

ROBO Cylinder®

Products designed for use in secondary
battery production processes

Wide Slider Type

RCP6B-WSA10C/WSA10R/
WSA12C/WSA12R/
WSA14C/WSA14R/
WSA16C/WSA16R

Instruction Manual First edition ME3847-1A



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IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

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

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

Please download the user's manual from our website.

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

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

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

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

[Important]

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

RCP6B Wide Slider Type Instruction Manual Configuration

No.	Name	Control number
1	Instruction Manual for RCP6B Wide Slider Type (this document)	ME3847
2	Instruction Manual for PCON-CB/CFB Controller	ME0342
3	Instruction Manual for PCON-CYB/PLB/POB Controller	ME0353
4	Instruction Manual for MCON-C/CG Controller	ME0341
5	Instruction Manual for MSEL-PC/PG Controller	ME0336
6	Instruction Manual for RCON System	ME0384
7	Instruction Manual for RSEL System	ME0392
8	PC Teaching Software IA-OS First Step Guide	ME0391
9	Touch Panel Teaching Pendant TB-02/02D Instruction Manual Applicable for Position Controller	ME0355
10	Touch Panel Teaching Pendant TB-02/02D Instruction Manual Applicable for Program Controller	ME0356
11	Touch Panel Teaching Pendant TB-03 Instruction Manual Applicable for Position Controller	ME0376
12	Touch Panel Teaching Pendant TB-03 Instruction Manual Applicable for Program Controller	ME0377

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Safety Guide

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

Safety Precautions for Our Products

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

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

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

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring • Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. • Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. • Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. • When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. • Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. • Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. (3) Grounding • The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. • For the ground terminal (PE) on the AC power cable of the controller and the grounding plate in the control panel, make sure for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment standards and criteria). For detail, follow the description in [an instruction manual of each controller or controller built-in actuator]. • Conduct functional grounding on the FG terminal for a controller supplying 24V DC or a controller built-in type actuator. In order to minimize influence to mechanical operation given by electromagnetic interference (noise) to an electrical device or insulation failure, conduct grounding on a terminal or a conductor that is electrically stable. The reference impedance should be Type D (Former Class 3, ground resistance 100Ω or less).

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

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

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

Alert Indication

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

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

Caution in Handling

1. Do not attempt to establish the settings for the speed and acceleration/ deceleration above the allowable range.
An operation with speed and acceleration/deceleration beyond the allowable range may cause an abnormal noise, vibration, malfunction or shortened life.
2. Set the allowable moment within the allowable range.
An operation with the load beyond the allowable moment may cause an abnormal noise, vibration, malfunction or shortened life. If it is extreme, flaking may occur on the guide.
3. Set the overhang load length in the allowable range.
The load overhang length is a reference of offset capable for operating an actuator smoothly when a workpiece or bracket is attached offset to a slider on an actuator.
Applying a load above the allowable range of the load overhang length may cause vibration or abnormal noise.
4. If back and forth operations are performed repeatedly in short distance, it may wear out the film of grease.
Continuous back and forth operation within a distance less than 30mm may cause wear of grease. As a reference, have approximately 5 cycles of back and forth operation in a distance more than 50mm in every 5,000 to 10,000 cycles to regenerate the oil film. Keep using the actuator with the grease worn out may cause malfunction. If it is extreme, flaking may occur on the guide, ball screw.
5. Do not attempt to hit the slider against an abstacle with high speed.
It may destroy the coupling.
6. Make sure to attach the actuator properly by following this instruction manual.
Using the product with the actuator not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.
7. Ensure use of the product in the specified conditions, environments and ranges.
An operation out of the specified conditions may cause a drop in performance or malfunction of the product.

8. For the PCON-CB, MCON (option T), and RCON/RSEL systems, the high output setting can be enabled or disabled by parameter setting. (The factory default setting is enabled.)
 For MSEL Controller, the high output setting is effective and cannot switch it over to ineffective.
 Refer to [instruction manual for each controller] for details.

The performance of weight capacity at each speed and acceleration/deceleration setting differs between the high output setting being effective and ineffective. Refer to the applicable performance when the high output setting is valid or invalid in 1.2 Specifications.

Controller	Parameter	Remarks
PCON-CB	No.152 High-output Setting 0: Ineffective, 1: Effective	
MCON	No.152 High-output Setting 0: Ineffective, 1: Effective	For the high output setting specification (option T), the high output function can be set to enabled
RCON System	No.152 High-output Setting 0: Ineffective, 1: Effective	When RCON-PC connected
RSEL System	Driver unit parameter No.152 High-output Setting 0: Ineffective, 1: Effective	When RCON-PC connected

* The RCP6B-WSA16C/WSA16R does not have a high output setting.

International Standards Compliances

This actuator complies with the following overseas standard.

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

RoHS3 Directive	CE Marking
○	○

Names of the Parts

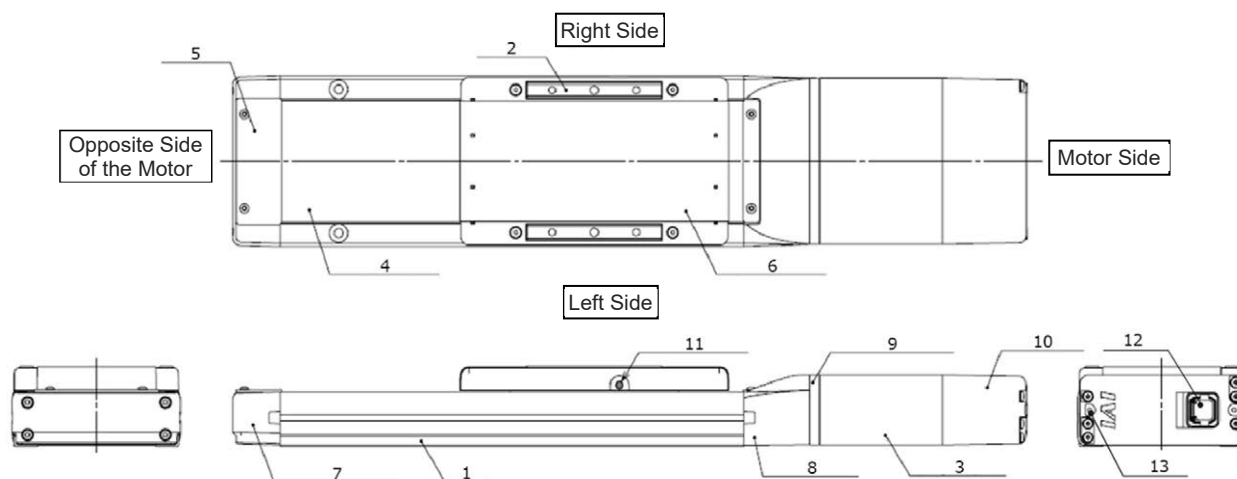
In this Instruction manual, the left and right sides are indicated by looking at the actuator from the motor end, with the actuator placed horizontally, as shown in the figure below.

[1] Standard Type

Motor Straight Type RCP6B-WSA10C, WSA12C, WSA14C, WSA16C

Motor Reversing Type RCP6B-WSA10R, WSA12R, WSA14R, WSA16R

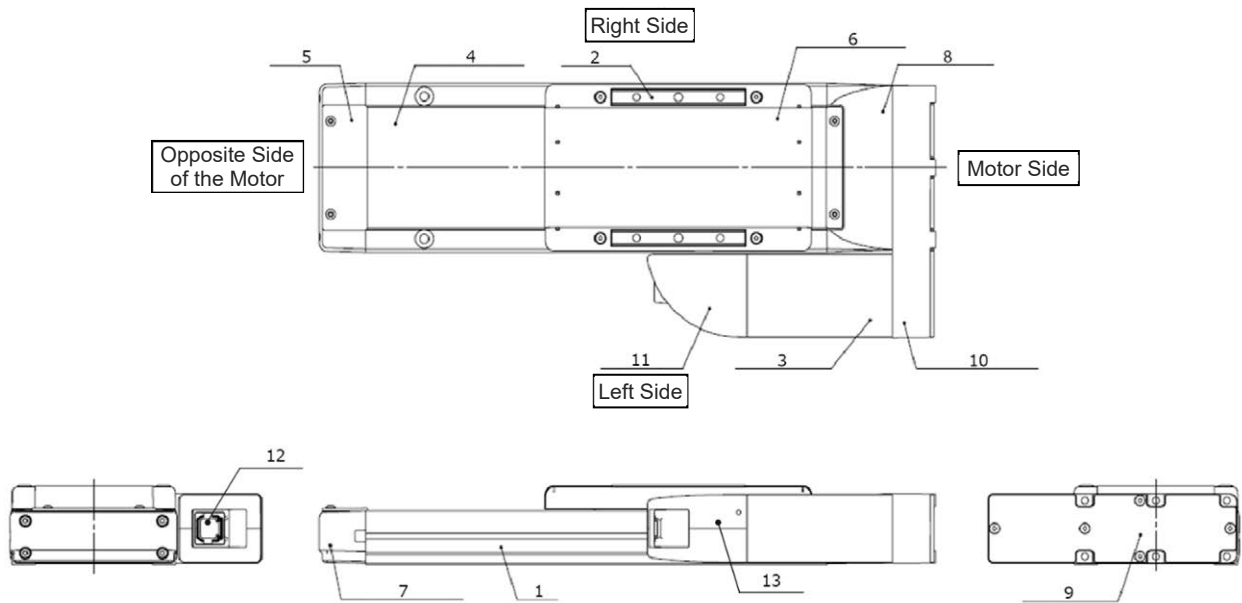
◆ Motor Straight Type



[Main Component Materials]

No.	Name	Material	Surface Treatment
1	Base	Aluminium alloy	White anodizing treatment
2	Slider	Aluminium alloy	White anodizing treatment
3	Motor Cover	Aluminium alloy	White anodizing treatment
4	Stainless Steel Sheet	Stainless steel	—
5	Sheet Retainer	Aluminium alloy	White anodizing treatment
6	Slider Cover	Resin	—
7	Front Bracket	Aluminum die-casting	Decorative surface coating
8	Rear Bracket	Aluminum die-casting	Decorative surface coating
9	Motor Bracket	Aluminum die-casting	Decorative surface coating
10	End Cover	Aluminum die-casting	Decorative surface coating
11	Grease Nipple	Stainless steel	—
12	Connector	Resin	—
13	Tapped hole for grounding wire attachment	—	—

◆ Motor Reversing Type



[Main Component Materials]

No.	Name	Material	Surface Treatment
1	Base	Aluminium alloy	White anodizing treatment
2	Slider	Aluminium alloy	White anodizing treatment
3	Motor Cover	Aluminium alloy	White anodizing treatment
4	Stainless Steel Sheet	Stainless steel	—
5	Sheet Retainer	Aluminium alloy	White anodizing treatment
6	Slider Cover	Resin	—
7	Front Bracket	Aluminum die-casting	Decorative surface coating
8	Rear Bracket	Aluminum die-casting	Decorative surface coating
9	Pulley Cover	Aluminium alloy	White anodizing treatment
10	Reverse Bracket	Aluminum die-casting	Decorative surface coating
11	Motor End Cover	Aluminum die-casting	Decorative surface coating
12	Connector	Resin	—
13	Tapped hole for grounding wire attachment	—	—

The direction of the motor is either left reversed: ML (shown in figure above), right reversed: MR.

ROBO Cylinder

Chapter 1

Specifications

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1.1 Checking the Product

The standard configuration of this product is comprised of the following parts.

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

1.1.1 Components

Name	Profile	Quantity	Remarks
ROBO Cylinder Main Unit		1	
Motor Encoder Integrated Cable or Motor Encoder Integrated Robot Cable		1	
Safety Guide		1	M0194

* Download instruction manual in our homepage.

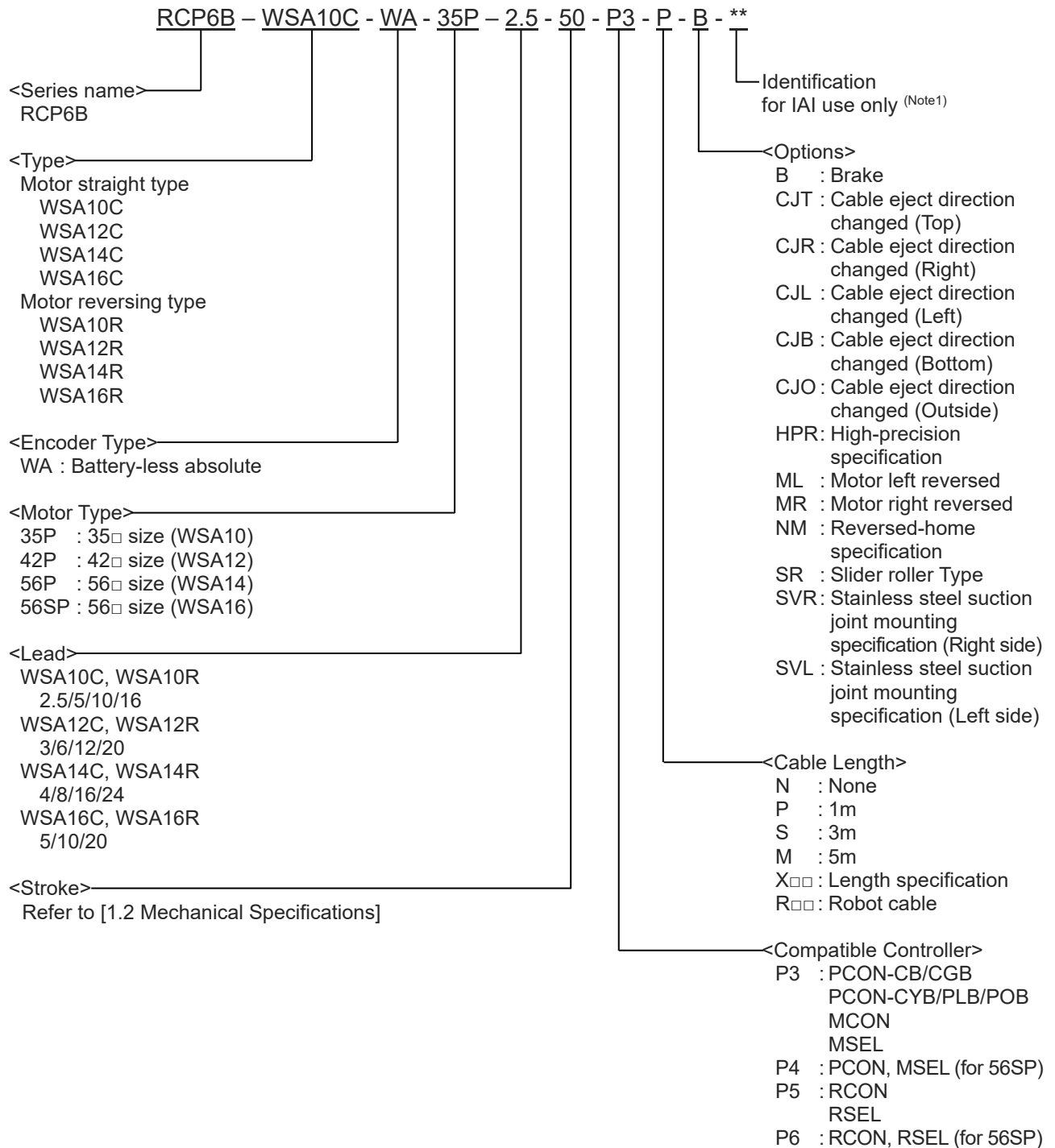
1.1.2 How to Read the Model Nameplate

Model	MODEL:RCP6B-WSA10C-WA-35P-2. 5-50-P-B
Serial number	S/N:B01234500 DATE:17/03/2026 INPUT:DC24V MADE IN JAPAN
	IAI Corporation 

1.1.3 How to Read the Model Number

This is a list of model codes.

The selectable options vary depending on the type and conditions. Refer to the catalog for details.



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

1.2 Mechanical Specifications

1.2.1 Speed

[When high-output setting for motor straight type is effective]

(Note) Lead 10 and 16 of WSA10C, Lead 12 and 20 of WSA12C, Lead 16 and 24 of WSA14C and Lead 20 of WSA16C should not be available for vertical installation.

Speed limits Uni (mm/s)

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Stroke (mm)															
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
WSA10C	35P	2.5	Horizontal	130								120	100	—	—	—	—	—	—
			Vertical	105								100	—	—	—	—	—	—	—
		5	Horizontal	260								245	205	—	—	—	—	—	—
			Vertical	215								205	—	—	—	—	—	—	—
		10	Horizontal	525								490	415	—	—	—	—	—	—
WSA12C	42P	3	Horizontal	125								115	100	—	—	—	—	—	—
			Vertical	100								85	75	70	—	—	—	—	—
		6	Horizontal	250								230	200	175	155	140	—	—	—
			Vertical	200								175	155	140	—	—	—	—	—
		12	Horizontal	500								465	405	355	315	285	—	—	—
WSA14C	56P	4	Horizontal	175								170	150	135	120	105	—	—	—
			Vertical	140								135	120	105	—	—	—	—	—
		8	Horizontal	350								305	270	240	215	—	—	—	—
			Vertical	280								270	240	215	—	—	—	—	—
		16	Horizontal	560								550	490	440	—	—	—	—	—
WSA16C	56SP	5	Horizontal	120								120	—	—	—	—	—	—	—
			Vertical	120								120	—	—	—	—	—	—	—
		10	Horizontal	240								240	—	—	—	—	—	—	—
			Vertical	240								240	—	—	—	—	—	—	—
		20	Horizontal	480								480	—	—	—	—	—	—	—
			Vertical	480								480	—	—	—	—	—	—	—
		5	Horizontal	120								110	100	—	—	—	—	—	—
			Vertical	120								110	100	—	—	—	—	—	—
		10	Horizontal	240								225	205	—	—	—	—	—	—
			Vertical	240								225	205	—	—	—	—	—	—
		20	Horizontal	480								450	415	—	—	—	—	—	—



Caution

- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.

Figure out the minimum speed using the following formula.

$$\text{Min. Speed}^*1 \text{ (mm/s)} = \text{Lead Length (mm)} / 800 / 0.001 \text{ (sec)}$$

Note 1 : For WSA10C and WSA10R, the minimum speed is 40mm/s when the lead length is 16mm.

1.2 Mechanical Specifications

[When high-output setting is effective of the motor reversing type]

(Note) Lead 10 and 16 of WSA10R, Lead 12 and 20 of WSA12R, Lead 16 and 24 of WSA14R and Lead 20 of WSA16R should not be available for vertical installation.

Speed limits Unit (mm/s)

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Stroke (mm)															
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
WSA10R	35P	2.5	Horizontal	130								120	100	—	—	—	—	—	—
			Vertical	105									100	—	—	—	—	—	—
		5	Horizontal	260								245	205	—	—	—	—	—	—
			Vertical	215									205	—	—	—	—	—	—
		10	Horizontal	525								490	415	—	—	—	—	—	—
		16	Horizontal	840								775	660	—	—	—	—	—	—
WSA12R	42P	3	Horizontal	125										115	100	85	75	70	
			Vertical	100												85	75	70	
		6	Horizontal	250										230	200	175	155	140	
			Vertical	200												175	155	140	
		12	Horizontal	500										465	405	355	315	285	
		20	Horizontal	800										740	650	580	520		
WSA14R	56P	4	Horizontal	175										170	150	135	120	105	
			Vertical	140												135	120	105	
		8	Horizontal	350										305	270	240	215		
			Vertical	280												270	240	215	
		16	Horizontal	560												550	490	440	
		24	Horizontal	700														665	

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Stroke (mm)															
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
WSA16R	56SP	5	Horizontal	120															
			Vertical	120															
		10	Horizontal	240															
			Vertical	210															
		20	Horizontal	480															
				Stroke (mm)															
				850	900	950	1000	1050	1100										
		5	Horizontal	120				110	100										
			Vertical	120				110	100										
		10	Horizontal	240				225	205										
			Vertical	210					205										
		20	Horizontal	480				450	415										



Caution

- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.

Figure out the minimum speed using the following formula.

$$\text{Min. Speed}^*1 \text{ (mm/s)} = \text{Lead Length (mm)} / 800 / 0.001 \text{ (sec)}$$

[When high-output setting is ineffective of the motor straight type]

(Note) • Lead 10 and 16 of WSA10C, Lead 12 and 20 of WSA12C, Lead 16 and 24 of WSA14C and Lead 20 of WSA16C should not be available for vertical installation.

- WSA16C and WSA16R do not have the high-output setting.

Speed limits Unit (mm/s)																					
Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Stroke (mm)																	
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800		
WSA10C	35P	2.5	Horizontal	105										100	—	—	—	—	—	—	—
			Vertical	105										100	—	—	—	—	—	—	—
		5	Horizontal	215										205	—	—	—	—	—	—	—
			Vertical	215										205	—	—	—	—	—	—	—
		10	Horizontal	435										415	—	—	—	—	—	—	—
		16	Horizontal	560											—	—	—	—	—	—	—
WSA12C	42P	3	Horizontal	125											115	100	85	75	70		
			Vertical	100													85	75	70		
		6	Horizontal	250											230	200	175	155	140		
			Vertical	200													175	155	140		
		12	Horizontal	500											465	405	355	315	285		
		20	Horizontal	640														580	520		
WSA14C	56P	4	Horizontal	105																	
			Vertical	105																	
		8	Horizontal	210																	
			Vertical	210																	
		16	Horizontal	420																	
		24	Horizontal	560																	



Caution

- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.

Figure out the minimum speed using the following formula.

$$\text{Min. Speed}^{*1} (\text{mm/s}) = \text{Lead Length (mm)} / 800 / 0.001 (\text{sec})$$

Note 1 : For WSA10C and WSA10R, the minimum speed is 40mm/s when the lead length is 16mm.

1.2 Mechanical Specifications

[When high-output setting is ineffective of the motor reversing type]

(Note) • Lead 10 and 16 of WSA10R, Lead 12 and 20 of WSA12R, Lead 16 and 24 of WSA14R and Lead 20 of WSA16R should not be available for vertical installation.

- WSA16C and WSA16R do not have the high-output setting.

Speed limits Unit (mm/s)

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Stroke (mm)															
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
WSA10R	35P	2.5	Horizontal	105									100	—	—	—	—	—	—
			Vertical	105									100	—	—	—	—	—	—
		5	Horizontal	215									205	—	—	—	—	—	—
			Vertical	215									205	—	—	—	—	—	—
		10	Horizontal	435									415	—	—	—	—	—	—
		16	Horizontal	560									—	—	—	—	—	—	—
WSA12R	42P	3	Horizontal	125											115	100	85	75	70
			Vertical	100											—	—	85	75	70
		6	Horizontal	250											230	200	175	155	140
			Vertical	200											—	—	175	155	140
		12	Horizontal	500											465	405	355	315	285
		20	Horizontal	640											—	—	—	580	520
WSA14R	56P	4	Horizontal	105															
			Vertical	105															
		8	Horizontal	210															
			Vertical	210															
		16	Horizontal	420															
		24	Horizontal	560															



Caution

- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.

Figure out the minimum speed using the following formula.

$$\text{Min. Speed}^{*1} (\text{mm/s}) = \text{Lead Length (mm)} / 800 / 0.001 (\text{sec})$$

Note 1 : For WSA10C and WSA10R, the minimum speed is 40mm/s when the lead length is 16mm.

1.2.2 Maximum Acceleration and Transportable Mass

If the transportable mass is smaller than as specified, the acceleration/deceleration can be raised beyond the applicable level.

[When high-output setting for motor straight type is effective]

(Note) Lead 10 and 16 of WSA10C should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA10C	35P	2.5	Horizontal	0	28	28	28	24.5	21
				20	28	28	28	24.5	21
				40	28	28	28	24.5	21
				65	28	28	28	24.5	21
				85	28	28	28	24.5	21
				105	28	28	14.5	14.5	10.5
				130	14	14	12	—	—
			Vertical	0	7	7	7	—	—
				20	7	7	7	—	—
				40	7	7	7	—	—
				65	7	7	7	—	—
				85	7	7	7	—	—
				105	7	7	7	—	—
				130	—	—	—	—	—
		5	Horizontal	0	19.5	17.5	15.5	14	14
				40	19.5	17.5	15.5	14	14
				85	19.5	17.5	15.5	14	14
				130	19.5	17.5	15.5	14	14
				175	19.5	17.5	15.5	14	14
				215	19.5	17.5	9	8.5	6.5
				260	10	8.5	7.5	—	—
			Vertical	0	2	2	2	—	—
				40	2	2	2	—	—
				85	2	2	2	—	—
				130	2	2	2	—	—
				175	2	2	2	—	—
				215	2	2	2	—	—
				260	—	—	—	—	—
		10	Horizontal	0	10.5	10.5	9	9	8.5
				85	10.5	10.5	9	9	8.5
				175	10.5	10.5	9	8.5	7
				260	10.5	10.5	9	7	5.5
				350	10.5	10.5	9	5.5	3.5
				435	10.5	10.5	4	3	1.5
				525	5	3.5	1.5	—	—
		16	Horizontal	0	3	3	2	2	1.5
				140	3	3	2	2	1.5
				280	3	3	2	2	1.5
				420	3	3	2	2	1.5
				560	3	3	2	1	1
				700	3	3	1	—	—
				840	—	0.5	—	—	—

1.2 Mechanical Specifications

[When high-output setting for motor straight type is effective]

(Note) Lead 12 and 20 of WSA12C should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA12C	42P	3	Horizontal	0	42	39	35	31.5	28
				25	42	39	35	31.5	28
				50	42	39	35	31.5	28
				65	42	39	32	28.5	28
				100	42	39	32	28.5	28
				125	42	39	32	—	—
			Vertical	0	12.5	12.5	12.5	—	—
				25	12.5	12.5	12.5	—	—
				50	12.5	12.5	12.5	—	—
				65	12.5	12.5	12.5	—	—
				100	12.5	12.5	12.5	—	—
				125	—	—	—	—	—
		6	Horizontal	0	28	28	24.5	21	17.5
				50	28	28	24.5	21	17.5
				100	28	28	24.5	21	17.5
				140	28	28	24.5	17.5	17.5
				200	28	28	21	17.5	14
				250	28	28	19	—	—
			Vertical	0	6.5	6.5	6.5	—	—
				50	6.5	6.5	6.5	—	—
				100	6.5	6.5	6.5	—	—
				140	6.5	6.5	6.5	—	—
				200	6.5	6.5	6.5	—	—
				250	—	—	—	—	—
		12	Horizontal	0	17.5	17.5	12.5	11	8.5
				100	17.5	17.5	12.5	11	8.5
				200	17.5	17.5	12.5	11	7
				285	17.5	17.5	12.5	8.5	5.5
				400	14	14	10	7	4
				500	10.5	10.5	5.5	—	—
		20	Horizontal	0	8.5	8.5	8.5	7.5	7.5
				160	8.5	8.5	8.5	7.5	7.5
				320	8.5	8.5	8.5	7.5	6.5
				480	8.5	8.5	8.5	7.5	6.5
				640	—	8.5	7	6.5	5.5
				800	—	7	6.5	—	—

[When high-output setting for motor straight type is effective]

(Note) Lead 16 and 24 of WSA14C should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA14C	56P	4	Horizontal	0	56	56	49	45.5	42
				35	56	56	49	45.5	42
				70	56	56	49	45.5	42
				105	56	56	42	35	28
				140	56	35	19	14	10.5
				175	35	10.5	—	—	—
			Vertical	0	18	18	18	—	—
				35	18	18	18	—	—
				70	18	18	18	—	—
				105	15.5	14	12.5	—	—
				140	11	8.5	7	—	—
				175	—	—	—	—	—
		8	Horizontal	0	45.5	45.5	38.5	35	31.5
				70	45.5	45.5	38.5	35	31.5
				140	45.5	45.5	38.5	32	31.5
				210	45.5	45.5	31.5	25	15.5
				280	45.5	27.5	17	12.5	8.5
				350	42.5	13.5	—	—	—
			Vertical	0	10	10	10	—	—
				70	10	10	10	—	—
				140	8.5	8.5	8.5	—	—
				210	7	7	6.5	—	—
				280	5.5	3.5	3	—	—
				350	—	—	—	—	—
		16	Horizontal	0	35	29.5	28	22.5	21
				140	35	29.5	28	22.5	21
				280	35	29.5	24.5	16	12
				420	33	17.5	12.5	10	7
				560	8.5	7	3	2	1.5
		24	Horizontal	0	17.5	17.5	16	14	12
				140	17.5	17.5	16	14	12
				420	17.5	17.5	16	14	10.5
				560	14	13.5	10	8.5	6.5
				700	—	7	3.5	4	4

1.2 Mechanical Specifications

[When high-output setting for motor straight type is effective]

(Note) Lead 20 of WSA16C should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA16C	56SP	5	Horizontal	0	70	63	63	63	63
				60	70	63	63	63	63
				95	70	63	63	56	56
				120	70	63	44	38	34.5
			Vertical	0	35	35	35	—	—
				60	35	35	35	—	—
				95	21	21	21	—	—
				120	13.5	13.5	13.5	—	—
		10	Horizontal	0	49	49	42	42	42
				80	49	49	42	42	42
				160	49	49	38.5	35	31.5
				210	49	49	38.5	35	28
				240	49	38.5	31.5	19	18.5
			Vertical	0	10.5	10.5	10.5	—	—
				80	10.5	10.5	10.5	—	—
				160	10.5	10.5	10.5	—	—
				210	3.5	3	3	—	—
				240	1.5	—	—	—	—
		20	Horizontal	0	35	24.5	19.5	17	14
				120	35	24.5	19.5	17	14
				240	35	24.5	19.5	17	11
				365	35	24.5	19.5	14	8.5
				480	28	10	2.5	1	

[When high-output setting is effective of the motor reversing type]

(Note) Lead 10 and 16 of WSA10R should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA10R	35P	2.5	Horizontal	0	28	28	28	24.5	21
				20	28	28	28	24.5	21
				40	28	28	28	24.5	21
				65	28	28	28	24.5	21
				85	28	28	28	24.5	21
				105	28	28	14.5	14.5	10.5
				130	14	14	12	—	—
			Vertical	0	7	7	7	—	—
				20	7	7	7	—	—
				40	7	7	7	—	—
				65	7	7	7	—	—
				85	7	7	7	—	—
				105	7	7	7	—	—
				130	—	—	—	—	—
		5	Horizontal	0	19.5	17.5	15.5	14	14
				40	19.5	17.5	15.5	14	14
				85	19.5	17.5	15.5	14	14
				130	19.5	17.5	15.5	14	14
				175	19.5	17.5	15.5	14	14
				215	19.5	17.5	9	8.5	5.5
				260	10	8.5	7.5	—	—
			Vertical	0	2	2	2	—	—
				40	2	2	2	—	—
				85	2	2	2	—	—
				130	2	2	2	—	—
				175	2	2	2	—	—
				215	2	2	2	—	—
				260	—	—	—	—	—
		10	Horizontal	0	10.5	10.5	9	9	8.5
				85	10.5	10.5	9	9	8.5
				175	10.5	10.5	9	8.5	7
				260	10.5	10.5	9	7	5.5
				350	10.5	10.5	9	5.5	3.5
				435	10.5	10.5	4	3	1.5
				525	5	3.5	1.5	—	—
		16	Horizontal	0	3	3	2	2	1.5
				140	3	3	2	2	1.5
				280	3	3	2	2	1.5
				420	3	3	2	2	1.5
				560	3	3	2	1	1
				700	3	3	1	—	—
				840	—	0.5	—	—	—

1.2 Mechanical Specifications

[When high-output setting is effective of the motor reversing type]

(Note) Lead 12 and 20 of WSA12R should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA12R	42P	3	Horizontal	0	42	39	35	31.5	28
				25	42	39	35	31.5	28
				50	42	39	35	31.5	28
				65	42	39	32	28.5	28
				100	42	39	32	28.5	28
				125	42	39	32	—	—
			Vertical	0	11	11	11	—	—
				25	11	11	11	—	—
				50	11	11	11	—	—
				65	11	11	11	—	—
				100	11	11	11	—	—
				125	—	—	—	—	—
		6	Horizontal	0	28	28	24.5	21	17.5
				50	28	28	24.5	21	17.5
				100	28	28	24.5	21	17.5
				140	28	28	24.5	17.5	17.5
				200	28	28	21	17.5	14
				250	28	28	19	—	—
			Vertical	0	6.5	6.5	6.5	—	—
				50	6.5	6.5	6.5	—	—
				100	6.5	6.5	6.5	—	—
				140	6.5	6.5	6.5	—	—
				200	6.5	6.5	6.5	—	—
				250	—	—	—	—	—
		12	Horizontal	0	17.5	17.5	12.5	11	8.5
				100	17.5	17.5	12.5	11	8.5
				200	17.5	17.5	12.5	11	7
				285	17.5	17.5	12.5	8.5	5.5
				400	14	14	10	7	4
				500	10.5	10.5	5.5	—	—
		20	Horizontal	0	8.5	8.5	8.5	7.5	7.5
				160	8.5	8.5	8.5	7.5	7.5
				320	8.5	8.5	8.5	7.5	6.5
				480	8.5	8.5	8.5	7.5	6.5
				640	—	8.5	7	6.5	5.5
				800	—	7	6.5	—	—

[When high-output setting is effective of the motor reversing type]

(Note) Lead 16 and 24 of WSA14R should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA14R	56P	4	Horizontal	0	56	56	49	45.5	42
				35	56	56	49	45.5	42
				70	56	56	49	45.5	42
				105	56	56	42	35	28
				140	56	35	6.5	4	4
				175	28	3.5	—	—	—
			Vertical	0	18	18	18	—	—
				35	18	18	18	—	—
				70	18	18	18	—	—
				105	15.5	14	12.5	—	—
				140	9	5.5	2	—	—
				175	—	—	—	—	—
		8	Horizontal	0	45.5	45.5	38.5	35	31.5
				70	45.5	45.5	38.5	35	31.5
				140	45.5	45.5	38.5	32	31.5
				210	45.5	45.5	31.5	21.5	15.5
				280	45.5	21.5	13	10	4
				350	42.5	5.5	—	—	—
			Vertical	0	10	10	10	—	—
				70	10	10	10	—	—
				140	8.5	8.5	8.5	—	—
				210	7	4	4	—	—
				280	5.5	3	1.5	—	—
				350	—	—	—	—	—
		16	Horizontal	0	35	29.5	28	22.5	21
				140	35	29.5	28	22.5	21
				280	35	29.5	24.5	16	12
				420	33	17.5	12.5	10	7
				560	8.5	7	3	2	1.5
		24	Horizontal	0	17.5	16	13.5	10	7.5
				140	17.5	16	13.5	10	7.5
				420	17.5	16	13.5	9	5.5
				560	14	13.5	10	7	3.5
				700	—	5.5	3.5	4	2

[When high-output setting is effective of the motor reversing type]

(Note) Lead 20 of WSA16R should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)					
				Speed (mm/s)	0.1G	0.3G	0.5G	0.7G	1.0G
WSA16R	56SP	5	Horizontal	0	70	63	63	63	63
				60	70	63	63	63	63
				95	70	63	63	56	56
				120	70	63	41	27	22
			Vertical	0	31.5	31.5	31.5	—	—
				60	31.5	31.5	31.5	—	—
				95	19	19	19	—	—
				120	5	5	5	—	—
		10	Horizontal	0	49	49	42	42	42
				80	49	49	42	42	42
				160	49	49	38.5	31.5	31.5
				210	49	45.5	31.5	21	19.5
				240	49	21	14	7.5	6
			Vertical	0	10.5	10.5	10.5	—	—
				80	10.5	10.5	10.5	—	—
				160	7	7	7	—	—
				210	1.5	1.5	0.5	—	—
				240	—	—	—	—	—
		20	Horizontal	0	21	21	19.5	17	14
				120	21	21	19.5	17	14
				240	21	21	19.5	14	11
				365	21	19.5	12.5	8.5	4
				480	21	4	—	—	—



Caution

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

(Note) There is no high output setting prepared for WSA16C and WSA16R which are to be operated with PCON-CFB controller.

[When high-output setting is ineffective of the motor straight type]

(Note) Lead 10 and 16 of WSA10C should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)		
				Speed (mm/s)	0.3G	0.7G
WSA10C	35P	2.5	Horizontal	0	25	19
				20	25	19
				40	25	19
				65	25	19
				85	25	19
				105	25	19
			Vertical	0	7	—
				20	7	—
				40	7	—
				65	5	—
				85	4.5	—
				105	3.5	—
		5	Horizontal	0	17.5	14
				40	17.5	14
				85	17.5	14
				130	17.5	14
				175	17.5	13.5
				215	13.5	9
			Vertical	0	2	—
				40	2	—
				85	2	—
				130	1.5	—
				175	1.5	—
				215	1.5	—
		10	Horizontal	0	8.5	6.5
				85	8.5	6.5
				175	8.5	6.5
				260	8.5	6.5
				350	7.5	4.5
				435	4	2.5
		16	Horizontal	0	3	2
				140	3	2
				280	3	2
				420	3	2
				560	2.5	0.5

[When high-output setting is ineffective of the motor straight type]

(Note) Lead 12 and 20 of WSA12C should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)		
				Speed (mm/s)	0.3G	0.7G
WSA12C	42P	3	Horizontal	0	29.5	23
				25	29.5	23
				50	29.5	23
				65	29.5	23
				100	29.5	23
				125	29.5	—
			Vertical	0	10.5	—
				25	10.5	—
				50	10.5	—
				65	9	—
				100	8.5	—
				125	—	—
		6	Horizontal	0	21	21
				50	21	21
				100	21	21
				140	21	21
				200	13.5	13.5
				250	11.5	—
			Vertical	0	5.5	—
				50	5.5	—
				100	5.5	—
				140	5.5	—
				200	4	—
				250	—	—
		12	Horizontal	0	12.5	11
				100	12.5	11
				200	12.5	10
				285	12.5	7.5
				400	8.5	5
				500	4	—
		20	Horizontal	0	5.5	2.5
				160	5.5	2.5
				320	5.5	2.5
				480	5.5	2
				640	3.5	1.5

[When high-output setting is ineffective of the motor straight type]

(Note) Lead 16 and 24 of WSA14C should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)		
				Speed (mm/s)	0.3G	0.7G
WSA14C	56P	4	Horizontal	0	38	33.5
				35	38	33.5
				70	38	33.5
				105	25	17
			Vertical	0	12.5	—
				35	12.5	—
				70	12.5	—
				105	4	—
		8	Horizontal	0	31.5	23
				70	31.5	23
				140	31.5	19
				210	9.5	6.5
			Vertical	0	7.5	—
				70	7.5	—
				140	7.5	—
				210	2	—
		16	Horizontal	0	23	17
				140	23	17
				280	15.5	8.5
				420	6.5	2.5
		24	Horizontal	0	11	8.5
				140	11	8.5
				420	9	5.5
				560	5	2

1.2 Mechanical Specifications

(Note) There is no high output setting prepared for WSA16C and WSA16R which are to be operated with PCON-CFB controller.

[When high-output setting is ineffective of the motor reversing type]

(Note) Lead 10 and 16 of WSA10R should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)		
				Speed (mm/s)	0.3G	0.7G
WSA10R	35P	2.5	Horizontal	0	25	19
				20	25	19
				40	25	19
				65	25	19
				85	25	19
				105	25	19
			Vertical	0	7	—
				20	7	—
				40	7	—
				65	5	—
				85	4.5	—
				105	3.5	—
		5	Horizontal	0	17.5	14
				40	17.5	14
				85	17.5	14
				130	17.5	14
				175	17.5	13.5
				215	13.5	9
			Vertical	0	2	—
				40	2	—
				85	2	—
				130	1.5	—
				175	1.5	—
				215	1.5	—
		10	Horizontal	0	8.5	6.5
				85	8.5	6.5
				175	8.5	6.5
				260	8.5	6.5
				350	7.5	4.5
				435	4	2.5
		16	Horizontal	0	3	2
				140	3	2
				280	3	2
				420	3	2
				560	2.5	0.5

[When high-output setting is ineffective of the motor reversing type]

(Note) Lead 12 and 20 of WSA12R should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)		
				Speed (mm/s)	0.3G	0.7G
WSA12R	42P	3	Horizontal	0	29.5	23
				25	29.5	23
				50	29.5	23
				65	29.5	23
				100	29.5	23
				125	29.5	—
			Vertical	0	10.5	—
				25	10.5	—
				50	10.5	—
				65	9	—
				100	8.5	—
				125	—	—
		6	Horizontal	0	21	21
				50	21	21
				100	21	21
				140	21	21
				200	13.5	13.5
				250	11.5	—
			Vertical	0	5.5	—
				50	5.5	—
				100	5.5	—
				140	5.5	—
				200	4	—
				250	—	—
		12	Horizontal	0	12.5	11
				100	12.5	11
				200	12.5	10
				285	12.5	7.5
				400	8.5	5
				500	4	—
		20	Horizontal	0	5.5	2.5
				160	5.5	2.5
				320	5.5	2.5
				480	5.5	2
				640	3.5	1.5

[When high-output setting is ineffective of the motor reversing type]

(Note) Lead 16 and 24 of WSA14R should not be available for vertical installation.

Type	Motor Type	Lead (mm)	Horizontal/ Vertical	Payload Capacity by Acceleration/Deceleration (kg)		
				Speed (mm/s)	0.3G	0.7G
WSA14R	56P	4	Horizontal	0	38	33.5
				35	38	33.5
				70	38	33.5
				105	25	17
			Vertical	0	12.5	—
				35	12.5	—
				70	12.5	—
				105	4	—
		8	Horizontal	0	31.5	23
				70	31.5	23
				140	31.5	19
				210	9.5	6.5
			Vertical	0	7.5	—
				70	7.5	—
				140	7.5	—
				210	2	—
		16	Horizontal	0	23	17
				140	23	17
				280	15.5	8.5
				420	6.5	2.5
		24	Horizontal	0	11	8.5
				140	11	8.5
				420	9	5.5
				560	5	2

1.2.3 Driving System • Position Detector

Type	Motor Type	Lead	No. of Encoder Pulses	Ball Screw Type		
				Type	Diameter	Accuracy
WSA10C WSA10R	35P	2.5	8192	Rolled	φ8mm	C10
		5				
		10				
		16				
WSA12C WSA12R	42P	3		Rolled	φ10mm	C10
		6				
		12				
		20				
WSA14C WSA14R	56P	4		Rolled	φ12mm	C10
		8				
		16				
		24				
WSA16C WSA16R	56SP	5		Rolled	φ16mm	C10
		10				
		20				

1.2.4 Positioning Precision

Type	Lead	Item	Tolerance	
			Standard	High-precision Specification Option Model Code: HPR
WSA10C	2.5, 5, 10	Positioning repeatability	±0.01mm	±0.005mm
		Lost motion	0.1mm or less	0.1mm or less
	16	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-
WSA10R	2.5, 5, 10, 16	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-
WSA12C	3, 6, 12	Positioning repeatability	±0.01mm	±0.005mm
		Lost motion	0.1mm or less	0.1mm or less
	20	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-
WSA12R	3, 6, 12, 20	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-
WSA14C	4, 8	Positioning repeatability	±0.01mm	±0.005mm
		Lost motion	0.1mm or less	0.1mm or less
	16, 24	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-
WSA14R	4, 8, 16, 24	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-
WSA16C	5, 10	Positioning repeatability	±0.01mm	±0.005mm
		Lost motion	0.1mm or less	0.1mm or less
	20	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-
WSA16R	5, 10, 20	Positioning repeatability	±0.01mm	-
		Lost motion	0.1mm or less	-

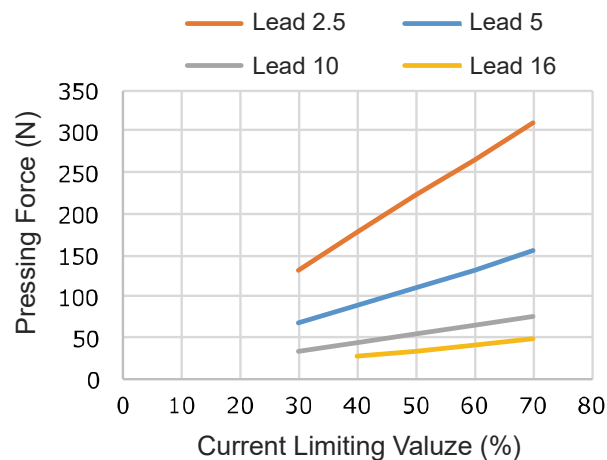
It is the accuracy when product is shipped out from the factory. It does not include the consideration of time-dependent change.

1.2.5 Current Limiting Value and Pressing Force

● WSA10C, WSA10R

Current Limiting Value	Lead 2.5 (N)	Lead 5 (N)	Lead 10 (N)	Lead 16 (N)
30%	133	66	33	—
40%	177	89	44	27
50%	221	111	55	34
60%	266	133	66	41
70%	310	155	77	48

Correlation Graph – Current Limiting Value vs. Pressing Force



Caution

- The relation of the current limit and the pressing force is a reference when assuming the speed is 20mm/s ^(Note 1).
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30% (40% for Lead 16). There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For CON-system controllers such as PCON, when the approach speed to the pressing start position (setting in the position table) is 20mm/s ^(Note 2) or less, pressing will be performed with the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.
For SEL-system controllers, such as MSEL, press at the speed set by PAPR instruction, regardless of the approach speed up to the pressing start position.

Note 1 : Lead 16 is 40mm/s.

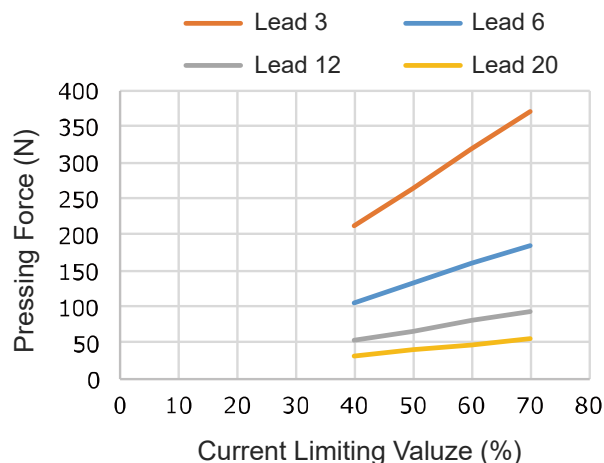
Note 2 : Do not make the approach speed for lead 16 slower than 40mm/s.

● WSA12C, WSA12R

Current Limiting Value	Lead 3 (N)	Lead 6 (N)	Lead 12 (N)	Lead 20 (N)
40%	211	106	53	32
50%	264	132	66	40
60%	317	159	80	48
70%	370	185	93	56

* It is a reference at 20mm/s of pressing speed.

Correlation Graph – Current Limiting Value vs. Pressing Force

**Caution**

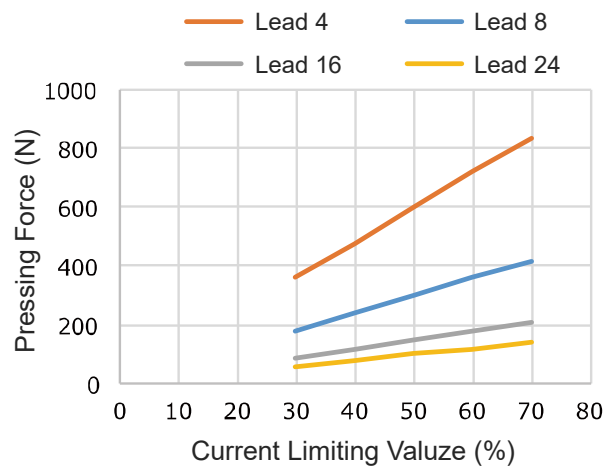
- The relation of the current limit and the pressing force is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 40%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For CON-system controllers such as PCON, when the approach speed to the pressing start position (setting in the position table) is 20mm/s or less, pressing will be performed with the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using. For SEL-system controllers, such as MSEL, press at the speed set by PAPR instruction, regardless of the approach speed up to the pressing start position.

● WSA14C, WSA14R

Current Limiting Value	Lead 4 (N)	Lead 8 (N)	Lead 16 (N)	Lead 24 (N)
30%	358	179	90	60
40%	478	239	119	80
50%	597	298	149	100
60%	717	358	179	119
70%	836	418	209	139

* It is a reference at 20mm/s of pressing speed.

Correlation Graph – Current Limiting Value vs. Pressing Force

**Caution**

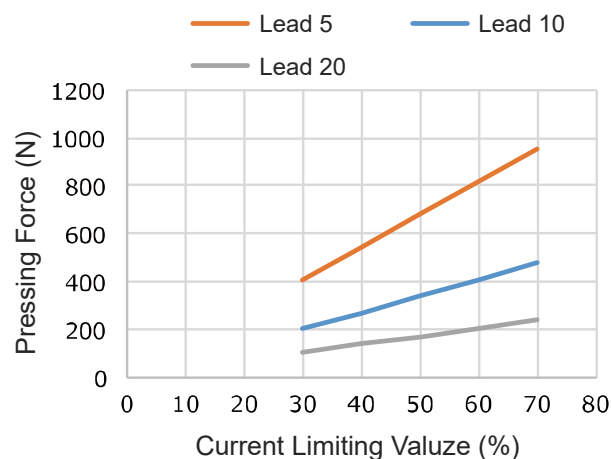
- The relation of the current limit and the pressing force is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For CON-system controllers such as PCON, when the approach speed to the pressing start position (setting in the position table) is 20mm/s or less, pressing will be performed with the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using. For SEL-system controllers, such as MSEL, press at the speed set by PAPR instruction, regardless of the approach speed up to the pressing start position.

● WSA16C, WSA16R

Current Limiting Value	Lead 5 (N)	Lead 10 (N)	Lead 20 (N)
30%	410	205	102
40%	546	273	137
50%	683	341	171
60%	819	410	205
70%	956	478	239

* It is a reference at 20mm/s of pressing speed.

Correlation Graph – Current Limiting Value vs. Pressing Force

**Caution**

- The relation of the current limit and the pressing force is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For CON-system controllers such as PCON, when the approach speed to the pressing start position (setting in the position table) is 20mm/s or less, pressing will be performed with the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using. For SEL-system controllers, such as MSEL, press at the speed set by PAPER instruction, regardless of the approach speed up to the pressing start position.

1.2.6 Allowable Moment of Actuator

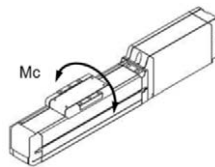
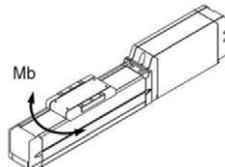
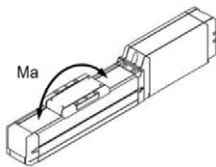
Type	Allowable static moment (N·m)		
	Ma	Mb	Mc
WSA10C WSA10R	271	271	553
WSA12C WSA12R	311	311	827
WSA14C WSA14R	462	462	1170
WSA16C WSA16R	642	642	1610

(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, the allowable dynamic moment is only for 5,000km of the driving life.

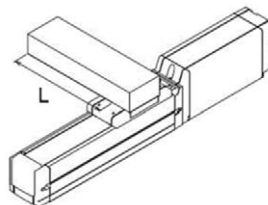
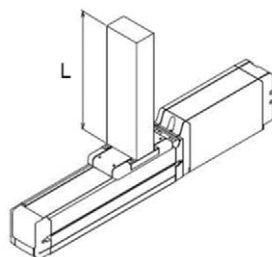
Type	Allowable static moment (N·m) 5,000km driving life			Allowable dynamic moment (N·m) 10,000km driving life			Allowable overhang load length (L)
	Ma	Mb	Mc	Ma	Mb	Mc	
WSA10C WSA10R	65.4	65.4	134	51.9	51.9	106	Ma direction: 500mm Mb, Mc direction: 500mm
WSA12C WSA12R	87.5	87.5	233	69.5	69.5	185	Ma direction: 450mm Mb, Mc direction: 450mm
WSA14C WSA14R	122	122	308	96.8	96.8	245	Ma direction: 550mm Mb, Mc direction: 550mm
WSA16C WSA16R	161	161	404	128	128	321	Ma direction: 650mm Mb, Mc direction: 650mm

Directions of the Load Moments

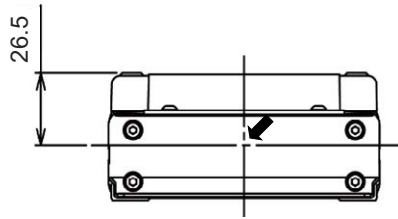
Ma: Pitching Direction Mb: Yawing Direction Mc: Rolling Direction



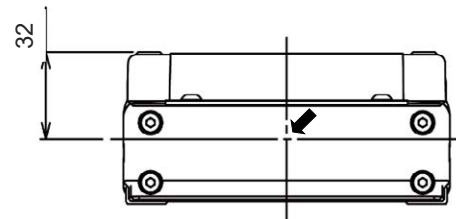
Load Overhang Length (L)



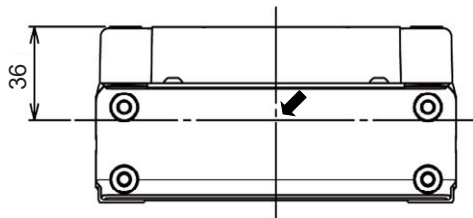
Conduct moment calculations for M_a and M_c with the point indicated with an arrow below as the reference.



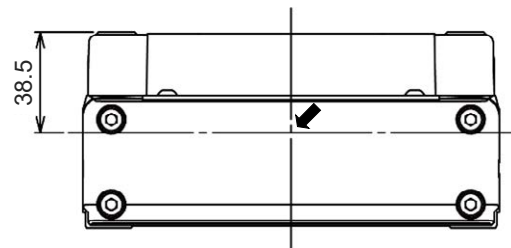
WSA10



WSA12



WSA14



WSA16



Caution

- Using the product above the allowable moment or overhang load length may cause not only to generate abnormal noise or vibration, but also to shorten the product life remarkably.
-

1.2.7 Duty Ratio of Continuous Operation

Duty ratio is the rate of operation expressed in percentage (%) that presents the time of the actuator being operated in 1 cycle of operation.

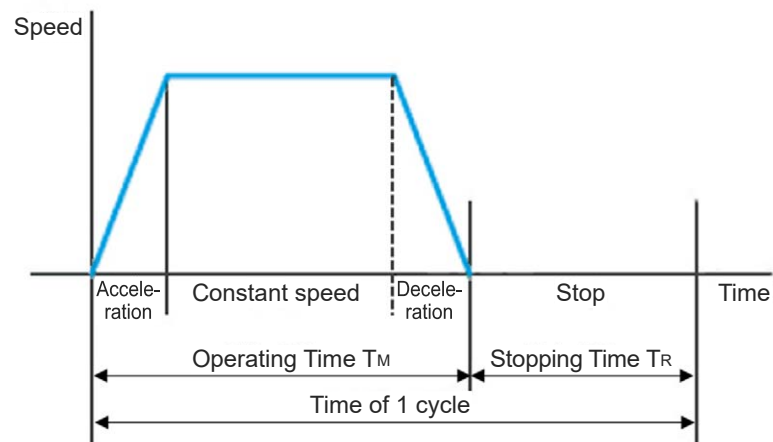
$$D = \frac{T_M}{T_M + T_R} \times 100 (\%)$$

D : Duty ratio

T_M : Operating time

(including push-motion operation)

T_R : Stopping time



© RCP6B-WSA10C/WSA12C/WSA14C/WSA16C, RCP6B-WSA10R/WSA12R/WSA14R/WSA16R
Continuous operation is available with the duty ratio 100%.

1.3 Options

1.3.1 Brake Type (Model Code: B)

It retains a slider so it would not move when the power or servo gets turned off.

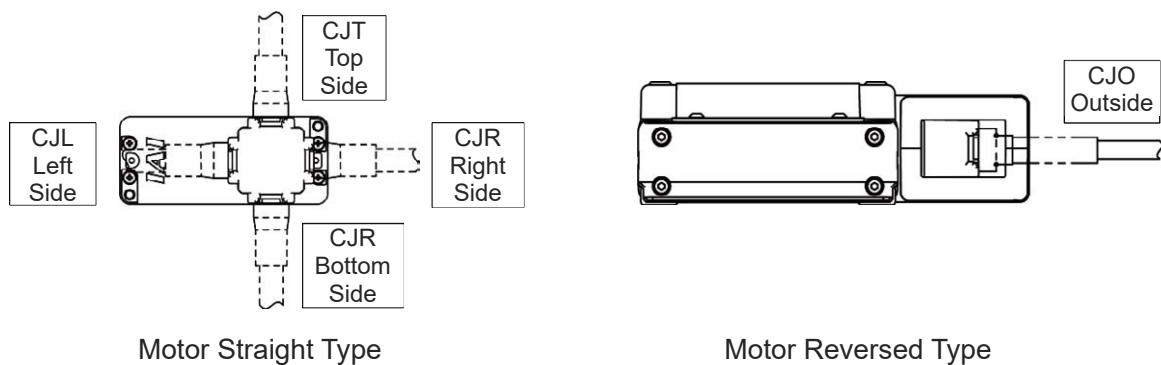
It can avoid the slider from dropping when installation is performed in the vertical orientation.

1.3.2 Cable Eject Direction Changed (Model Code: CJT, CJR, C JL, CJB, CJO)

The direction to eject the motor / encoder cable applied on the actuator main unit can be changed to top/bottom/right/left.

There are ejection directions, top (model code: CJT), right (model code: CJR), left (model code: C JL), bottom (model code: CJB) and outside (model code: CJO).

- CJO can be selected only for the reversed type of WSA10R, WSA12R, WSA14R and WSA16R.



1.3.3 High-precision Specification (Model Code: HPR)

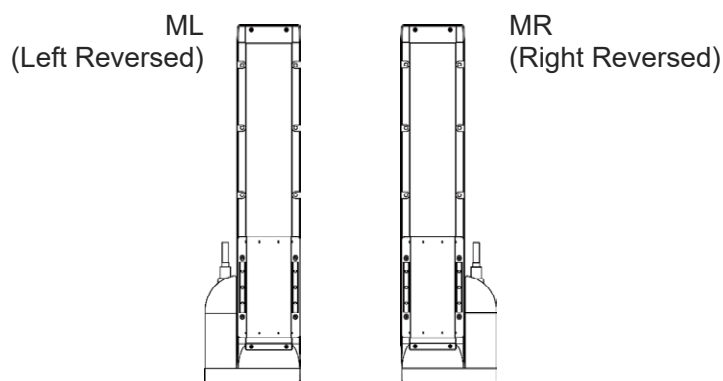
By indicating this option, the positioning accuracy repeatability can get to $\pm 0.005\text{mm}$.

The standard positioning accuracy repeatability is $\pm 0.01\text{mm}$.

There are some leads that cannot be set. Refer to [1.2.4 Positioning Precision].

1.3.4 Motor Left Reversed Specification, Motor Right Reversed Specification (Model Code: ML, MR)

It is a symbol to indicate the motor reversing direction in the motor reversed type.
From the view of motor side, reversing to the left is ML and reversing to the right is MR.



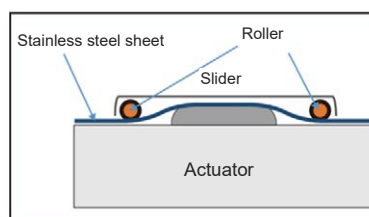
1.3.5 Reversed-home Specification (Model Code: NM)

Although the standard home position is on the motor side, it can be allocated on the opposite side if it is desired so due to the layout of equipment.

1.3.6 Slider Roller Type (Model Code: SR)

The slider construction in the standard slider type can be changed to the roller structure which is the same structure as the one for the clean specification.

If the slider part gets to the roller type, the appearance and the dimensions at the slider cover should become the same as the clean specification.



1.3.7 Stainless Steel Suction Joint Mounting Specification (Right Side) (Model Code: SVR) Stainless Steel Suction Joint Mounting Specification (Left Side) (Model Code: SVL)

A stainless steel suction joint for air suction is mounted on the side surface. For the joint position, refer to [Chapter 6 External Dimensions].

ROBO Cylinder

Chapter 2

Installation

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2.1 Transportation

2.1.1 Handling of Robot

[1] Handling of Robot

When you want to transport the actuator alone, observe the following points.

(1) Handling of the Packed Product

Unless otherwise specified, the actuator is shipped with each axis packaged separately.

- Do not damage or drop. The package is not applied with any special treatment that enables it to resist an impact caused by a drop or crash.
- Transport a heavy package with at least more than two operators. Consider an appropriate method for transportation.
- Keep the unit in horizontal orientation when placing it on the ground or transporting. Follow the instruction if there is any for the packaging condition.
- Do not step or sit on the package.
- Do not put any load that may cause a deformation or breakage of the package.

(2) Handling the Actuator after Unpacking

- Do not carry an actuator by holding motor unit or a cable, or move it by pulling a cable.
- Be careful not to bump the actuator into anything when moving it.
- Hold the body base when transporting the actuator.
- Do not attempt to force any part of the actuator. Take particular care not to apply pressure to the stainless steel sheet.



Caution

- Do not attempt to grab or hold the stainless steel sheet for any reason.

For the names of each part of the actuator, refer to [Name of the Parts].

2.1.2 Handling in the Assembled Condition

This is the case when the product is delivered from our factory under a condition that it is assembled with other actuators. The combined axes are delivered in a package that the frame is nailed on the lumber base. Fix the slider so that would not accidentally move during transportation. The actuators are also fixed so the tip of it would not shake due to the external vibration.

(1) How to Handle the Package

- Do not hit or drop the package. No special treatment is conducted on this package to endure a drop or impact on it.
- Do not attempt to carry a heavy package with only one worker. Also, have an appropriate method for transportation.
- When hanging up with ropes, support on the reinforcement frame on the bottom of the base. When bringing up the package with a forklift, also support on the bottom of the lumber base.
- Handle with care when putting the package down to avoid impact or bounce.
- Do not step on the package.
- Do not put anything on the package that could deform or damage it.

(2) How to Handle after Unpackaged

- Fix the slider so they would not accidentally move during transportation.
- If the tip of an actuator is overhanging, have an appropriate way to fix it to avoid shake due to the external vibration. In the transportation without the tip being fixed, do not apply any impact with 0.3G or more.
- When hanging up with ropes, have appropriate cushioning to avoid any deformation of the actuator body. Also keep it in stable horizontal orientation. Make a fixture utilizing the attachment holes and the screw holes on the actuator body if necessary.
- Do not attempt to apply load on the actuators or the connector box. Also pay attention not to pinch cables and bend or deform them forcefully.

2.1.3 Handling in Condition of being assembled in Machinery Equipment (System)

These are some caution notes for when transporting the actuator being assembled in the machinery equipment (system):

- Fix the slider so that it would not move during transportation.
- If the tip of an actuator is overhanging, have an appropriate way to fix it to avoid shake due to the external vibration. In the transportation without the tip being fixed, do not apply any impact with 0.3G or more.
- When hanging up the machinery equipment (system) with ropes, do not attempt to apply load on the actuators or the connector box. Also pay attention not to pinch cables and bend or deform them forcefully.

2.2 Installation and Storage • Preservation Environme

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 2000m

If the actuator is used in any of the following locations, provide sufficient shielding measures:

- 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

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

2.3 How to Install

This chapter explains how to install the actuator on your mechanical system.

2.3.1 Installation

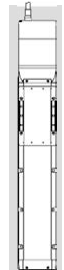
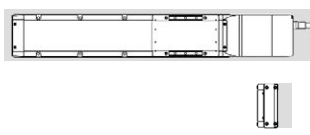
Below shows availability of horizontal orientation and restrictions.

Refer to the following precautions when installation is performed in the postures marked with △ (Daily Inspection Needed).

○ : Possible △ : Daily inspection is required × : Not possible

Type	Horizontal installation	Vertical installation	Sideways installation	Ceiling Mount installation
WSA10C, WSA12C, WSA14C, WSA16C, WSA10R, WSA12R, WSA14R, WSA16R	○	○	△	△

Installation Orientation

Horizontal	Vertical	Sideways	Ceiling Mount
			



Caution

- It is recommended to have the motor installed on top for the vertical orientation.
- Can be installed sideways or ceiling mount, but the actuators must be checked daily. If the actuator is installed sideways or ceiling mount, the stainless steel sheet may be deviated or slacked. If the actuator is used continuously while the stainless steel sheet is deviated or slacked, the stainless steel sheet may break or other problems may occur. Check the actuator daily and if the stainless steel sheet is found slacked or displaced, make installation adjustment of the stainless steel sheet. Refer to [5.6.1 Procedure for Stainless Steel Sheet Replacement and Adjustment.]

2.3.2 Installation of the Main Unit

The surface to mount the main unit should be a machined surface or a plane that possesses an equivalent accuracy and the flatness should be within 0.05mm/m. Also, the platform should have a structure stiff enough to install the unit so it would not generate vibration or other abnormality.

Also consider enough space necessary for maintenance work such as actuator replacement and inspection.

There are datum surfaces for attachment on the base.

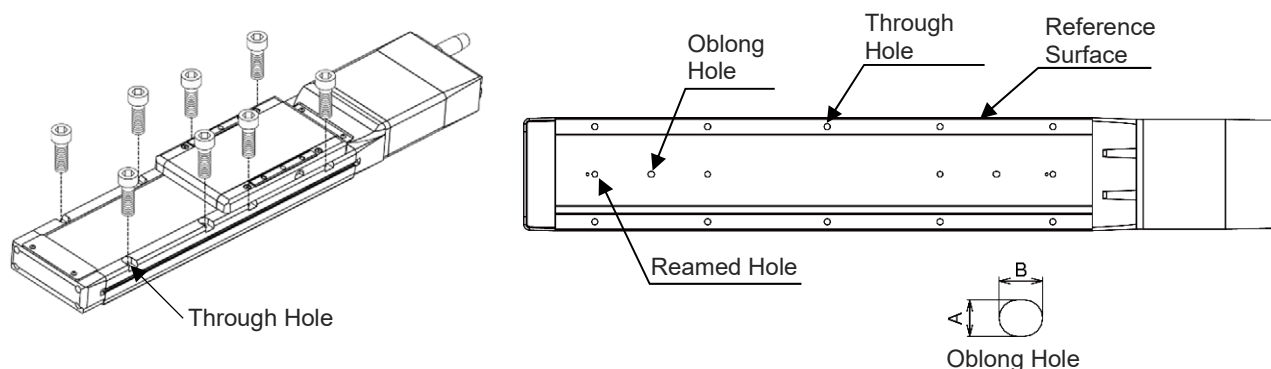
The flatness of the slider movement is designed to be 0.05mm/m at maximum to the datum surface. On the rear side of the actuator, there are screw holes and through holes for attachment and reamed hole and oblong hole for positioning. (Note that there is no through hole on SA8C and SA8R.) See the appearance drawings for the details of the position and diameters. Refer to [6. External Dimensions]

Utilize the reamed holes when repeatability in the attachment after detaching is required. However, when small tunings such as the perpendicularity is required, consider such things like to use one reamed hole.

[1] Using the Screw Holes on the Bottom of the Base

This actuator has the screwed holes for mounting so it can be fixed from the bottom of the base. Also, 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.

Type	Screw Hole Size	Through Hole	Tightening Torque	Reamed Hole (mm)	Oblong Hole
WSA10C WSA10R	M5	$\phi 5.5$ Through, $\phi 11$ counterbore	3.42 N•m	$\phi 5H7$ Depth 5	A: $5^{+0.012}_0$ B: 6 Depth 5mm or less
WSA12C WSA12R	M6	$\phi 6.6$ Through, $\phi 12.5$ counterbore	5.36 N•m	$\phi 6H7$ Depth 6	A: $6^{+0.012}_0$ B: 7 Depth 6mm or less
WSA14C WSA14R	M8	$\phi 9$ Through, $\phi 16.5$ counterbore	11.48 N•m	$\phi 8H7$ Depth 9	A: $8^{+0.015}_0$ B: 9 Depth 9mm or less
WSA16C WSA16R	M8	$\phi 9$ Through, $\phi 16.5$ counterbore	11.48 N•m	$\phi 8H7$ Depth 9	A: $8^{+0.015}_0$ B: 9 Depth 9mm or less

Tightening Screws

- Use hexagonal socket head bolts for the male threads for installing the base.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to have the effective length of screw engagement described below or more for the tightening of a bolt and a female screw.

When female screw is on steel → thread length same as nominal diameter

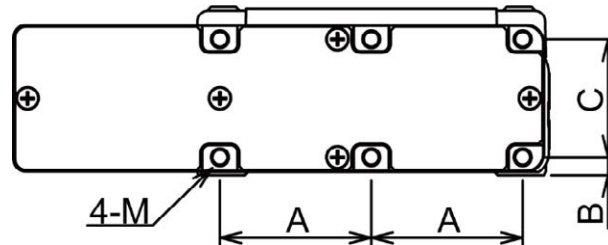
When female screw is on aluminum → thread length 1.8 times longer than nominal diameter

**Caution**

- Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.

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

There are screw holes equipped on the reversing bracket. Refer to the table below for detailed dimensions.



Type	A	B	C
WSA10R	42.5	5	33
WSA12R	51.5	5.5	41
WSA14R	60	7	50
WSA16R	70.5	7	59

Type	Attachment Hole Diameter	Attachment Hole Depth	Tightening Torque
WSA10R	M5	10mm	3.42 N•m
WSA12R	M6	10mm	5.36 N•m
WSA14R	M8	12mm	11.5 N•m
WSA16R	M8	16mm	11.5 N•m

Tightening Screws

- Use hexagonal socket head bolts for the male threads for installing.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to have the effective length of thread engagement at least approximately 1.8 times of the nominal diameter of bolts and screws.

**Caution**

- Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.

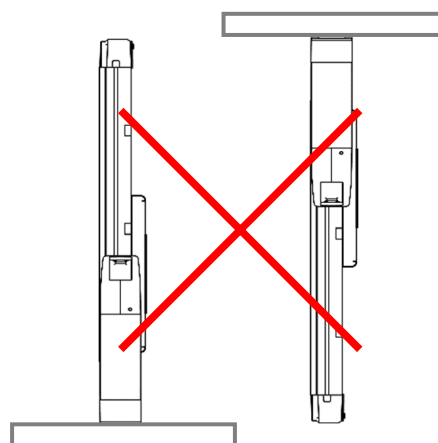
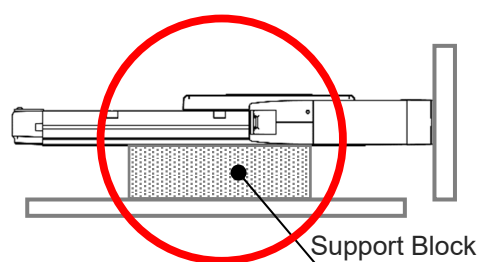
[Caution at Pressing]

Pay attention to the following when installation is conducted with using the attachment holes on the reversing bracket.

- Do not attempt to use only the attachment holes on the reversing bracket for installation.
- Avoid external force to be applied on the main body.
- Some operational conditions and conditions of installation environment could generate vibration, which may cause operational error or parts malfunction.

Refer below for the availability of orientations for installation.

Installation Posture			Support
Horizontal	Vertical	Ceiling Mount	
×	×	×	No
○	×	×	Yes

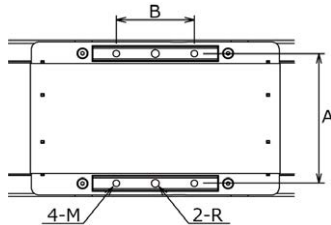


When using the product in horizontal or vertical orientation, have a support block to support the main body to avoid any external force to be applied on the body.

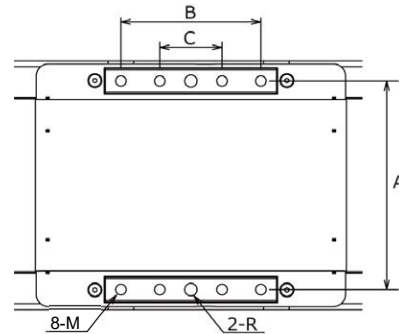
[3] Attachment of Transported Object

- There are screw holes on the top surface of the slider. Affix the work part (transported object) here.
- The way to affix follows the installation of the main unit.
- There are two reamed holes on the top surface of the slider. Use these reamed holes if repeatability of attaching and detaching is required. Also, if small tuning such as perpendicularity is required, use one of the reamed holes for the tuning.
- Refer to the below table for the screwed depth and reamed depth. Screwing further than indicated in the table may destroy the screw hole or lower the reinforcement of the attachment of the work part, result in the drop of the accuracy or an unexpected accident.

• WSA10C, WSA12C, WSA14C



• WSA16C

Reamer Pitch Tolerance ± 0.02

Type	A	B	C	Reamed Hole R	Screw Hole M	Mounting Bolt	
						Bolt Nominal Diameter	Tightening Torque
WSA10C WSA10R	83	50		$\Phi 5H7$ depth 5	M5 depth 14	M5	3.42 N•m
WSA12C WSA12R	101	50		$\Phi 6H7$ depth 6	M6 depth 18	M6	5.36 N•m
WSA14C WSA14R	117	70		$\Phi 8H7$ depth 8	M8 depth 22	M8	11.5 N•m
WSA16C WSA16R	134	90	40	$\Phi 8H7$ depth 8	M8 depth 24.5	M8	11.5 N•m

Tightening Screws

- Use hexagonal socket head bolts for the male threads for installing.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to have the effective length of thread engagement at least approximately 1.8 times of the nominal diameter of bolts and screws.

**Caution**

- Pay attention when choosing the bolt length. Use of screws with inappropriate length may cause damage on the attachment holes or not sufficient strength of attachment of a transferred work piece.

[4] Mounting Surface

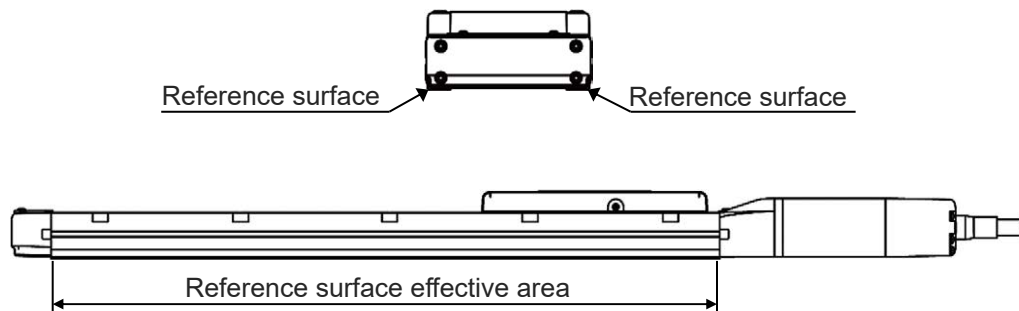
The platform to install the actuator should possess a structure that ensures enough stiffness, and should be free from vibration.

The surface where the actuator will be mounted should be a machined surface or that with an accuracy equivalent to it, and the flatness should be 0.05mm/m or below.

Ensure a room for maintenance work.

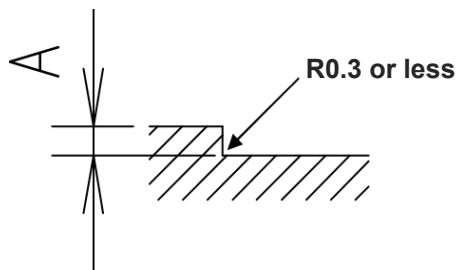
The side and bottom surfaces of the base on the actuator work as the datum surfaces for the side of the rod.

Use these surfaces as the reference surfaces for mounting.



As shown in the figure above, the base side surface is the datum surface for the slider drive. Have this surface as the datum for installation when accuracy is required.

Follow the diagram below when installing the device using the reference surface.



Type	A Dimensions (mm)
WSA10, WSA12, WSA14, WSA16	3 to 5 or less



Caution

- As there could be a case that the width dimension of the front bracket or rear bracket is wider than the datum surface dimension on the side, have them pushed towards the datum surface within the datum surface effective range. Having machining work to press the brackets towards the datum surface outside the datum surface effective range may cause interference to brackets and motors.

ROBO Cylinder

Chapter 3

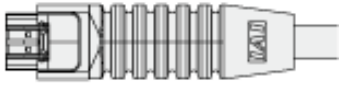
Connecting with the Controller

3.1	Connecting with the Controller	3-1
3.2	Motor • Encoder Cables	3-7
3.2.1	Dedicated connection cable for compatible controllers P3 and P4	3-7
3.2.2	Dedicated connection cable for compatible controllers P5 and P6	3-10

3.1 Connecting with the Controller

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

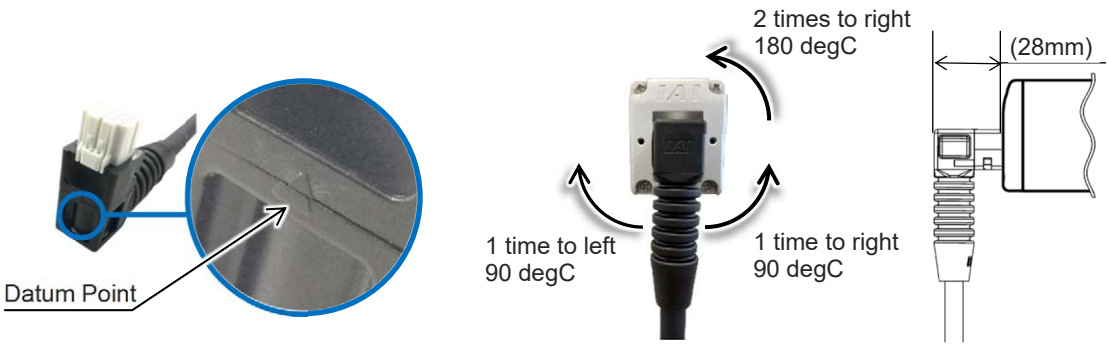
Dedicated Connection Cable

Standard Connector Type (Actuator side)	4-way Connector Type (Actuator side)
	
CB-CAN-MPA□□□ (-RB)	CB-CAN2-MPA□□□ (-RB)
CB-ADPC-MPA□□□ (-RB)	CB-ADPC2-MPA□□□ (-RB)



Caution

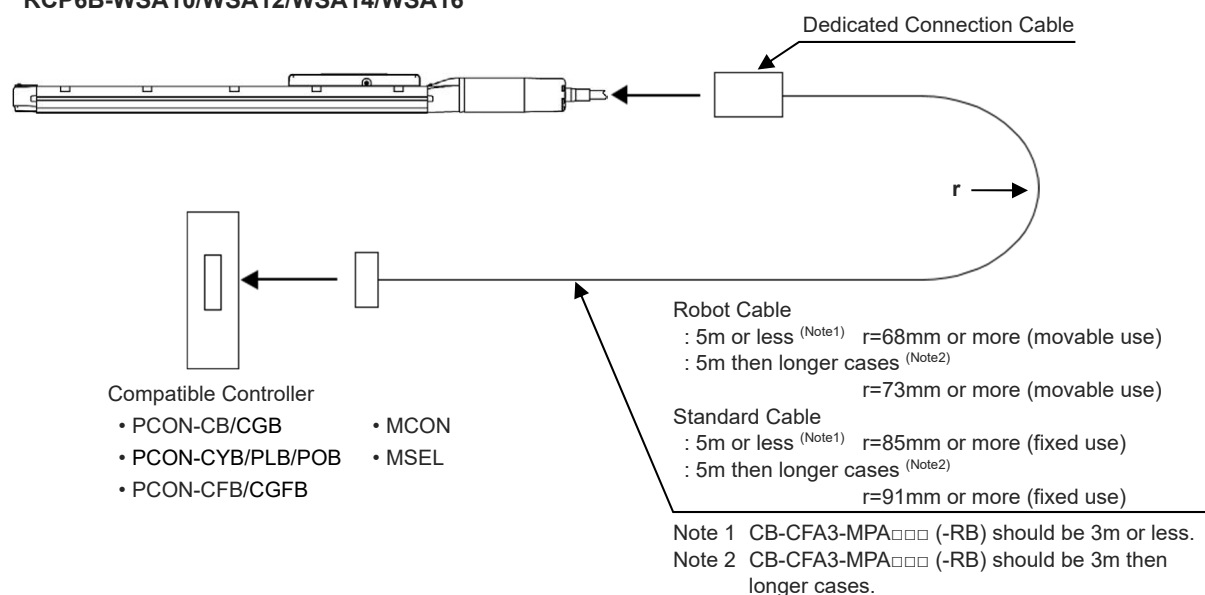
- If the dedicated connection cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Do not cut and reconnect the dedicated connection cable for extension or shorten the cable.
- Do not pull on the dedicated connection cable or bend it forcibly.
- The 4-way connector type should not rotate in 360degC. It can be turned "1 time to left" and "2 times to right" from the datum point. (Have the count of rotation at 10 times or less)



Contact us if you wish to have a change to the specifications of the dedicated cables.

[1] Connection of compatible controllers P3 and P4

RCP6B-WSA10/WSA12/WSA14/WSA16

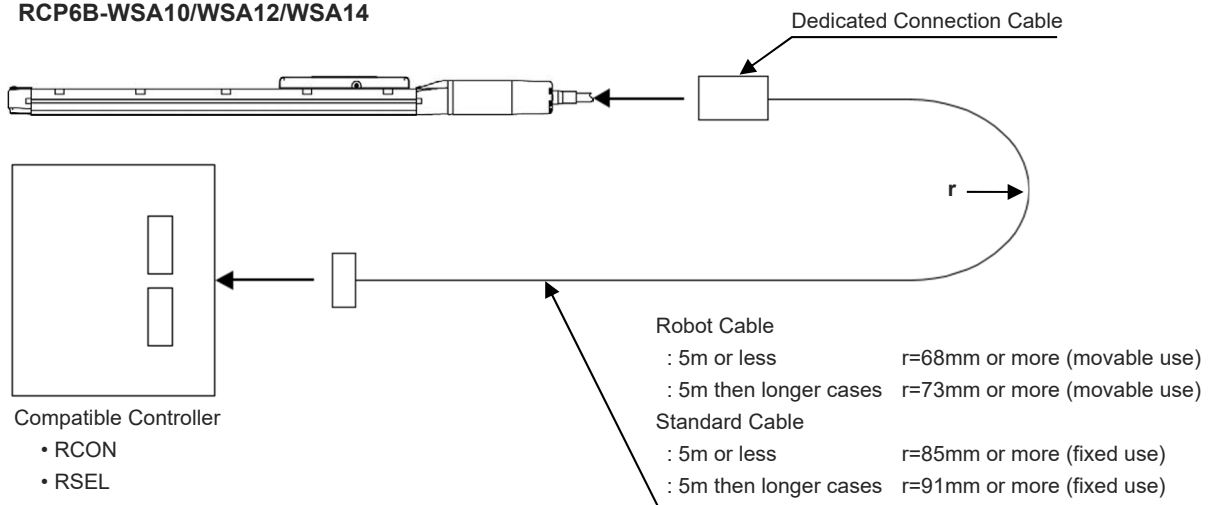
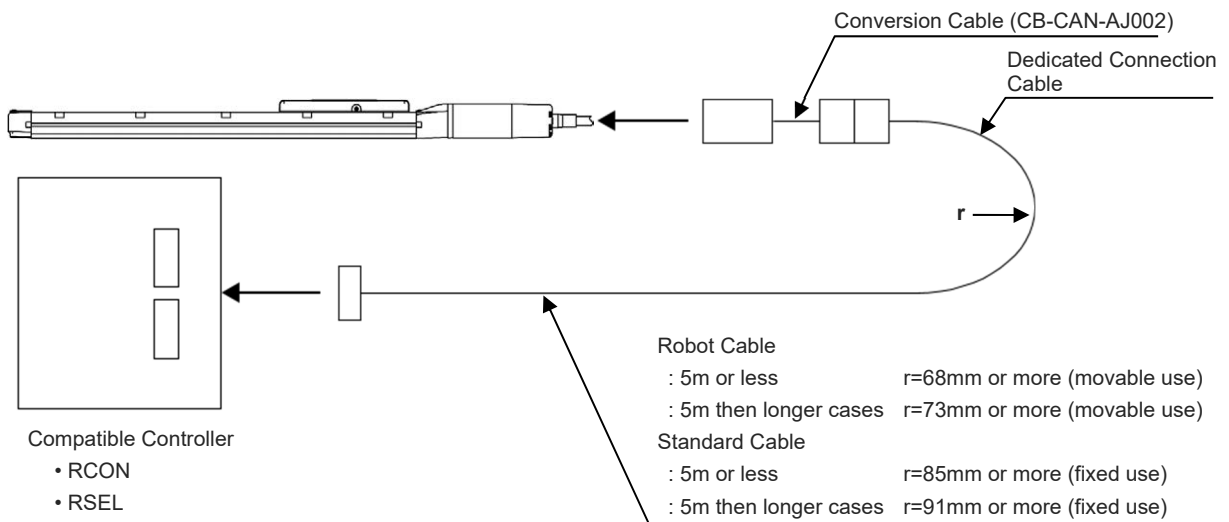


Dedicated Connection Cable Model Code

Cable	WSA10, WSA12, WSA14	WSA16
Motor Encoder Integrated Cable	CB-CAN-MPA□□□	CB-CFA3-MPA□□□
Motor Encoder Integrated Robot Cable	CB-CAN-MPA□□□-RB	CB-CFA3-MPA□□□-RB
Motor Encoder Integrated Cable 4-way Connector Type	CB-CAN2-MPA□□□	—
Motor Encoder Integrated Robot Cable 4-way Connector Type	CB-CAN2-MPA□□□-RB	—

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

[2] Connection of compatible controllers P5 and P6

RCP6B-WSA10/WSA12/WSA14**RCP6B-WSA16**

Dedicated Connection Cable Model Code

Cable	WSA10, WSA12, WSA14	WSA16
Motor Encoder Integrated Cable	CB-ADPC-MPA□□□	CB-ADPC-MPA□□□
Motor Encoder Integrated Robot Cable	CB-ADPC-MPA□□□-RB	CB-ADPC-MPA□□□-RB
Motor Encoder Integrated Cable 4-way Connector Type	CB-ADPC2-MPA□□□	CB-ADPC2-MPA□□□
Motor Encoder Integrated Robot Cable 4-way Connector Type	CB-ADPC2-MPA□□□-RB	CB-ADPC2-MPA□□□-RB
Conversion Cable	—	CB-CAN-AJ002

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



Warning

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

- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or re-joint it.
- Hold the dedicated cable to avoid mechanical force being applied to the terminals and connectors.
- Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
- In case a dedicated cable is to be used at a moving part, make sure to lay out the cable without applying any force to pull the connector or extreme bend on the cable. Do not attempt to use the cable with a bending radius below the allowable value.
- Make certain that the connectors are plugged properly. Insufficient connection may cause an operation error, thus it is extremely risky.
- Do not lay out the cables to where the machine runs over them.
- Pay attention to the cable layout so it would not hit peripherals during an operation. In case it does, have an appropriate protection such as a cable carrier.
- When a cable is used hanging on the ceiling, prevent an environment that the cable swings with acceleration or wind velocity.

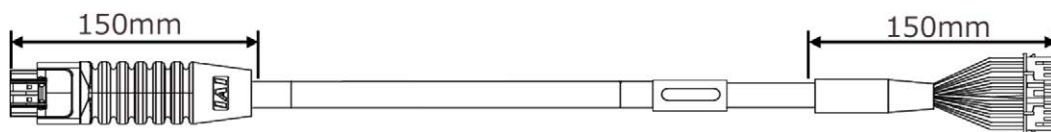
- Make sure there is not too much friction inside the cable storage equipment.
- Do not apply radiated heat to power line or cables.
- Do not bend the cable in the area from the connector tip inward to 150mm on both ends.

Motor • Encoder Integrated Cables

CB-CAN-MPA□□□, CB-CFA3-MPA□□□,
CB-ADPC-MPA□□□

Motor • Encoder Integrated Cables Robot Type

CB-CAN-MPA□□□-RB, CB-CFA3-MPA□□□-RB,
CB-ADPC-MPA□□□-RB



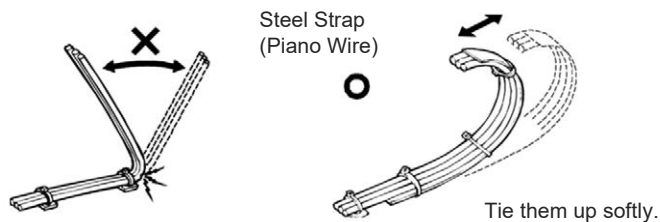
- Do not attempt to use the motor / encoder cable in a condition that the cable is bundled up in several layers such as coil winding.

There are motor driving power line and encoder signal line in the motor / encoder cable.

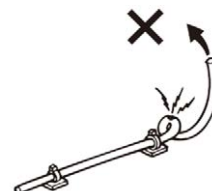
Therefore, if the motor / encoder cable is bundled up, the noise generated from the motor driving power line could give an influence to the encoder and may cause an error.



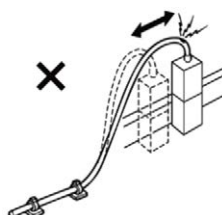
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



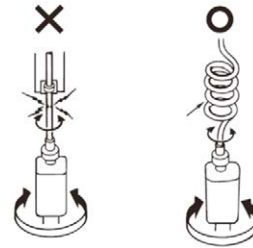
- Do not let the cable bend, kink or twist.



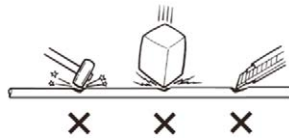
- Do not pull the cable with a strong force.



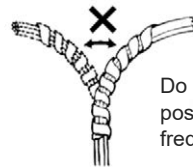
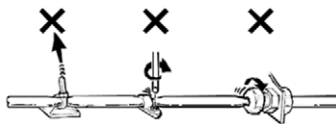
- Pay attention not to concentrate the twisting force to one point on a cable.



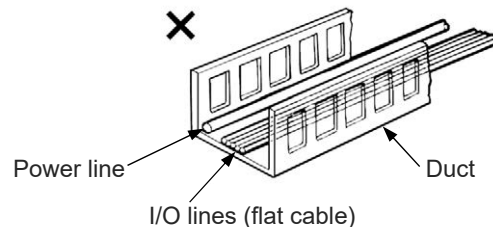
- Do not pinch, drop a heavy object onto or cut the cable.



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

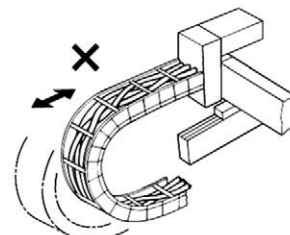
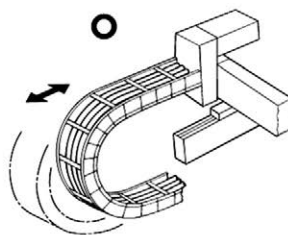
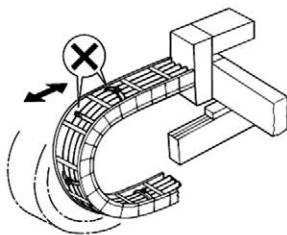


- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable 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.



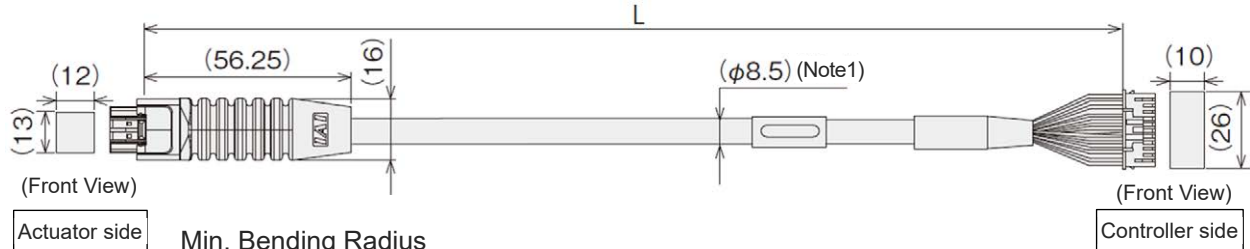
3.2 Motor • Encoder Cables

3.2.1 Dedicated connection cable for compatible controllers P3 and P4

[1] Motor • Encoder Integrated Cable Standard Connector (Refer to [3] for SA8)

Model code **CB-CAN-MPA□□□ / CB-CAN-MPA□□□-RB** (Robot Cable)

(□□□ indicates the cable length L, Example: 030=3m), Max.20m



Min. Bending Radius

When cable length is 5m or less 68mm (for movable use)

When cable length is more than 5m 73mm (for movable use)

* A robot cable is a cable with high bending resistance performance.
A robot cable is to be used when cables laid through in a cable carrier.

(Note 1) It should be $\phi 9.1$ when the cable length is 5m or more.

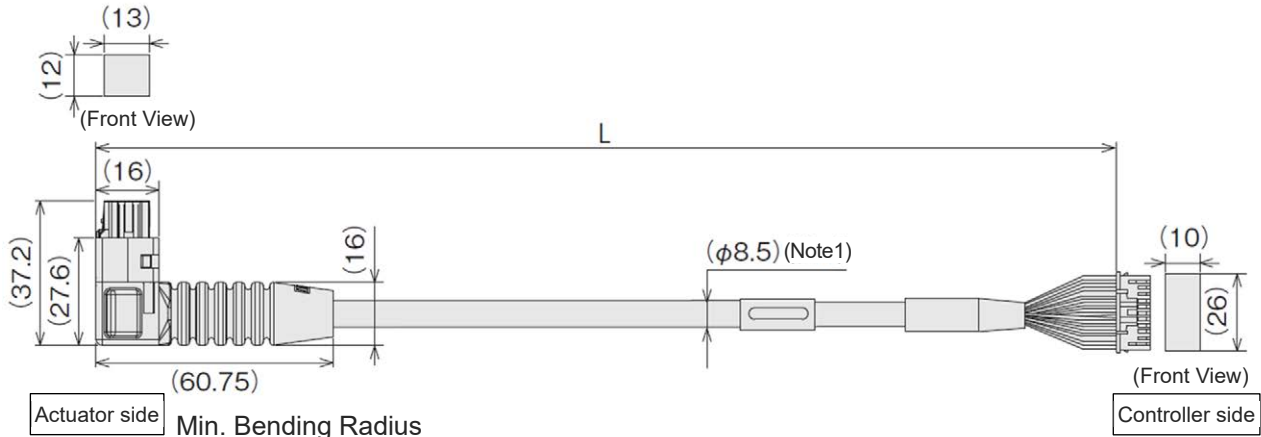
Connection diagram

DF62DL-24S-2.2C (Hirose)					PADP-24V-1-S (JST)	
Standard Cable	Color (Thickness)		Symbol	Pin No.	Pin No.	Symbol
	July 2022 and later	July 2022 and earlier				
Blue (AWG22/19)	Black (AWG22/19)	Blue (AWG22/19)	ϕA	3	1	ϕA
Orange (AWG22/19)	White (AWG22/19)	Orange (AWG22/19)	VMM	5	2	VMM
Brown (AWG22/19)	Green (AWG22/19)	Brown (AWG22/19)	ϕB	10	3	ϕB
Gray (AWG22/19)	Yellow (AWG22/19)	Gray (AWG22/19)	VMM	9	4	VMM
Green (AWG22/19)	Brown (AWG22/19)	Green (AWG22/19)	ϕ_A	4	5	ϕ_A
Red (AWG22/19)	Red (AWG22/19)	Red (AWG22/19)	ϕ_B	15	6	ϕ_B
Light Blue (AWG26)	White (AWG26)	Light Blue (AWG26)	SA [mABS]	12	11	SA [mABS]
Orange (AWG26)	Yellow (AWG26)	Orange (AWG26)	SB [mABS]	17	12	SB [mABS]
Green (AWG26)	Red (AWG26)	Green (AWG26)	A+	1	13	A+
Brown (AWG26)	Green (AWG26)	Brown (AWG26)	A-	6	14	A-
Gray (AWG26)	Black (AWG26)	Gray (AWG26)	B+	11	15	B+
Red (AWG26)	Brown (AWG26)	Red (AWG26)	B-	16	16	B-
Black (AWG26)	Blue (AWG26)	Black (AWG26)	VPS	18	18	VPS
Yellow (AWG26)	Pink (AWG26)	Yellow (AWG26)	LS+	8	7	LS+
Light Blue (AWG26)	Black (AWG26)	Light Blue (AWG26)	BK+	20	9	BK+
Orange (AWG26)	Brown (AWG26)	Orange (AWG26)	BK-	2	10	BK-
Gray (AWG26)	White (AWG26)	Gray (AWG26)	VCC	21	17	VCC
Red (AWG26)	Yellow (AWG26)	Red (AWG26)	GND	7	19	GND
Brown (AWG26)	Red (AWG26)	Brown (AWG26)	LS-	14	8	LS-
Green (AWG26)	Green (AWG26)	Green (AWG26)	LS_GND	13	20	LS_GND
—	—	—	—	19	22	—
Pink (AWG26)	Orange (AWG26)	Pink (AWG26)	CF_VCC	22	21	CF_VCC
—	—	—	—	23	23	—
Black (AWG26)	Green (AWG26)	Black (AWG26)	FG	24	24	FG

Standard :Purple (AWG26)
Robot : Gray (AWG26)

[2] Motor • Encoder Integrated Cable 4-way Connector

Model code **CB-CAN2-MPA□□□ / CB-CAN2-MPA□□□-RB** (Robot Cable)
(□□□ indicates the cable length L, Example: 030=3m), Max.20m



Min. Bending Radius
When cable length is 5m or less 68mm (for movable use)
When cable length is more than 5m 73mm (for movable use)

* A robot cable is a cable with high bending resistance performance.
A robot cable is to be used when cables laid through in a cable carrier.

(Note 1) It should be φ9.1 when the cable length is 5m or more.

Connection diagram

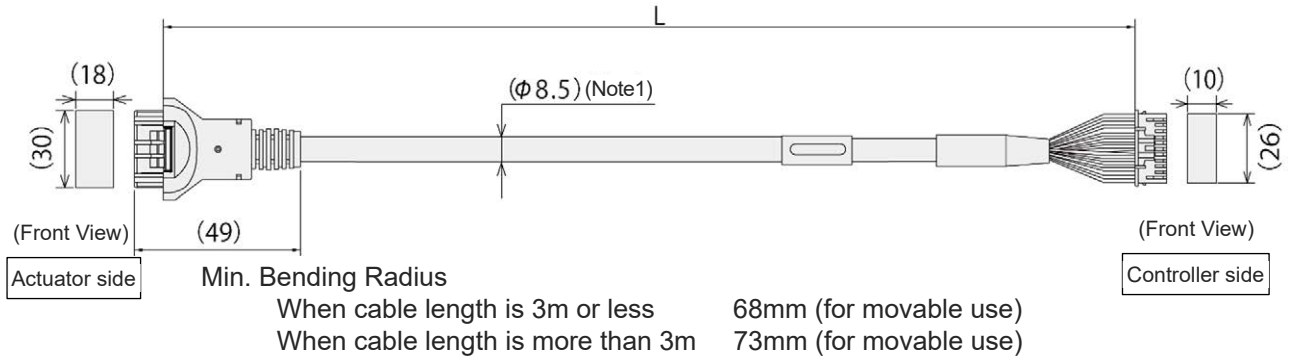
DF62DL-24S-2.2C (Hirose)					PADP-24V-1-S (JST)		
Color (Thickness)			Symbol	Pin No.		Pin No.	Symbol
Standard Cable	Robot Cable						
	July 2022 and later	July 2022 and earlier					
Blue (AWG22/19)	Black (AWG22/19)	Blue (AWG22/19)	ΦA	3		1	ΦA
Orange (AWG22/19)	White (AWG22/19)	Orange (AWG22/19)	VMM	5		2	VMM
Brown (AWG22/19)	Green (AWG22/19)	Brown (AWG22/19)	ΦB	10		3	ΦB
Gray (AWG22/19)	Yellow (AWG22/19)	Gray (AWG22/19)	VMM	9		4	VMM
Green (AWG22/19)	Brown (AWG22/19)	Green (AWG22/19)	Φ_A	4		5	Φ_A
Red (AWG22/19)	Red (AWG22/19)	Red (AWG22/19)	Φ_B	15		6	Φ_B
Light Blue (AWG26)	White (AWG26)	Light Blue (AWG26)	SA [mABS]	12		11	SA [mABS]
Orange (AWG26)	Yellow (AWG26)	Orange (AWG26)	SB [mABS]	17		12	SB [mABS]
Green (AWG26)	Red (AWG26)	Green (AWG26)	A+	1		13	A+
Brown (AWG26)	Green (AWG26)	Brown (AWG26)	A-	6		14	A-
Gray (AWG26)	Black (AWG26)	Gray (AWG26)	B+	11		15	B+
Red (AWG26)	Brown (AWG26)	Red (AWG26)	B-	16		16	B-
Black (AWG26)	Blue (AWG26)	Black (AWG26)	VPS	18		18	VPS
Yellow (AWG26)	Pink (AWG26)	Yellow (AWG26)	LS+	8		7	LS+
Light Blue (AWG26)	Black (AWG26)	Light Blue (AWG26)	BK+	20		9	BK+
Orange (AWG26)	Brown (AWG26)	Orange (AWG26)	BK-	2		10	BK-
Gray (AWG26)	White (AWG26)	Gray (AWG26)	VCC	21		17	VCC
Red (AWG26)	Yellow (AWG26)	Red (AWG26)	GND	7		19	GND
Brown (AWG26)	Red (AWG26)	Brown (AWG26)	LS-	14		8	LS-
Green (AWG26)	Green (AWG26)	Green (AWG26)	LS_GND	13		20	LS_GND
—	—	—	—	19		22	—
Pink (AWG26)	Orange (AWG26)	Pink (AWG26)	CF_VCC	22		21	CF_VCC
—	—	—	—	23		23	—
Black (AWG26)	Green (AWG26)	Black (AWG26)	FG	24		24	FG

Standard :Purple (AWG26)
Robot : Gray (AWG26)

[3] Motor • Encoder Integrated Cable (For SA8)

Model code **CB-CFA3-MPA□□□ / CB-CFA3-MPA□□□-RB** (Robot Cable)

(□□□ indicates the cable length L, Example: 030=3m), Max.20m



* A robot cable is a cable with high bending resistance performance.
A robot cable is to be used when cables laid through in a cable carrier.

(Note 1) It should be $\phi 9.1$ when the cable length is 3m or more.

Connection diagram

1-1827863-1 (AMP)

PADP-24V-1-S (JST)

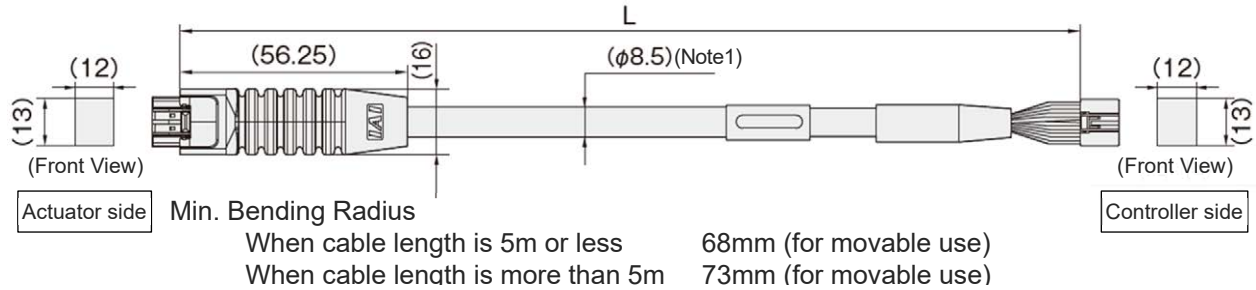
Color (Thickness)			Symbol	Pin No.		Pin No.	Symbol
Standard Cable	Robot Cable						
	July 2022 and later	July 2022 and earlier					
Blue (AWG22/19)	Black (AWG22/19)	Blue (AWG22/19)	ΦA	A1		1	ΦA
Orange (AWG22/19)	White (AWG22/19)	Orange (AWG22/19)	VMM	B1		2	VMM
Green (AWG22/19)	Brown (AWG22/19)	Green (AWG22/19)	Φ_A	A2		5	Φ_A
Brown (AWG22/19)	Green (AWG22/19)	Brown (AWG22/19)	ΦB	B2		3	ΦB
Gray (AWG22/19)	Yellow (AWG22/19)	Gray (AWG22/19)	VMM	A3		4	VMM
Red (AWG22/19)	Red (AWG22/19)	Red (AWG22/19)	Φ_B	B3		6	Φ_B
Light Blue (AWG26)	White (AWG26)	Light Blue (AWG26)	SA [mABS]	A6		11	SA [mABS]
Orange (AWG26)	Yellow (AWG26)	Orange (AWG26)	SB [mABS]	B6		12	SB [mABS]
Green (AWG26)	Red (AWG26)	Green (AWG26)	A+	A7		13	A+
Brown (AWG26)	Green (AWG26)	Brown (AWG26)	A-	B7		14	A-
Gray (AWG26)	Black (AWG26)	Gray (AWG26)	B+	A8		15	B+
Red (AWG26)	Brown (AWG26)	Red (AWG26)	B-	B8		16	B-
Black (AWG26)	Blue (AWG26)	Black (AWG26)	VPS	B9		18	VPS
Yellow (AWG26)	Pink (AWG26)	Yellow (AWG26)	LS+	A4		7	LS+
Light Blue (AWG26)	Black (AWG26)	Light Blue (AWG26)	BK+	A5		9	BK+
Orange (AWG26)	Brown (AWG26)	Orange (AWG26)	BK-	B5		10	BK-
Green (AWG26)	Green (AWG26)	Green (AWG26)	LS_GND	A9		20	LS_GND
Brown (AWG26)	Red (AWG26)	Brown (AWG26)	LS-	B4		8	LS-
Gray (AWG26)	White (AWG26)	Gray (AWG26)	VCC	A10		21	VCC
Red (AWG26)	Yellow (AWG26)	Red (AWG26)	GND	B10		19	GND
—	—	—	—	A11		17	—
Black	Green (AWG26)	Green (AWG26)	FG	B11		22	—
						23	—
						24	FG

3.2.2 Dedicated connection cable for compatible controllers P5 and P6

[1] Motor • Encoder Integrated Cable Standard Connector

Model code **CB-ADPC-MPA□□□ / CB-ADPC-MPA□□□-RB** (Robot Cable)

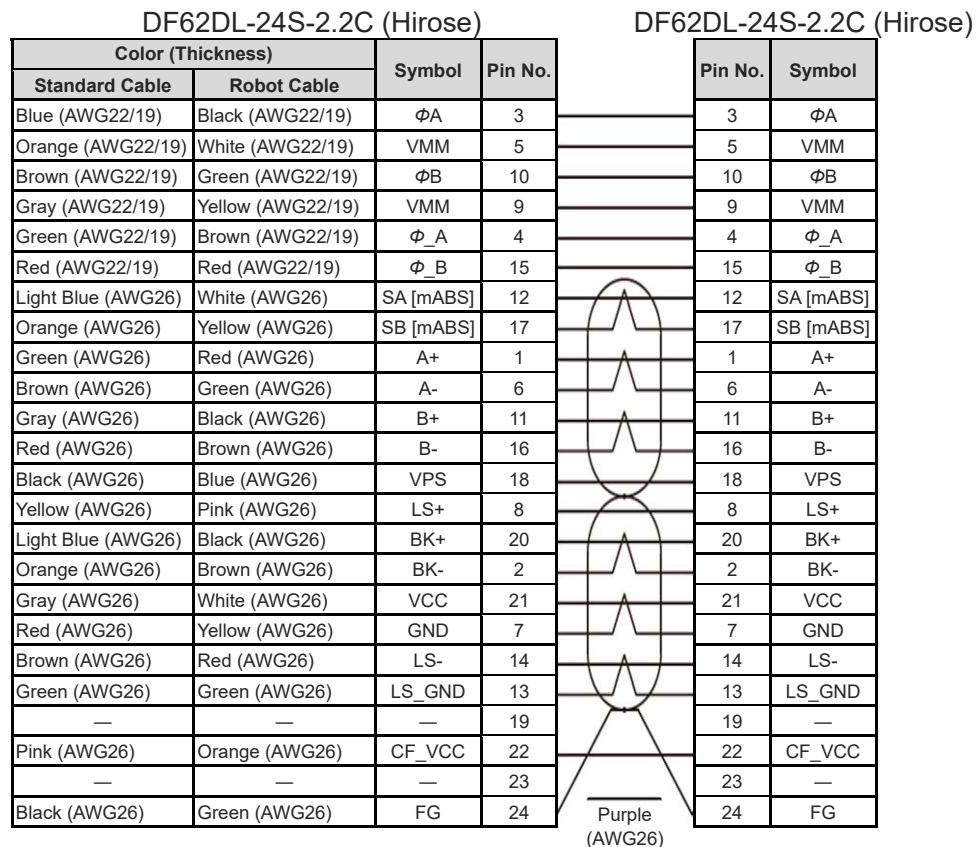
(□□□ indicates the cable length L, Example: 030=3m), Max.20m



* A robot cable is a cable with high bending resistance performance.
A robot cable is to be used when cables laid through in a cable carrier.

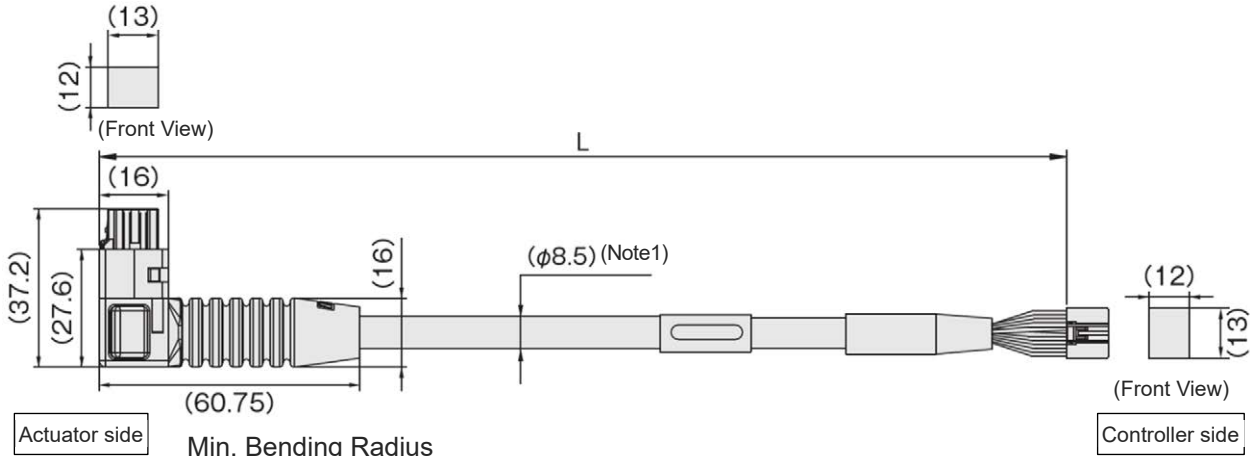
(Note 1) It should be $\phi 9.1$ when the cable length is 3m or more.

Connection diagram



[2] Motor • Encoder Integrated Cable 4-way Connector

Model code CB-ADPC2-MPA□□□ / CB-ADPC2-MPA□□□-RB (Robot Cable)
(□□□ indicates the cable length L, Example: 030=3m), Max.20m



Min. Bending Radius
When cable length is 5m or less 68mm (for movable use)
When cable length is more than 5m 73mm (for movable use)

* A robot cable is a cable with high bending resistance performance.
A robot cable is to be used when cables laid through in a cable carrier.

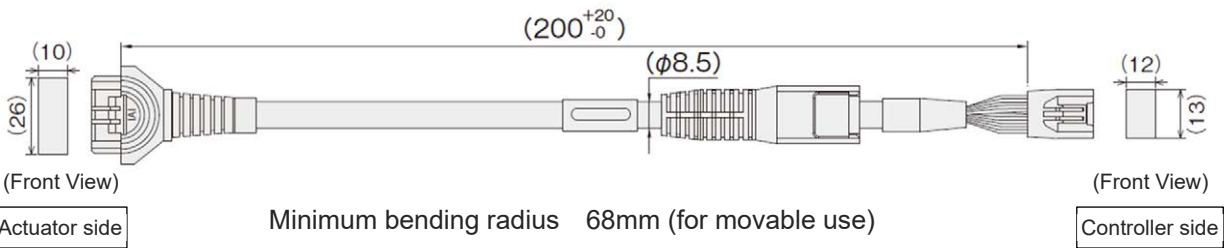
(Note 1) It should be φ9.1 when the cable length is 5m or more.

Connection diagram

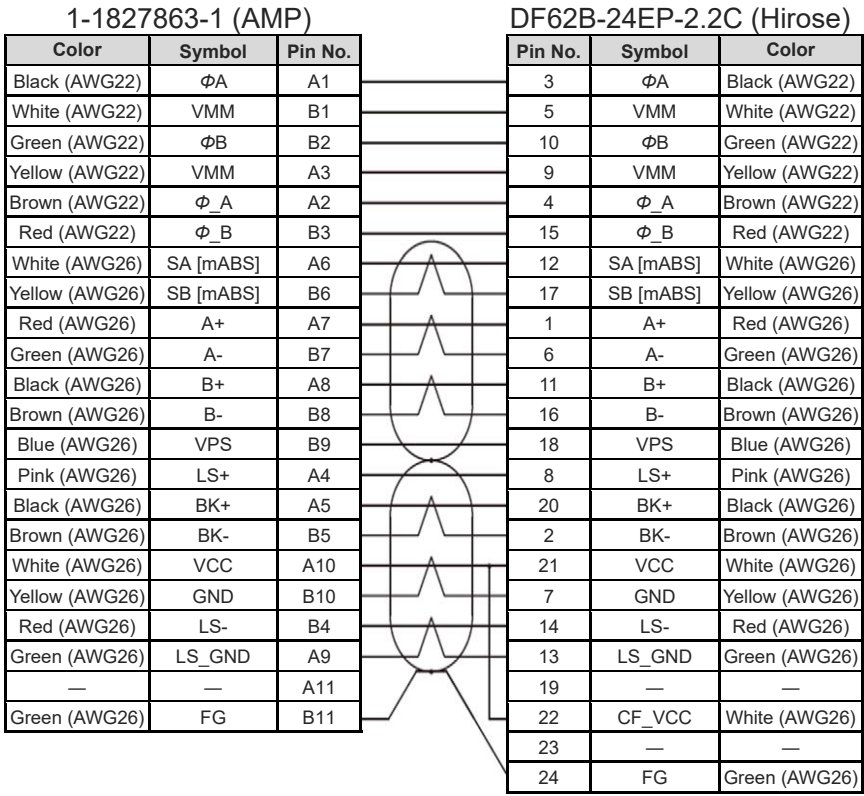
DF62DL-24S-2.2C (Hirose)			DF62DL-24S-2.2C (Hirose)		
Color (Thickness)	Symbol	Pin No.	Pin No.	Symbol	
Black (AWG22/19)	φA	3	3	φA	
White (AWG22/19)	VMM	5	5	VMM	
Green (AWG22/19)	φB	10	10	φB	
Yellow (AWG22/19)	VMM	9	9	VMM	
Brown (AWG22/19)	φ_A	4	4	φ_A	
Red (AWG22/19)	φ_B	15	15	φ_B	
White (AWG26)	SA [mABS]	12	12	SA [mABS]	
Yellow (AWG26)	SB [mABS]	17	17	SB [mABS]	
Red (AWG26)	A+	1	1	A+	
Green (AWG26)	A-	6	6	A-	
Black (AWG26)	B+	11	11	B+	
Brown (AWG26)	B-	16	16	B-	
Blue (AWG26)	VPS	18	18	VPS	
Pink (AWG26)	LDC_VCC	8	8	LS+	LDC_VCC
Black (AWG26)	BK+	20	20	BK+	
Brown (AWG26)	BK-	2	2	BK-	
White (AWG26)	VCC	21	21	VCC	
Yellow (AWG26)	GND/LDC_GND	7	7	GND	GND/LDC_GND
Red (AWG26)	LDC_SD+	14	14	LS-	LDC_SD+
Green (AWG26)	LDC_SD-	13	13	LS_GN	LDC_SD-
—	—	19	19	—	
Orange (AWG26)	CF_VCC	22	22	CF_VCC	
—	—	23	23	—	
Green (AWG26)	FG	24	24	FG	

[3] Conversion Cable

Model code **CB-CAN-AJ002** Cable length 0.2m



Connection diagram



ROBO Cylinder

Chapter 4

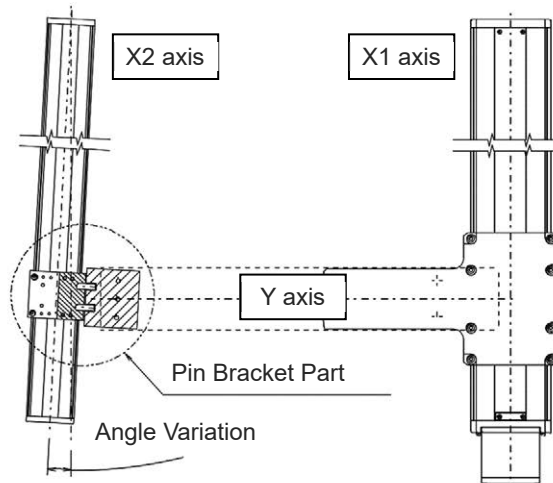
Operation

4.1	Caution for Operation	4-1
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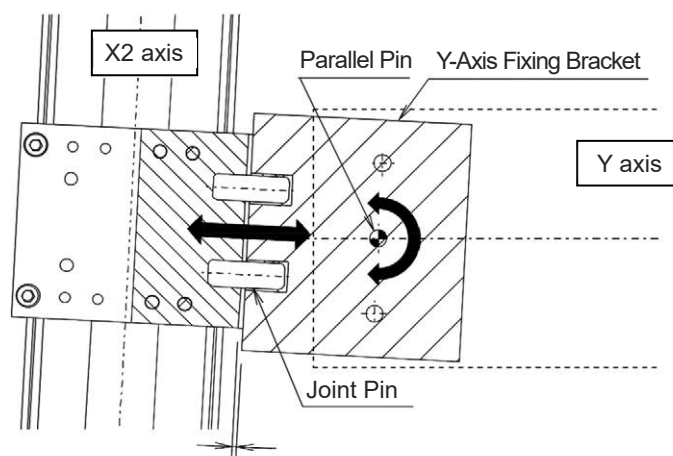
4.1 Caution for Operation

- 1) When performing pressing operation with the slider type, adjust the pressing current so the reaction force moment generated by the pressing force will not exceed 80% of the allowable dynamic moment.
- 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.
- 3) 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.

<<Top View for Gantry Assembly>>



<< Detail of Pin Bracket Part >>



ROBO Cylinder

Chapter 5

Maintenance and Inspection

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5.1 Precautions for maintenance and inspection work

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



Caution

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



Notice

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

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

Also, it is recommended to improve the environmental conditions in case the grease changes color notably due to poor operating conditions.

- Base oil may separate from the grease due to the mounting orientation or operating conditions.

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

Check visually for oil drips when supplying grease.

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

Supply grease before the start of use.

For details, refer to [5.5 Grease Supply].

5.2 Inspection

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.

5.2.1 Inspection items and schedule

Period of Time	External Visual Inspection	Internal Inspection	Grease Supply ^(Note 1)
Start of work inspection	○		
1 month inspection	○		
3 month inspection			○
3 months after starting operation			Depends on grease supply timing (reference)
6 months inspection	○	○ (Note 2)	
Every 6 months thereafter	○	○ (Note 2)	

Note 1 Grease film may run out if the actuator is moved back and forth continuously over a distance of 30mm or less. As a guide, perform a back-and-forth operation five times or so over a distance of 50mm or more after a back-and-forth operation over such short distance has been repeated 5,000 to 10,000 times. This will restore oil film.

Note 2 Check the condition of grease, and wipe off the grease before supplying new in case it is extremely dirty.

5.2.2 Grease Supply Timing (Reference)

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

Maximum Speed of Use (mm/s)	Grease Supply Timing (Reference)	
	Operated distance	Months
0 to 750 or less	1,250km	6 months
750 to 840	2,500km	

5.3 Visual Inspection

5.3.1 External Visual Inspection

An external visual inspection should check the following things.

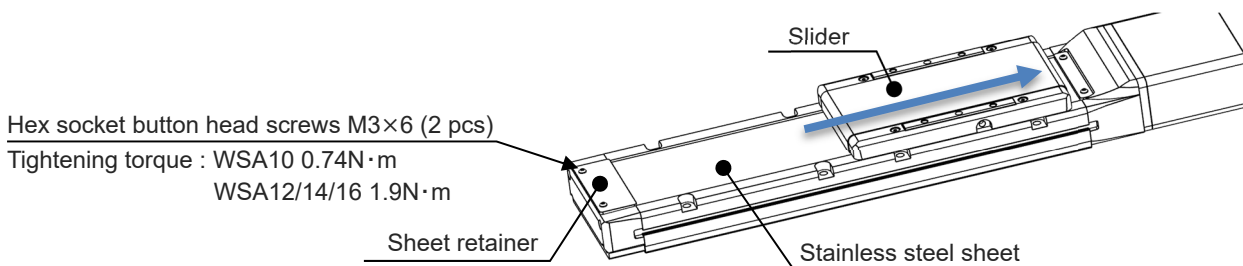
Inspection items	Maintenance work
Is abnormal noise or vibration generated?	Take an action by referring to [Troubleshooting in Controller Instruction Manual].
Are actuator mounting bolts loose?	Tighten them further.
Is the cable scratched?	Replace if the damage is severe.
Is the connector loose?	Re-insert 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.

5.3.2 Internal visual inspection

[1] Inspection Items Inside Slider and How to Inspect

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

1. Move the slider to the motor end.
2. Remove the hex socket button head screws (2 pcs) and take the sheet retainer off.
3. Pull up the stainless steel sheet and inspect inside.
4. Attach the stainless steel sheet with the hex socket button head screws (2 pcs).
5. Slide the slider back and forth in the range of stroke to confirm there is no looseness.



Caution

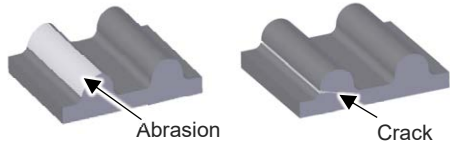
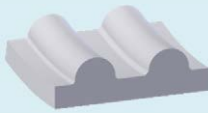
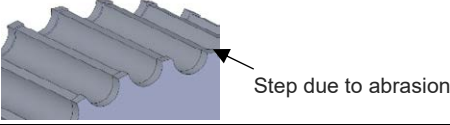
- Do not bend the stainless steel sheet forcefully or damage it during internal inspection. Do not tug on the stainless steel sheet or in any way attempt to reposition it. Change in the attached condition may cause the sheet to be mounted unevenly or impact the product life.
- Keep in mind that the edges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

[2] Inspection items and how to inspect on timing belt on motor reversing type

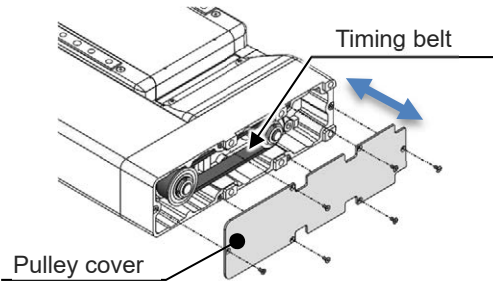
Application : WSA10R, WSA12R, WSA14R, WSA16R

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

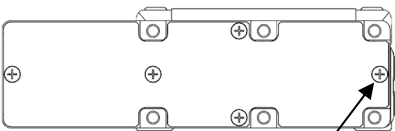
As abrasion and degradation of a belt could go along as it is used time by time, it is necessary to check the following inspection items for the motor reversed type.

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

1. Remove the hex socket flat-head screws and take the pulley cover off.
2. Check the condition of the timing belt visually.
3. Attach the pulley cover with the hex socket flat-head screw.

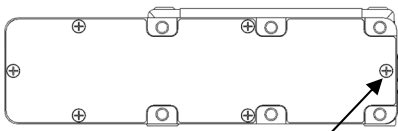


WSA10R



Hex socket flat-head screw M3×6 (5 pcs)
Tightening torque : 0.73N·m

WSA12R, WSA14R, WSA16R



Hex socket flat-head screw M3×6 (6 pcs)
Tightening torque : 0.73N·m

5.4 Cleaning

5.4.1 External cleaning

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

5.4.2 Internal cleaning

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

5.5 Grease Supply

5.5.1 Grease used

Model	Applied Area	At Maintenance (recommended product)	Factory Default
WSA10 WSA12 WSA14 WSA16	Ball Screw	IAI Corporation IAGR-LDP01-400	IAI Corporation IAGR-LDP01-400
	Guide		
	Coupling Spacer	NOK Corporation NOXLUB TL1013 (Lithium Based Grease)	NOK Corporation NOXLUB TL1013 (Lithium Based Grease)



Caution

- Do not attempt to use any grease other than the specified grease above. If it is mixed with other grease, not only will the grease performance be impaired, but it may also cause damage to the actuator.

5.5.2 Grease Supply procedure



Caution

- Supplying too much grease may increase sliding resistance and load to the motor, resulting in a drop of performance.
Also, excess grease on the ball screw may be splashed around in the ambience.
- In case the grease got into your eye, rinse it off with clean water for 15 minutes and immediately go see the doctor to get appropriate care.
- After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease OFF.

◆ Preparation

- Phillips screwdriver
- Grease Gun

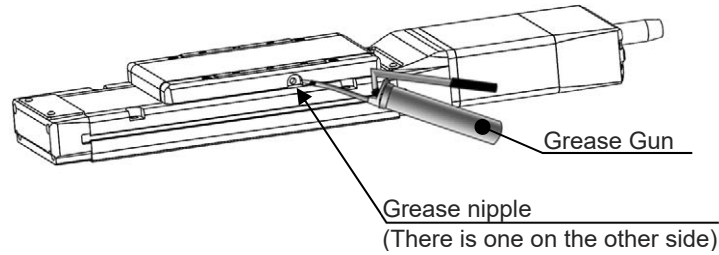
Grease Gun	Nozzle	Supplier of nozzle
Grease gun of mounting screw R1/8 (Example) GC-57K (Yamada Corporation)	NZ3	NSK

- Grease

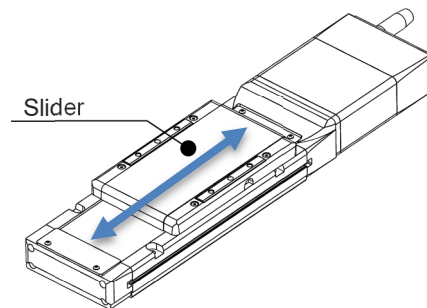
Type	Amount of Grease Supply (Reference)	Grease Nipple Diameter
WSA10	1.5cc to 2.0cc	φ3.5
WSA12	1.5cc to 2.0cc	φ6.0
WSA14	2.0cc to 2.5cc	
WSA16	3.0cc to 3.5cc	

◆ Grease Supply Procedure

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



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



3. Wipe off excess grease.

5.6 Replacing Components

5.6.1 Stainless steel sheet replacement/adjustment

◆ Preparation

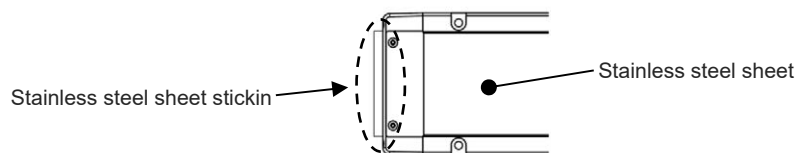
- Hex wrench Parallel Faces: 2mm (WSA10), 2.5mm (WSA12/WSA14/WSA16)
- Protection Gear (e.g. Cotton Work Gloves)
- Tape
- Scissors
- Replacement stainless steel sheet

Type	Model Code
WSA10	ST-6WA10-(Stroke)
WSA12	ST-6WA12-(Stroke)
WSA14	ST-6WA14-(Stroke)
WSA16	ST-6WA16-(Stroke)



Caution

- Degradation and wear-out of the stainless steel sheet relies on its tension of attachment. Pulling it with high tension making the gap to the slider cover too big may cause fatigue fracture, and if the tension is too loose, the stainless steel sheet may interfere with the back of the slider cover, which could generate dust.
- Ensure that the stainless steel sheet does not stick out of the end of the actuator when it is mounted. It may lead to a risk of cutting your finger on the stainless steel sheet.



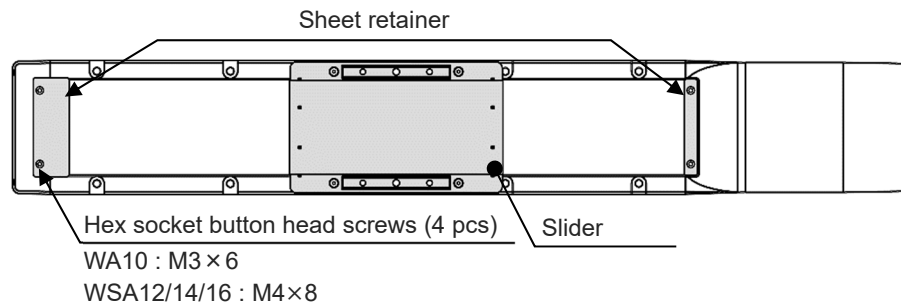
- As a guideline, the stainless steel sheet should last for about 5,000km of motion. However, depending on the usage or environment, replace the stainless steel sheet appropriately.

◆ Procedure for Replacement

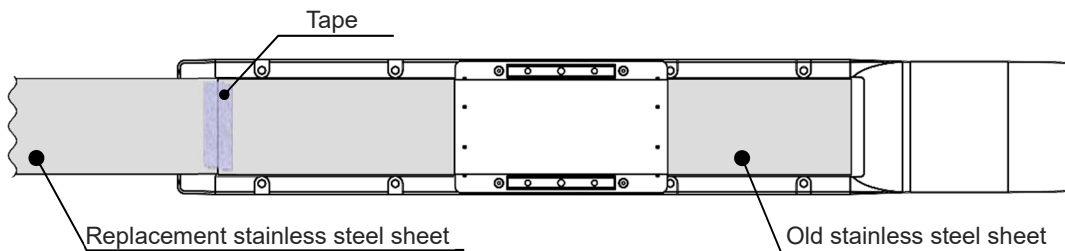
Have procedure of either Procedure 1 or Procedure 2 for replacing and tuning.

● Procedure 1

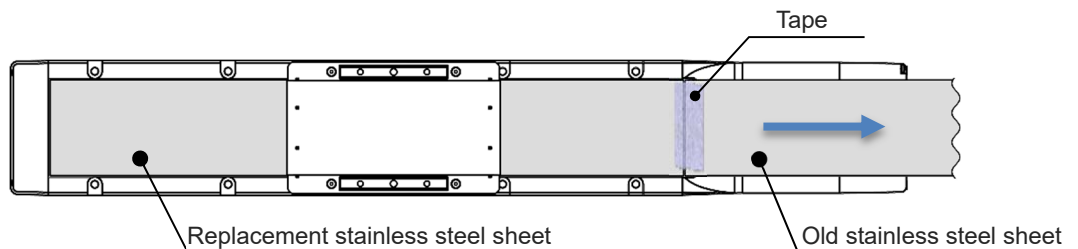
1. Move the slider to the middle of the actuator.
2. Remove the hex socket button head screws (4 pcs) and take the sheet retainers off.



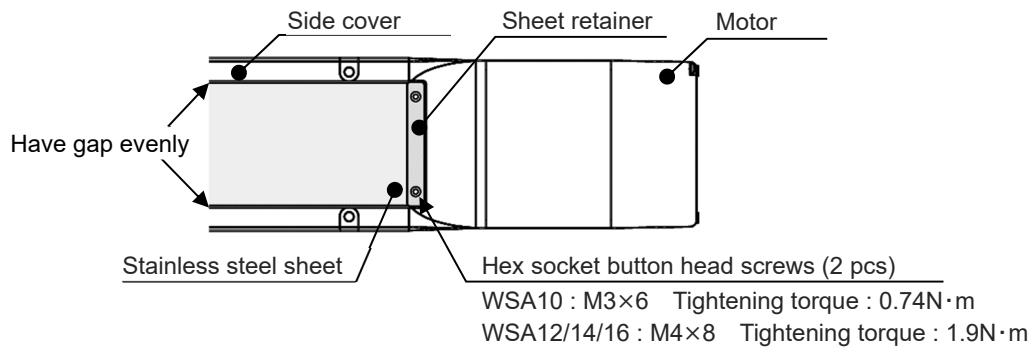
3. Join the old stainless steel sheet with a stainless steel sheet for replacement.
 - * Make sure width of adhesive tape would not go out of the stainless steel sheet width.
 - * Do not duplicate the stainless steel sheets.



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

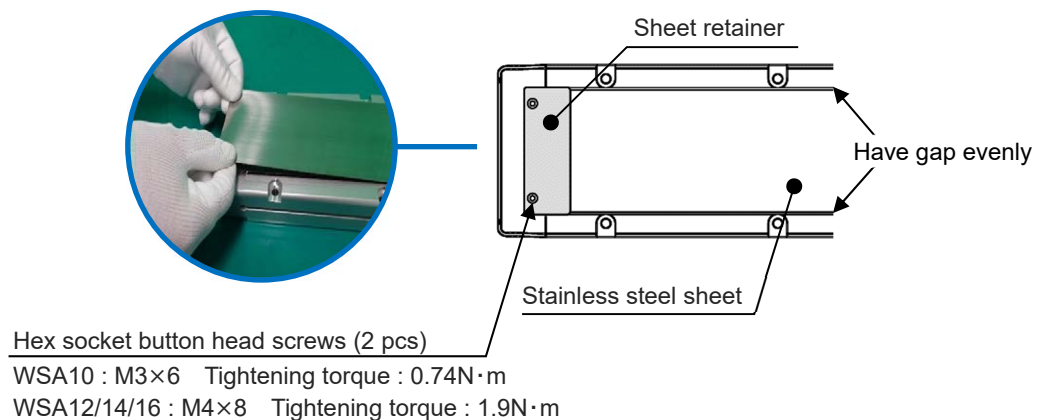


5. Tune the position so the gaps between the stainless steel sheet and the side cover are even on both sides as much as possible, and attach the sheet retainer on the motor side.

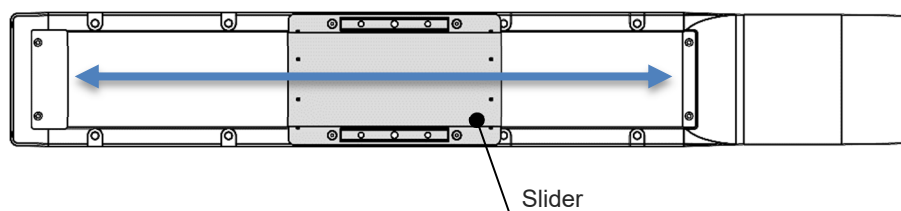


6. Pull the stainless steel sheet on the side opposite the motor softly (with approx. 10N) and attach the sheet retainer.

* It should go back for approx. 0.5mm naturally when it gets let go.

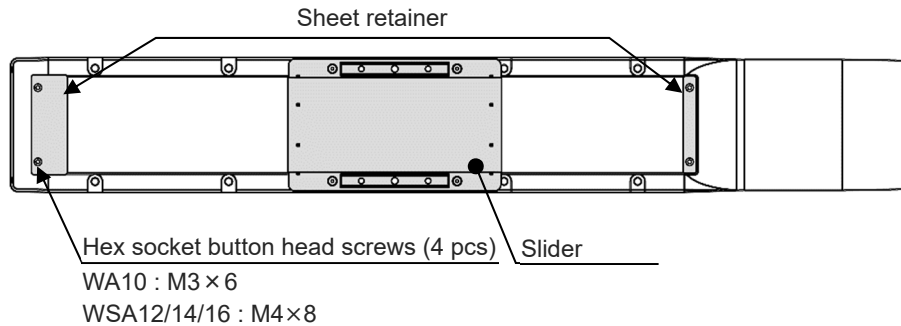


7. Move the slider in the full stroke range to make sure there is no waviness or looseness on the stainless steel sheet. Redo the from Procedure 5 to 6 if there is any problem.

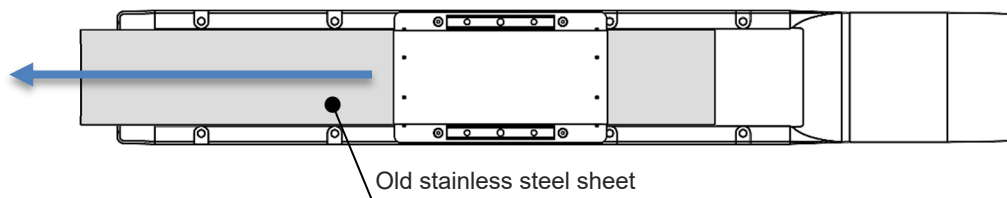


● **Procedure 2**

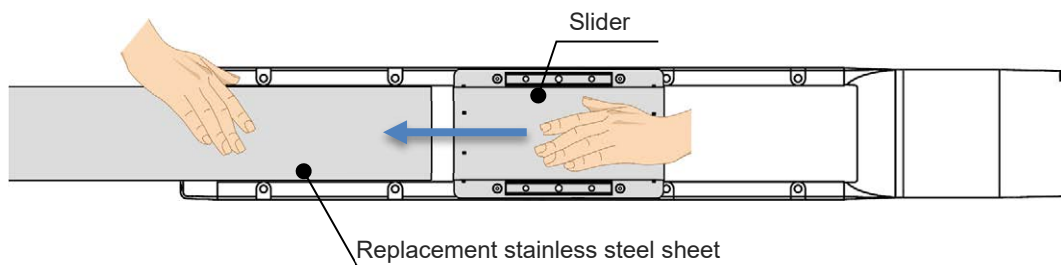
1. Move the slider to the middle of the actuator.
2. Remove the hex socket button head screws (4 pcs) and take the sheet retainers off.



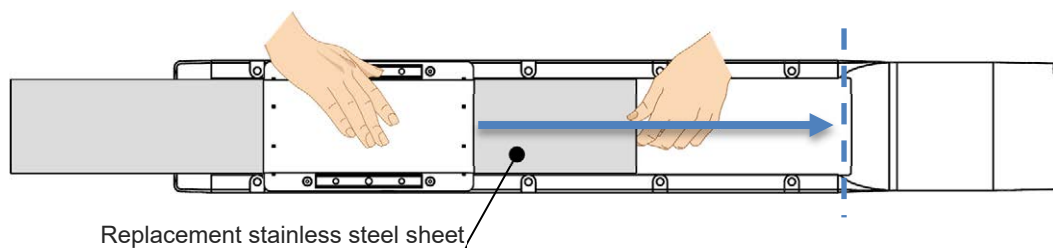
3. Pull out the old stainless steel sheet.



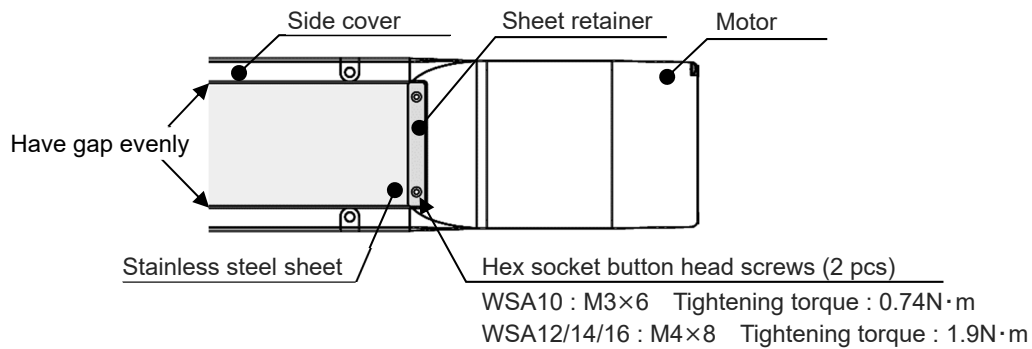
4. Put the stainless steel sheet for replacement on the main body, and move the slider while holding the stainless steel sheet to set the stainless steel sheet through.



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

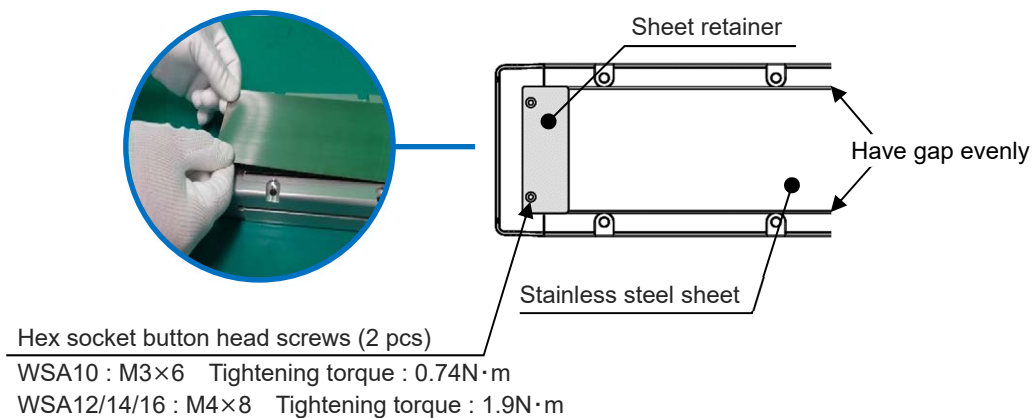


6. Tune the position so the gaps between the stainless steel sheet and the side cover are even on both sides as much as possible, and attach the sheet retainer on the motor side.

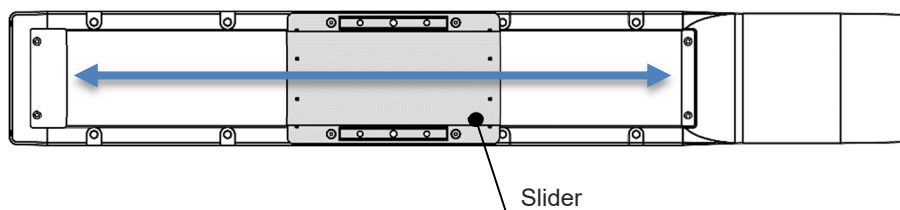


7. Pull the stainless steel sheet on the side opposite the motor softly (with approx. 10N) and attach the sheet retainer.

* It should go back for approx. 0.5mm naturally when it gets let go.



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



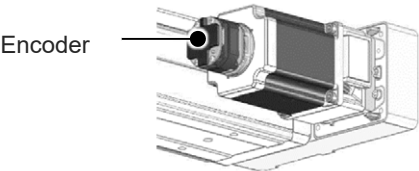
5.6.2 Timing belt replacement/adjustment

Application : WSA10R, WSA12R, WSA14R, WSA16R



Caution

- Do not attempt to touch on the encoder part of the motor directly with hand.
If touched with hands, the encoder phase may change, resulting in an error.

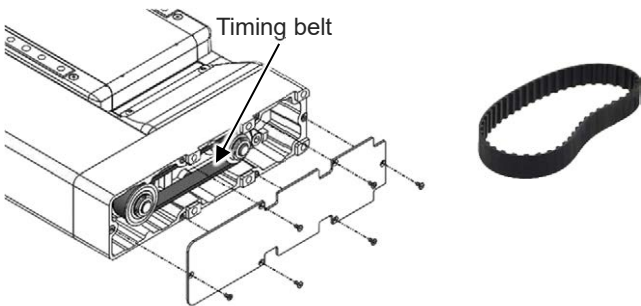


- In case of replacing the timing belt while keeping the vertical orientation, fix the slider in advance. The slider will drop and cause danger.

◆ Preparation

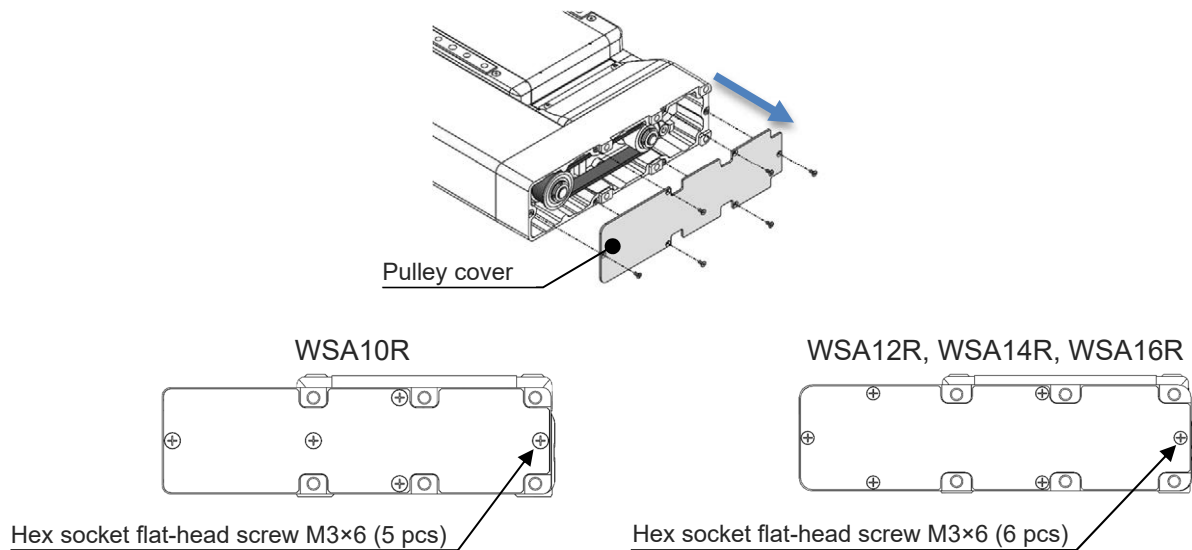
- Hex wrench Parallel Faces: 2mm, 2.5mm (WSA10), 3mm (WSA12/WSA14), 4mm (WSA16)
- Phillips screwdriver
- Tension gauge (capable thing of tensioning to 90N or greater)
- Long zip ties, etc. (thin string)
- Timing belt for replacement

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

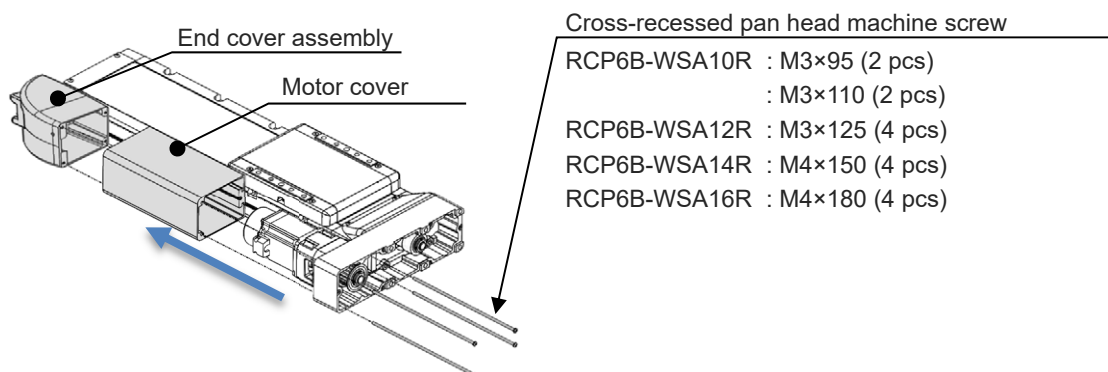


◆ Procedure for Replacement

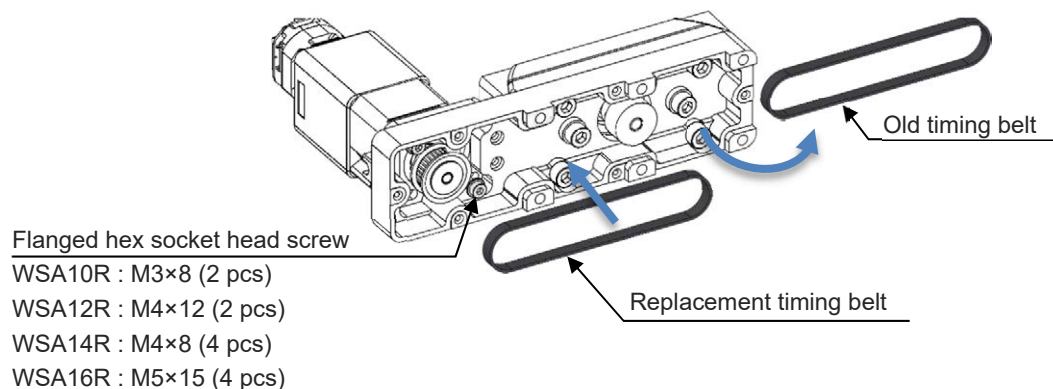
1. Remove the hex socket flat-head screw and take the pulley cover off.



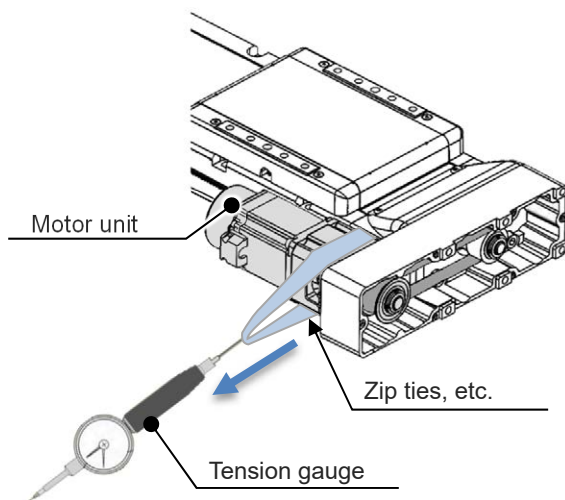
2. Remove the cross-recessed pan head machine screws (4 pcs) and take the motor cover and end cover assembly off.



3. Loosen the flanged hex socket head screw and replace the timing belt

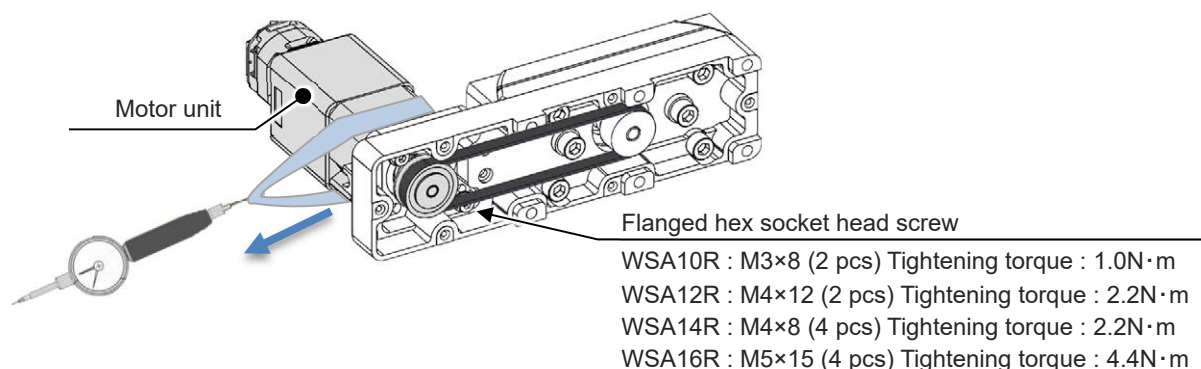


4. Hang a zip ties or equivalent on the motor unit and apply the specified load (tensile strength) with a tension gauge.

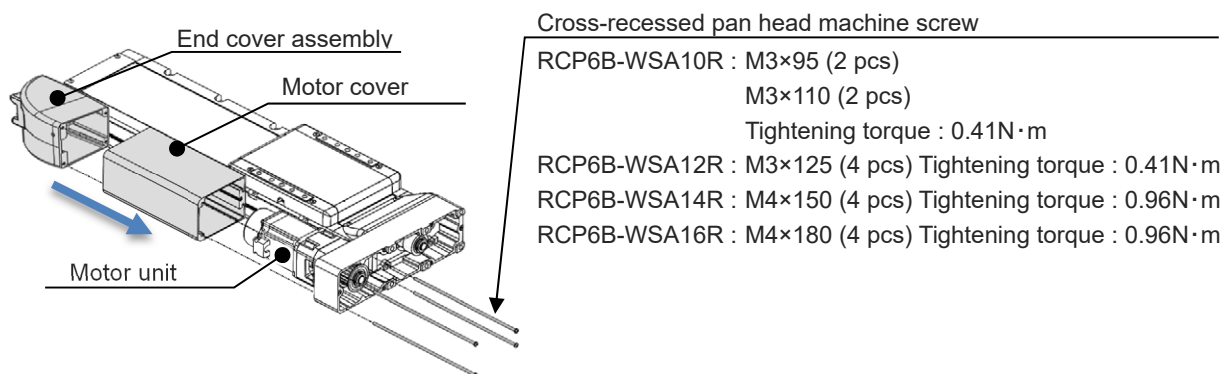


Type	Tensile Strength
WSA10R	2 to 2.6kgf
WSA12R	2 to 2.6kgf
WSA14R	7 to 9.4kgf
WSA16R	11 to 13kgf

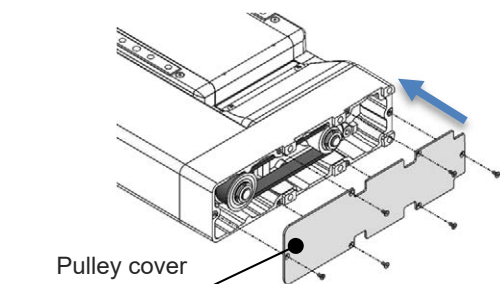
5. While the specified load (tensile strength) is applied, tighten up the flanged hex socket head screw to affix the motor unit.



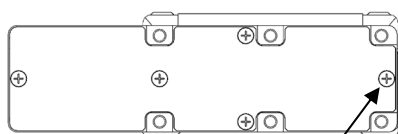
6. Put the motor cover and the end cover assembly over the motor unit and affix them with the cross recessed pan head machine screws (4 pcs).



7. Put the pulley cover on and affix it with the hex socket flat-head screws.

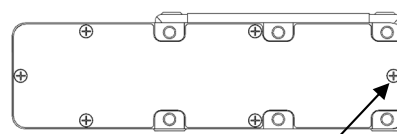


WSA10R



Hex socket flat-head screw M3×6 (5 pcs)
Tightening torque : 0.73N·m

WSA12R, WSA14R, WSA16R



Hex socket flat-head screw M3×6 (6 pcs)
Tightening torque : 0.73N·m

8. Make sure to conduct a home return on a PC teaching software or a touch panel teaching.

5.6.3 Replacement Work of Motor Unit and Coupling Spacer

[1] Motor straight type WSA10C, WSA12C, WSA14C, WSA16C



Caution

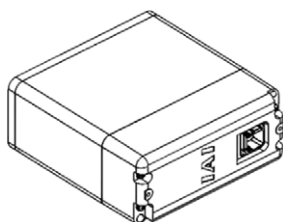
- Do not attempt to touch the control circuit board.
- Touch a metal to remove static electricity from the body before start replacement work.
- Do not attempt to do the replacement work in any place that is easy to cause static electricity (such as on a carpet).

◆ Preparation

- Phillips screwdriver
- Motor unit for replacement

Series	Type	Basic Model Code	Brake	Cable Ejected Orientation
RCP6B	WSA10C	RCP6-MUWSRA10C	No Description (w/o brake)	CJT/CJR CJL/CJB
	WSA12C	RCP6-MUWSRA12C		
	WSA14C	RCP6-MUWSA14C	B (with brake)	
	WSA16C	RCP6-MUWSA16C		

Motor unit



- Coupling Spacer for replacement

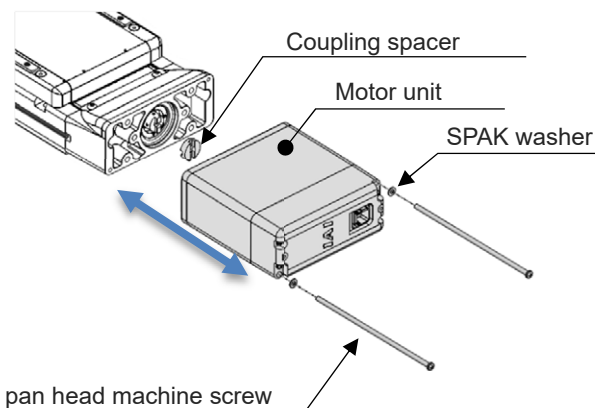
Type	Model Code
WSA10C, WSA12C	CPG-RCP6-S
WSA14C	CPG-RCP6-M
WSA16C	CPG-RCP6-L



- Grease NOXLUB TL1013 Grease manufactured by NOK (To be applied to coupling spacer)

◆ Procedure for Replacement

1. Take off the cross recessed pan head machine screws and SPAK washers and take the motor unit off.
Also, take the coupling spacer off.
2. Apply grease (NOXLUB TL1013 Grease manufactured by NOK) on a coupling spacer for replacement for appropriate amount and put it on a motor unit for replacement.
3. Align the recess and protrusion, put on a motor unit for replacement and affix it with the SPAK washers and cross recessed socket head machine screws.
4. Make sure to conduct a home return on a PC teaching software or a touch panel teaching.



Cross-recessed pan head machine screw

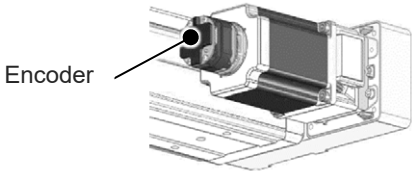
RCP6B-WSA10C : M3×130 (2 pcs) with brake : M3×160	Tightening torque : 0.41N·m
RCP6B-WSA12C : M4×120 (2 pcs) with brake : M4×170	Tightening torque : 0.96N·m
RCP6B-WSA14C : M4×150 (4 pcs) with brake : M4×200	Tightening torque : 0.96N·m
RCP6B-WSA16C : M4×170 (4 pcs) with brake : M4×230	Tightening torque : 0.96N·m

[2] Motor reversed type WSA10R, WSA12R, WSA14R, WSA16R



Caution

- Do not attempt to touch the encoder area in the motor directly with hand.
If touched with hands, the encoder phase may change, resulting in an error.



- Do not attempt to touch the control circuit board.
- Touch a metal to remove static electricity from the body before start replacement work.
- Do not attempt to do the replacement work in any place that is easy to cause static electricity (such as on a carpet).

◆ Preparation

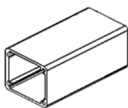
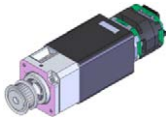
- Hex wrench Parallel Faces: 2mm, 2.5mm (WSA10), 3mm (WSA12/WSA14), 4mm (WSA16)
- Phillips screwdriver
- Tension gauge (capable thing of tensioning to 90N or greater)
- Long zip ties, etc. (thin string)
- Motor unit for replacement

Example of Model Code : For RCP6B-WSA10R equipped with Brake

Model Code : RCP6-MUSRTA4WSRA10RV-B-PU

Type	Basic Model Code	Brake	Pulley
WSA10R	RCP6-MUSRTA4WSRA10RV	No Description (w/o brake) B (with brake)	PU
WSA12R	RCP6-MUSRTA6WSRA12R		
WSA14R	RCP6-MUSTA7WSA14R		
WSA16R	RCP6-MUWSA16R		

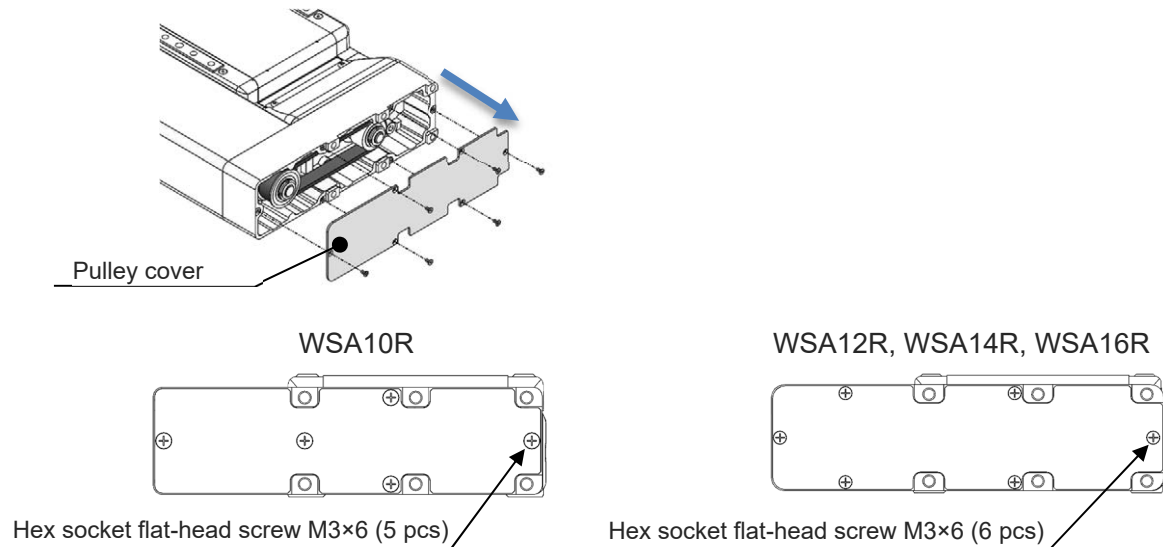
Motor Unit *Make sure to use the enclosed components.



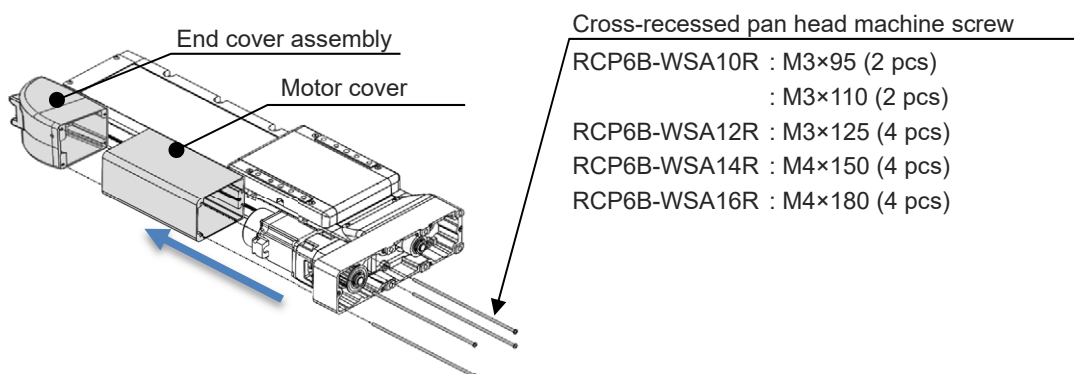
Enclosed only in WSA10R
Motor Cover and Bolts (4 pcs)

◆ Procedure for Replacement

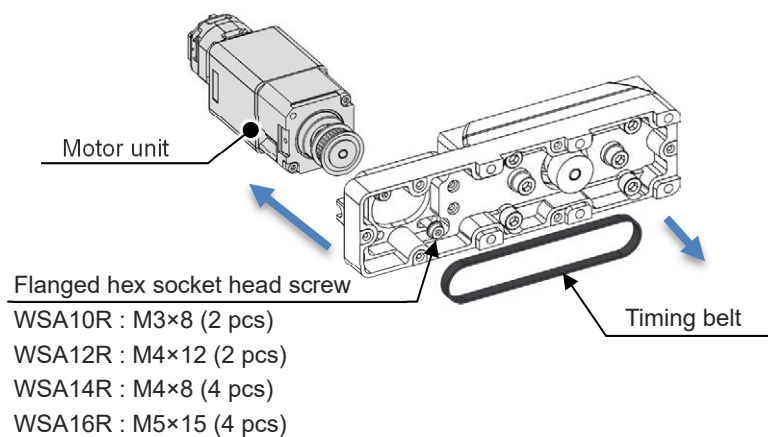
1. Remove the hex socket flat-head screw and take the pulley cover off.



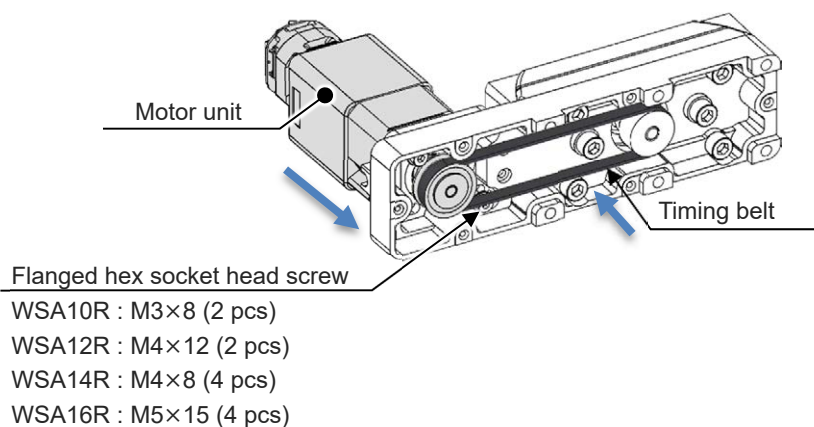
2. Remove the cross-recessed pan head machine screws (4 pcs) and take the motor cover and end cover assembly off.



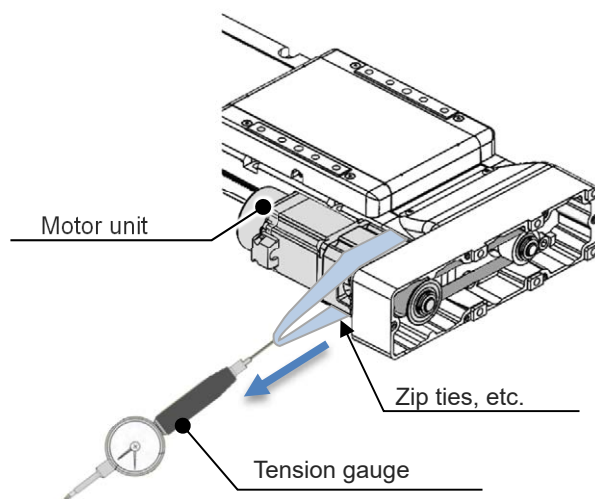
3. Remove the flanged hex socket head screw and take off the motor unit and timing belt.



4. Attach a motor unit and timing belt for replacement and tighten them loosely with the flanged hex socket head machine screws temporarily.

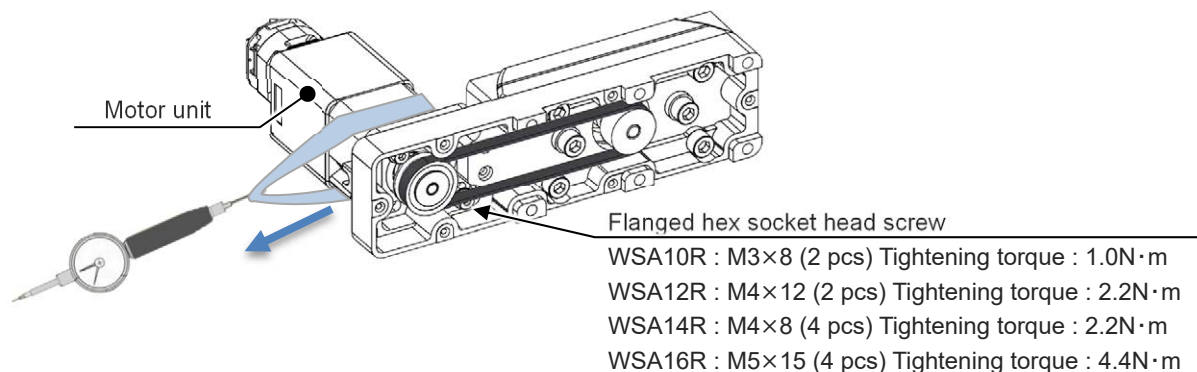


5. Hang a zip ties or equivalent on the motor unit and apply the specified load (tensile strength) with a tension gauge.

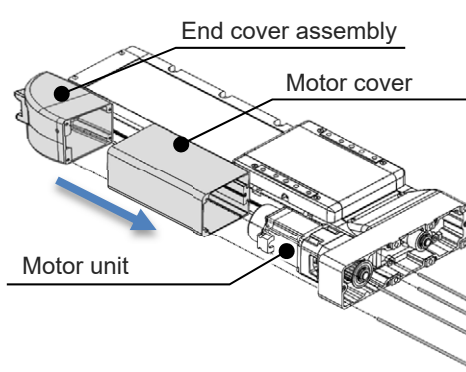


Type	Tensile Strength
WSA10R	2 to 2.6kgf
WSA12R	2 to 2.6kgf
WSA14R	7 to 9.4kgf
WSA16R	11 to 13kgf

6. While the specified load (tensile strength) is applied, tighten up the flanged hex socket head screw to affix the motor unit.



7. Put the motor cover and the end cover assembly over the motor unit and affix them with the cross recessed pan head machine screws (4 pcs).



Cross-recessed pan head machine screw

RCP6B-WSA10R : M3×95 (2 pcs)

M3×110 (2 pcs)

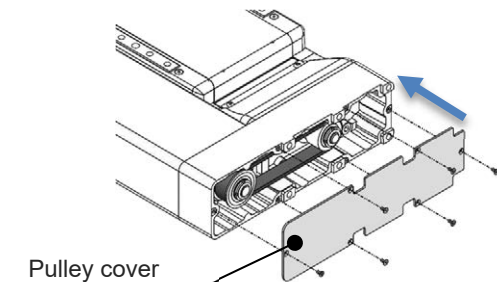
Tightening torque : 0.41N·m

RCP6B-WSA12R : M3×125 (4 pcs) Tightening torque : 0.41N·m

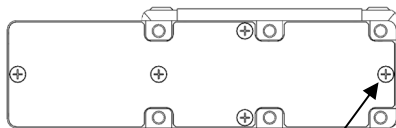
RCP6B-WSA14R : M4×150 (4 pcs) Tightening torque : 0.96N·m

RCP6B-WSA16R : M4×180 (4 pcs) Tightening torque : 0.96N·m

8. Put the pulley cover over and affix it with the hex socket flat-head screw.



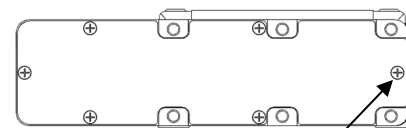
WSA10R



Hex socket flat-head screw M3×6 (5 pcs)

Tightening torque : 0.73N·m

WSA12R, WSA14R, WSA16R



Hex socket flat-head screw M3×6 (6 pcs)

Tightening torque : 0.73N·m

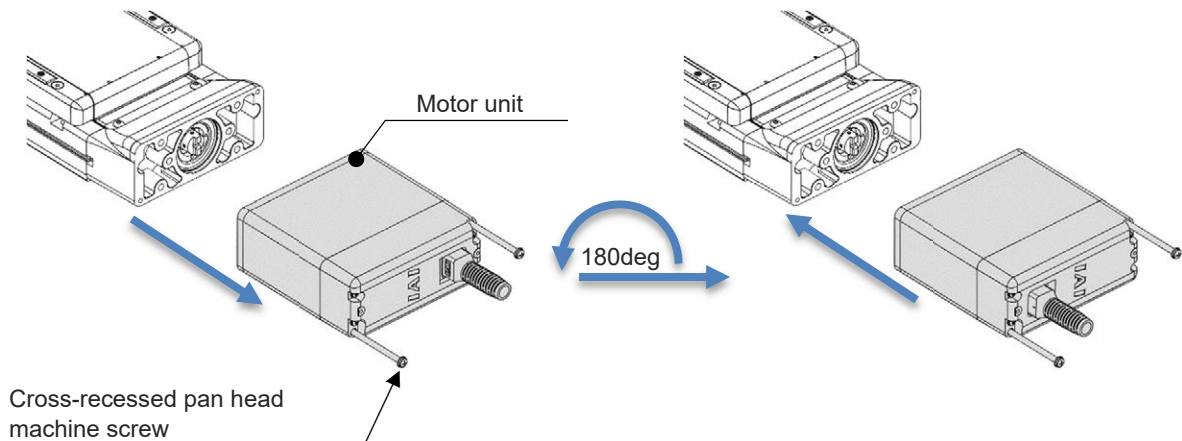
9. Make sure to conduct a home return on a PC teaching software or a touch panel teaching.

5.6.4 Cable Ejecting Position Change

For the motor straight type WSA10C, WSA12C, WSA14C and WSA16C, the cable ejection position at the delivery is on the right hand side when you put the unit horizontally and view it from the motor unit side. By turning the motor unit by 180deg to install, the cable ejection position can be reversed from right to left.

◆ Procedure for Change

1. Take off the cross recessed pan head machine screws and SPAK washers and take the motor unit off.
2. Turn the motor unit by 180 deg and align the recess and protrusion and affix it with the SPAK washers and cross recessed socket head machine screws.



RCP6B-WSA10C : M3×130 (2 pcs) with brake : M3×160	Tightening torque : 0.41N·m
RCP6B-WSA12C : M4×120 (2 pcs) with brake : M4×170	Tightening torque : 0.96N·m
RCP6B-WSA14C : M4×150 (4 pcs) with brake : M4×200	Tightening torque : 0.96N·m
RCP6B-WSA16C : M4×170 (4 pcs) with brake : M4×230	Tightening torque : 0.96N·m

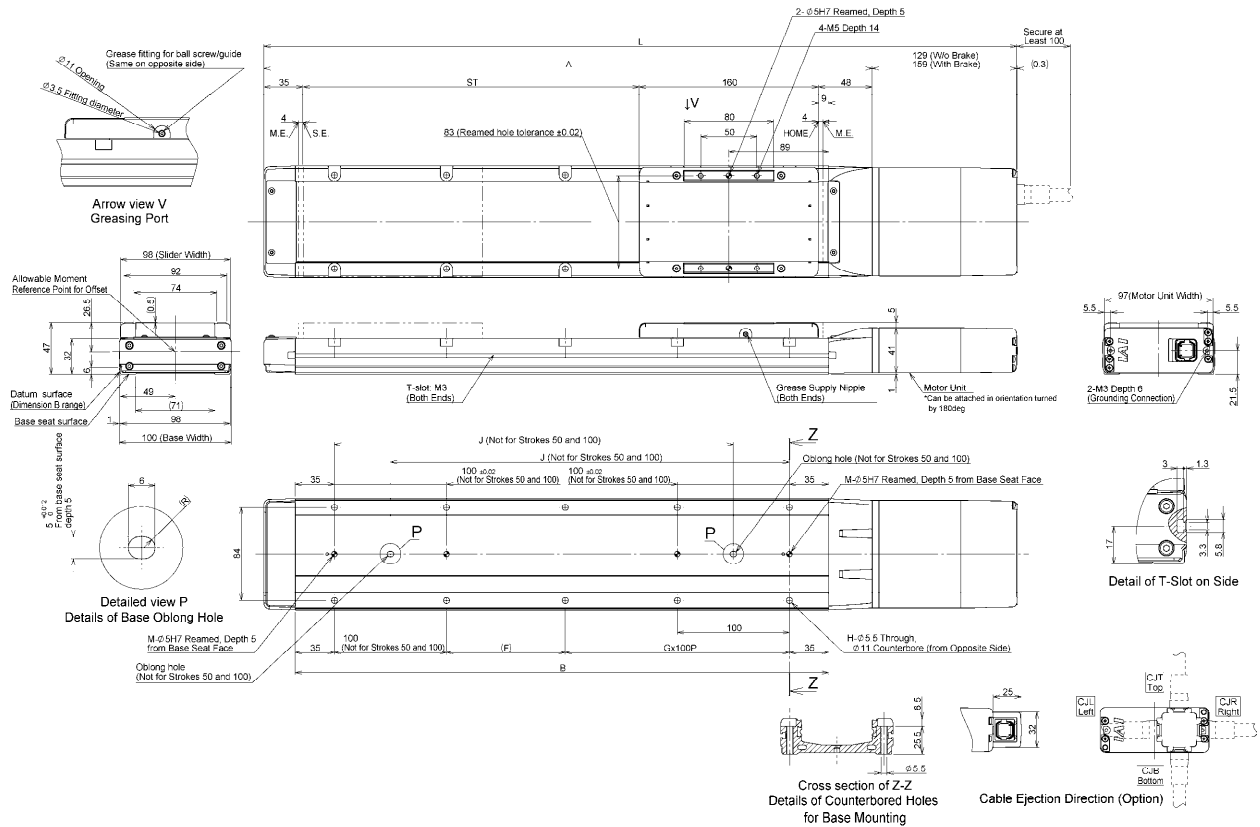
ROBO Cylinder

Chapter 6

External Dimensions

6.1	RCP6B-WSA10C	6-1
6.2	RCP6B-WSA12C	6-3
6.3	RCP6B-WSA14C	6-5
6.4	RCP6B-WSA16C	6-7
6.5	RCP6B-WSA10R	6-9
6.6	RCP6B-WSA12R	6-11
6.7	RCP6B-WSA14R	6-13
6.8	RCP6B-WSA16R	6-15

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



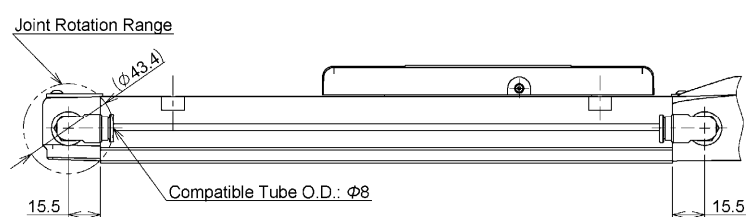
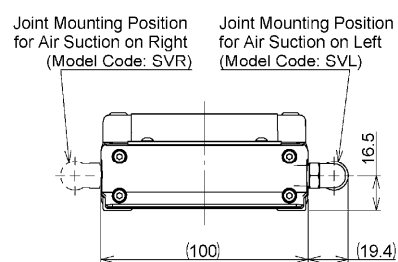
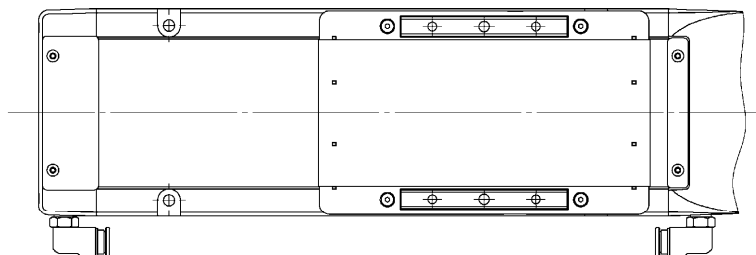
Unit (mm)											
Stroke	50	100	150	200	250	300	350	400	450	500	
L	W/o Brake	422	472	522	572	622	672	722	772	822	872
	With Brake	452	502	552	602	652	702	752	802	852	902
A	293	343	393	443	493	543	593	643	693	743	
B	226	276	326	376	426	476	526	576	626	676	
F	156	206	56	106	56	106	56	106	56	106	
G	0	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	

(Note) L dimensions described in the table are those with no cable ejection direction (option).

For cable ejection direction types (option), the dimensions are longer in 25mm.

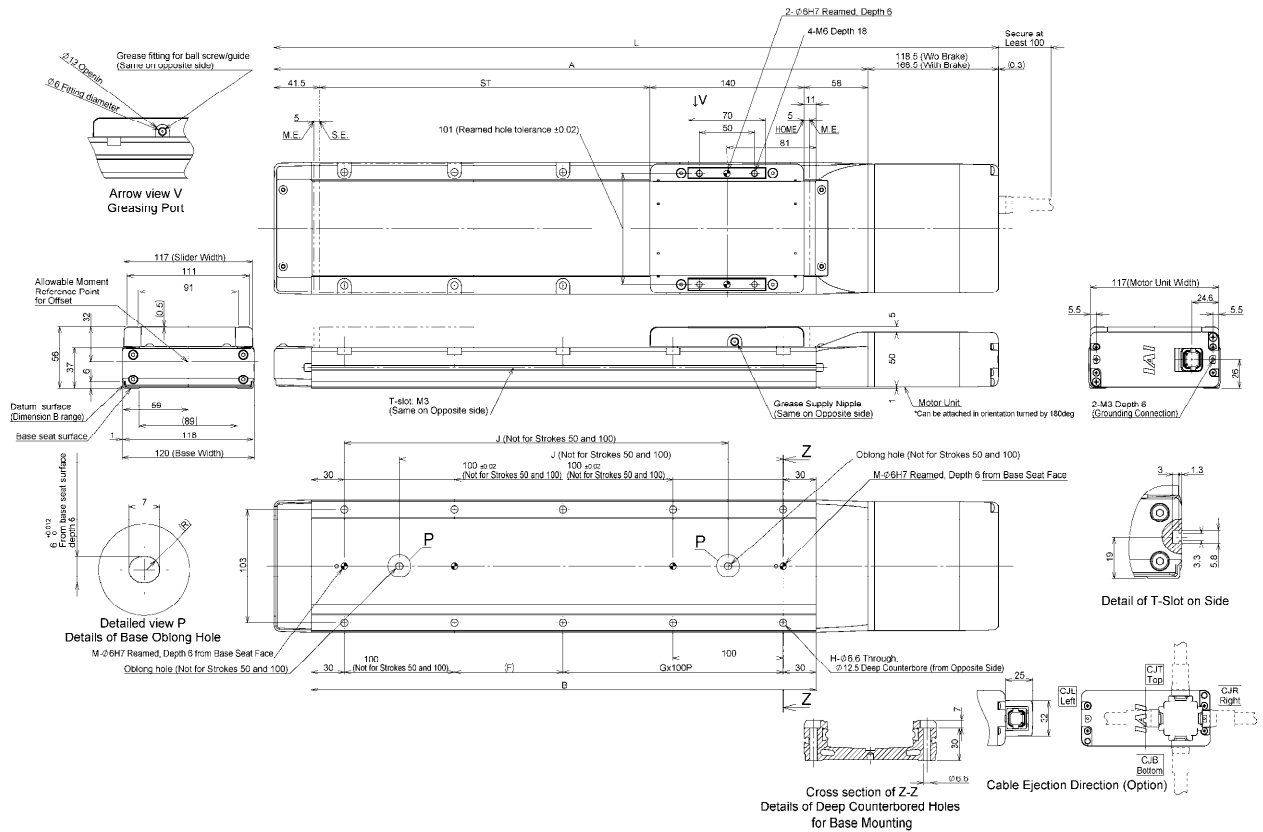
Stroke		50	100	150	200	250	300	350	400	450	500
Mass (kg)	W/o Brake	2.9	3.1	3.4	3.6	3.8	4.1	4.3	4.6	4.8	5.0
	With Brake	3.1	3.3	3.6	3.8	4.0	4.3	4.5	4.8	5.0	5.2

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)



6.2 RCP6B-WSA12C

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



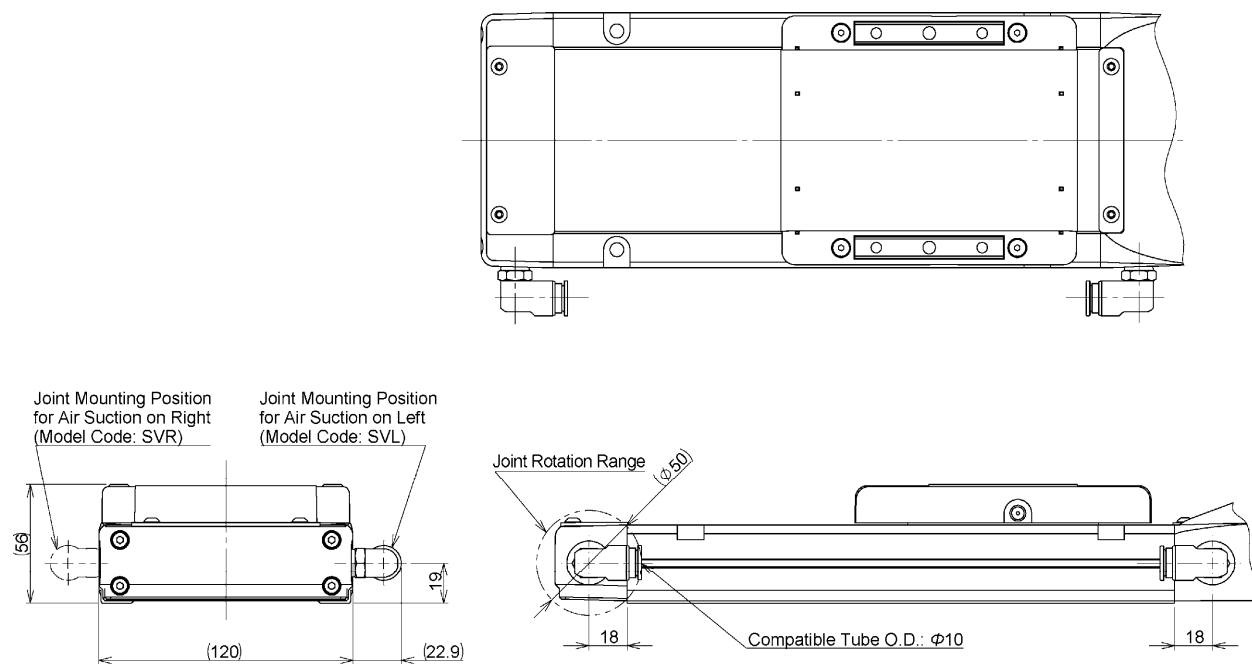
		Unit (mm)															
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	W/o Brake	408	458	508	558	608	658	708	758	808	858	908	958	1008	1058	1108	1158
	With Brake	458	508	558	608	658	708	758	808	858	908	958	1008	1058	1108	1158	1208
A		289.5	339.5	389.5	439.5	489.5	539.5	589.5	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	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	898.5
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

(Note) L dimensions described in the table are those with no cable ejection direction (option).

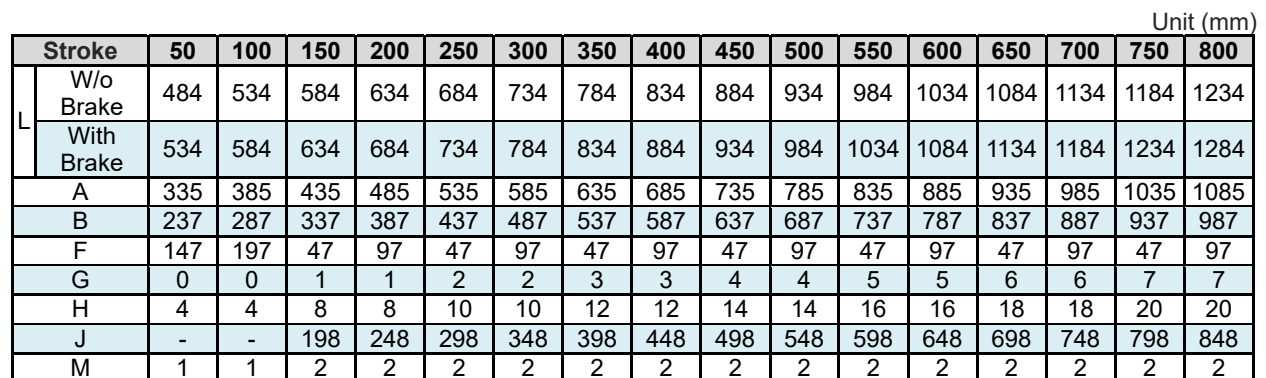
For cable ejection direction types (option), the dimensions are longer in 25mm.

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass (kg)	W/o Brake	3.8	4.1	4.4	4.8	5.1	5.4	5.8	6.1	6.4	6.8	7.1	7.4	7.8	8.1	8.4	8.8
	With Brake	4.0	4.4	4.7	5.0	5.4	5.7	6.0	6.4	6.7	7.1	7.4	7.7	8.1	8.4	8.7	9.1

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)



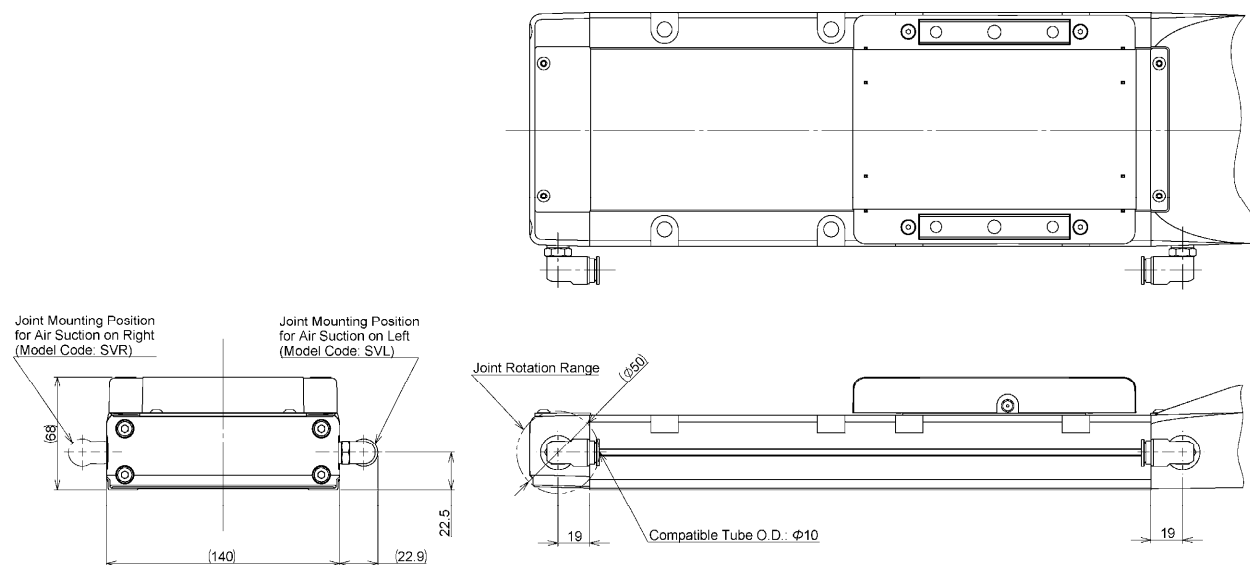
ST : Stroke
M.E.: Mechanical end
S.E. : Stroke end



For cable ejection direction types (option), the dimensions are longer in 25mm.

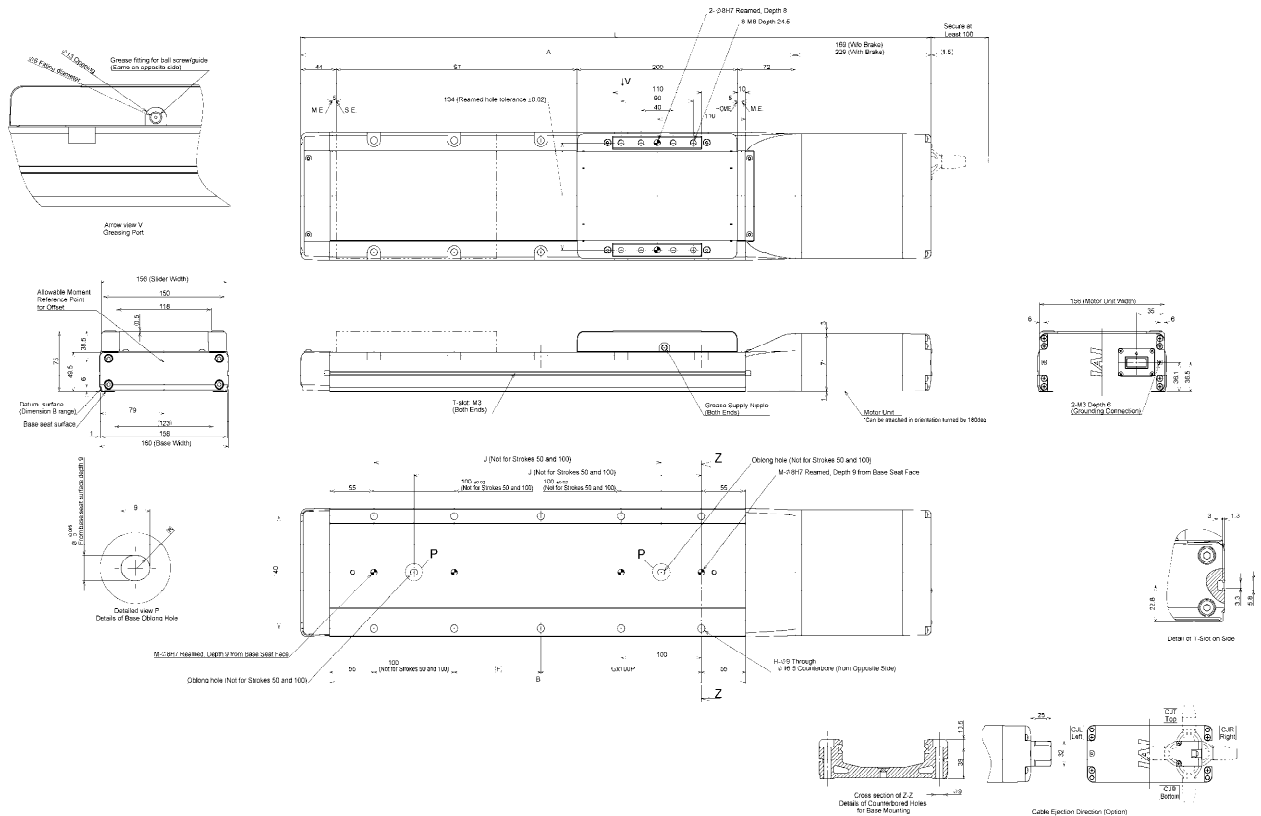
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass (kg)	W/o Brake	6.6	7.0	7.5	8.0	8.5	8.9	9.4	9.9	10.4	10.9	11.3	11.8	12.3	12.8	13.2	13.7
	With Brake	7.0	7.5	8.0	8.5	8.9	9.4	9.9	10.4	10.9	11.3	11.8	12.3	12.8	13.2	13.7	14.2

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)



6.4 RCP6B-WSA16C

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



Unit (mm)

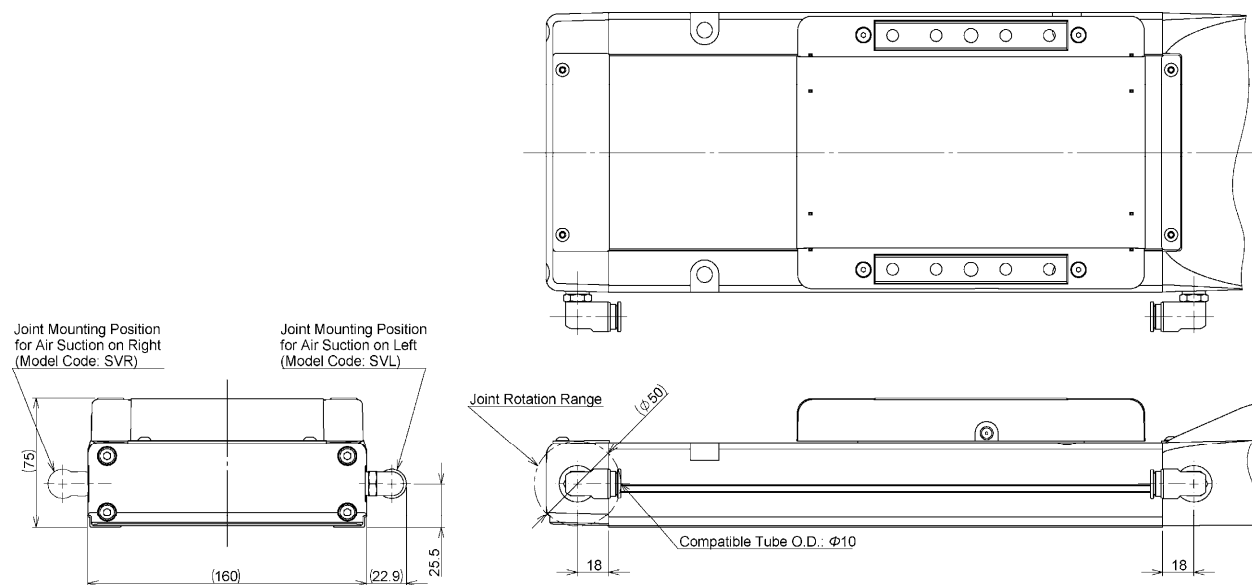
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
L	W/o Brake	535	585	635	685	735	785	835	885	935	985	1035	1085	1135	1185	1235	1285	1335	1385	1435	1485	1535	1585
	With Brake	595	645	695	745	795	845	895	945	995	1045	1095	1145	1195	1245	1295	1345	1395	1445	1495	1545	1595	1645
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

(Note) L dimensions described in the table are those with no cable ejection direction (option).

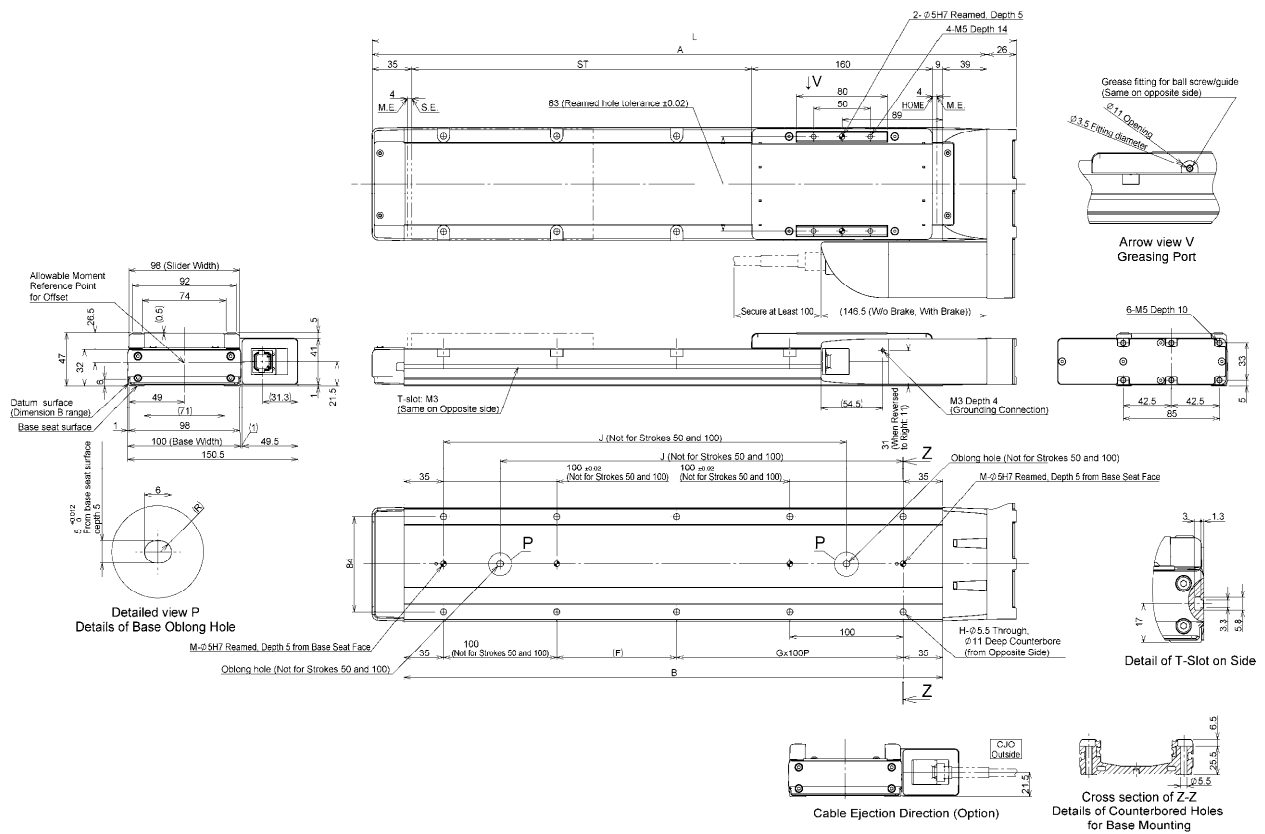
For cable ejection direction types (option), the dimensions are longer in 25mm.

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	9.0	9.6	10.2	10.8	11.4	12.0	12.6	13.2	13.8	14.4	15.0	15.7	16.2	16.9	17.4	18.1	18.7	19.3	19.9	20.5	21.1	21.7
	With Brake	9.5	10.1	10.7	11.3	11.9	12.5	13.1	13.7	14.3	14.9	15.5	16.1	16.7	17.3	17.9	18.5	19.1	19.7	20.3	21.0	21.5	22.2

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)



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

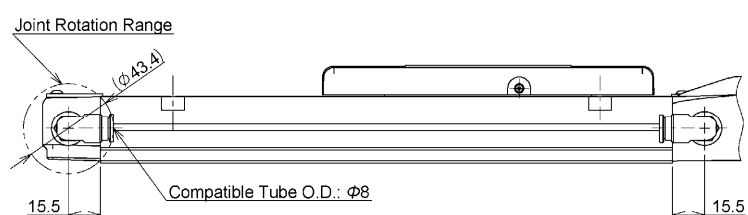
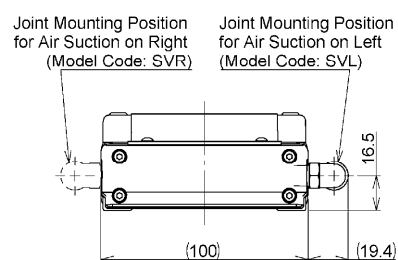
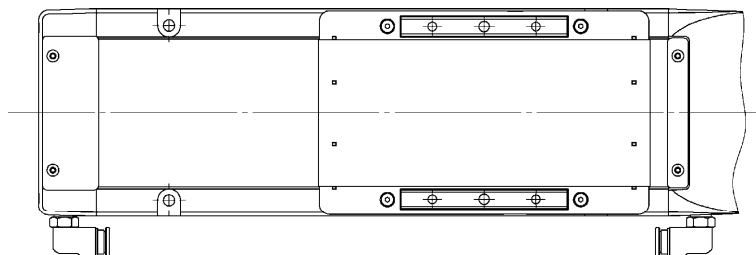


6. External Dimensions

	Unit (mm)									
Stroke	50	100	150	200	250	300	350	400	450	500
L	319	369	419	469	519	569	619	669	719	769
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

Stroke		50	100	150	200	250	300	350	400	450	500
Mass (kg)	W/o Brake	2.9	3.2	3.4	3.6	3.9	4.1	4.4	4.6	4.8	5.1
	With Brake	3.0	3.2	3.5	3.7	3.9	4.2	4.4	4.7	4.9	5.2

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)

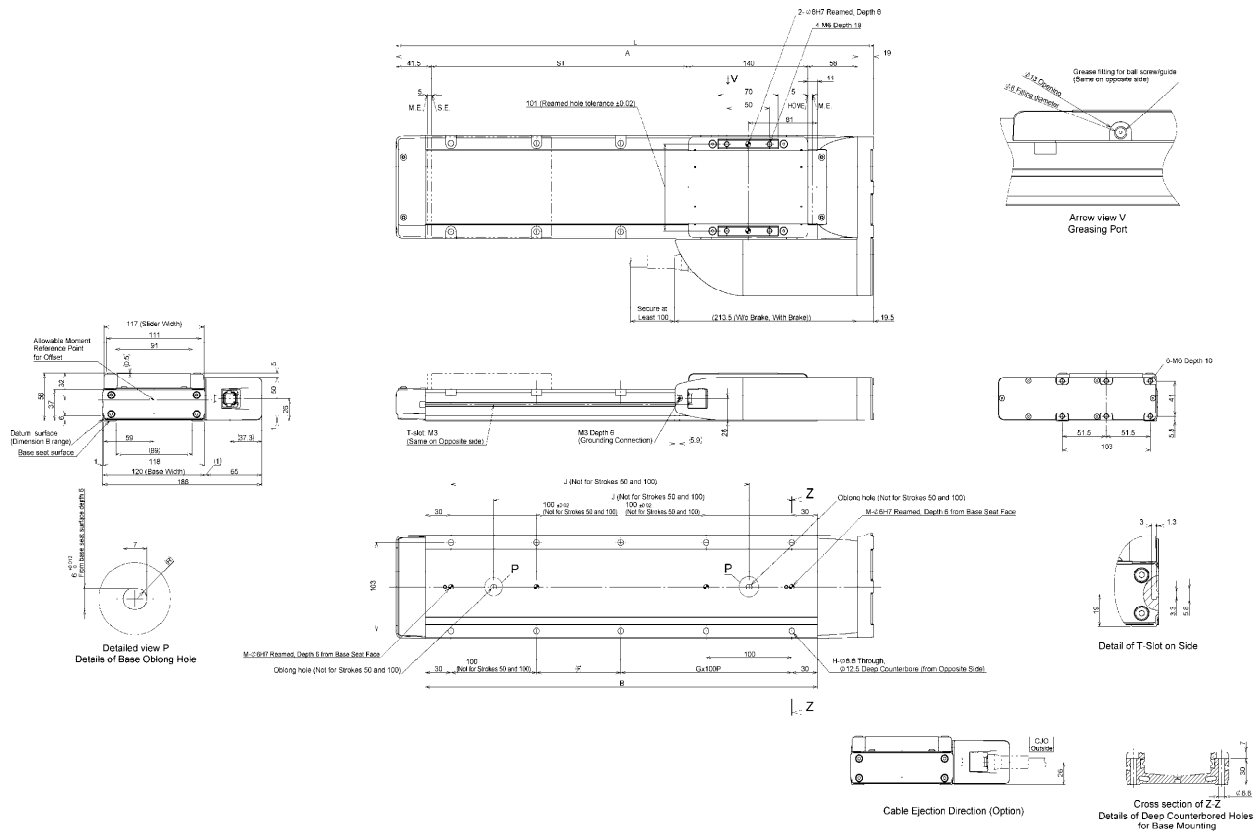


6.6 RCP6B-WSA12R

(Note) Shown in the figure below is for the motor left reversed type (model code: ML).

Right reversed type (model code: MR) should have the motor on the opposite side of slider.

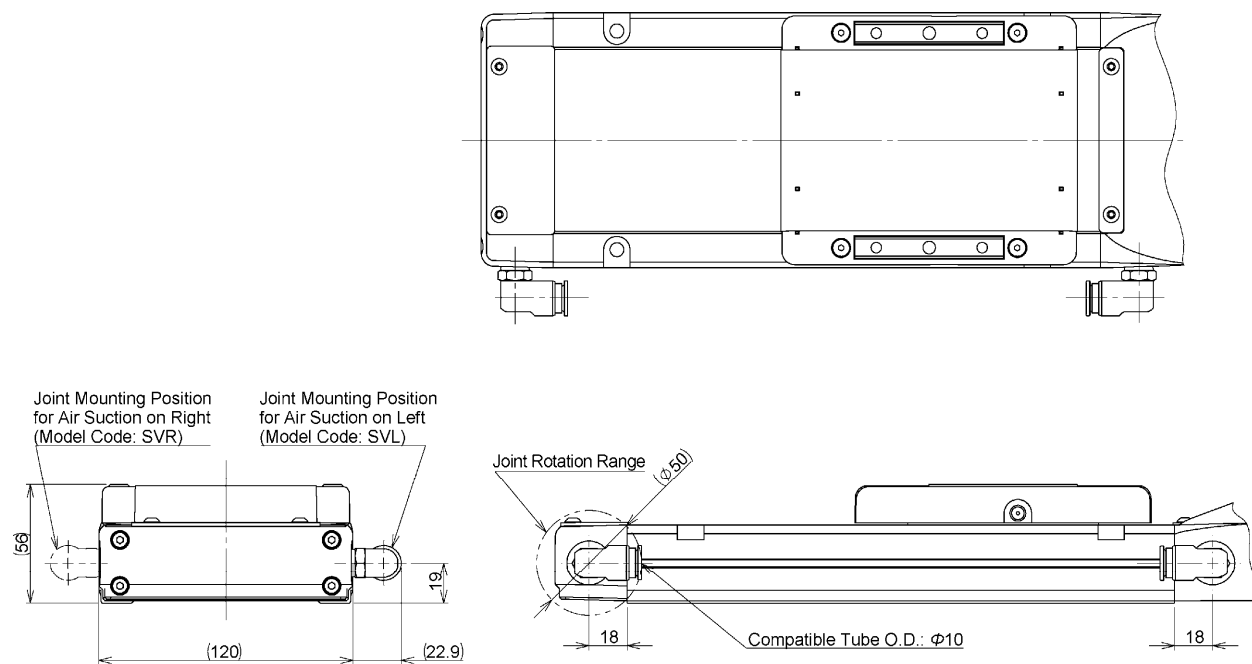
ST : Stroke
M.E.: Mechanical end
S.E.: Stroke end



		Unit (mm)															
Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L		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	1008.5	1058.5
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

Stroke		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass (kg)	W/o Brake	4.1	4.4	4.7	5.1	5.4	5.7	6.1	6.4	6.7	7.1	7.4	7.7	8.1	8.4	8.7	9.1
	With Brake	4.1	4.5	4.8	5.1	5.5	5.8	6.1	6.5	6.8	7.1	7.5	7.8	8.1	8.5	8.8	9.1

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)

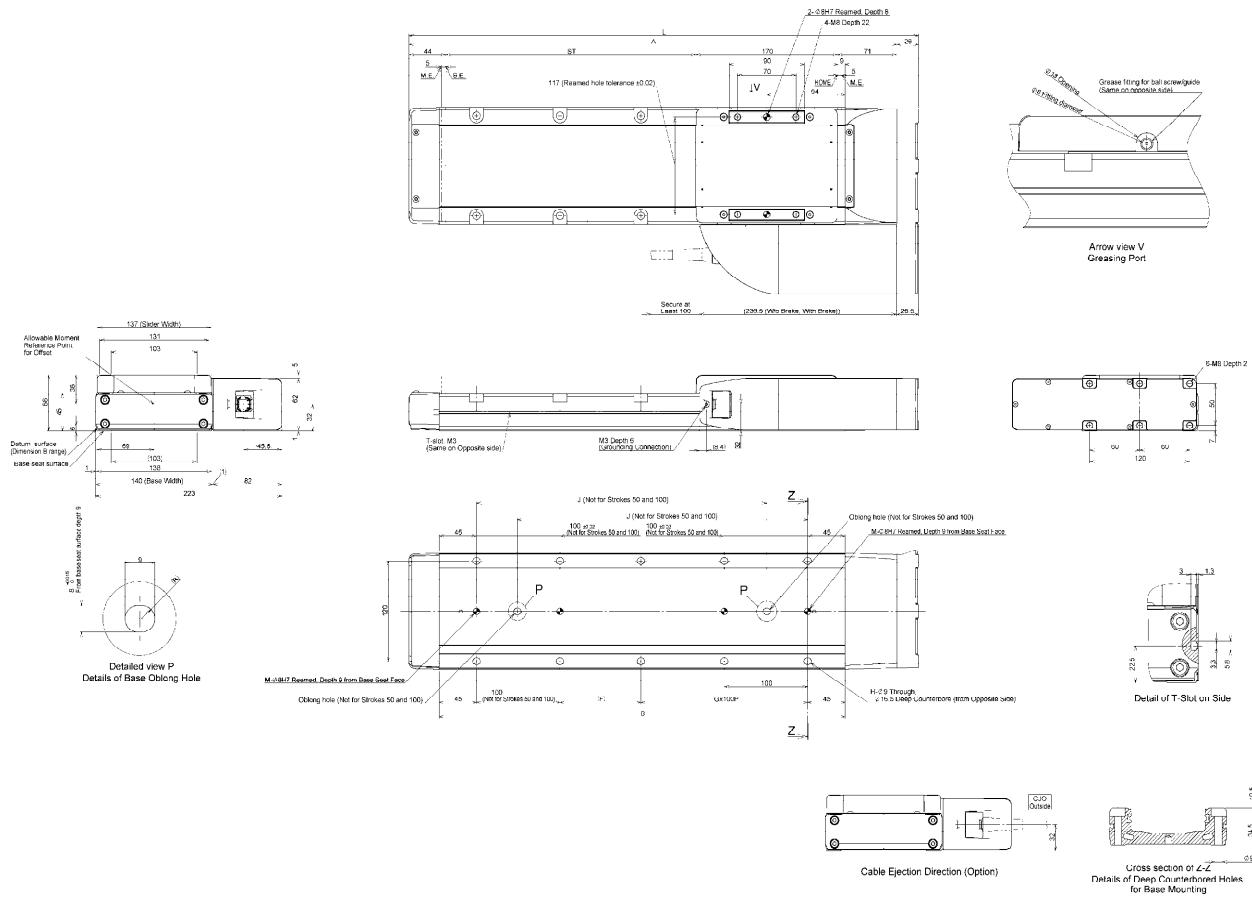


6.7 RCP6B-WSA14R

(Note) Shown in the figure below is for the motor left reversed type (model code: ML).

Right reversed type (model code: MR) should have the motor on the opposite side of slider.

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

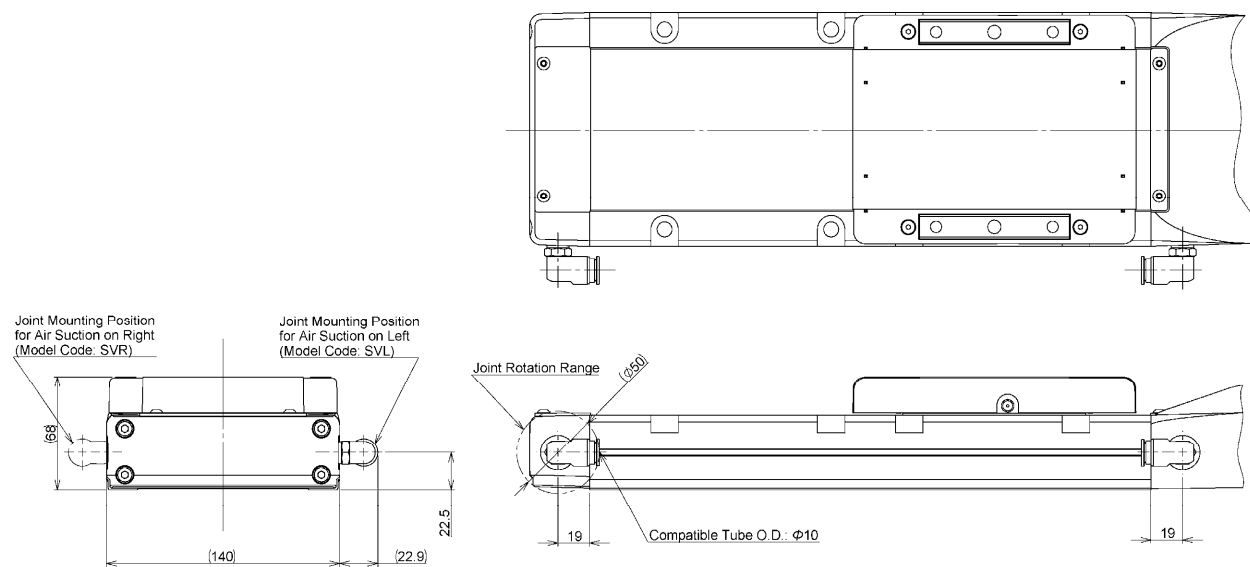


Unit (mm)

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	361	411	461	511	561	611	661	711	761	811	861	911	961	1011	1061	1111
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	247	297	347	397	447	497	547	597	647	697	747	797	847	897
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

Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Mass (kg)	7.3	7.8	8.2	8.7	9.2	9.6	10.1	10.6	11.1	11.5	12.0	12.5	13.0	13.4	13.9	14.4
W/o Brake	7.3	7.8	8.2	8.7	9.2	9.6	10.1	10.6	11.1	11.5	12.0	12.5	13.0	13.4	13.9	14.4
With Brake	7.4	7.9	8.3	8.8	9.3	9.8	10.2	10.7	11.2	11.7	12.1	12.6	13.1	13.6	14.0	14.5

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)

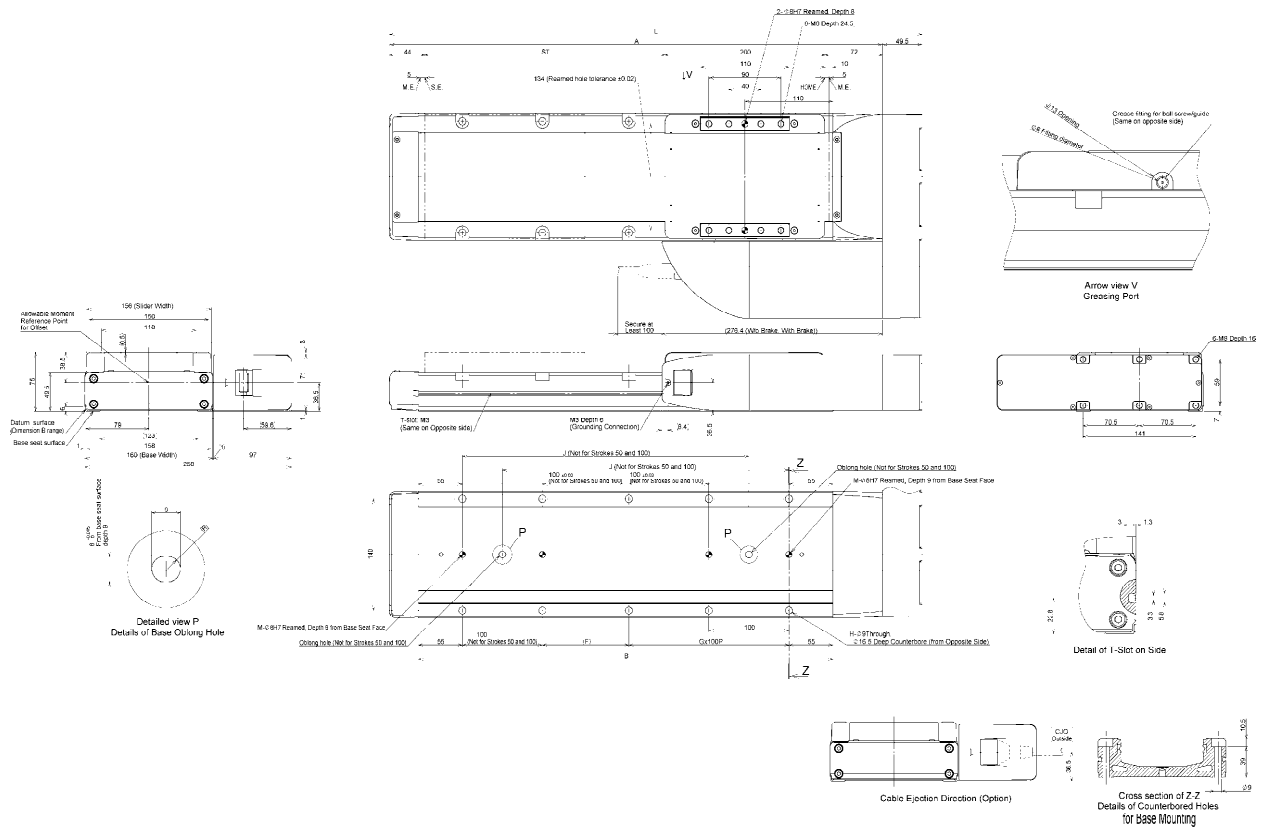


6.8 RCP6B-WSA16R

(Note) Shown in the figure below is for the motor left reversed type (model code: ML).

Right reversed type (model code: MR) should have the motor on the opposite side of slider.

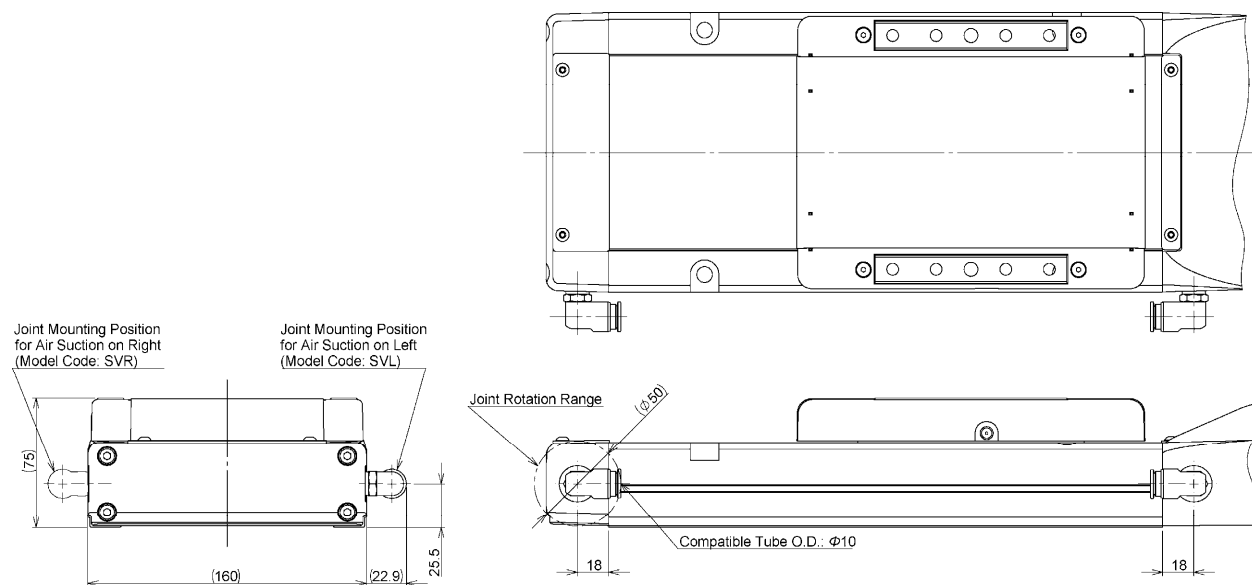
ST : Stroke
M.E.: Mechanical end
S.E.: Stroke end



		Unit (mm)																				
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
L	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

		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		10.4	11.0	11.6	12.2	12.7	13.3	13.9	14.5	15.1	15.7	16.3	16.9	17.5	18.1	18.7	19.3	19.9	20.5	21.0	21.7	22.2	22.8
	With Brake		10.6	11.2	11.8	12.4	13.0	13.6	14.2	14.8	15.4	16.0	16.6	17.2	17.7	18.3	18.9	19.5	20.1	20.7	21.3	21.9	22.5	23.1

■ Stainless Steel Suction Joint Mounting Specification (Option Model Code: SVL, SVR)



ROBO Cylinder

Chapter 7

Life

7.1	Concept of Operation Life	7-1
7.1.1	How to Calculate Operation Life	7-1
7.1.2	Relation Between Operation Life and Moment	7-3

7.1 Concept of Operation Life

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

7.1.1 How to Calculate Operation Life

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

$$L = \left(\frac{C_M}{M} \right)^3 \bullet 5,000\text{km or } 1,000\text{km}$$

L: Operation life (km)

C_M : Allowable dynamic moment (N·m)

M: Moment to work (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, have a calculation for the drop of life with the formula below if there is a concern that the life could drop due to the condition of vibration or way to be attached.

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

L : Operation life (km)

C_M : Allowable dynamic moment (N·m)

M : Moment to work (N·m)

f_{ws} : Standard operational coefficient

f_w : Load coefficient

f_α : Attachment coefficient

5,000km or 10,000km : Standard rated life of ROBO Cylinder

Explained below is regarding the standard operational coefficient f_{ws} , load coefficient f_w and attachment coefficient f_a .

Refer to the contents below to set them up.

[Standard operational coefficient f_{ws}]

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

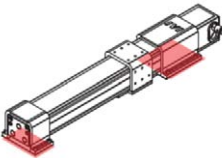
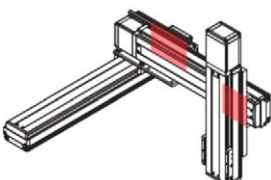
[Load coefficient f_w]

It is a coefficient to consider the life drop due to operational conditions.

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

[Attachment coefficient f_a]

Attachment coefficient f_a is a coefficient to consider the life drop due to the condition of actuator attachment.

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

* As the figures are those in common for each manual, they are not for RCP6B Slider Type.

Replace to figures for RCP6B Slider Type and select the attachment coefficient.

* Even when in attachment in whole area, and the actuator is seated in the whole length of the product, select 1.2 or 1.5 for the attachment coefficient depending on the position of screw fixing.

* For attachment in whole area, use all of the screw holes (counterbored holes) on the seat surface to fix.

7.1.2 Relation Between Operation Life and Moment

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

* The product life fluctuates drastically depending on the condition of use, environment and condition of maintenance.

ROBO Cylinder

Chapter 8

Warranty

8.1	Warranty period	8-1
8.2	Scope of the warranty	8-1
8.3	Honoring the warranty	8-1
8.4	Limited liability	8-2
8.5	Conformance with applicable standards/regulations, etc., and application conditions.....	8-2
8.6	Other items excluded from warranty	8-2

8.1 Warranty period

Whichever of the following periods is shorter:

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

8.2 Scope of the warranty

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

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

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

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

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

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

8.3 Honoring the warranty

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

8.4 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.

8.5 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.

8.6 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 program

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Change History

Revision Date	Description of Revision
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