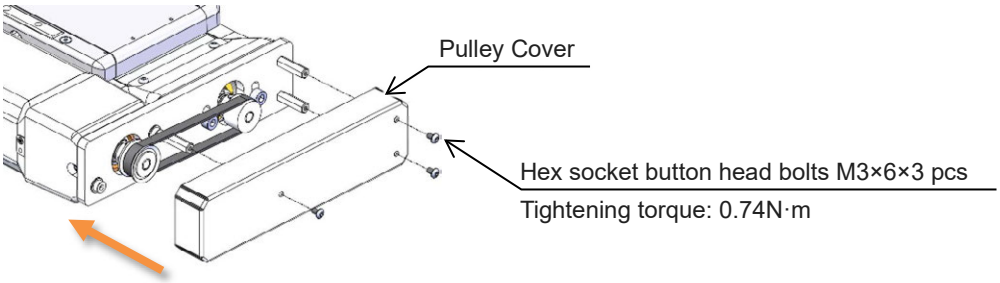
WSA10R: M4×10×2 pcs
WSA12R: M4×15×4 pcs
WSA14R: M5×20×4 pcs

Motor Unit Tensile Force and Bolt Tightening Torque

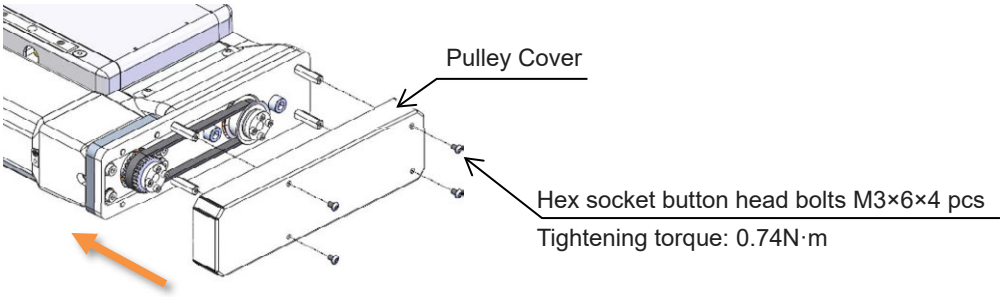
Type	Tension Force [N]	Tightening Torque [N·m]
WSA10R	20 to 25	2.1
WSA12R	40 to 45	2.1
WSA14R	70 to 80	4.1

6. Attach the pulley cover with the hex socket button head screws.

WSA10R

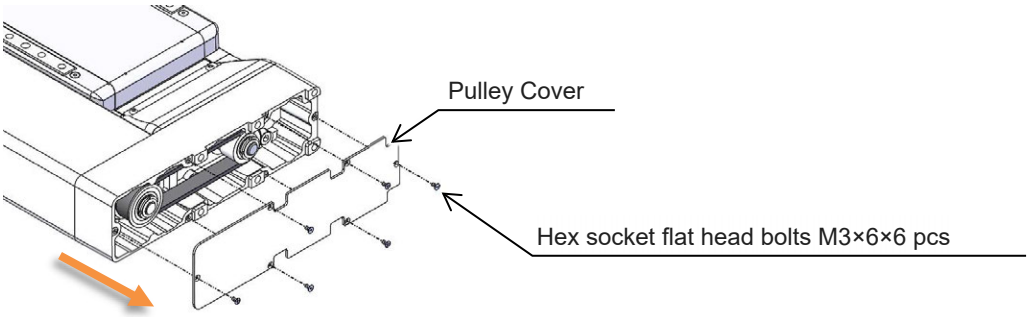


WSA12R/14R

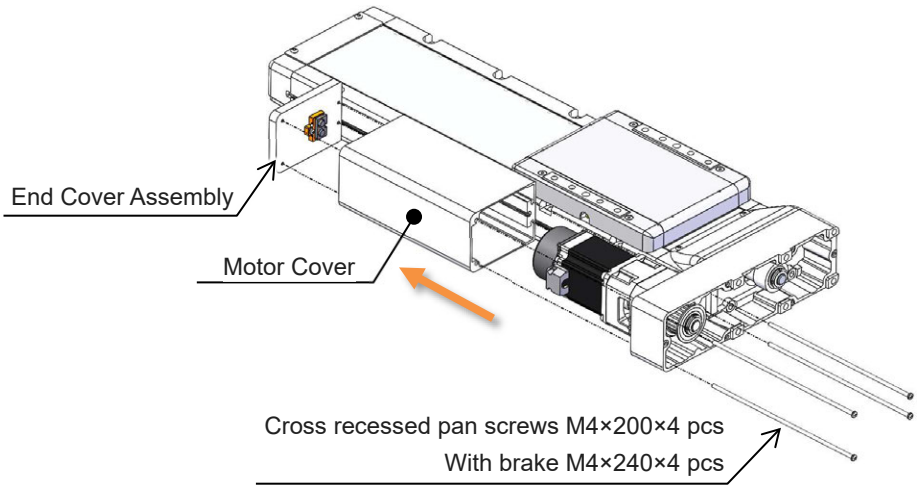


♦ WSA16R

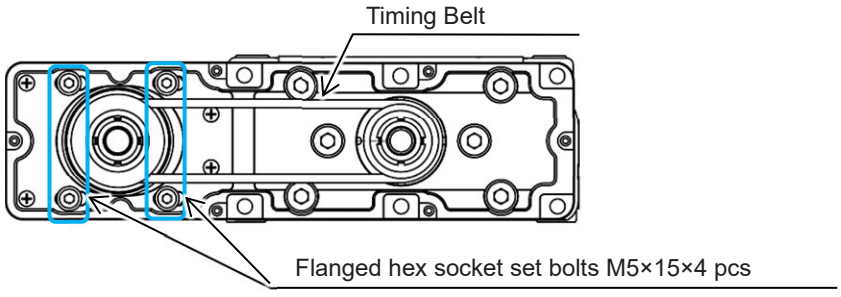
1. Remove the hex socket flat head bolts (6 pcs) to take the pulley cover off.



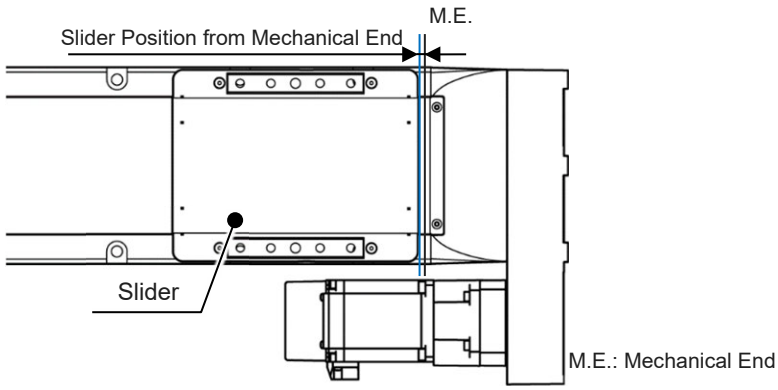
2. Remove the cross recessed pan screws (4 pcs) to take off the end cover assembly and the motor cover.



3. Loosen the flanged hex socket set bolts (4 pcs) to take the timing belt off.



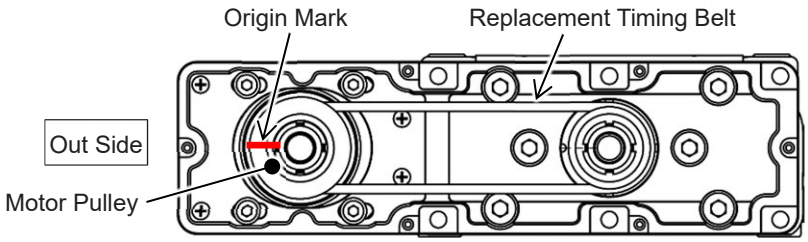
4. Move the slider away from the mechanical end (a position where slider hits) for the specified distance and retain that position.



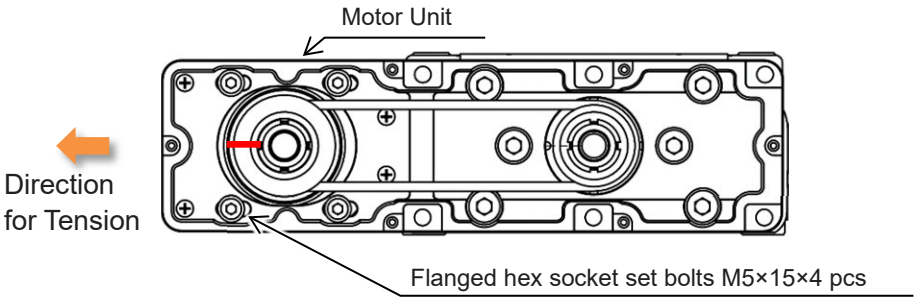
Slider Position from Mechanical End

Slider Position [mm]
2

5. Confirm that the 0-point mark put on the motor pulley is orienting outward and attach a timing belt for replacement between the pulleys.



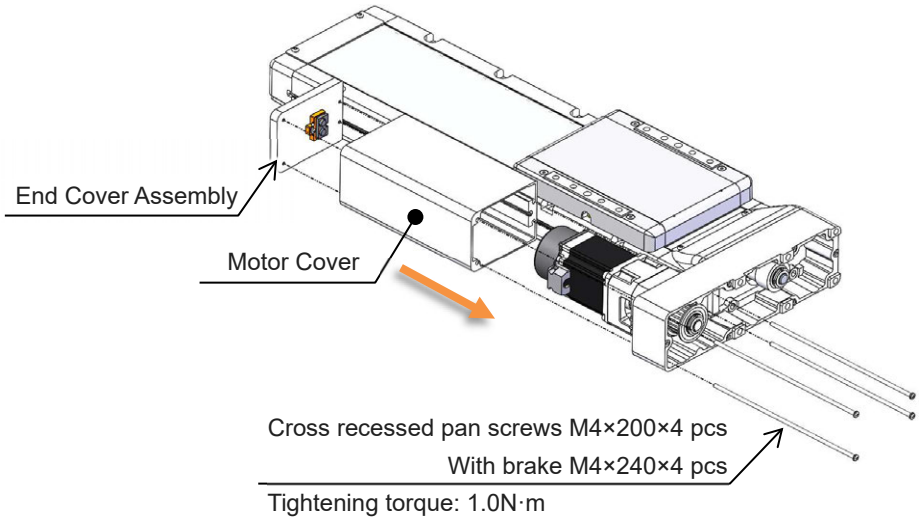
6. Hang such as a cable band on the motor unit and apply the specified load (tensile force) with using a tension gauge.
While the load is applied, tighten up the flanged hex socket set bolts.



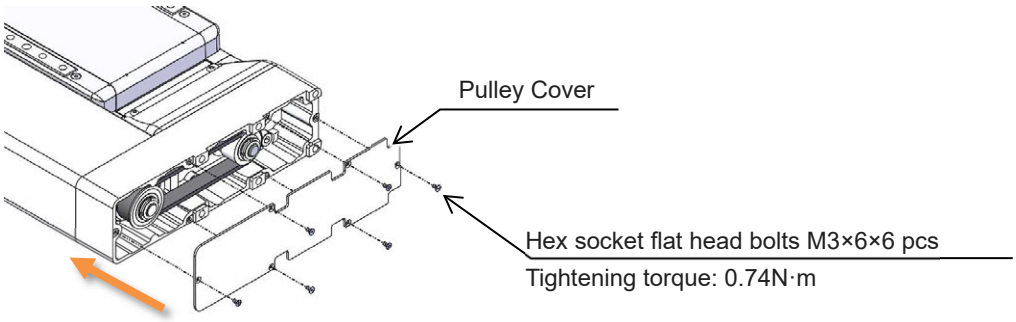
Motor Unit Tensile Force and Screw Tightening Torque

Tension Force [N]	Tightening Torque [N·m]
180 to 200	4.1

7. Attach the end cover assembly and the motor cover with the cross recessed pan screws (4 pcs).
* Pay special attention to cables not to pinch them



8. Attach the pulley cover with the hex socket flat head bolts.



4.6.3 Motor unit replacement

♦ Preparation

- Torque Wrench or Hex Wrench with 3mm of Parallel Faces Width (WSA10C/12C)
  with 4mm of Parallel Faces Width (WSA14C/16C)
  with 2mm/3mm of Parallel Faces Width (WSA10R/12R)
  with 2mm/4mm of Parallel Faces Width (WSA14R)
  with 4mm of Parallel Faces Width (WSA16R)
- Phillips screwdriver
- Replacement Motor Unit

Type	Model
WSA10C	RCS4-MUWSRA10C (-B)
WSA12C	RCS4-MUWSRA12C (-B)
WSA14C	RCS4-MUWSRA14C (-B)
WSA16C	RCS4-MUWSRA16C (-B)
WSA10R	RCS4B-MUSRTA4WSRA10R (-B) (-CJT/CJB/CJO) (-ML/MR) (-PU)
WSA12R	RCS4B-MUSRTA6WSRA12R (-B) (-CJT/CJB/CJO) (-ML/MR) (-PU)
WSA14R	RCS4B-MUSRTA7WSRA14R (-B) (-CJT/CJB/CJO) (-ML/MR) (-PU)
WSA16R	RCS4-MURA8WSRA16R (-B) (-CJT/CJB/CJO) (-ML/MR) (-PU)

When the option in ( ) is selected B: Brake-Equipped Type, CJT/CJB/CJO: Cable Exit Direction, ML/MR: Motor Reversed Direction, PU: Pulley Equipped Type



Caution

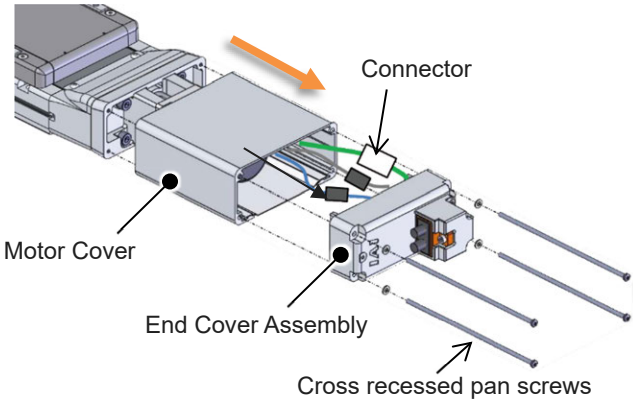
- Affix the slider in advance when replacing the motor unit in vertical installation. Without fixing, the slider will drop immediately after the motor is taken off.
- Pay attention not to get the cable pinched when attaching the motor cover and end cover.
- When the actuator is not equipped with a brake, make sure that the motor is magnetized when attaching it so the shaft and the origin point get aligned.

[Motor replacement method]

♦ Motor straight type

1. Detach the Cross recessed pan screws.

2. Unplug the connectors on the cables connected between the end cover assembly and the motor.



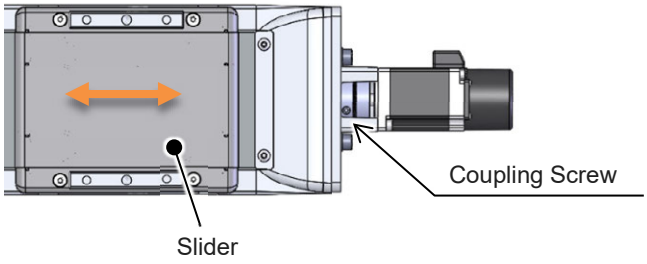
* The image shows WSA10C

Type	Screw
WSA10C	M3x120x4 pcs (M3x160x4 pcs)
WSA12C	M4x180x2 pcs (M4x220x2 pcs)
WSA14C	M4x150x4 pcs (M4x190x4 pcs)
WSA16C	M4x180x4 pcs (M4x220x4 pcs)

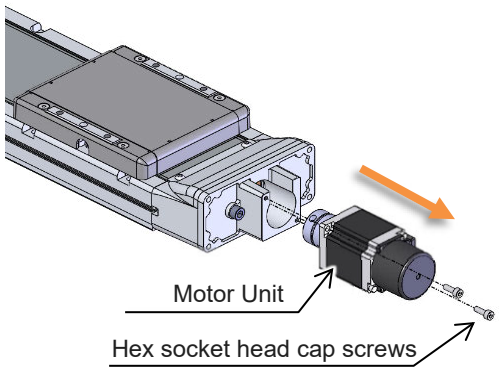
Described in brackets are the brake-equipped type

3. Detach the motor cover.

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



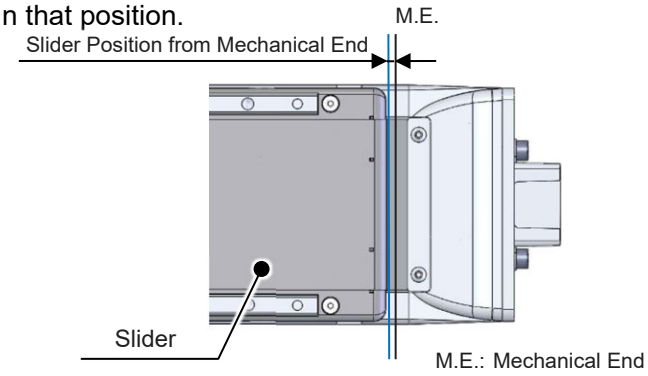
5. Remove the hex socket head cap screws to take the motor unit off.



*The image shows WSA10C

Type	Bolt
WSA10C	M4x12x2 pcs
WSA12C	M4x12x2 pcs
WSA14C	M5x15x4 pcs
WSA16C	M5x15x4 pcs

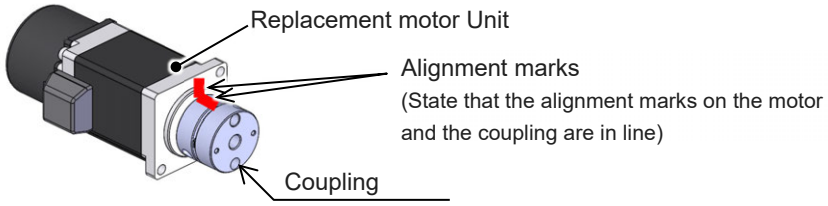
6. Move the slider away from the mechanical end (a position where slider hits) for the specified distance and retain that position.



Slider Position from Mechanical End

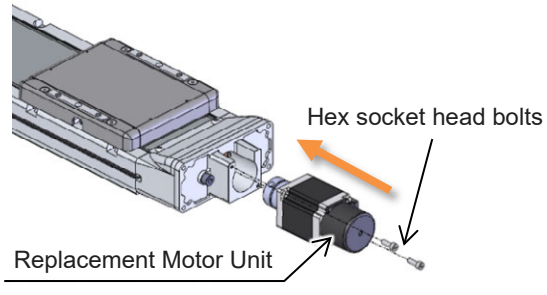
Type	Slider Position [mm]
WSA10C, WSA14C, WSA16C	2
WSA12C	2.5

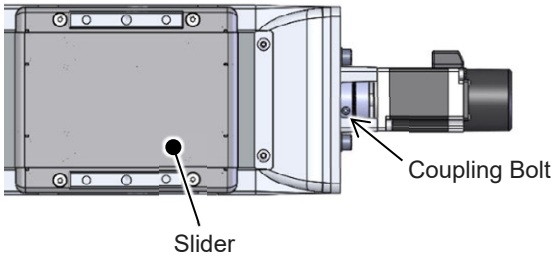
7. Confirm that the alignment marks on the motor unit for replacement and on the coupling are aligned with each other.
Align the alignment marks to each other when they are not aligned.



8. Tighten a motor unit for replacement loosely with the hex socket head cap screws and tighten up the coupling screw (1 pc).

* The image shows WSA10C





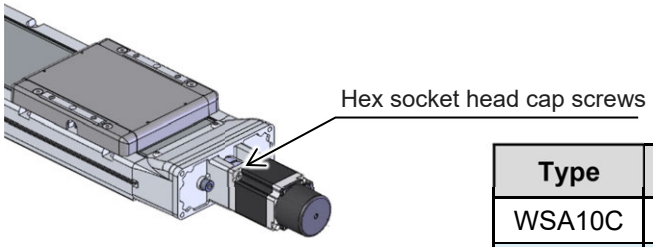
Hex socket head bolts

Type	Bolt
WSA10C	M4x12x2 pcs
WSA12C	M4x12x2 pcs
WSA14C	M5x15x4 pcs
WSA16C	M5x15x4 pcs

Coupling Bolt

Type	Tightening torque [N·m]
WSA10C	0.4
WSA12C	0.9
WSA14C WSA16C	1.5

9. Tighten up the hex socket head cap screws that were once loosely tightened in Step 8.

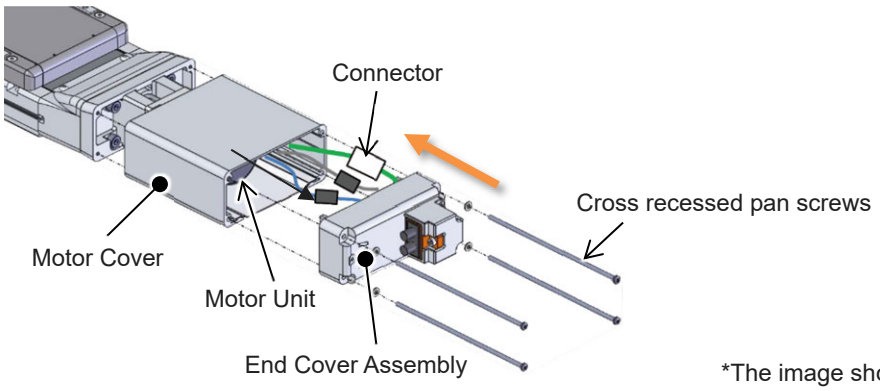


*The image shows WSA10C

Type	Bolt	Tightening torque [N·m]
WSA10C	M4×12×2 pcs	2.1
WSA12C	M4×12×2 pcs	2.1
WSA14C	M5×15×4 pcs	4.1
WSA16C	M5×15×4 pcs	4.1

10. Put the motor cover over the motor unit and join the connectors on the cables to connect between the end cover assembly and the motor. (Refer to figure below)

11. Attach the end cover assembly and the motor cover with the cross recessed pan screws.
* Pay special attention to cables not to pinch them.



*The image shows WSA10C

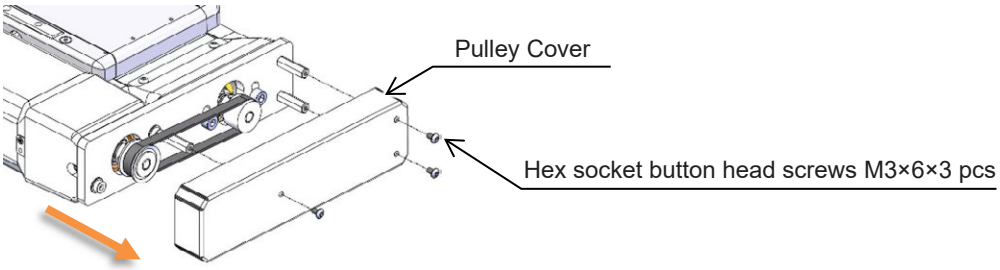
Type	Screw	Tightening torque [N·m]
WSA10C	M3×120×4 pcs (M3×160×4 pcs)	0.4
WSA12C	M4×180×2 pcs (M4×220×2 pcs)	1.0
WSA14C	M4×150×4 pcs (M4×190×4 pcs)	1.0
WSA16C	M4×180×4 pcs (M4×220×4 pcs)	1.0

Described in brackets are the brake-equipped type

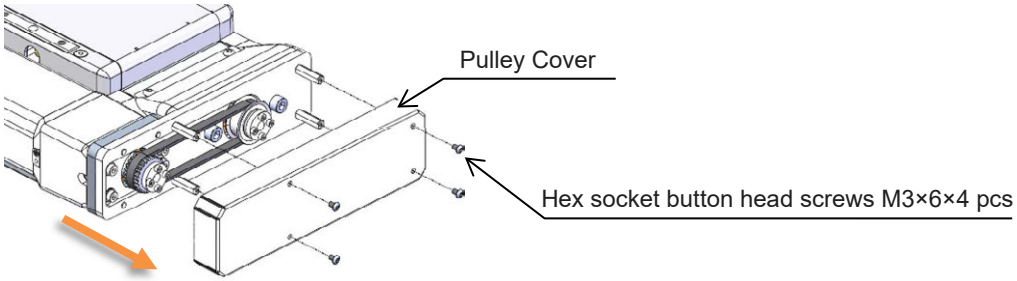
♦ Motor Reversing Type: WSA10R, WSA12R, WSA14R

1. Remove the hex socket button head screws to take off the pulley cover.

WSA10R

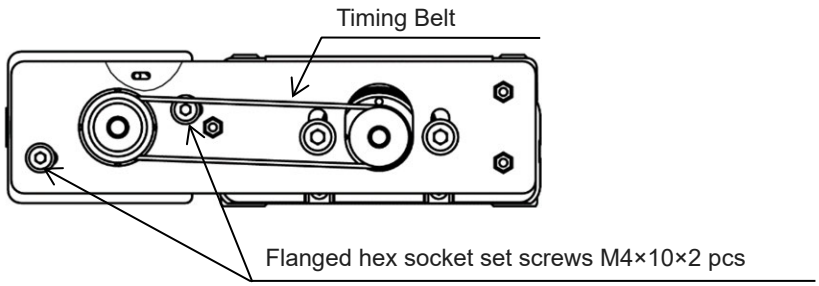


WSA12R/14R

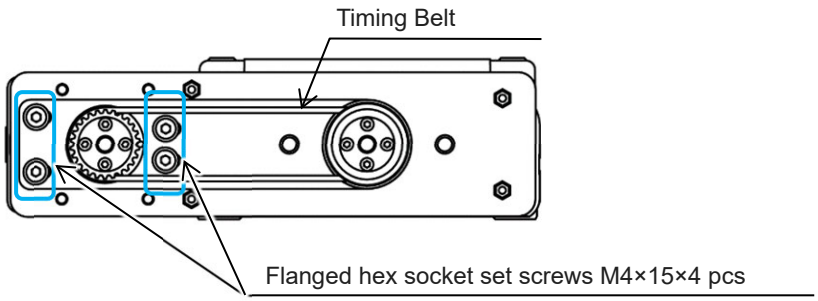


2. Remove the flanged hex socket set screws to take the timing belt off.

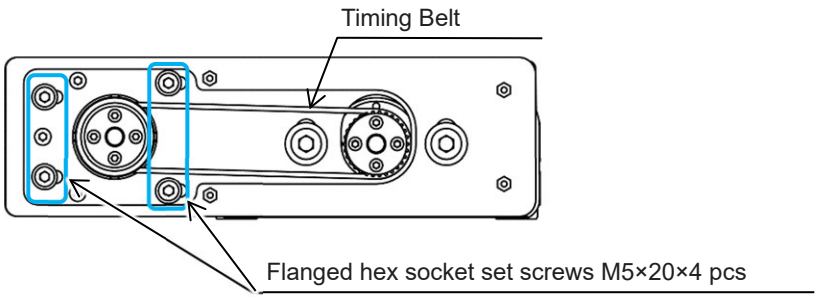
WSA10R



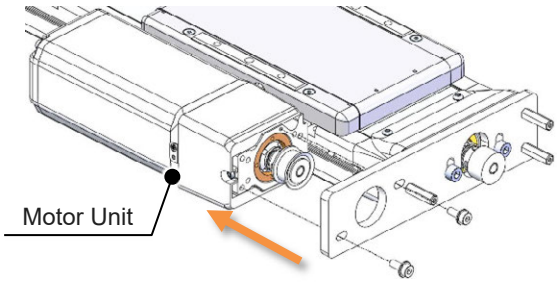
WSA12R



WSA14R

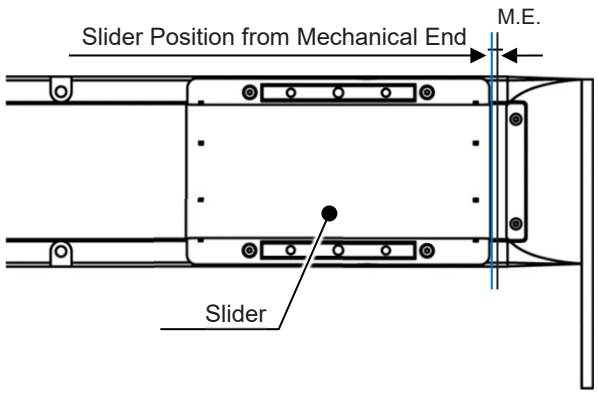


3. Detach the motor unit.



*The image shows WSA10R

4. Move the slider away from the mechanical end (a position where slider hits) for the specified distance and retain that position.



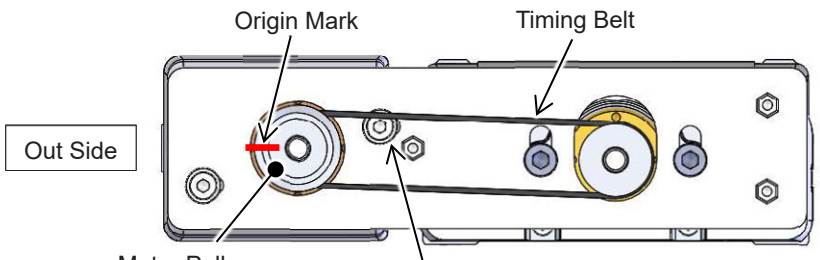
M.E.: Mechanical End

Slider Position from Mechanical End

Slider Position [mm]
2

5. Confirm that the 0-point mark put on the motor pulley in a motor unit for replacement is orienting outward and attach the motor unit for replacement with the flanged hex socket set screws loosely. (Refer to figure below)

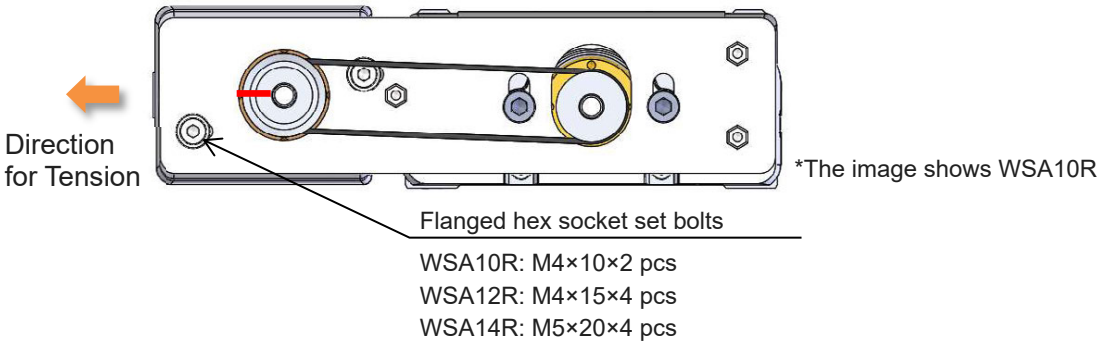
6. Attach the timing belt.



*The image shows WSA10R

WSA10R: M4×10×2 pcs
WSA12R: M4×15×4 pcs
WSA14R: M5×20×4 pcs

7. Hang such as a cable band on the motor unit and apply the specified load (tensile force) with using a tension gauge.
While the load is applied, tighten up the flanged hex socket set bolts.

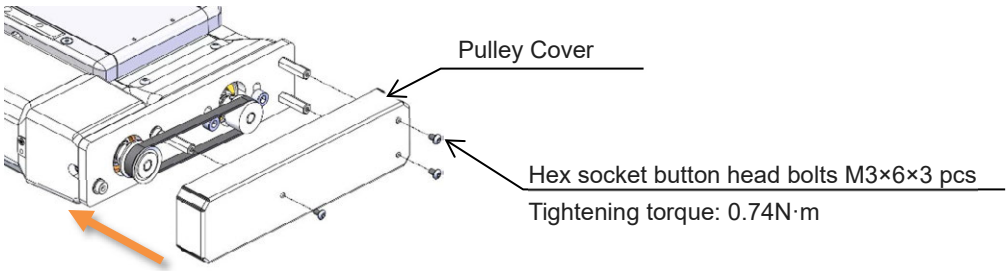


Motor Unit Tensile Force and Screw Tightening Torque

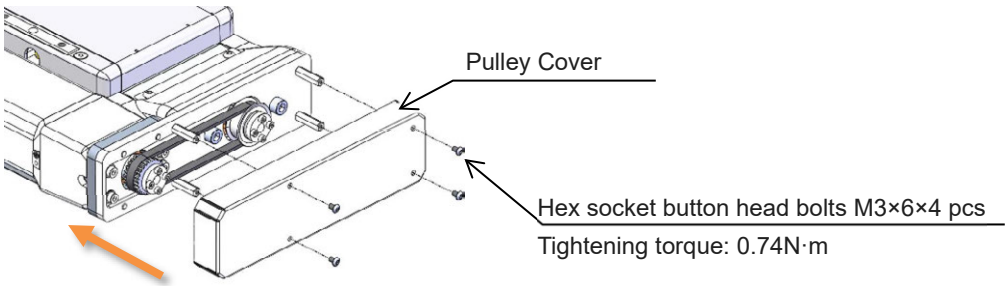
Type	Tension Force [N]	Tightening torque [N·m]
WSA10R	20 to 25	2.1
WSA12R	40 to 45	2.1
WSA14R	70 to 80	4.1

8. Attach the pulley cover with the hex socket button head bolts.

WSA10R

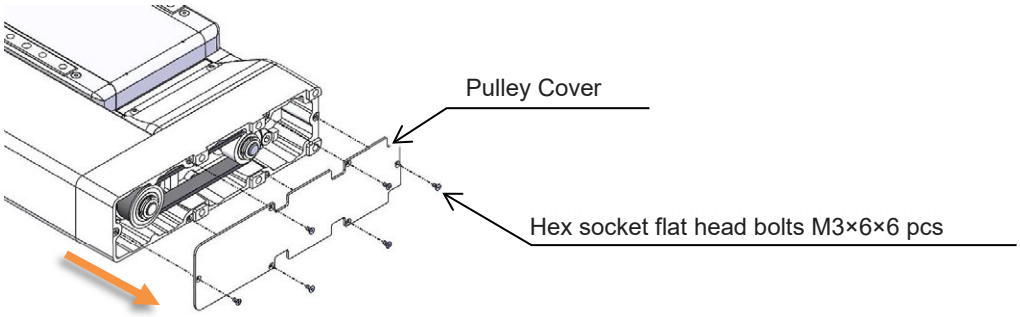


WSA12R/14R

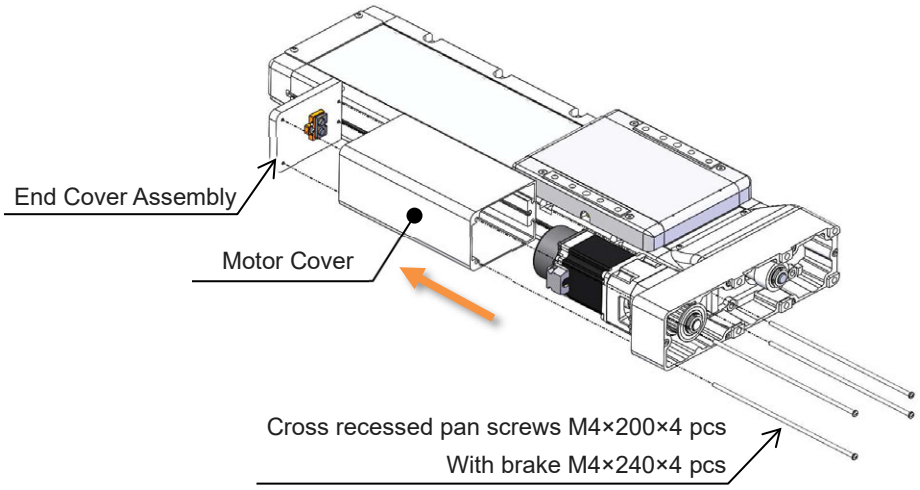


♦ Motor Reversing Type: WSA16R

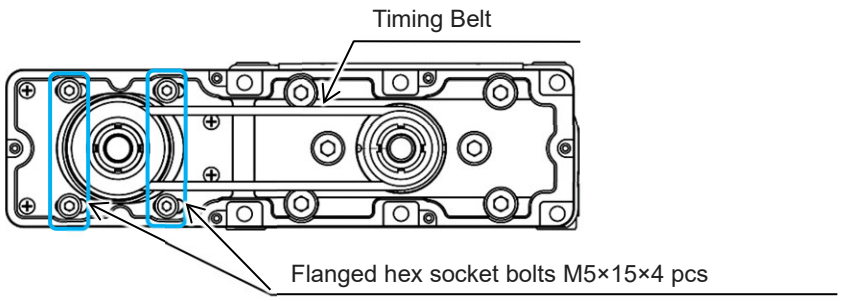
1. Remove the hex socket flat head bolts (6 pcs) to take the pulley cover off.



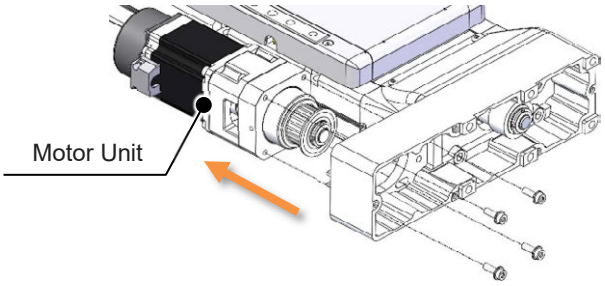
2. Remove the cross recessed pan screws (4 pcs) to take off the end cover assembly and the motor cover.



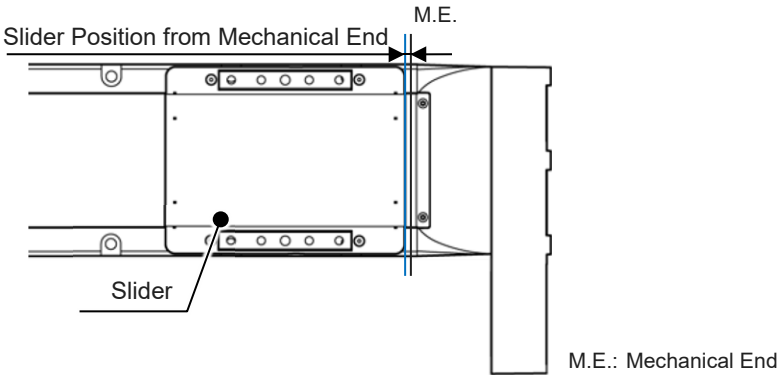
3. Remove the flanged hex socket bolts (4 pcs) to take the timing belt off.



4. Take off the motor unit.



5. Move the slider away from the mechanical end (a position where slider hits) for the specified distance and retain that position.

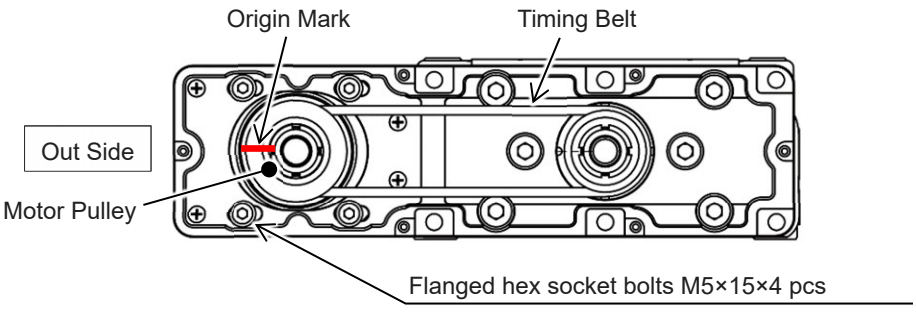


Slider Position from Mechanical End

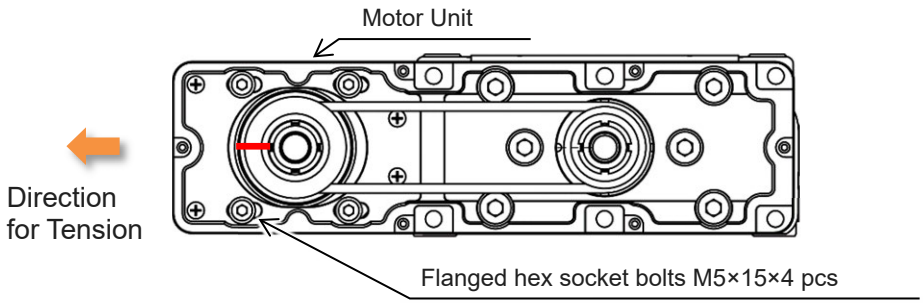
Slider Position (mm)
2

6. Confirm that the 0-point mark put on the motor pulley in a motor unit for replacement is orienting outward and attach the motor unit for replacement with the flanged hex socket bolts (4 pcs) loosely. (Refer to figure below)

7. Attach the timing belt.



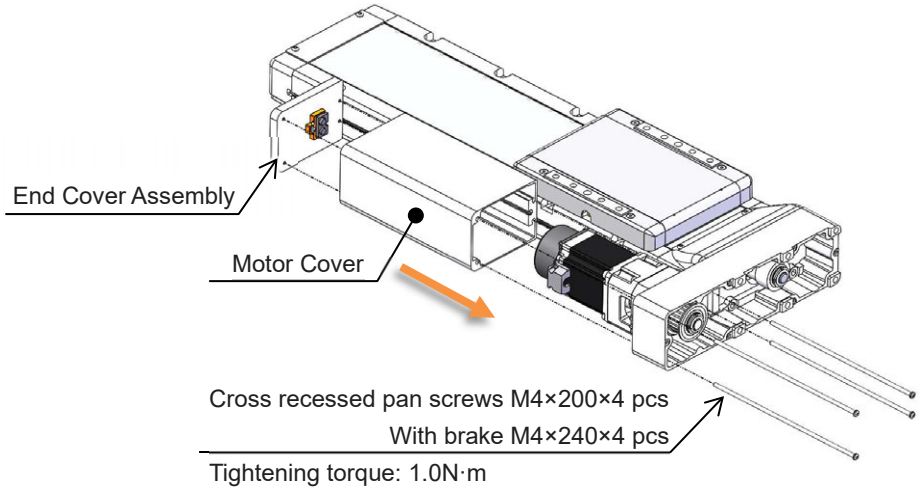
8. Hang such as a cable band on the motor unit and apply the specified load (tensile force) with using a tension gauge.
While the load is applied, tighten up the flanged hex socket bolts.



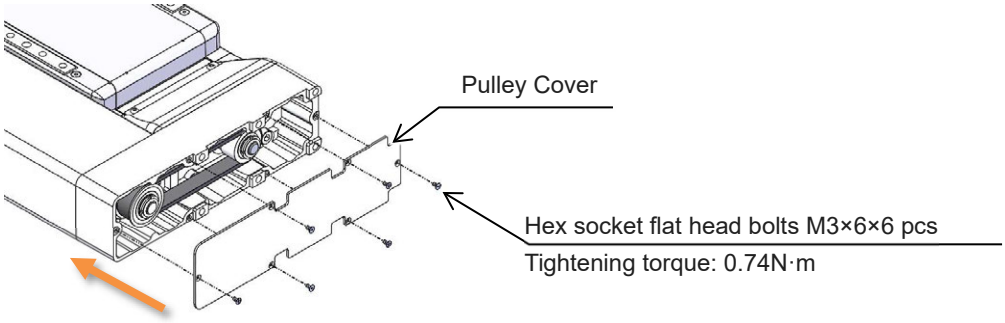
Motor Unit Tensile Force and Screw Tightening Torque

Tension Force [N]	Tightening torque [N·m]
180 to 200	4.1

9. Attach the end cover assembly and the motor cover with the cross recessed pan screws (4 pcs).
* Pay special attention to cables not to pinch them.



10. Attach the pulley cover with the hex socket flat head bolts.



ROBO Cylinder

Chapter 5

External Dimensions

5.1 External Dimensions ····· 5-1

5.1.1 RCS4B-WSA10C ····· 5-1

5.1.2 RCS4B-WSA12C ····· 5-3

5.1.3 RCS4B-WSA14C ····· 5-5

5.1.4 RCS4B-WSA16C ····· 5-7

5.1.5 RCS4B-WSA10R ····· 5-9

5.1.6 RCS4B-WSA12R ····· 5-11

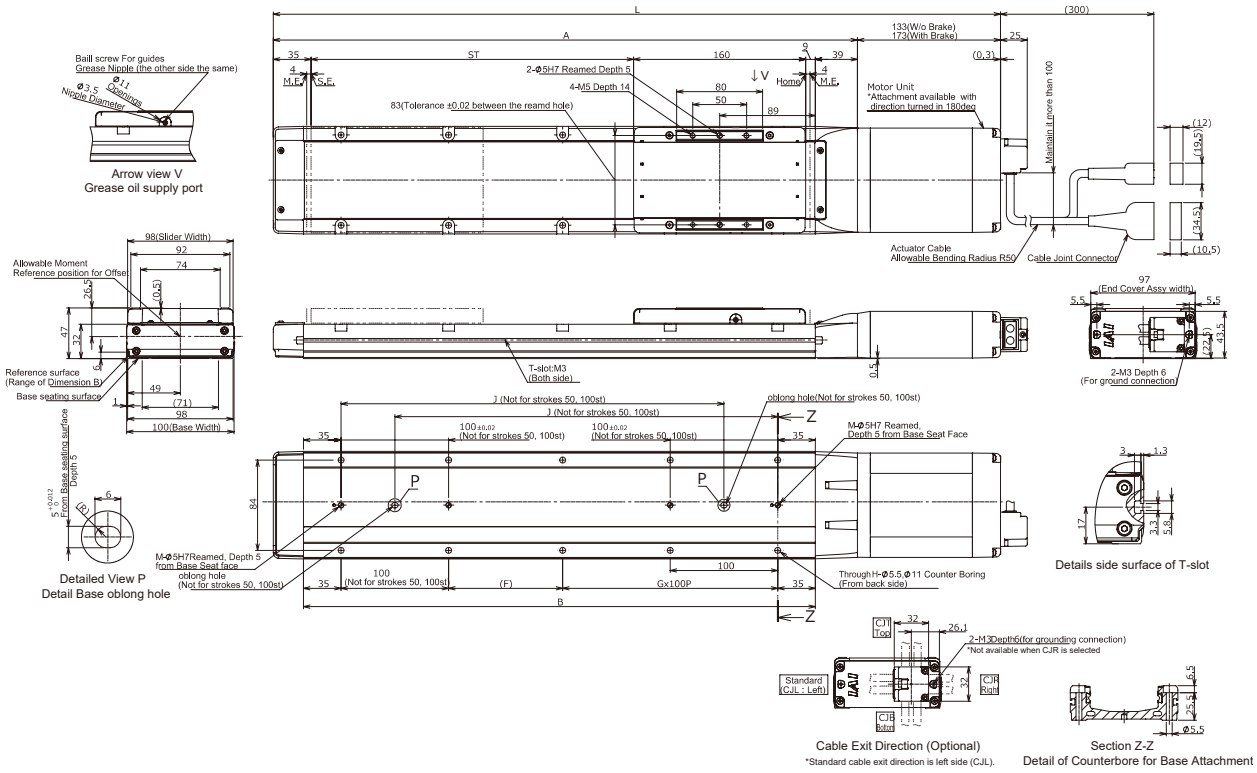
5.1.7 RCS4B-WSA14R ····· 5-13

5.1.8 RCS4B-WSA16R ····· 5-15

5.1 External Dimensions

5.1.1 RCS4B-WSA10C

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



■Dimensions by Stroke

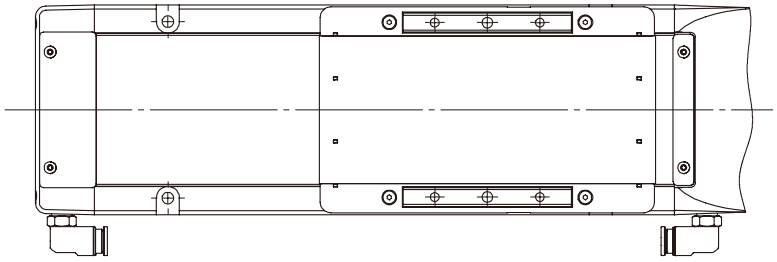
Unit: [mm]

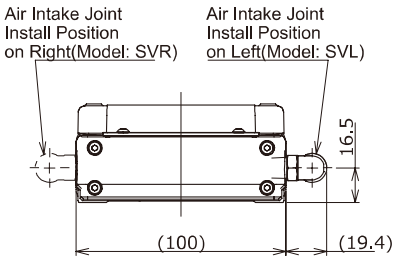
Stroke		50	100	150	200	250	300	350	400	450	500
L	W/o Brake	426	476	526	576	626	676	726	776	826	876
	With Brake	466	516	566	616	666	716	766	816	866	916
A		293	343	393	443	493	543	593	643	693	743
B		226	276	326	376	426	476	526	576	626	676
F		156	206	56	106	56	106	56	106	56	106
G		0	0	1	1	2	2	3	3	4	4
H		4	4	8	8	10	10	12	12	14	14
J		-	-	206	256	306	356	406	456	506	556
M		1	1	2	2	2	2	2	2	2	2

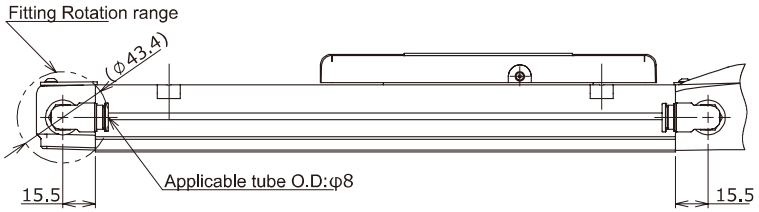
■Mass by Stroke

Stroke		50	100	150	200	250	300	350	400	450	500
Mass [kg]	W/o Brake	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5.0
	With Brake	3.1	3.3	3.6	3.8	4.1	4.3	4.6	4.8	5.1	5.3

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

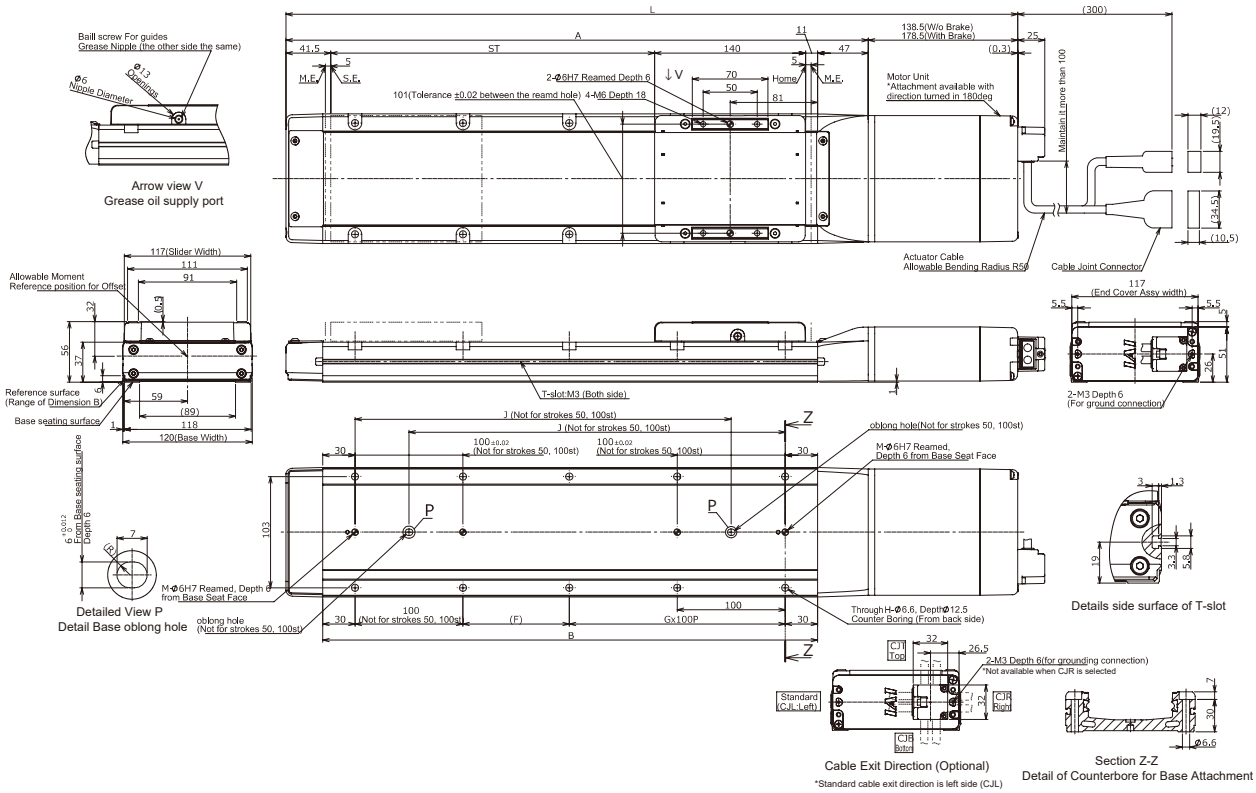






5.1.2 RCS4B-WSA12C

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



■Dimensions by Stroke

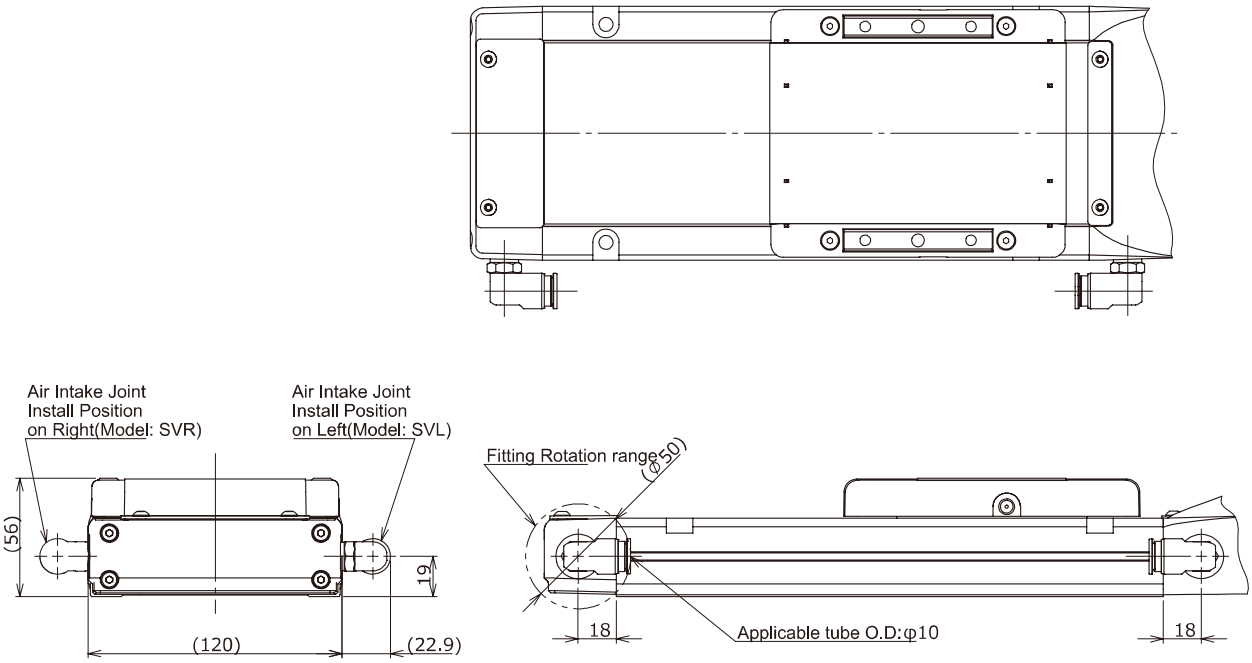
Unit: [mm]

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	W/o Brake	428	478	58	578	628	678	728	778	828	878	928	978	1028	1078	1128	1178
	With Brake	468	518	568	618	668	718	768	818	868	918	968	1018	106	1118	1168	1218
A		289.5	339.5	389.5	439.5	489.5	539.5	589.5	639.5	689.5	739.5	789.5	839.5	889.5	939.5	989.5	1039.5
B		208.5	258.5	308.5	358.5	408.5	58.5	508.5	558.5	608.5	658.5	708.5	758.5	808.5	858.5	908.5	958.5
F		148.5	198.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5
G		0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
H		4	4	8	8	10	10	12	12	14	14	16	16	18	18	20	20
J		-	-	198.5	248.5	298.5	348.5	398.5	448.5	498.5	548.5	598.5	648.5	698.5	748.5	798.5	848.5
M		1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2

■Mass by Stroke

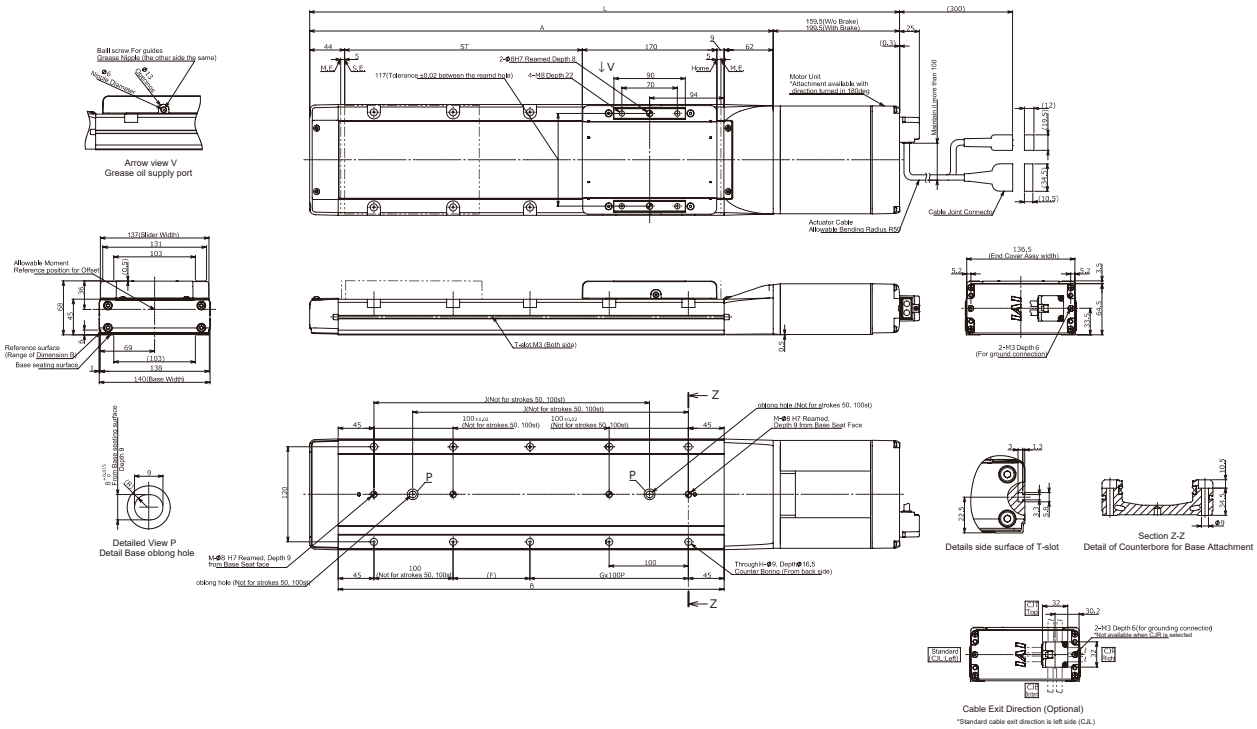
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass [kg]	W/o Brake	3.8	4.2	4.5	4.8	525	5.5	5.8	6.2	6.5	6.9	7.2	7.5	7.9	8.2	7.5	8.9
	With Brake	4.2	4.6	4.9	5.2	5.6	5.9	6.2	6.6	6.9	7.3	7.6	7.9	8.3	8.6	8.9	9.3

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



5.1.3 RCS4B-WSA14C

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



■Dimensions by Stroke

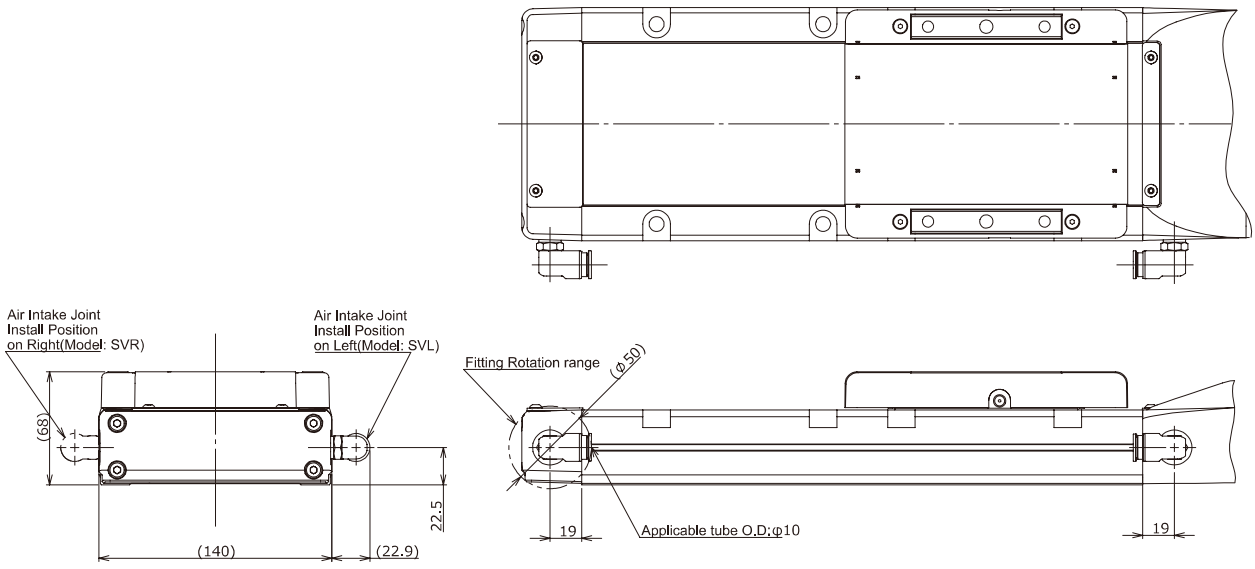
Unit: [mm]

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	W/o Brake	494.5	544.5	594.5	644.5	694.5	744.5	794.5	844.5	894.5	944.5	994.5	1044.5	1094.5	1144.5	1194.5	1244.5
	With Brake	534.5	584.5	634.5	684.5	734.5	784.5	834.5	884.5	934.5	984.5	1034.5	1084.5	1134.5	1184.5	1234.5	1284.5
A		335	385	435	485	535	585	635	685	735	785	835	885	935	985	1035	1085
B		237	287	337	387	437	487	537	587	637	687	737	787	837	887	937	987
F		147	197	47	97	47	97	47	97	47	97	47	97	47	97	47	97
G		0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
H		4	4	8	8	10	10	12	12	14	14	16	16	18	18	20	20
J		-	-	198	248	298	348	398	448	498	548	598	648	698	748	798	848
M		1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
A		335	385	435	485	535	585	635	685	735	785	835	885	935	985	1035	1085

■Mass by Stroke

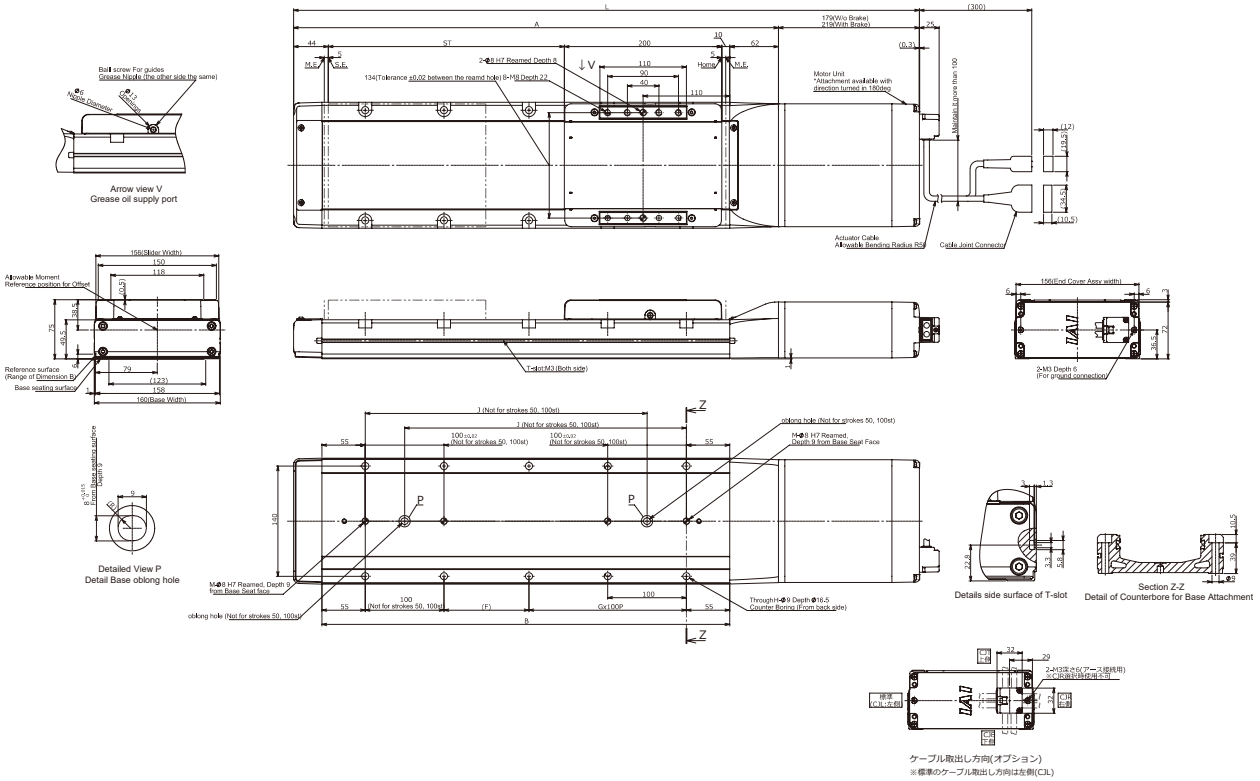
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass [kg]	W/o Brake	6.5	6.9	7.4	7.9	8.4	8.9	9.4	9.9	10.3	10.8	11.3	11.8	12.3	12.8	13.3	13.8
	With Brake	7.1	7.5	8.0	8.5	9.0	9.5	10.0	10.5	10.9	11.4	11.9	12.4	12.9	13.4	13.9	14.4

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



5.1.4 RCS4B-WSA16C

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



■Dimensions by Stroke

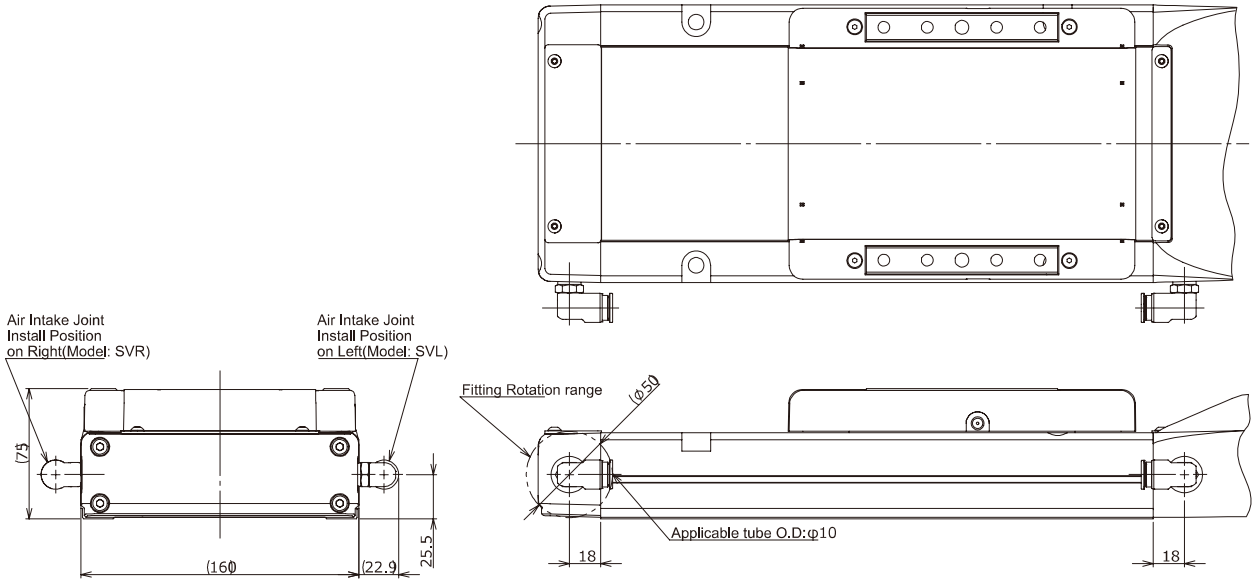
Unit: [mm]

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

■Mass by Stroke

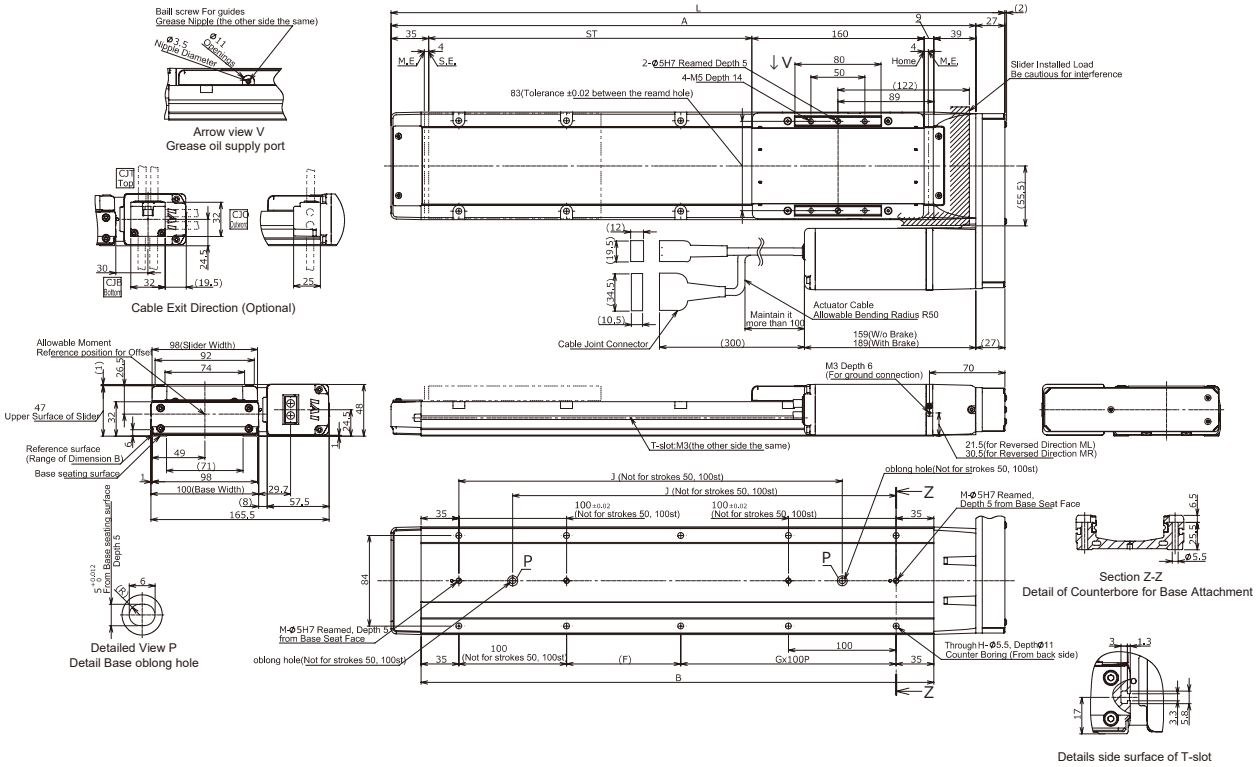
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
Mass [kg]	W/o Brake	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7	10.0	10.3	10.6	10.8
	With Brake	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.1	8.4	8.7	9.0	9.3	9.6	9.9	10.2	10.5	10.8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

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



5.1.5 RCS4B-WSA10R

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



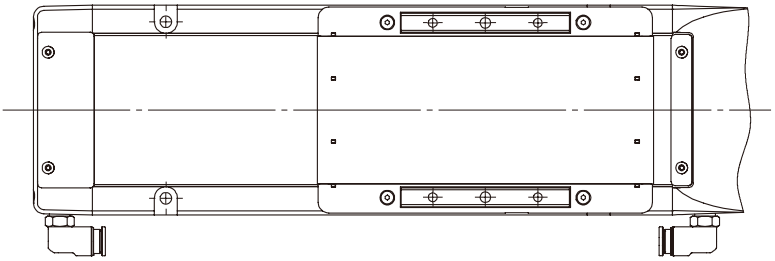
■Dimensions by Stroke Unit: [mm]

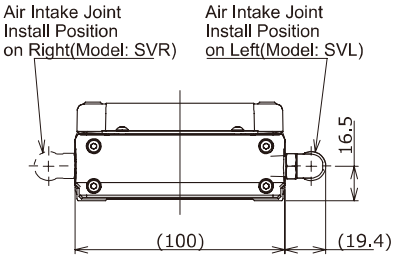
Stroke	50	100	150	200	250	300	350	400	450	500
L	320	370	420	470	520	570	620	670	720	770
A	293	343	393	443	493	543	593	643	693	743
B	226	276	326	376	426	476	526	576	626	676
F	156	206	56	106	56	106	56	106	56	106
G	0	0	1	1	2	2	3	3	4	4
H	4	4	8	8	10	10	12	12	14	14
J	-	-	206	256	306	356	406	456	506	556
M	1	1	2	2	2	2	2	2	2	2

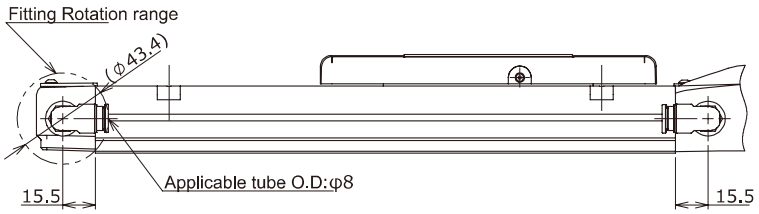
■Mass by Stroke

Stroke		50	100	150	200	250	300	350	400	450	500
Mass [kg]	W/o Brake	3.2	3.5	3.7	4.0	4.2	4.5	4.7	4.9	5.2	5.4
	With Brake	3.5	3.8	4.0	4.3	4.5	4.8	5.0	5.2	5.5	5.7

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

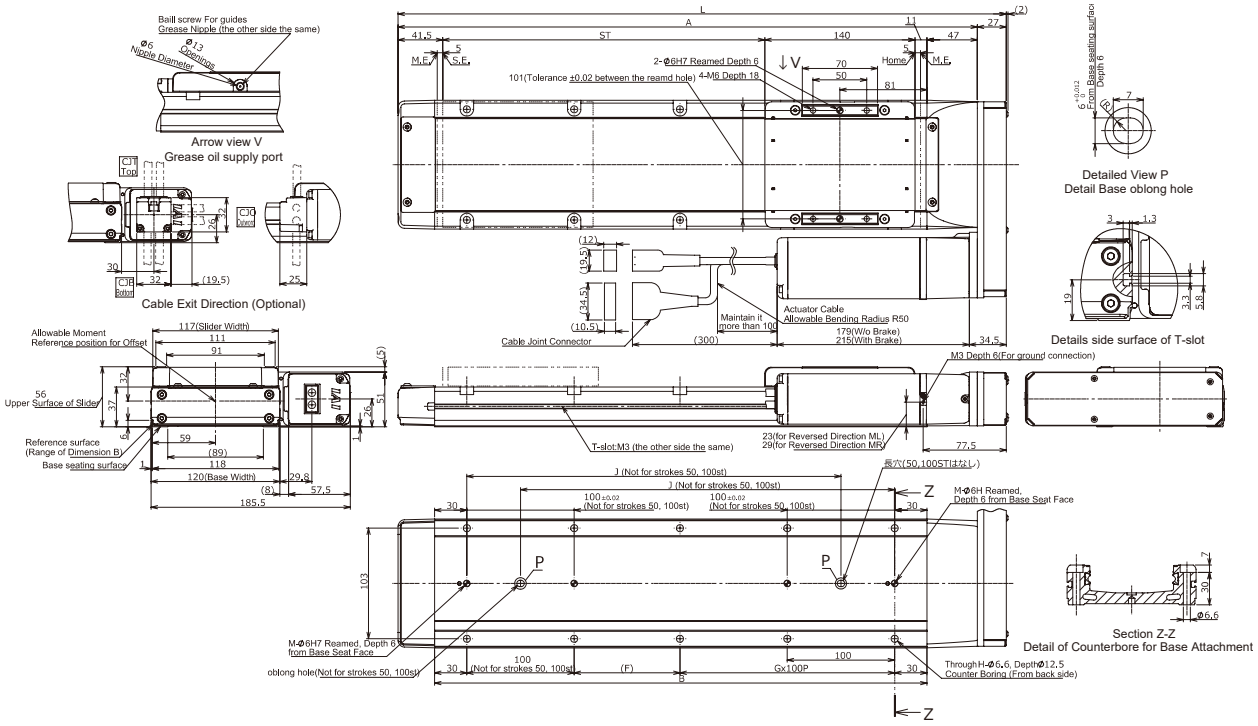






5.1.6 RCS4B-WSA12R

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



■Dimensions by Stroke

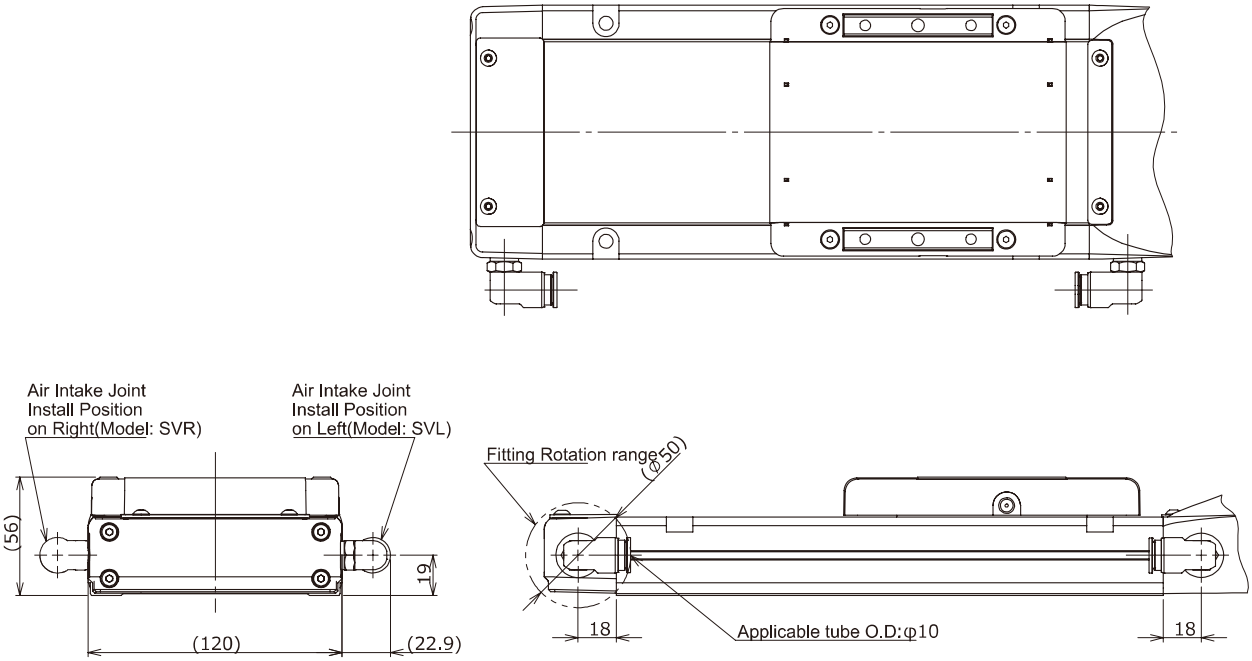
Unit: [mm]

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	316.5	366.5	416.5	466.5	516.5	566.5	616.5	666.5	716.5	766.5	816.5	866.5	916.5	966.5	1016.5	1066.5
A	289.5	339.5	389.5	439.5	489.5	539.5	589.5	639.5	689.5	739.5	789.5	839.5	889.5	939.5	989.5	1039.5
B	208.5	258.5	308.5	358.5	408.5	458.5	508.5	558.5	608.5	658.5	708.5	758.5	808.5	858.5	908.5	958.5
F	148.5	198.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5	48.5	98.5
G	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
H	4	4	8	8	10	10	12	12	14	14	16	16	18	18	20	20
J	-	-	198.5	248.5	298.5	348.5	398.5	448.5	498.5	548.5	598.5	648.5	698.5	748.5	798.5	848.5
M	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2

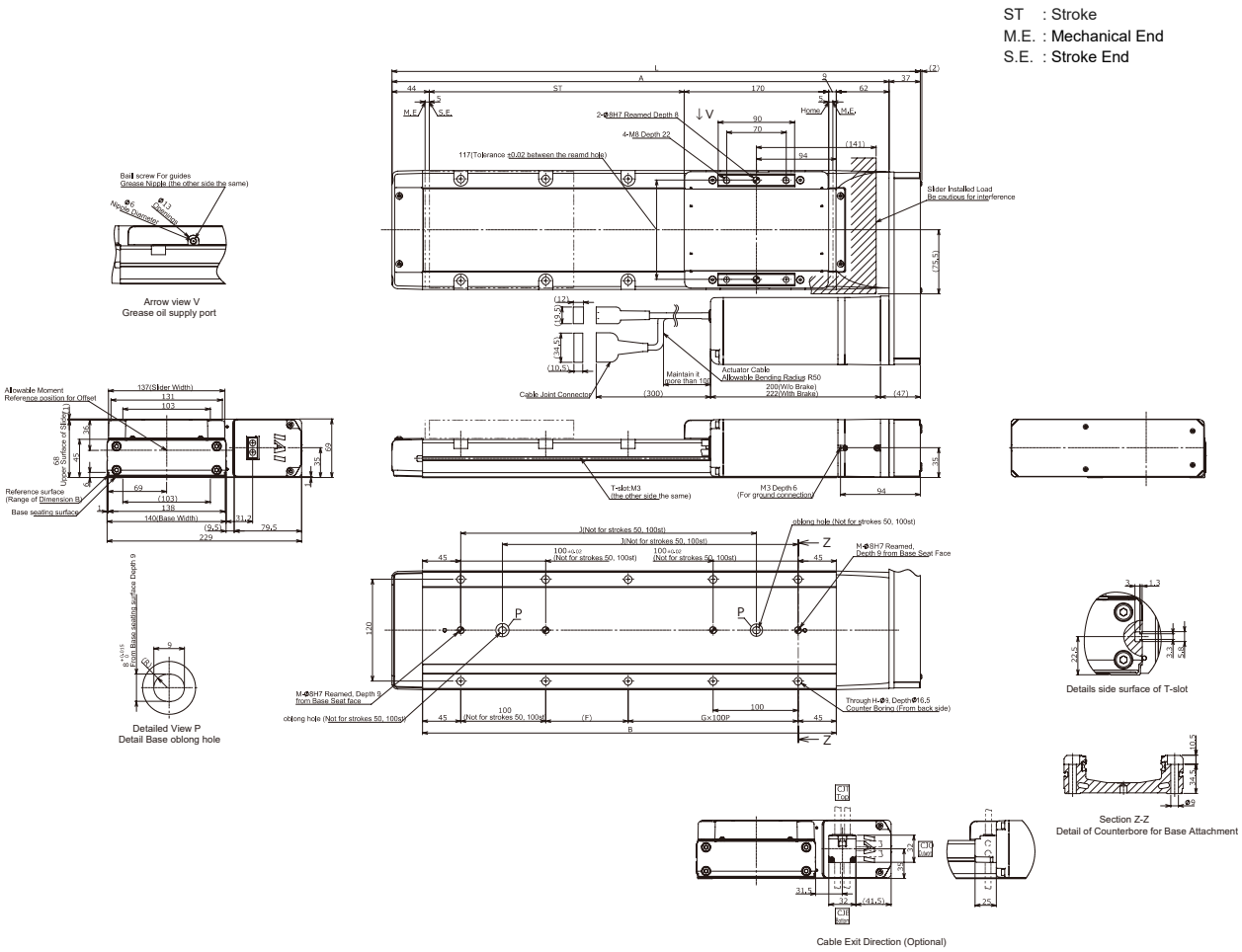
■Mass by Stroke

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass [kg]	W/o Brake	4.2	4.5	4.9	5.2	5.6	5.9	6.5-2	6.6	6.9	7.2	7.6	7.9	8.3	8.6	8.9	9.3
	With Brake	4.5	4.8	5.2	5.5	5.9	6.2	6.5	6.9	7.2	7.5	7.9	8.2	8.6	8.9	9.2	9.6

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



5.1.7 RCS4B-WSA14R



■Dimensions by Stroke

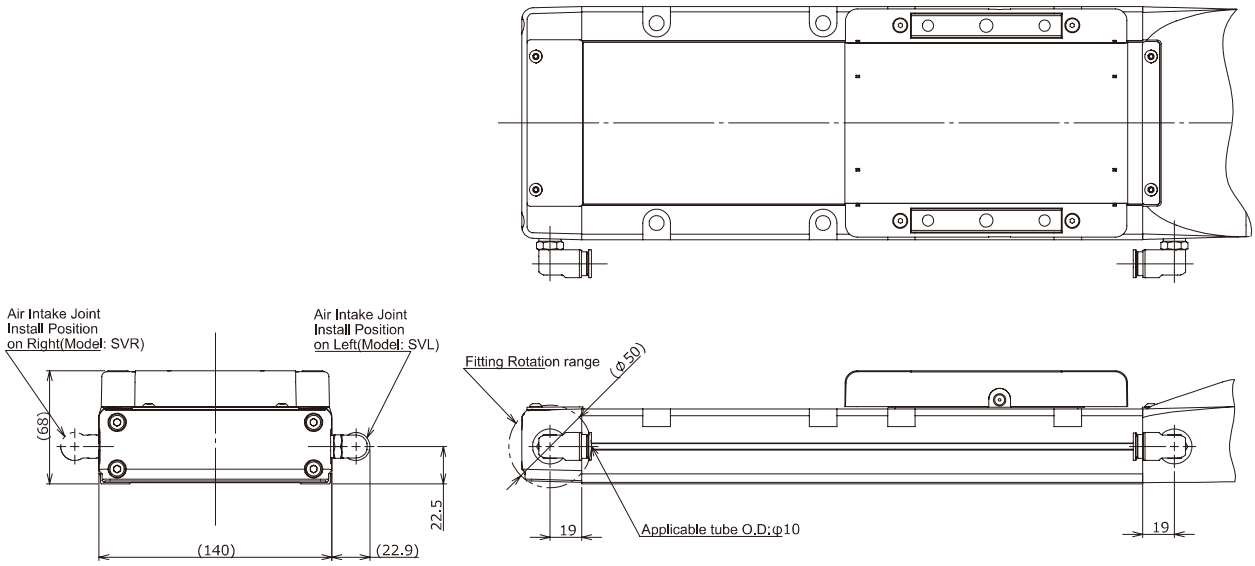
Unit: [mm]

ストローク	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	372	422	472	522	572	622	672	722	772	822	872	922	972	1022	1072	1122
A	335	385	435	485	535	585	635	685	735	785	835	885	935	985	1035	1085
B	237	287	337	387	437	487	537	587	637	687	737	787	837	887	937	987
F	147	197	47	97	47	97	47	97	47	97	47	97	47	97	47	97
G	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
H	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
J	-	-	198	248	298	348	398	448	498	548	598	648	698	748	798	848
M	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2

■Mass by Stroke

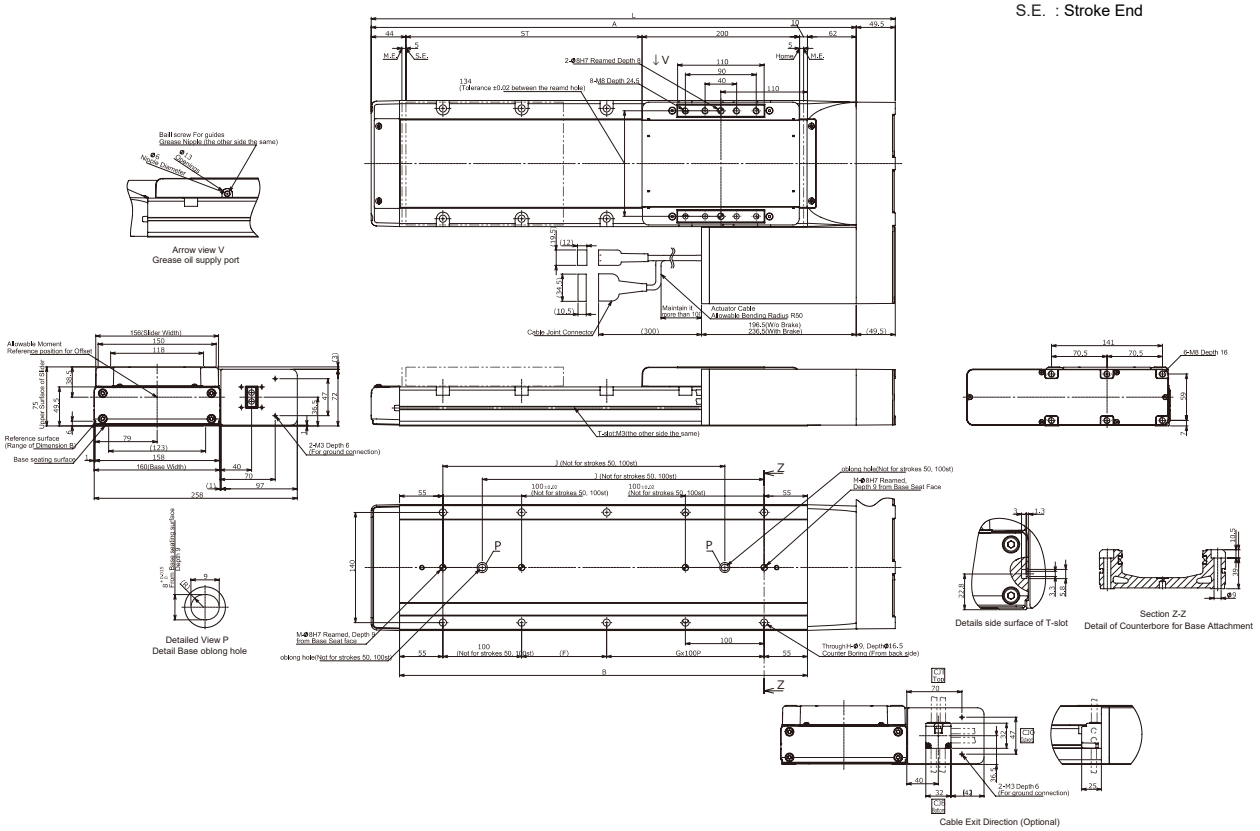
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass [kg]	W/o Brake	7.4	7.9	8.4	8.9	9.4	9.9	10.3	10.8	11.3	11.8	12.3	12.8	13.3	13.8	14.2	14.7
	With Brake	8.0	8.5	9.0	9.5	10.0	10.5	10.9	11.4	11.9	112.4	12.9	13.4	13.9	14.4	14.8	15.3

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



5.1.8 RCS4B-WSA16R

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



■Dimensions by Stroke

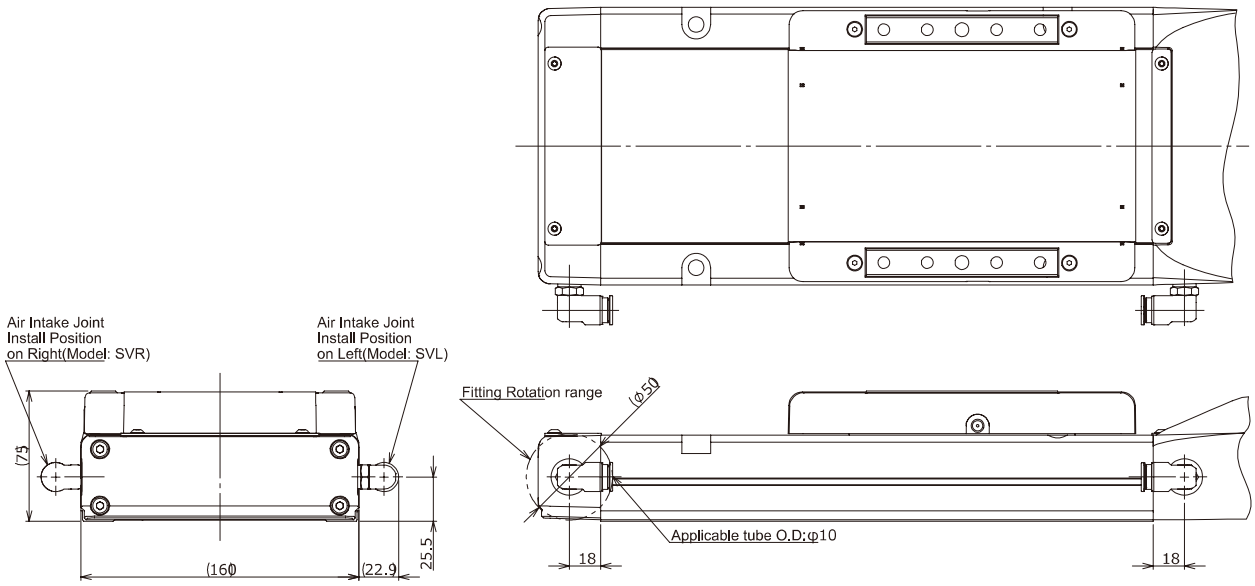
Unit: [mm]

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
L	415.5	465.5	515.5	565.5	615.5	665.5	715.5	765.5	815.5	865.5	915.5	965.5	1015.5	1065.5	1115.5	1165.5	1215.5	1265.5	1315.5	1365.5	1415.5	1465.5
A	366	416	466	516	566	616	666	716	766	816	866	916	966	1016	1066	1116	1166	1216	1266	1316	1366	1416
B	268	318	368	418	468	518	568	618	668	718	768	818	868	918	968	1018	1068	1118	1168	1218	1268	1318
F	158	208	58	108	58	108	58	108	58	108	58	108	58	108	58	108	58	108	58	108	58	108
G	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
H	4	4	8	8	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26
J	-	-	208	258	308	358	408	458	508	558	608	658	708	758	808	858	908	958	1008	1058	1108	1158
M	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

■Mass by Stroke

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
Mass [kg]	W/o Brake	10.6	11.2	11.8	12.4	13.0	13.6	14.2	14.9	15.5	16.1	16.7	17.3	17.9	18.5	19.1	19.8	20.4	21.0	21.6	22.2	22.8	23.4
	With Brake	11.2	11.8	12.4	13.0	13.6	14.2	14.8	15.5	16.1	16.7	17.3	17.9	18.5	19.1	19.7	20.4	21.0	21.6	22.2	22.8	23.4	24.0

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



ROBO Cylinder

Chapter 6

Life

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

6.1 Concept of life for slider type

The mechanical life of the slider type is represented by that of the linear guide receiving the greatest moment load.
The operation life of the linear guide is to be determined by the total driving distance reachable without flaking (peeling on rail surface) in 90% of a group of products operated under the same conditions.

Operation life can be calculated with the method shown below.

6.1.1 How to calculate operation life

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

$$L = \left(\frac{C_M}{M} \right)^3 \times 5{,}000\text{km or } 10{,}000\text{km}$$

L	: Operation life [km]
C_M	: Dynamic allowable moment [N·m]
M	: Moment acting [N·m]
5,000km or 10,000km: Standard rated life of ROBO Cylinder	

(Note) For Lead 2.5mm of WSA10C and WSA10R, Lead 3mm of WSA12C and WSA12R, Lead 4mm of WSA14C and WSA14R and Lead 5mm of WSA16C and WSA16R, it is only 5,000km.

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

$$L = \left(\frac{C_M}{M} \bullet \frac{f_{WS}}{f_W} \bullet \frac{1}{f_\alpha} \right)^3 \times 5{,}000\text{km or } 10{,}000\text{km}$$

L	: Operation life [km]	f_{WS}	: Standard load coefficient
C_M	: Dynamic allowable moment [N·m]	f_W	: Load coefficient
M	: Moment acting [N·m]	f_α	: Mounting coefficient
5,000km or 10,000km: Standard rated life of ROBO Cylinder			

For "Standard load coefficient f_{WS}", "Load coefficient f_W" and "Mounting coefficient f_α", refer to the contents below for configuration and selection.

[Standard load coefficient: f_{WS}]

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

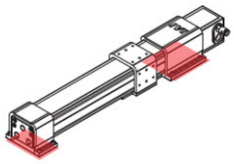
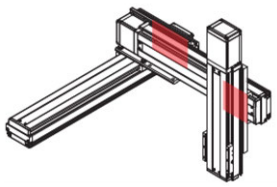
[Load coefficient: f_W]

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

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

[Mounting coefficient f_α]

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

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

- The actuator used in the explanatory figures above is not the RCS4 ROBO Cylinder. Replace with ROBO Cylinder and select the mounting coefficient.
- Even when seated over the total length of the product, select 1.2 or 1.5 for the mounting coefficient depending on the position of screw fixing and not "fixing over the entire surface".
- "Fixing over the entire surface" is considered to be the case only when fixing with all of the screw holes (counterbored holes) 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 5,000km, the standard rated life.

With no consideration of vibration and mounting conditions, the operation life is 40,000km according to the calculation with the formula on the previous page, assuming that 0.5 C_M (half of dynamic allowable moment) of moment is applied.
We see that it can be 8 times longer than the standard rated life, which is 5,000km.

ROBO Cylinder

Chapter 7

Warranty

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7.1 Warranty period

Whichever of the following periods is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to the specified location
- 2,500 hours of operation

7.2 Scope of the warranty

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

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

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

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

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

7.3 Honoring the warranty

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

7.4 Limited liability

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

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

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

(3) Contact IAI in advance if our product is to be used in any condition or environment that differs from that specified in the catalog or instruction manual.

7.6 Other items excluded from warranty

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

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

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