

ROBO Cylinder[®]

Pulse Pressing

RCP6-RR4R-LCT
RCP6-RR6R-LCT
RCP6-RR7R-LCT

Instruction Manual First Edition ME3807-1E



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Please Read Before Use

Thank you for purchasing our product.

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

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

Please download the user's manual from our website.

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

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

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

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

[Important]

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

RCS6 Pulse Pressing Type Instruction Manual Configuration

Product name	Instruction manual name	Control number
RCP6 Pulse Pressing Type	First Step Guide	ME3808
RCP6 Pulse Pressing Type	Instruction Manual (this document)	ME3807
PCON-CB/CGB Controller	PCON-CB/CGB Controller Instruction Manual	ME0342
Touch Panel Teaching Pendant	TB-02/02D Applicable for Position Controller Instruction Manual	ME0355
Touch Panel Teaching Pendant	TB-03 Applicable for Position Controller	ME0376
PC software	IA-OS First Step Guide * Refer to the guidance feature stored in IA-OS for how to operate	ME0391

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Safety Guide

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

Safety Precautions for Our Products

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

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

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

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

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

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

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

Alert Indication

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

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

Warning Label

Warning label as shown below is attached on the pulse pressing.
Please follow the description on the label in order to use the product safely.

[Warning Label 1: Do not attempt to apply impact on loadcell]

Please do not attempt to apply impact or crash on the loadcell. As a loadcell is a precise measurement device, it may get damaged with an impact or collision.

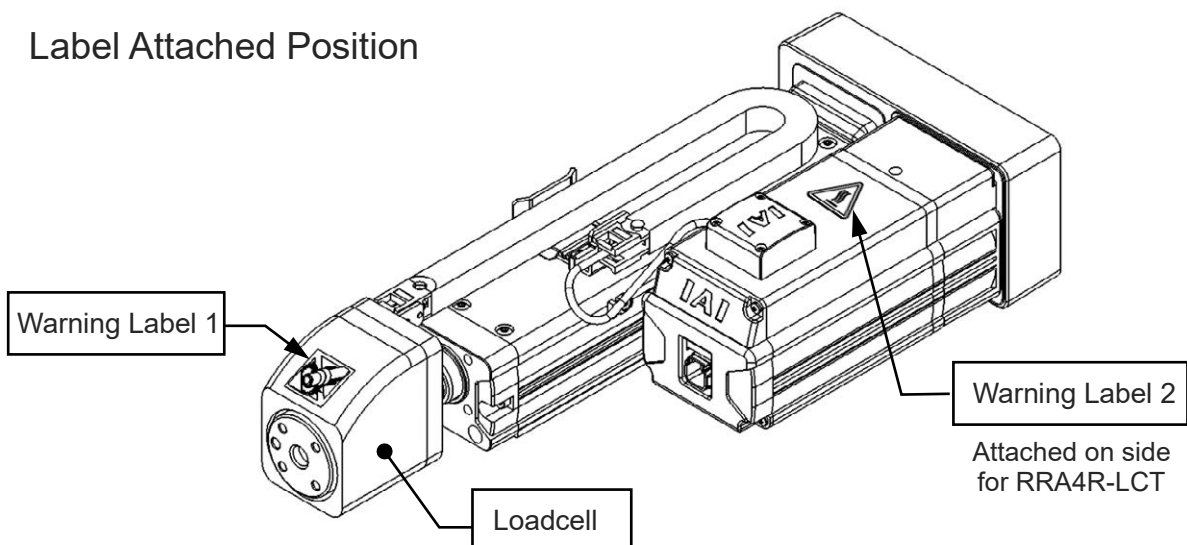


[Warning Label 2: Caution high temperature]

The surface of this device may get hot during operation.
There may be a risk of burn. Leave for enough while before having a service or maintenance.



Label Attached Position



Precautions for Handling

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

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

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

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

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

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

Use within the allowable range for each item.

Item	Cautions for use	Problems or breakdowns which may occur if the allowable range is exceeded
Speed and acceleration/deceleration	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life.

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

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

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

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

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

This may damage the coupling or other mechanical parts.

7. Do not attempt to apply the radial load and the moment load when the actuator is equipped with a loadcell.
8. The duration till pressing/pulling complete may become long for actuators equipped with the loadcell.
9. Do not attempt to perform pressing/pulling operation with the positioning operation, or attempt to run a loadcell in high speed crashing to an obstacle. The loadcell may get damaged.
10. The measurement accuracy of a loadcell is the repeatability of the unit and accuracy to detect load, and not that to guarantee the absolute accuracy.
11. Grease has been applied to the outer periphery of the rod for the rod type. Protect the peripheral equipment if grease adhesion negatively affects them.
12. In some conditions of environment of use, postures of installation and conditions of operation, the base oil separated from the grease may come out of ROBO Cylinder.
It is recommended to have a protection in case the peripheral devices could get influence of the base oil.
13. PCON-CBP controllers are capable of switching enable/disable the high output setting in the parameter setting. (The high output setting is set enabled on delivery.)

International Standard Compliance

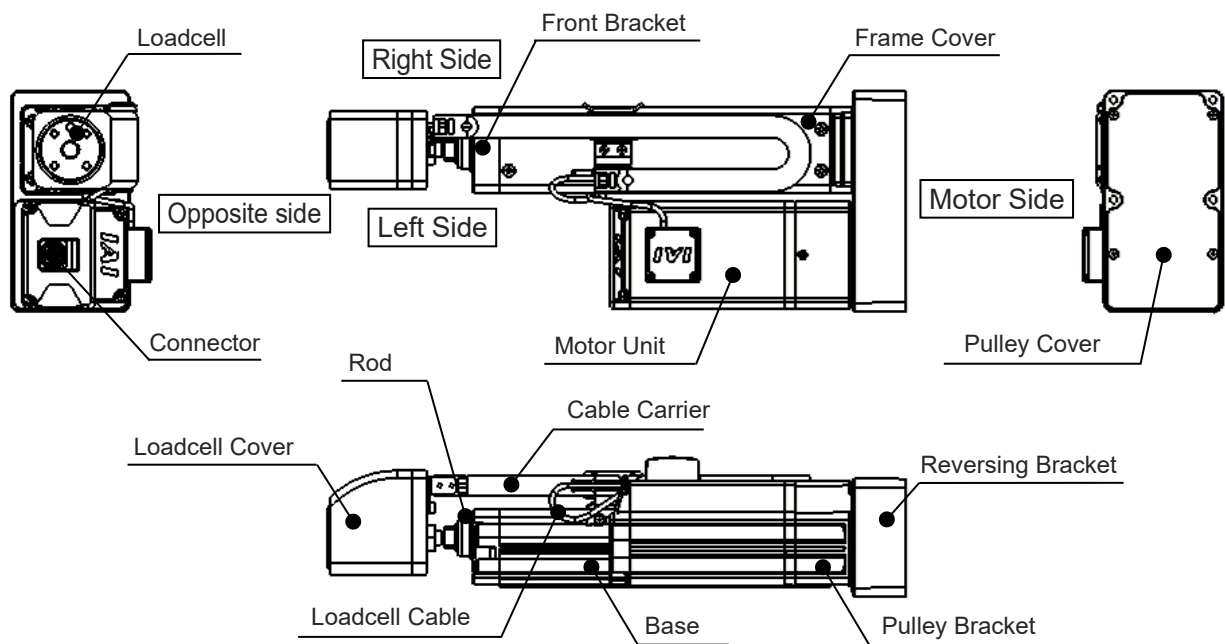
The ROBO Cylinder complies with the following overseas standards.
Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

CE Marking	RoHS3 Directive
○	○

Names of the Parts

In this 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.

RCP6-RAA4R-LCT, RCP6-RAA6R-LCT, RCP6-RAA7R-LCT





Specifications

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	Foot Bracket (Model Code: FT)	1-20
	Equipped with Loadcell (Equipped in Standard) (Model Code: LCT)	1-21
	Motor Reversed Direction (Model Code: ML, MR)	1-21

1.1 Checking the product

Components

The following table shows the product configuration for the standard specification.
See the packing list for the details of the enclosed components. In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

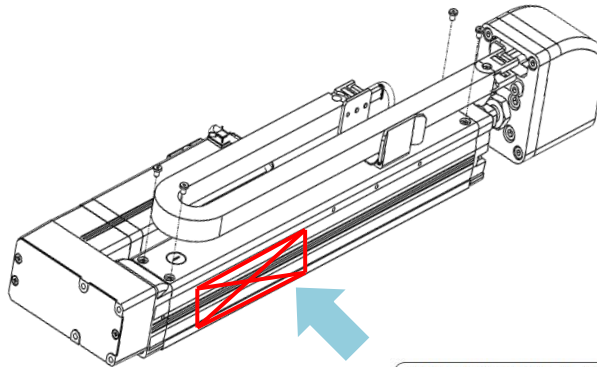
Body	Accessories
<u>Actuator Quantity: 1</u> 	<u>Motor / Encoder Cable Quantity: 1</u> 
Accessories (Documents)	
<u>Safety Guide Quantity: 1</u> M0194 	

How to Read the Model Nameplate

[Positions Labels Attached]

- RC Manufacturing Number Label

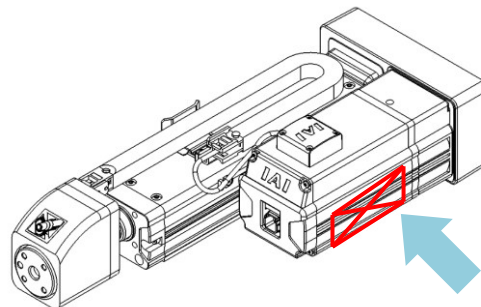
Model → MODEL : RCP6-RRA6R-WA-42P-1.5-115-P3-S-B-LCT
 Serial number → S/N: B01000000 DATE: 01/05/2021
 MADE IN JAPAN **IAI Corporation** **CE**



MODEL : RCP6 RRA6R WA 42P 1.5 115 P3 S B LCT
 S/N: B01000000 DATE: 01/05/2021
 MADE IN JAPAN **IAI Corporation** **CE**

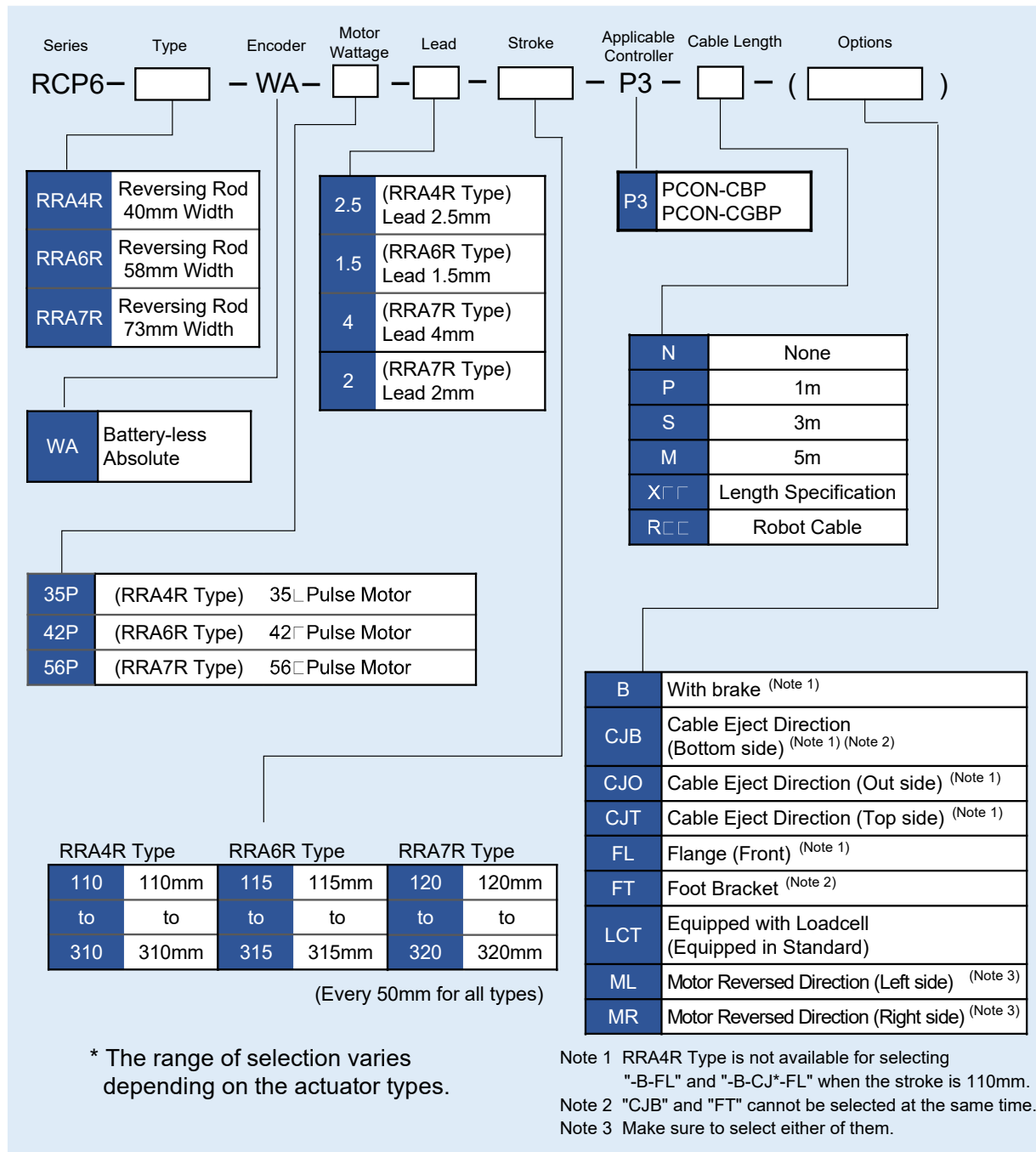
- Manufacturing Number Label for Maintenance

Motor Unit Model Code → MODEL : RCP6-MUPP6R-B-ML
IAI Corporation



MODEL : RCP6-MUPP6R-B-ML
IAI Corporation

How to Read the Model Number



1.2 Specifications

Specifications

[1] RCP6-RRA4R-LCT

[Actuator Specifications 1]

Item			Content
Lead		Lead (mm)	2.5
Horizontal	Payload	Max. payload (kg) (High output enabled)	3
		Max. payload (kg) (High output disabled)	3
	Speed and Acceleration/deceleration	Max. speed (mm/s)	200
		Rated Acceleration/Deceleration (G)	0.5
		Max. acceleration/deceleration (G)	0.5
Vertical	Payload	Max. payload (kg) (High output enabled)	3
		Max. payload (kg) (High output disabled)	3
	Speed and Acceleration/deceleration	Max. speed (mm/s)	200
		Rated Acceleration/Deceleration (G)	0.5
		Max. acceleration/deceleration (G)	0.5
Pressing		Max. Thrust at Pressing (N)	300
		Min. Thrust at Pressing (N)	60
		Max. Pressing Velocity (mm/s)	10
Pulling		Max. Thrust at Pulling (N)	300
		Min. Thrust at Pulling (N)	60
		Max. Pulling Velocity (mm/s)	10
Brake		Brake Type	Non-Excited Electromagnetic Brake
		Brake Retaining Force (kg)	3
Stroke		Min. Stroke (mm)	110
		Max. Stroke (mm)	310
		Stroke Pitch (mm)	50

[Actuator Specifications 2]

Item	Content
Drive system	Ball screw $\phi 8\text{mm}$, rolled C10
Positioning repeatability	$\pm 0.02\text{mm}$
Lost motion	0.1mm or less
Loadcell rated capacity	600N
Repeated load accuracy ^(*1)	$\pm 1.0\%$ F.S. ^(*2)
Ambient operating temperature/humidity	0 to 40°C, 85% RH or less (Non-condensing)
Protection class	IP20
Vibration Durability / Shock Durability	4.9m/s ²
International standard compliance	CE Marking, RoHS Directive
Motor type	Pulse motor
Encoder type	Battery-less absolute
No. of Encoder Pulses	8192 pulse/rev

*1 It is the value that the variances of the load in repeated operation against the loadcell rated capacity are expressed in ratio.

*2 F.S.: Full Scale = It is the maximum value available for measurement.

[Payload by Speed/Acceleration]

When High Output Setting Enabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.5	0.5
0	3	3
40	3	3
85	3	3
130	3	3
150	3	3
200	3	3

When High Output Setting Disabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.5	0.5
0	3	3
40	3	3
85	3	3
130	3	3
150	3	3

**Caution**

- Do not attempt to configure settings for acceleration/deceleration above the specifications. It may cause to generate vibration, malfunction or shorten the product life.

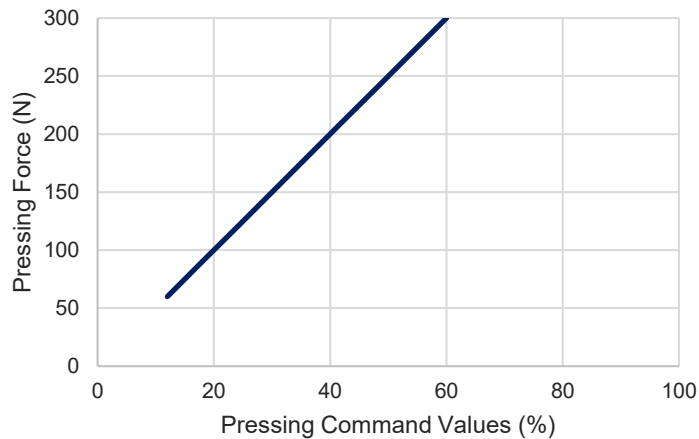
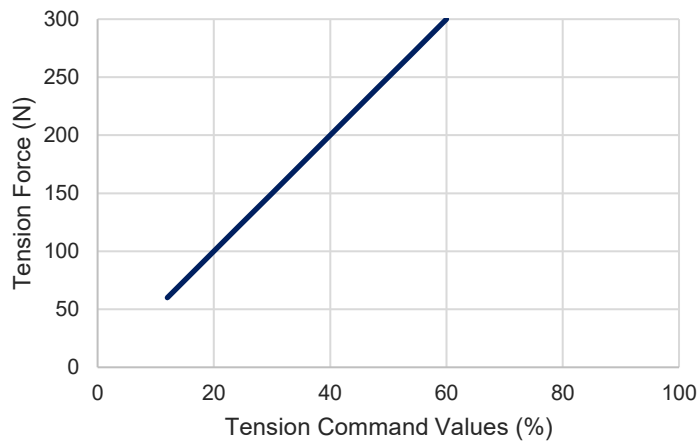
[Stroke and Max. Speed]

Max. Speed (mm/s)

Stroke	110 mm	160 mm	210 mm	260 mm	310 mm
High Output Setting					
Enabled	200				
Disabled	150				

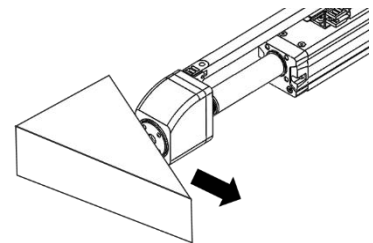
**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting the lower speed than the minimum speed may cause such concerns of generating abnormal noise or making the speed unstable.
Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.
Minimum speed (mm/s) = lead (mm/r) ÷ 8192 (p/r) × 1000 (1/s)
(mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Correlation Diagram Between Pressing Force and Pressing Command Values]**[Correlation Diagram Between Tension Force and Tension Command Values]****Caution**

Use the product within the range in the graph for the pressing command values and tension command values. Usage above the maximum command values shown in the graph is not available. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.

When the reaction force of pressing or tension is side load, any load is not given to the loadcell.



[2] RCP6-RRA6R-LCT**[Actuator Specifications 1]**

Item			Content
Lead		Lead (mm)	1.5
Horizontal	Payload	Max. payload (kg) (High output enabled)	10
		Max. payload (kg) (High output disabled)	10
	Speed and Acceleration/deceleration	Max. speed (mm/s)	110
		Rated Acceleration/Deceleration (G)	0.3
		Max. acceleration/deceleration (G)	0.3
Vertical	Payload	Max. payload (kg) (High output enabled)	10
		Max. payload (kg) (High output disabled)	10
	Speed and Acceleration/deceleration	Max. speed (mm/s)	110
		Rated Acceleration/Deceleration (G)	0.3
		Max. acceleration/deceleration (G)	0.3
Pressing		Max. Thrust at Pressing (N)	600
		Min. Thrust at Pressing (N)	60
		Max. Pressing Velocity (mm/s)	10
Pulling		Max. Thrust at Pulling (N)	600
		Min. Thrust at Pulling (N)	60
		Max. Pulling Velocity (mm/s)	10
Brake		Brake Type	Non-Excited Electromagnetic
		Brake Retaining Force (kg)	10
Stroke		Min. Stroke (mm)	115
		Max. Stroke (mm)	315
		Stroke Pitch (mm)	50

[Actuator Specifications 2]

Item	Content
Drive system	Ball screw $\phi 10\text{mm}$, rolled C10
Positioning repeatability	$\pm 0.02\text{mm}$
Lost motion	0.1mm or less
Loadcell rated capacity	600N
Repeated load accuracy ^(*1)	$\pm 1.0\%$ F.S. ^(*2)
Ambient operating temperature/humidity	0 to 40°C, 85% RH or less (Non-condensing)
Protection class	IP20
Vibration Durability / Shock Durability	4.9m/s ²
International standard compliance	CE Marking, RoHS Directive
Motor type	Pulse motor
Encoder type	Battery-less absolute
No. of Encoder Pulses	8192 pulse/rev

*1 It is the value that the variances of the load in repeated operation against the loadcell rated capacity are expressed in ratio.

*2 F.S.: Full Scale = It is the maximum value available for measurement.

[Payload by Speed/Acceleration]

When High Output Setting Enabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.3	0.3
0	10	10
35	10	10
70	10	10
100	10	10
110	10	10

When High Output Setting Disabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.3	0.3
0	10	10
35	10	10
80	10	10

**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications. It may cause to generate vibration, malfunction or shorten the product life.

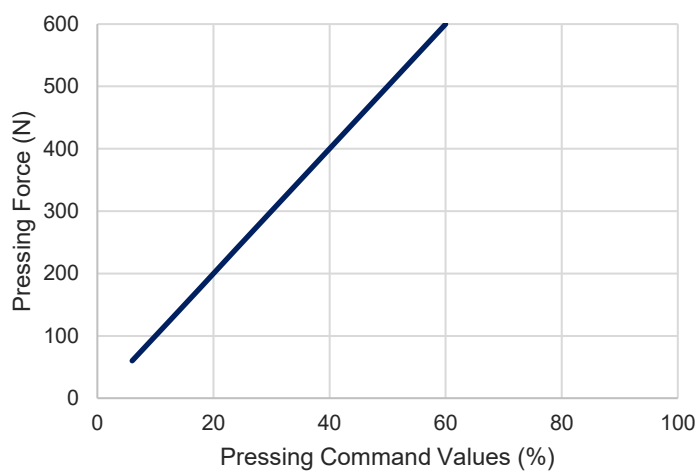
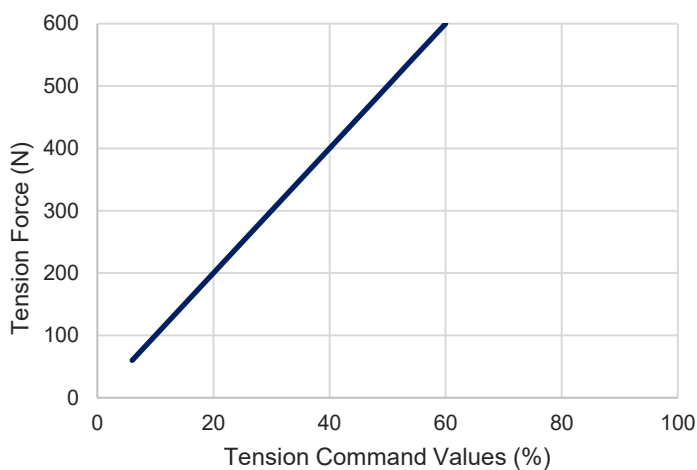
[Stroke and Max. Speed]

Max. Speed (mm/s)

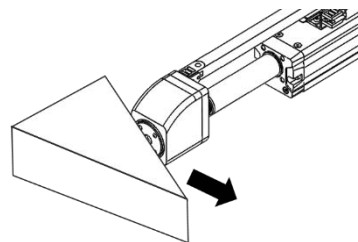
Stroke	115 mm	165 mm	215 mm	265 mm	315 mm
High Output Setting					
Enabled	110				
Disabled	80				

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting the lower speed than the minimum speed may cause such concerns of generating abnormal noise or making the speed unstable.
Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.
Minimum speed (mm/s) = lead (mm/r) ÷ 8192 (p/r) × 1000 (1/s)
(mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Correlation Diagram Between Pressing Force and Pressing Command Values]**[Correlation Diagram Between Tension Force and Tension Command Values]****Caution**

- Use the product within the range in the graph for the pressing command values and tension command values. Usage above the maximum command values shown in the graph is not available. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- When the reaction force of pressing or tension is side load, any load is not given to the loadcell.



[3] RCP6-RRA7R-LCT**[Actuator Specifications 1]**

Item		Content	
Lead	Lead (mm)	2	4
Horizontal	Payload	Max. payload (kg) (High output enabled)	10
		Max. payload (kg) (High output disabled)	10
	Speed and Acceleration/deceleration	Max. speed (mm/s)	85
		Rated Acceleration/Deceleration (G)	0.3
		Max. acceleration/deceleration (G)	0.3
Vertical	Payload	Max. payload (kg) (High output enabled)	10
		Max. payload (kg) (High output disabled)	10
	Speed and Acceleration/deceleration	Max. speed (mm/s)	85
		Rated Acceleration/Deceleration (G)	0.3
		Max. acceleration/deceleration (G)	0.3
Pressing		Max. Thrust at Pressing (N)	2000
		Min. Thrust at Pressing (N)	200
		Max. Pressing Velocity (mm/s)	10
Pulling		Max. Thrust at Pulling (N)	2000
		Min. Thrust at Pulling (N)	200
		Max. Pulling Velocity (mm/s)	10
Brake	Brake Type	Non-Excited Electromagnetic Brake	
	Brake Retaining Force (kg)	10	10
Stroke	Min. Stroke (mm)	120	120
	Max. Stroke (mm)	320	320
	Stroke Pitch (mm)	50	50

[Actuator Specifications 2]

Item	Content
Drive system	Ball screw $\phi 12\text{mm}$, rolled C10
Positioning repeatability	$\pm 0.02\text{mm}$
Lost motion	0.1mm or less
Loadcell rated capacity	2000N
Repeated load accuracy ^(*1)	$\pm 1.0\%$ F.S. ^(*2)
Ambient operating temperature/humidity	0 to 40°C, 85% RH or less (Non-condensing)
Protection class	IP20
Vibration Durability / Shock Durability	4.9m/s ²
International standard compliance	CE Marking, RoHS Directive
Motor type	Pulse motor
Encoder type	Battery-less absolute
No. of Encoder Pulses	8192 pulse/rev

*1 It is the value that the variances of the load in repeated operation against the loadcell rated capacity are expressed in ratio.

*2 F.S.: Full Scale = It is the maximum value available for measurement.

[Payload by Speed/Acceleration: Lead 4]

When High Output Setting Enabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.3	0.3
0	10	10
35	10	10
70	10	10
115	10	10
160	10	10

When High Output Setting Disabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.3	0.3
0	10	10
35	10	10
70	10	10
115	10	10

[Payload by Speed/Acceleration: Lead 2]

When High Output Setting Enabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.3	0.3
0	10	10
35	10	10
70	10	10
85	10	10

When High Output Setting Disabled

Payload (kg)

Orientation	Horizontal	Vertical
Speed (mm/s)	Acceleration (G)	
	0.3	0.3
0	10	10
35	10	10
60	10	10

**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications. It may cause to generate vibration, malfunction or shorten the product life.

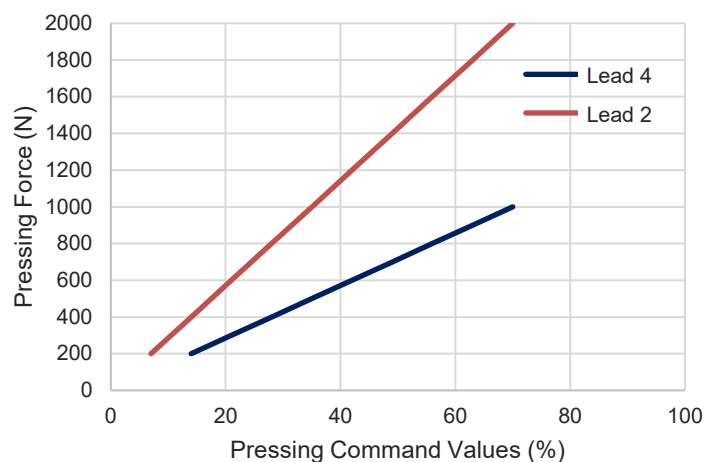
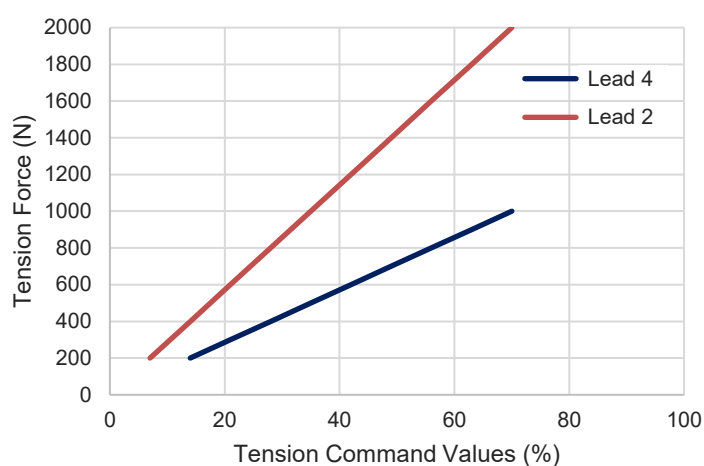
[Stroke and Max. Speed]

Max. Speed (mm/s)

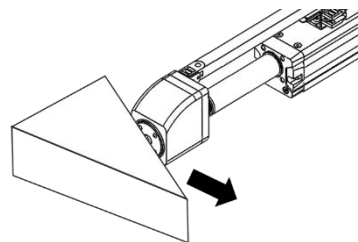
Lead (mm)	Stroke	120 mm	170 mm	220 mm	270 mm	320 mm
	High Output Setting					
4	Enabled	160				
	Disabled	115				
2	Enabled	85				
	Disabled	60				

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting the lower speed than the minimum speed may cause such concerns of generating abnormal noise or making the speed unstable.
Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.
Minimum speed (mm/s) = lead (mm/r) ÷ 8192 (p/r) × 1000 (1/s)
(mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Correlation Diagram Between Pressing Force and Pressing Command Values]**[Correlation Diagram Between Tension Force and Tension Command Values]****Caution**

- Use the product within the range in the graph for the pressing command values and tension command values. Usage above the maximum command values shown in the graph is not available. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- When the reaction force of pressing or tension is side load, any load is not given to the loadcell.





[Loadcell Type]

Tolerance	RRA4R-LCT (300N type)	RRA6R-LCT (600N type)	RRA7R-LCT (1000N type)	RRA7R-LCT (2000N type)
Loadcell System	Strain Gauge			
Rated Capacity (N)	600		2000	
Allowable Overload (% F.S.)	200			
Repeated Load Accuracy ^(*) (% F.S.)	±1.0			
Dielectric Strength Voltage (V)	DC50V			

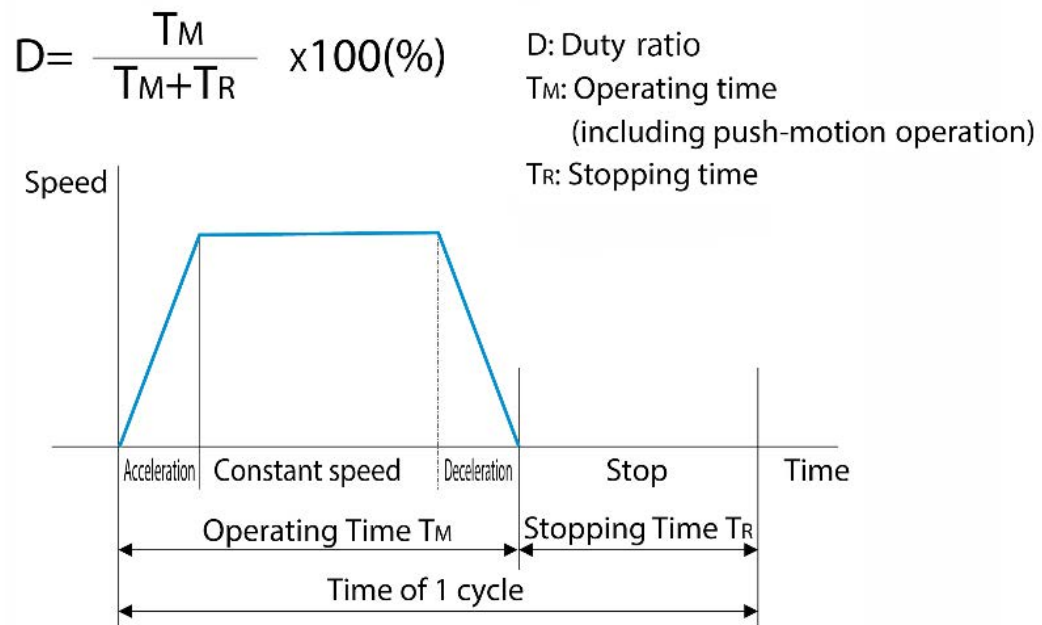
* 1 It is the value that the variances of the load in repeated operation against the loadcell rated capacity are expressed in ratio.

* F.S. : Full Scale (It is the maximum value available for measurement.)

(Note) The frequency of calibration for loadcell differs depending on the condition of use (such as frequency of pressing operation, pressing force, ambient temperature and so on). For the frequency reference of calibration, refer to [7.1 Frequency of Calibration]. Refer to [4.9 How to replace components (Loadcell)] for how to detach and attach the loadcell when passing to the calibration.

Duty ratio

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



There is no limit in the duty ratio for all of RRA4R-LCT, RRA6R-LCT and RRA7R-LCT. Operation at 100% of the duty ratio should be available in the ambient temperature from 0degC to 40degC.

Continuous Pressing Time and Continuous Pulling Time

There is no limit to the continuous pressing time and continuous pulling for all of RCP6-RRA4R-LCT, RCP6-RRA6R-LCT and RCP6-RRA7R-LCT.

1.3 Options

● : Available to Select

No.	Option Name	Model Code	Model / Lead (mm)			
			RRA4R	RRA6R	RRA7R	
			2.5	1.5	2	4
1	With brake	B	●	●	●	●
2	Cable Eject Direction (Top side)	CJT	●	●	●	●
3	Cable Eject Direction (Bottom side)	CJB	●	●	●	●
4	Cable Eject Direction (Out side)	CJO	●	●	●	●
5	Flange (Front)	FL	●	●	●	●
6	Foot Bracket	FT	●	●	●	●
7	Equipped with Loadcell (Equipped in Standard)	LCT	●	●	●	●
8	Motor Reversed Direction (Left side)	ML	●	●	●	●
9	Motor Reversed Direction (Right side)	MR	●	●	●	●

* The option model codes "CJB" and "FT" cannot be used at the same time.

* RRA4R-LCT is not available for selecting "-B-FL" and "-B-CJ-FL" when the stroke is 110mm.

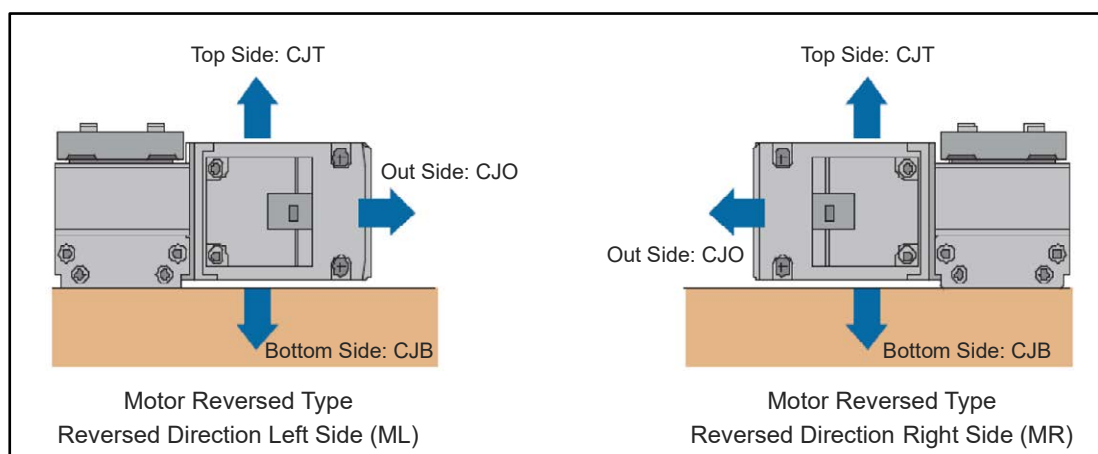
With brake (Model Code: B)

This is used to prevent the slider or rod from moving during power outages or when the servo is OFF.

It can also be used to prevent the slider or rod from falling when mounted vertically.

Cable Eject Direction (Model Code: CJT, CJB and CJO)

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



Flange (Model Code: FL)

It is a bracket to affix the actuator from the main body side with screws.

The flange (front) (for Option -FL) should be already attached on delivery.

It is available to attach it later after delivered.

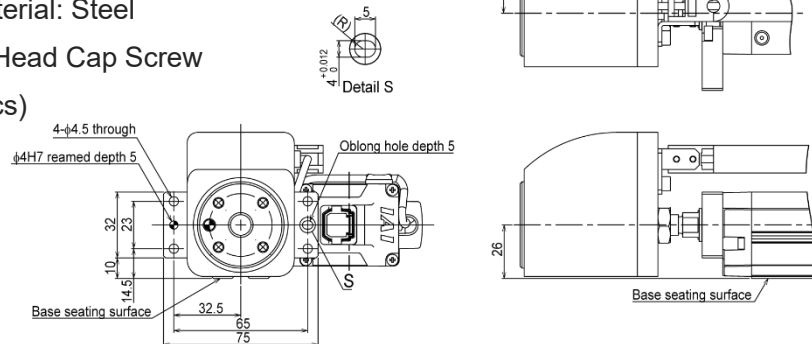
[RCP6-RAA4R-LCT]

Unit Model Code: RCP6L-FL-RAA4

Unit Weight: 0.14kg, Material: Steel

Accessory: Hex Socket Head Cap Screw

M4 × 12 (4pcs)



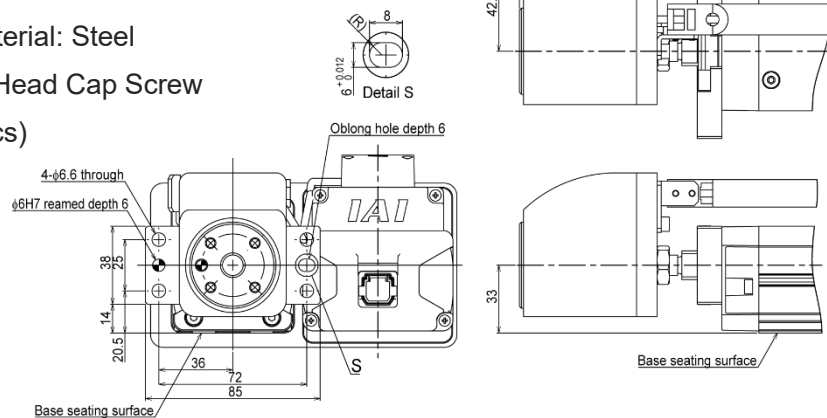
[RCP6-RAA6R-LCT]

Unit Model Code: RCP6L-FL-RAA6

Unit Weight: 0.20kg, Material: Steel

Accessory: Hex Socket Head Cap Screw

M6 × 15 (4pcs)



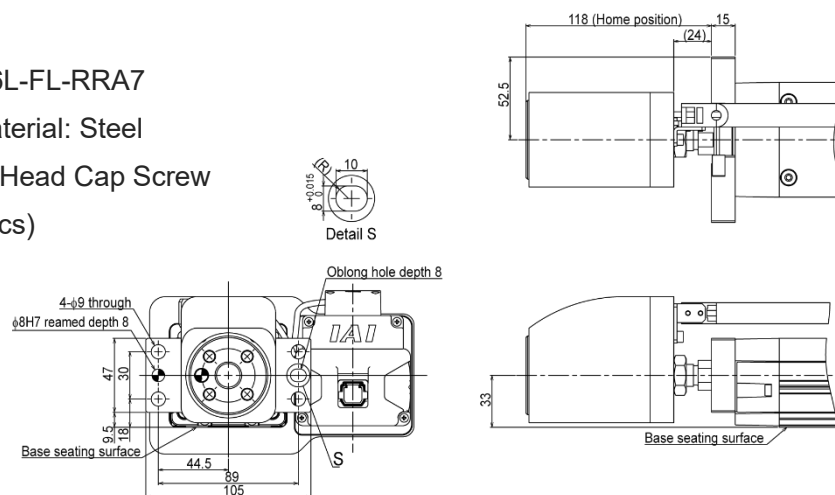
[RCP6-RAA7R-LCT]

Unit Model Code: RCP6L-FL-RAA7

Unit Weight: 0.36kg, Material: Steel

Accessory: Hex Socket Head Cap Screw

M8 × 20 (4pcs)



Foot Bracket (Model Code: FT)

It is a bracket to hold the actuator main body with screws on the top.

As the unit model code represents one piece of the foot bracket, it is necessary to order the necessary number.

Too small number of foot brackets should make the main body warped and may shorten the product life.

[RCP6-RAA4R-LCT]

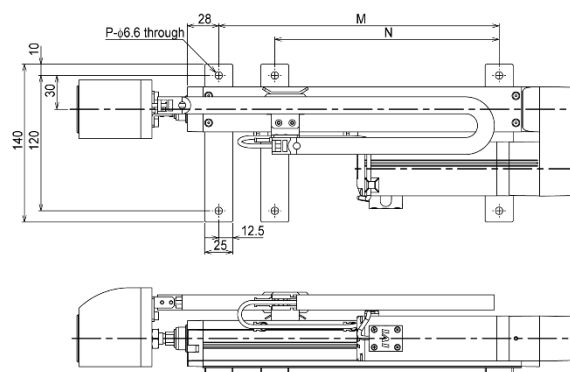
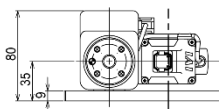
Unit Model Code: RCS3-FT-RA4-2

Unit Weight: 0.24kg, Material: Steel

Accessory: Hex Socket Head Cap Screw

M4 × 8

- * Two pieces enclosed in one piece of bracket



[RCP6-RAA6R-LCT]

Unit Model Code: RCS3-FT-RA6-2

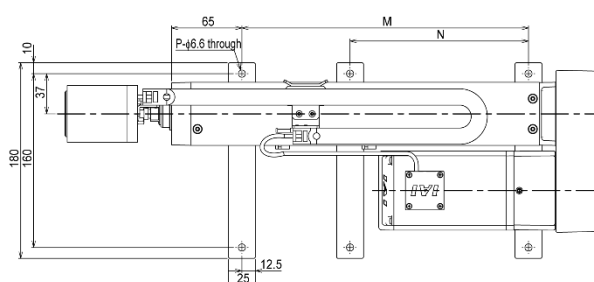
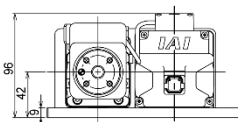
Unit Weight: 0.31kg, Material: Steel

Accessory:

Hex Socket Head Cap Screw

M5 × 12

- * Two pieces enclosed in one piece of bracket



[RCP6-RAA7R-LCT]

Unit Model Code: RCS3-FT-RA7-2

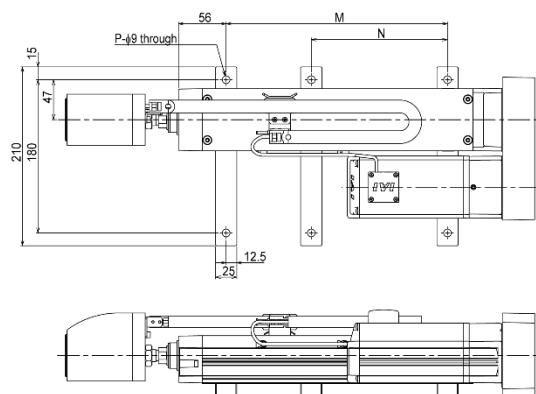
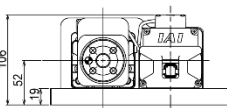
Unit Weight: 0.76kg, Material: Steel

Accessory:

Hex Socket Head Cap Screw

M5 × 20

- * Two pieces enclosed in one piece of bracket



* Refer to [5.1 External Dimensions] for Dimensions M and N and the quantity of P in the drawing.

Equipped with Loadcell (Equipped in Standard) (Model Code: LCT)

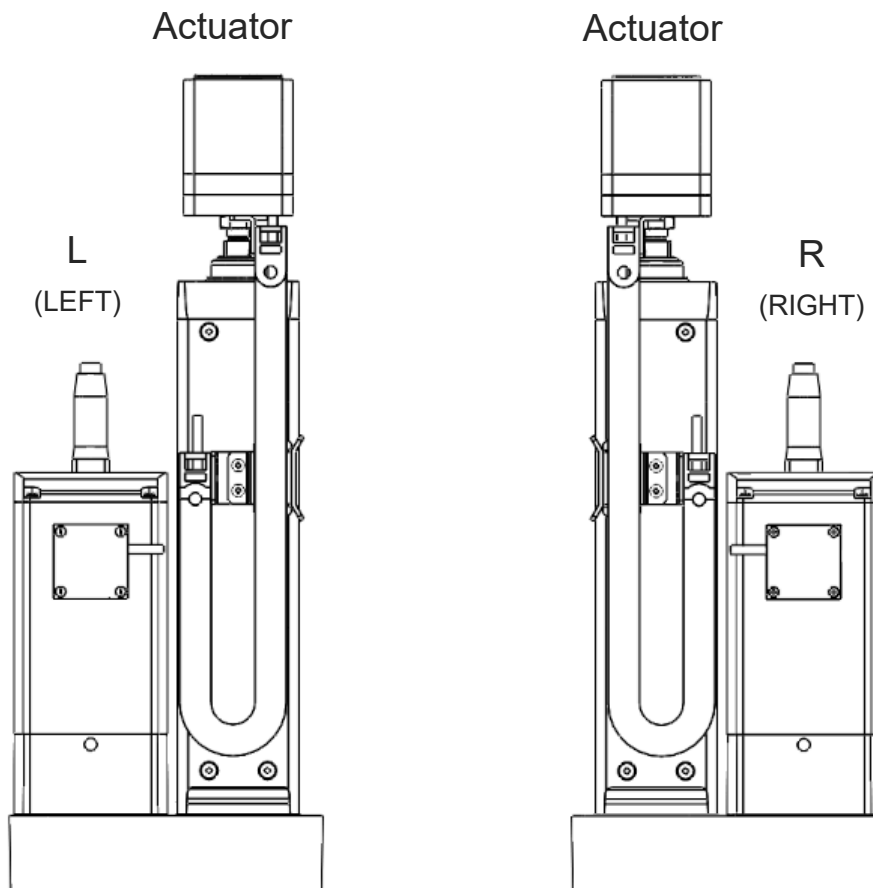
It is an option to install a loadcell on the rod tip and make operation with the force control.

* Make sure to state LCT for the pulse pressing option.

Motor Reversed Direction (Model Code: ML, MR)

It is the code to indicate the direction of motor reversed when selecting the motor reversed type.

ML shows reversed to left and MR to right.



ML: Reversed Direction (Left side)

MR: Reversed Direction (Right side)

ROBO Cylinder

Chapter 2

Installation

2.1	Precautions for transportation	2-1
2.2	Installation and storage/preservation environment	2-3
	Installation Environment	2-3
	Storage/preservation environment	2-4
2.3	How to Install	2-5
	Mounting Orientation	2-5
	Installation surface	2-6
	Installation of the Main Unit	2-7

2.1 Precautions for transportation

[Handling the package]

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

- Do not damage or drop the package.

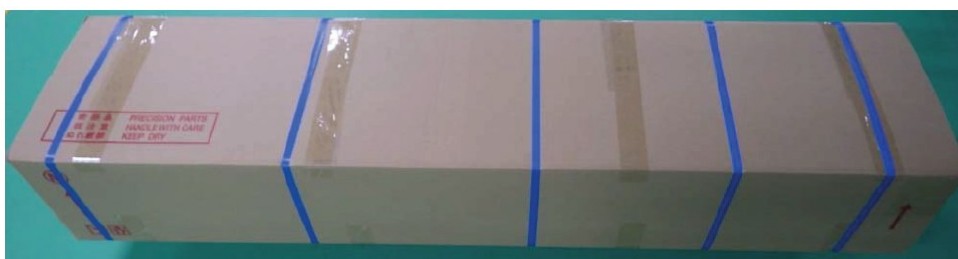
The package is not specially designed to withstand dropping or shock due to collision.

- Keep the unit in horizontal orientation for stationary positioning or transportation.

Follow the instruction if there is any for the packaging condition.

- Do not climb onto the package.
- Do not put anything that could deform the package on it.
- Transport a heavy package with at least more than two operators.

Consider an appropriate method for transportation.



[Handling after unpacking]

- Carry the slider type by its base part.
- Do not attempt to hold the motor unit, loadcell, cables or cable carriers for transportation, or pull cables to move the device.
- Do not damage or drop the package during transportation. Do not apply excessive force to any part.
- Do not attempt to apply impact on the loadcell. The loadcell may get damaged.
→ For the names of each part, refer to [Names of the Parts] on page Intro-13.



Base part

[Handling when assembled into machinery (system)]

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

2.2 Installation and storage/preservation environment

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

Pollution degree 3: Conductive pollution or dry nonconductive pollution, which could become conductive due to expected condensation. This generally applies to industrial environments. (IEC60664-1)

Installation Environment

Avoid the following locations for installation.

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

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

Also, provide sufficient work space for the maintenance and inspection listed below:

- Space to replenish grease
- Space to replace the motor

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

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

Storage/preservation environment

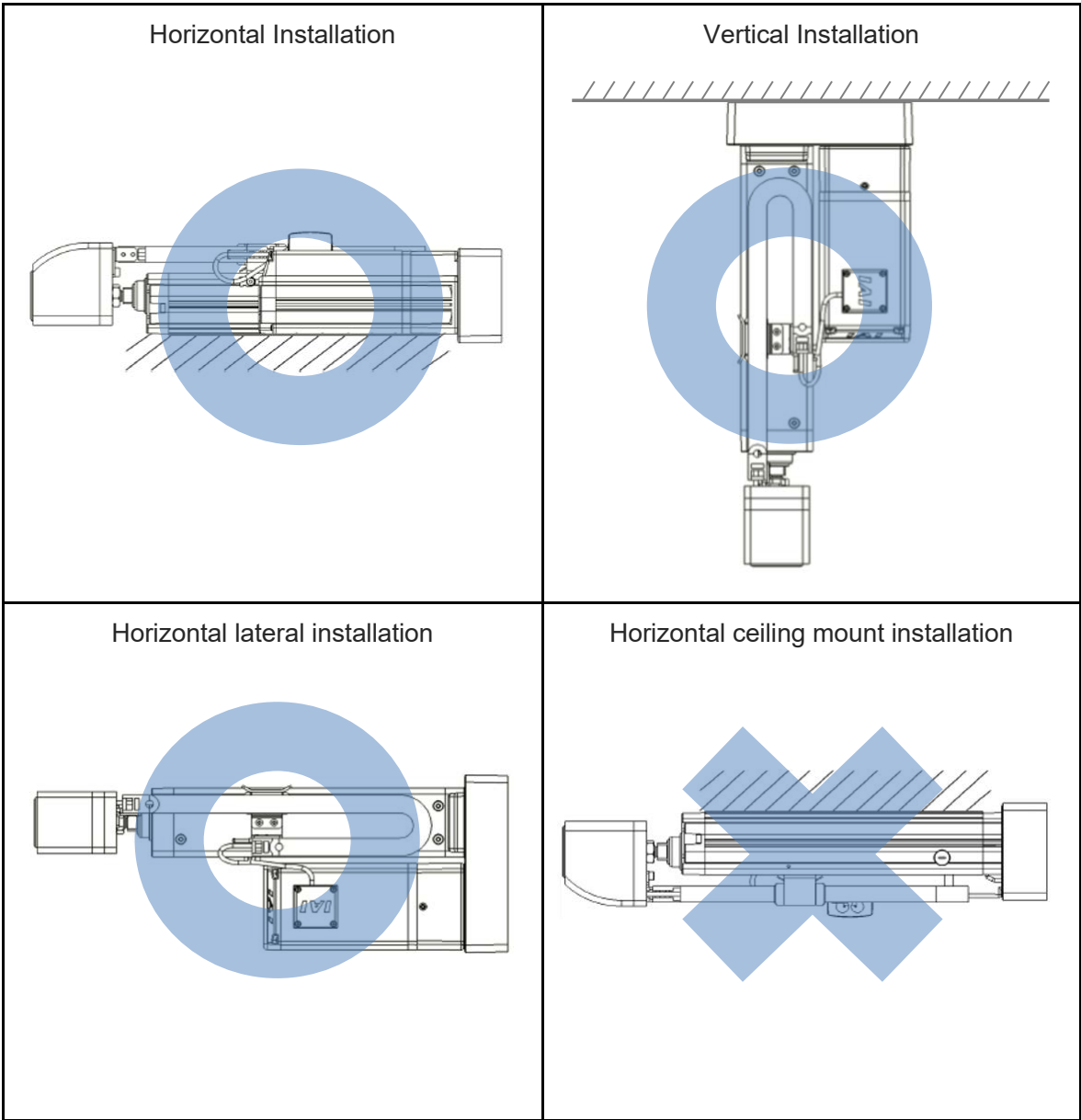
- For the storage and preservation environment, see the installation environment.
However, give especial consideration to the prevention of condensation during long-term storage/preservation.
- Unless especially specified, desiccant is not included in the package at shipping.
If the product is to be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

2.3 How to Install

Mounting Orientation

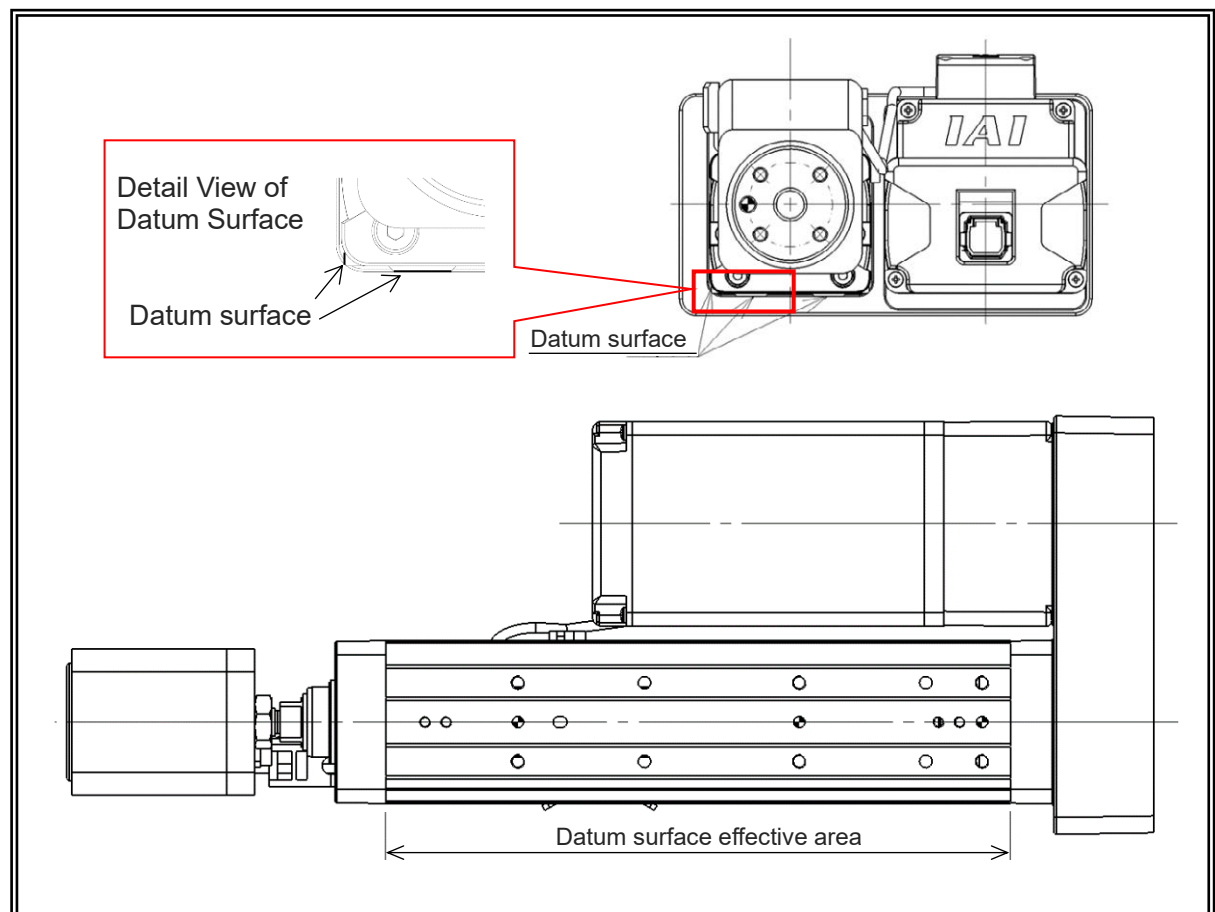
[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

Installation in the orientations marked with O should be available.

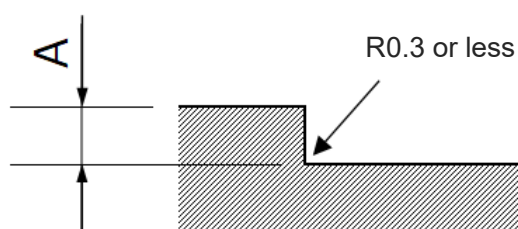


Installation surface

- The body mounting surface should be a machined surface or a plane with similar accuracy, with flatness within 0.05mm/m.
- The mounting frame should have a structure rigid enough to prevent the generation of vibration, etc.
- Also consider the necessary space for maintenance work such as Actuator replacement and inspection.
- The sides and the bottom of the base of the actuator are the datum surfaces for the rod run. When it is required to have a traveling accuracy, take each surface as a datum when installation.



For the finish on the platform when using the datum surfaces of the base, follow the figure below.



Model Name	A Dimensions (mm)
RRA4R-LCT	2 to 4
RRA6R-LCT	
RRA7R-LCT	

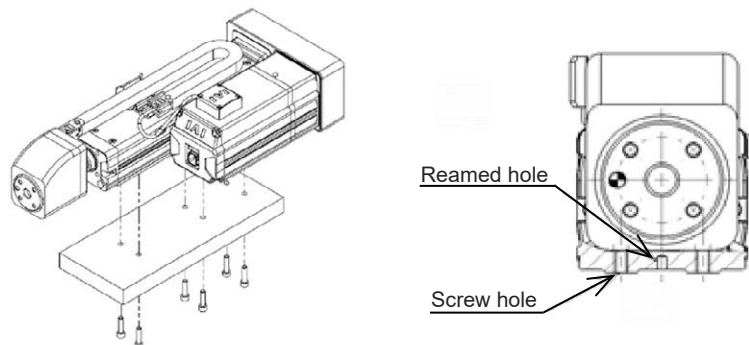
Installation of the Main Unit

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

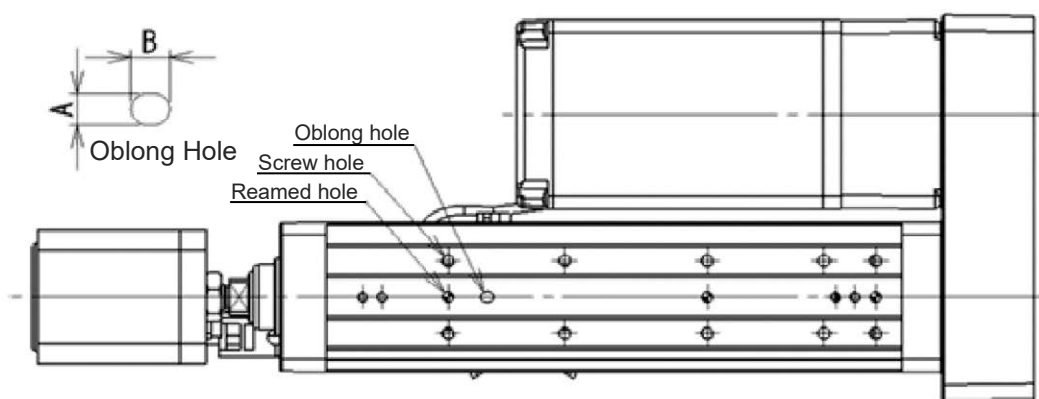
[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

It can be affixed at the back using the mounting screw holes at the bottom of the base.

→ For details regarding the screw hole position and dimensions, refer to [5.1 External Dimensions].



Dimensions for Screw Hole Positions



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.
- Ensure to have the length of thread engagement approximately 1.5 times longer than the nominal diameter for RRA4R-LCT and approximately 1.8 times longer than the nominal diameter for RRA6R-LCT and RRA7R-LCT, so the screws tips would not come out inside the actuator.

Model Name	Nominal Screw Diameter	Screw Holes Depth (mm)	Tightening Torque (N·m)		Reamed Hole (mm)	Oblong Hole (mm)
			In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:		
RRA4R-LCT	M4	6	3.59	1.76	φ3 H7 depth 4	A:3 $\begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix}$ B:4 depth 4 or less
RRA6R-LCT	M5	10	7.27	3.42	φ4 H7 depth 5.5	A:4 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ B:5 depth 5.5 or less
RRA7R-LCT	M5	9	7.27	3.42	φ4 H7 depth 6	A:4 $\begin{smallmatrix} +0.012 \\ 0 \end{smallmatrix}$ B:5 depth 6 or less

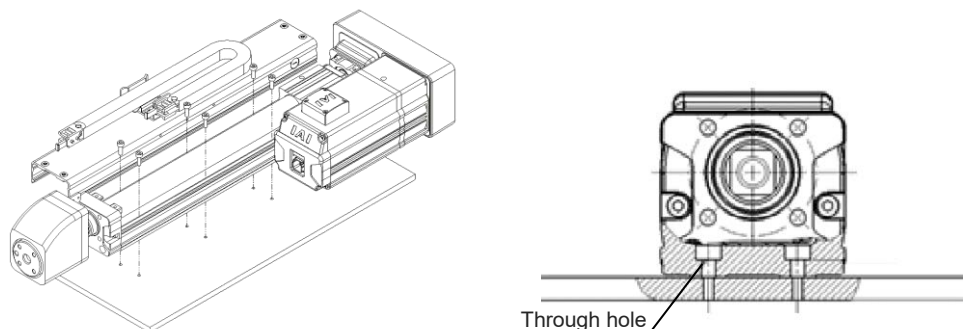
[2] Using the Through Holes on the Top of the Base

[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

As there are through holes equipped on the base, the unit can be held from the top.

Please note that there are some through holes not available for use on RRA4R-LCT.

→ Refer to [5.1 External Dimensions] for the positions and dimensions of the through holes not available for use.



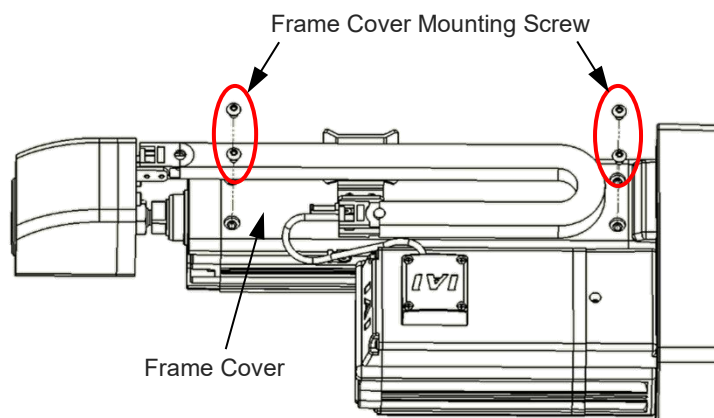
Work on the unit with the rod pulled out.

For the brake-equipped type, a rod is not available for move only with the ROBO Cylinder unit.

Connect a controller to have the rod make the jog operation for installation.

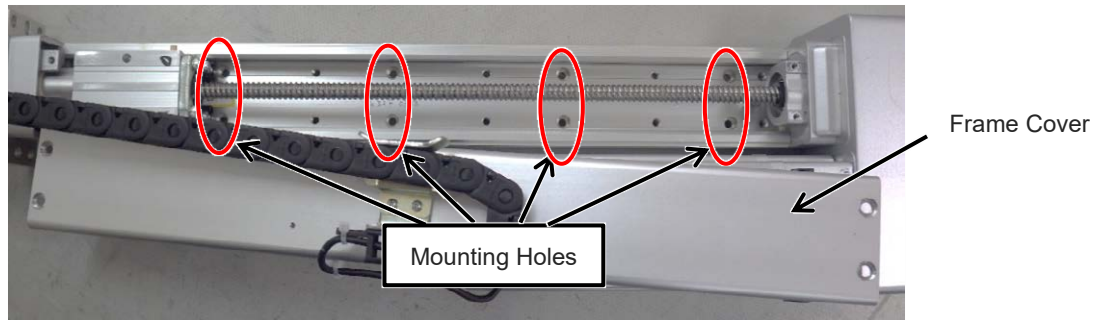
1

Confirming that the power is off, remove the hex socket button head screws (thin head FH type for RRA4R-LCT) at four places on the frame cover with using a hex wrench with 1.5mm parallel faces (RRA4R-LCT), 2.5mm parallel faces (RRA6R-LCT) and 3mm parallel faces (RRA7R-LCT), and take the frame cover off.



2

Slide the frame cover to conduct the installation.



3

Apply the socket head cap screw indicated in the table below

Model Name	Through Holes	Nominal Screw Diameter	Tightening Torque (N·m)
RRA4R-LCT	φ3.4 through, φ6.5 counter boring depth 3.5	M3	0.83
RRA6R-LCT	φ4.5 through, φ8 counter boring depth 4.5	M4	1.76
RRA7R-LCT	φ6 through, φ9.5 counter boring depth 5.5	M5	3.42

4

Tighten the screws with the following tightening torque when putting the frame cover on.

Model Name	Screw	Screw Quantity	Tightening Torque (N·m)
RRA4R-LCT	Thin Head FH Type (Hex Pocket) M3 × 4	4pcs	0.62
RRA6R-LCT	Hex Socket Button Head Screw (SUS) M4 × 6	4pcs	1.91
RRA7R-LCT	Hex Socket Button Head Screw (SUS) M5 × 10	4pcs	4.14

! Notice

- The use of high-strength bolts of ISO-10.9 or higher is recommended.
- Make sure to ensure the same length as the nominal diameter for the effective length of thread engagement between a screw and a threaded hole when the threaded hole is made of steel and length 1.8 times of the nominal diameter when the threaded hole is made of aluminum.

[3] When using Flange (Front) (Optional)**[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]**

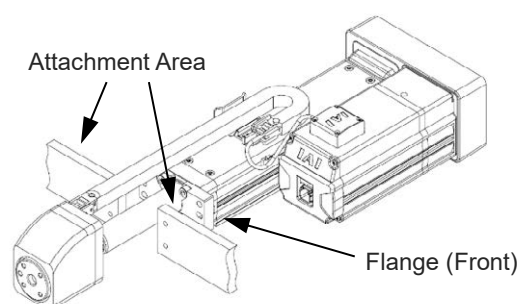
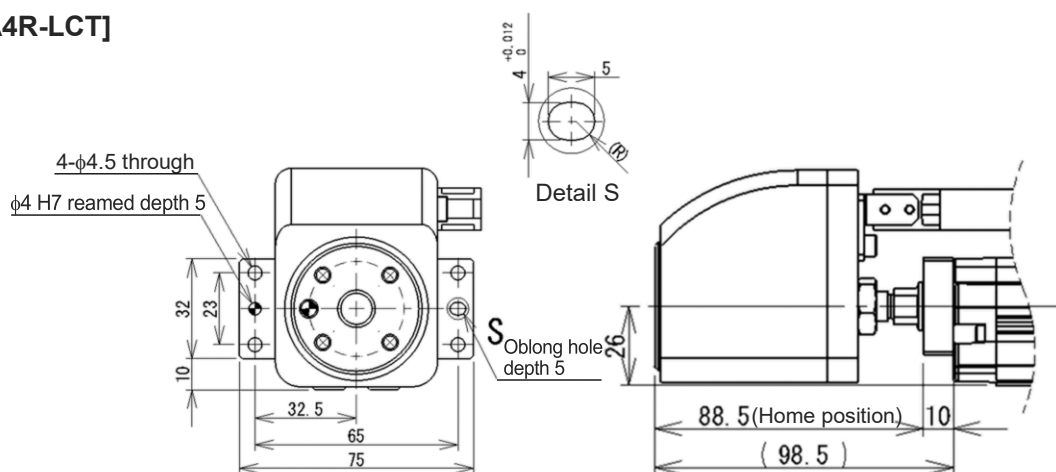
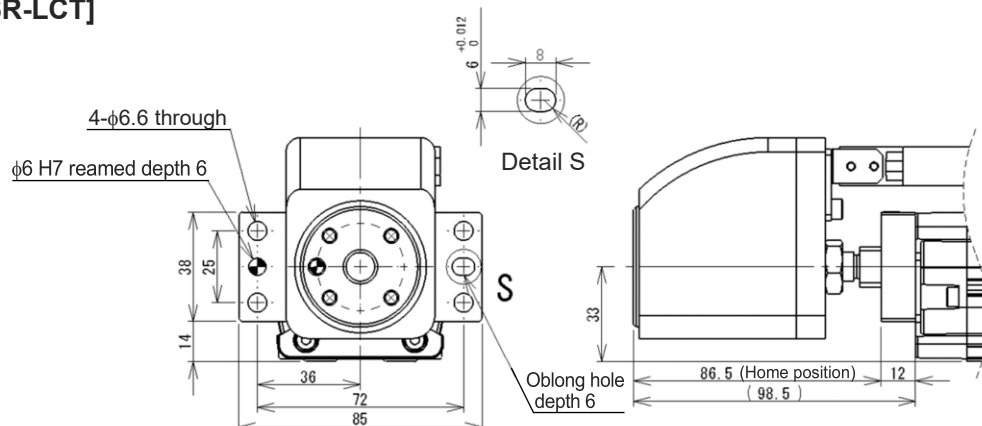
The flange (front) (for Option -FL) should be already attached on delivery.

It is available to attach it later after delivered.

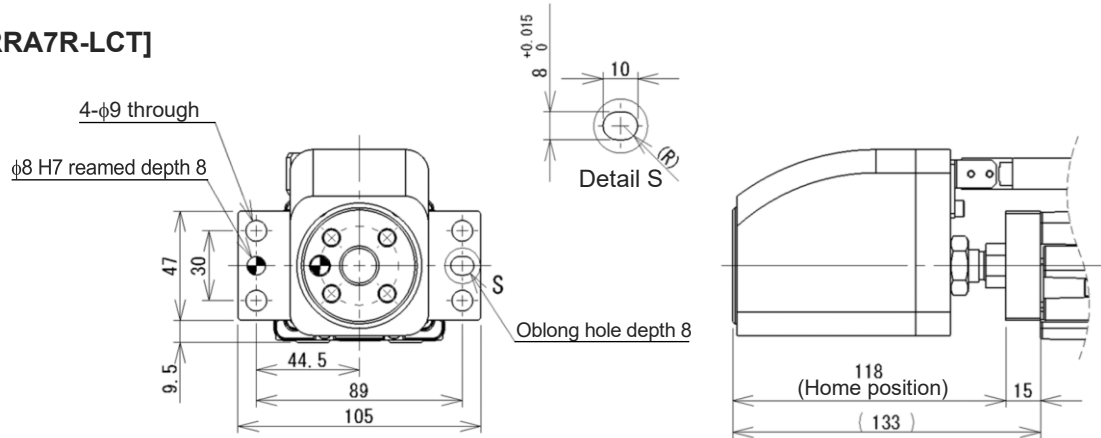
There are screw holes equipped on the flange (front) (for Option -FL).

Utilize these holes for the installation.

Make sure to follow the instruction in [Precautions for Installation using Flange (Front) and Front Bracket] described in the following pages.

**[RRA4R-LCT]****[RRA6R-LCT]**

[RRA7R-LCT]

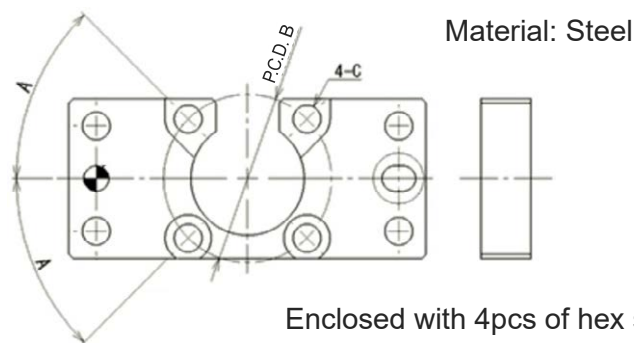


<Recommended Values for Flange (Front) Fixing Screws>

- It is recommended to apply high-tensile bolts complied with ISO-10.9 or higher for the used screws.
- Ensure to have the length of thread engagement between the screws and the threaded holes approximately 1.8 times longer than the nominal diameter.
- Apply the tightening torque of the recommended values described in the table below for screw tightening.

Model Name	Nominal Screw Diameter	Tightening Torque (N·m)
		In the case that steel is used for the bolt seating surface:
RRA4R-LCT	M4	3.59
RRA6R-LCT	M6	12.3
RRA7R-LCT	M8	30.0

◆ When Attaching Flange (Front) to Main Body



Enclosed with 4pcs of hex socket head cap screws

Hole Dimensions and Tightening Torques for Flange (Front) Attached to Main Body

Model Name	A (deg)	B (mm)	C (mm)	Nominal Screw Diameter	Tightening Torque (N·m)
RRA4R-LCT	50	30	φ4.5 through	M4 × 12	3.59
RRA6R-LCT	45	40	φ6.6 through	M6 × 15	12.3
RRA7R-LCT	45	46	φ9 through	M8 × 20	30.0

[4] When using Screw Holes on Front Bracket

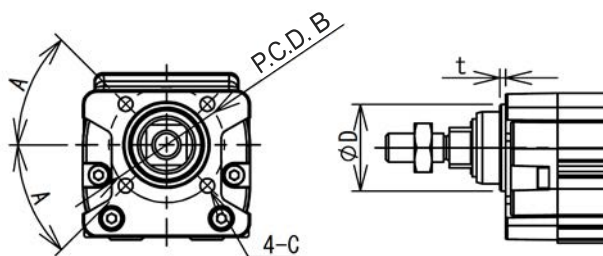
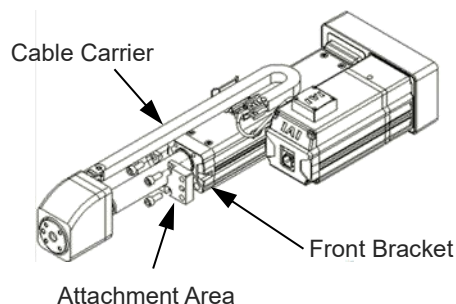
[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

There are screw holes equipped on the front bracket.

Utilize these screw holes for installation.

■ Pay attention to Interference with Cable Carrier

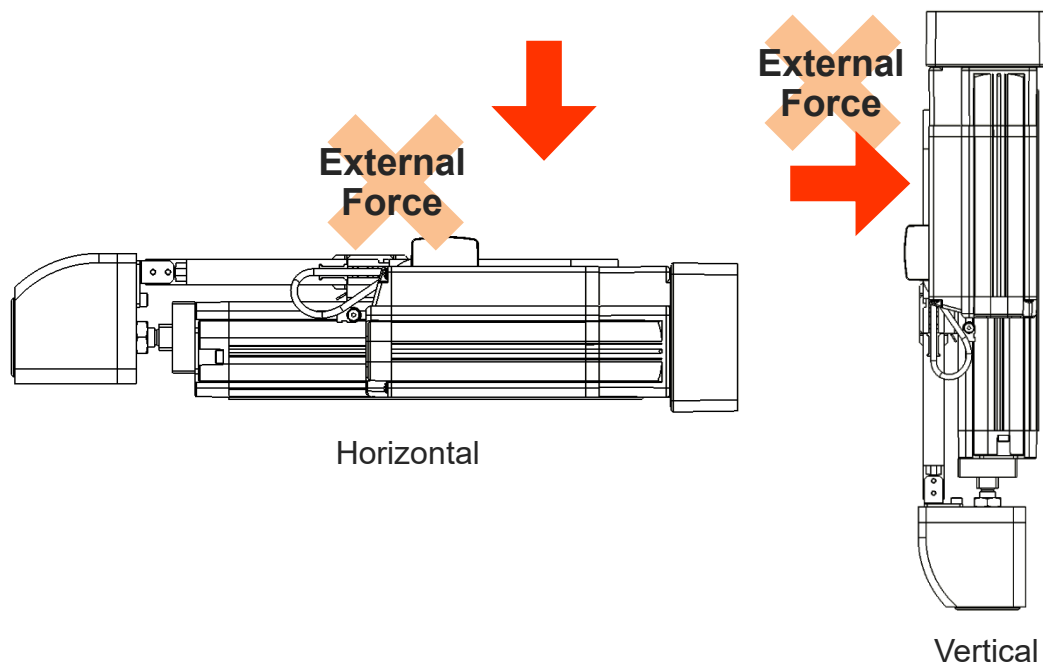
As the way to install the main body requires attention to interference to cable carriers, it is recommended to have an installation using the flange (front) (option).



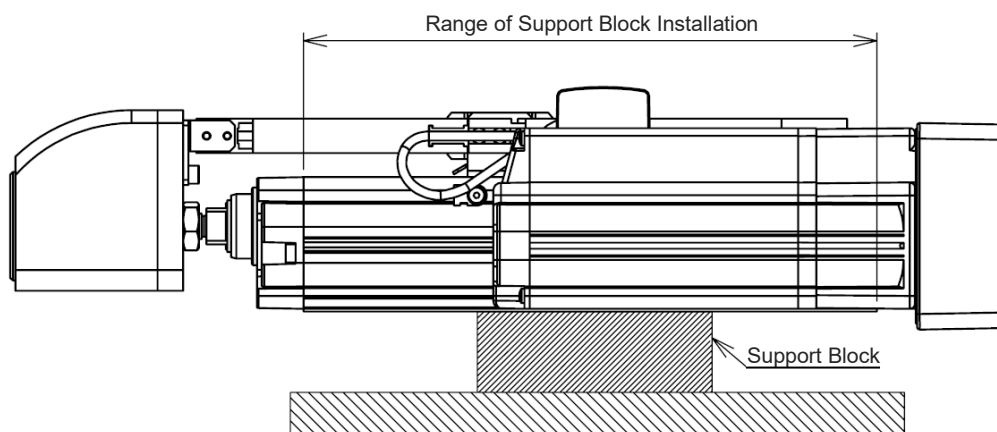
Model Name	A (deg)	B (mm)	Screw Hole C (mm)	ϕD (mm)	t (mm)	Tightening Torque (N·m)	
						In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
RRA4R-LCT	50	30	M4 depth 8	24h7	1.5	3.59	1.76
RRA6R-LCT	45	40	M6 depth 12	30h7	2	12.3	5.40
RRA7R-LCT	45	46	M8 depth 16	35h7	2	30.0	11.5

Precautions for Installation using Flange (Front) and Front Bracket

- Do not apply external force to the actuator body.



Have a support of such as a support block on the main body in order to avoid any external force.



Caution

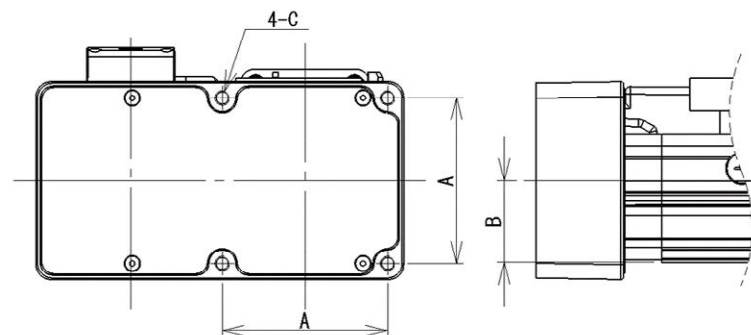
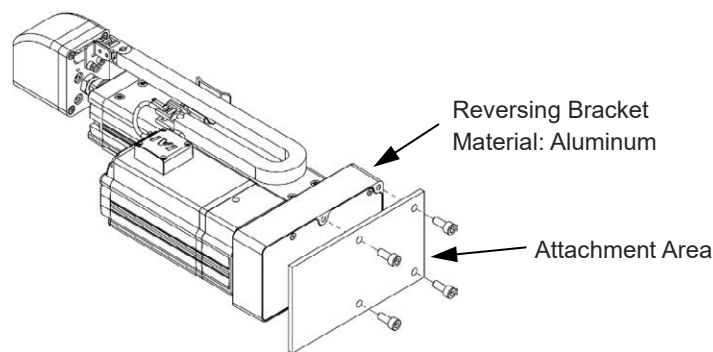
- Do not apply external force to the actuator body after installation.
External force may cause malfunctions or damage to parts.

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

[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

There are screw holes for installation equipped on the reversing bracket.

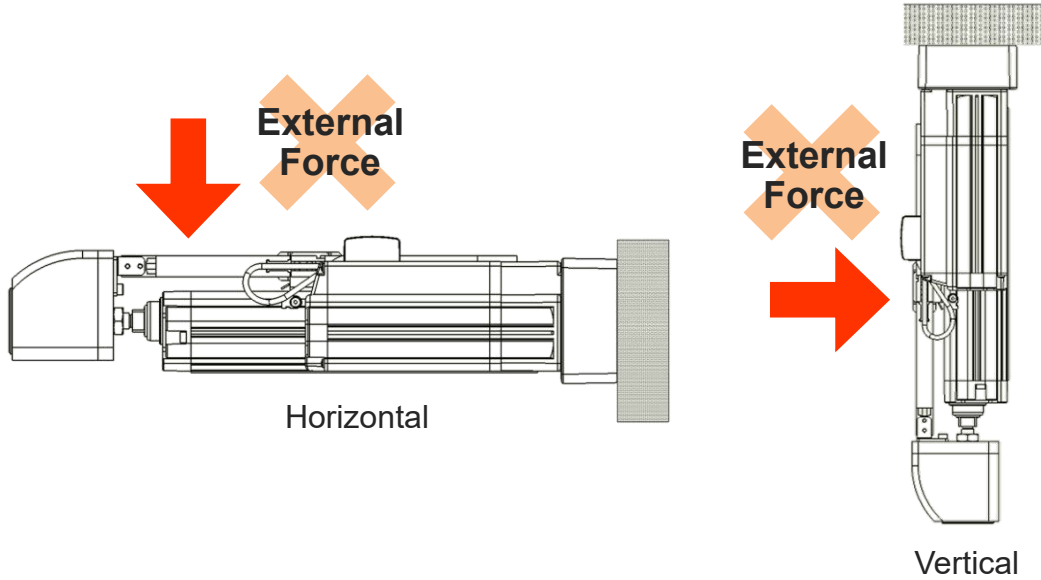
For installation, these holes are available for holding at the back.



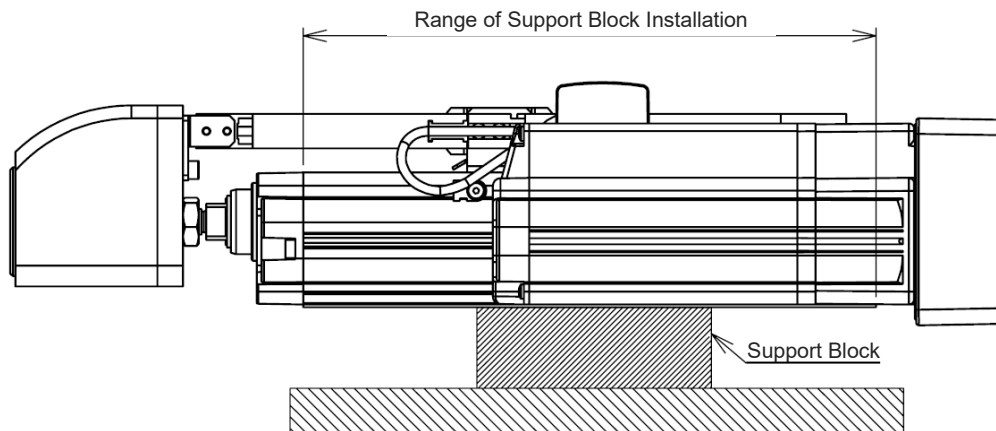
Model Name	A (mm)	B (mm)	C (mm)	Tightening Torque (N·m)	
				In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
RRA4R-LCT	32	26	M4 depth 9	3.59	1.76
RRA6R-LCT	67	33	M6 depth 14	12.3	5.40
RRA7R-LCT	82	33	M8 depth 16	30.0	11.5

Precautions for Using Attachment Holes on Bracket in Motor Reversing Type

- Do not apply external force to the actuator body.



Have a support of such as a support block on the main body in order to avoid any external force.



Caution

- Do not apply external force to the actuator body after installation.
External force may cause malfunctions or damage to parts.

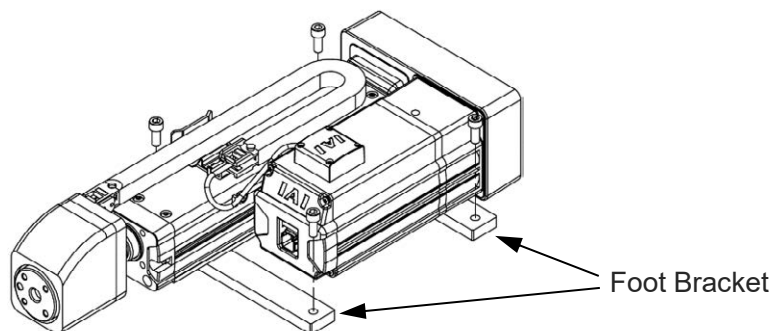
[6] When Using Attachment Holes on Foot Bracket (Optional)

[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

There are screw holes for installation equipped on the foot bracket (Option -FT).

For installation, these holes are available.

Refer to [5.1 External Dimensions] for the positional relation between the actuator and foot brackets.

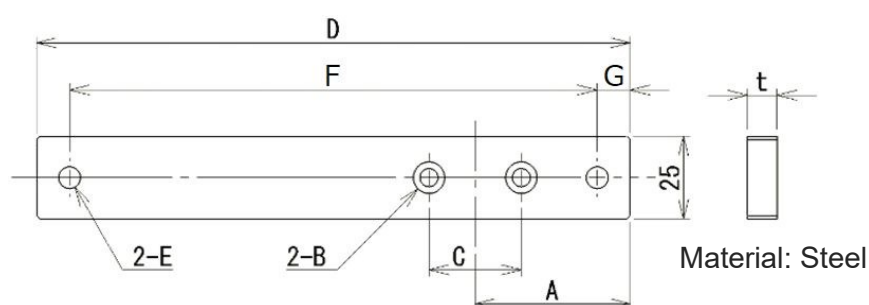


<Recommended Values for Foot Bracket Fixing Screws>

- It is recommended to apply high-tensile bolts complied with ISO-10.9 or higher for the used screws.
- Ensure to have the length of thread engagement between the screws and the threaded holes approximately 1.8 times longer than the nominal diameter.
- Apply the tightening torque of the recommended values described in the table below for screw tightening.

Model Name	Nominal Screw Diameter	Tightening Torque (N·m)
RRA4R-LCT	M6	12.3
RRA6R-LCT	M6	12.3
RRA7R-LCT	M8	30.0

◆ When Attaching Foot Bracket to Main Body



Two pieces of hex socket head cap screws enclosed in one piece of foot bracket

Dimensions of Foot Brackets

Model Name	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	t (mm)
RRA4R-LCT	40	φ4.5 through φ8 counter boring depth 5	17	140	φ6.6 through	120	10	9
RRA6R-LCT	47	φ5.5 through φ9.5 counter boring depth 5.5	28	180	φ6.6 through	160	10	9
RRA7R-LCT	62	φ5.5 through φ9.5 counter boring depth 7	40	210	φ9 through	180	15	19

Tightening Torques of Foot Brackets

Model Name	Nominal Screw Diameter	Tightening Torque (N·m)
RRA4R-LCT	M4 × 8	3.59
RRA6R-LCT	M5 × 12	7.27
RRA7R-LCT	M5 × 20	7.27

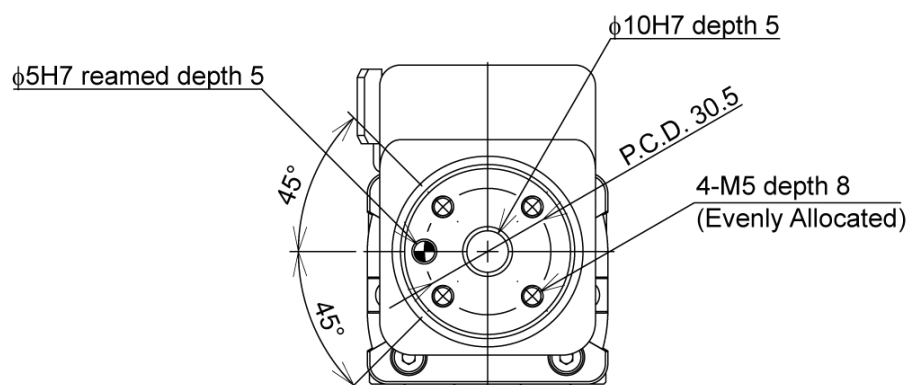
[7] Attachment of Tool (prepared by user)

On the end of the loadcell unit, there is a feature to attach a tool (prepared by a user).

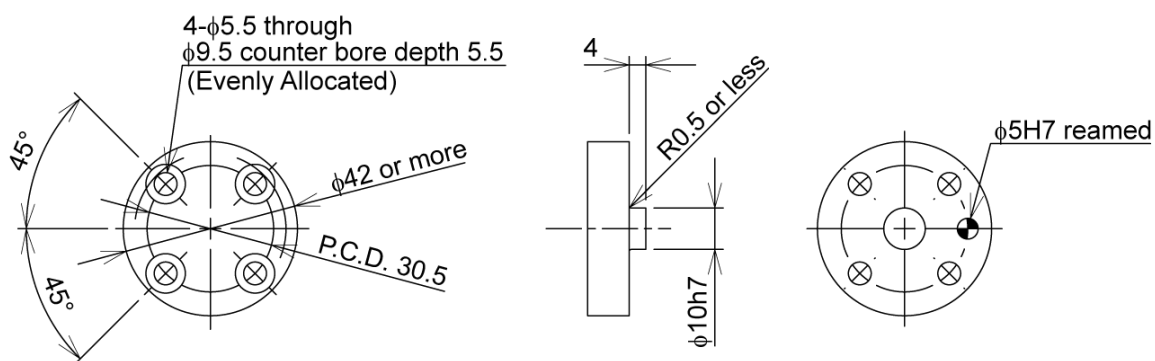
A tool can be attached using the screw holes on the tips.

The dimensions of the tip area of the loadcell and the position of the reamed hole are as shown below.

[RRA4R-LCT/RRA6R-LCT]

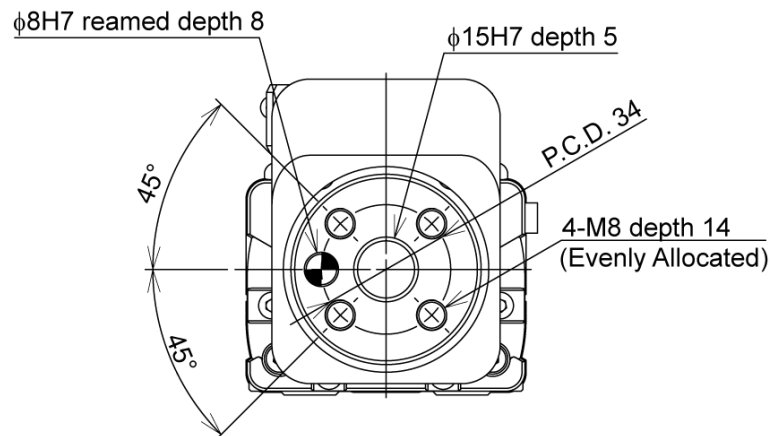


Reference Dimensions for A Tool to be Attached on Loadcell Tip

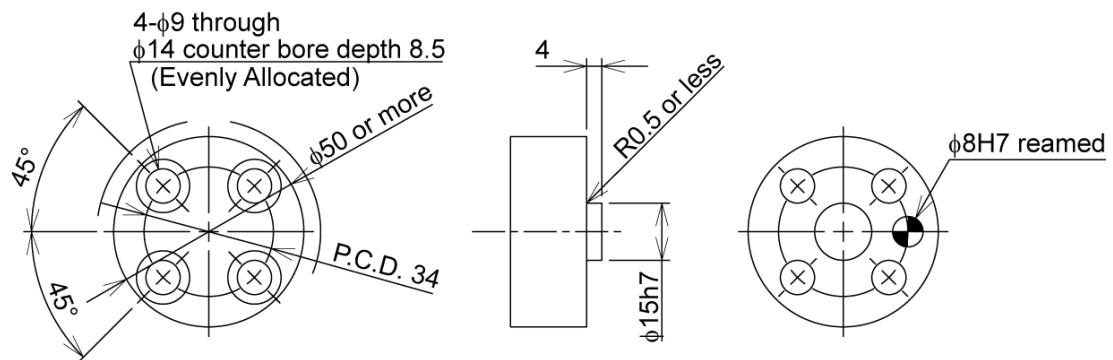


Refer to the recommended tightening torques shown in the table below when tightening a tool.

Model Name	Nominal Screw Diameter	Tightening Torque(N·m)	
		In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
RRA4R-LCT RRA6R-LCT	M5	7.27	3.42

[RRA7R-LCT]

Reference Dimensions for A Tool to be Attached on Loadcell Tip



Refer to the recommended tightening torques shown in the table below when tightening a tool.

Model Name	Nominal Screw Diameter	Tightening Torque(N·m)	
		In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
RRA7R-LCT	M8	30.0	11.5

**Caution**

- Keep the jig weight less than the allowable payload of the actuator.
- When attaching a tool, pay attention not to apply impact load or unbalanced load to the loadcell or peripheral components. It may cause malfunction of the loadcell.
- When attaching a tool in horizontal orientation, avoid moment load from being applied to the loadcell.

ROBO Cylinder

Chapter 3

Connecting with the Controller

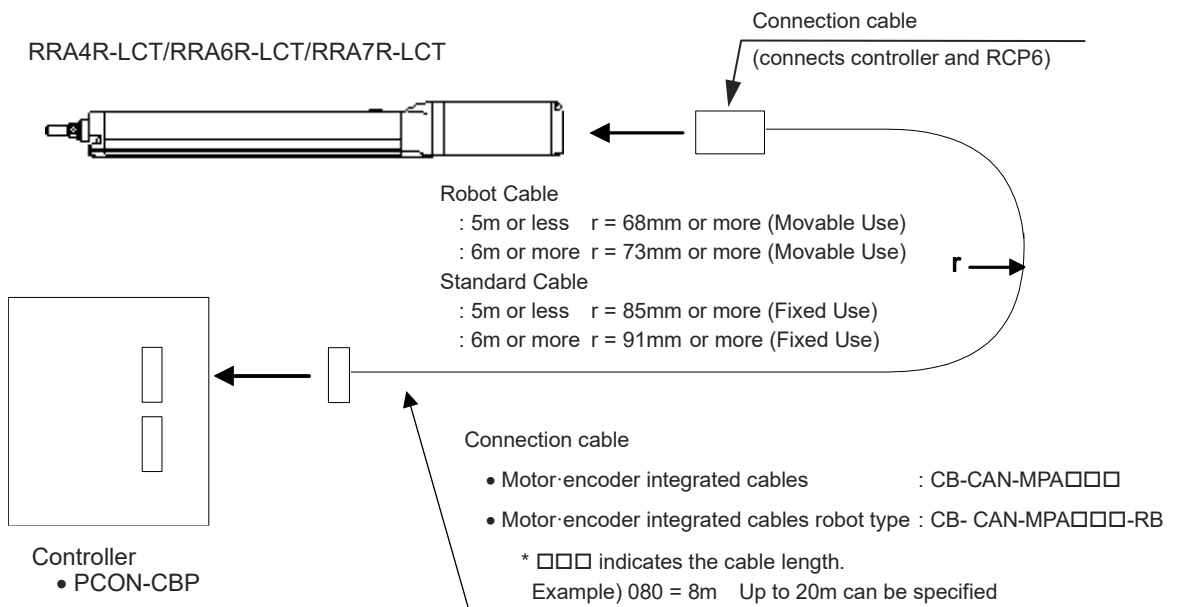
3.1	Connecting with the Controller	3-1
3.2	Motor • Encoder Cables	3-2

3.1 Connecting with the Controller

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

- If the 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 sufficient radius for bending.
- Do not cut and reconnect the connection cable for extension or shorten the cable.
- Do not pull on the connection cable or bend it forcibly.
- The actuator cable coming out of the motor unit is not meant to be bent. Fix the cable so it would not be bent repeatedly.

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



Do not bend the cable in the area from the connector tip (on both sides) to 150mm.

Refer to [3.2 Motor • Encoder Cables] for the details of the connection cable CB-CAN-MPA□□□(-RB).

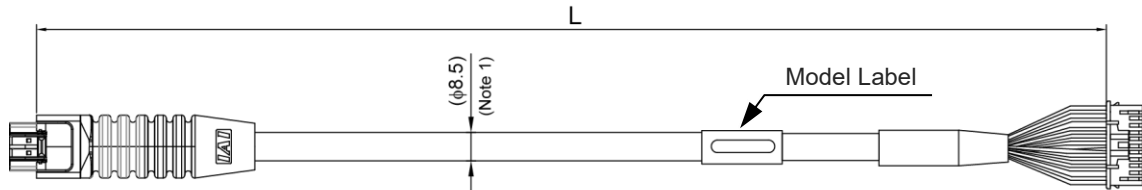
3.2 Motor • Encoder Cables

Model Code **CB-CAN-MPA-***/ CB-CAN-MPA-***-RB**

For cables, use one with the revision below or later. (described on model label)

Standard cable : CB-CAN-MA*** / ED-090-2-008-G-***-5 (5 or later for revision number at end)

Robot cable : CB-CAN-MA***-RB / ED-090-2-009-G-***-6 (6 or later for revision number at end)



DF62DL-24S-2.2C (Hirose Electric)

Electric Wire Color		Symbol	Pin No.
Standard Cable	Robot Cable		
Blue (AWG22/19)	Blue (AWG22/19)	ϕA	3
Orange (AWG22/19)	Orange (AWG22/19)	VMM	5
Brown (AWG22/19)	Brown (AWG22/19)	ϕB	10
Gray (AWG22/19)	Gray (AWG22/19)	VMM	9
Green (AWG22/19)	Green (AWG22/19)	ϕ_A	4
Red (AWG22/19)	Red (AWG22/19)	ϕ_B	15
Light Blue (AWG26)	Light Blue (AWG26)	SA _[mABS]	12
Orange (AWG26)	Orange (AWG26)	SB _[mABS]	17
Green (AWG26)	Green (AWG26)	A+	1
Brown (AWG26)	Brown (AWG26)	A-	6
Gray (AWG26)	Gray (AWG26)	B+	11
Red (AWG26)	Red (AWG26)	B-	16
Black (AWG26)	Black (AWG26)	VPS	18
Yellow (AWG26)	Yellow (AWG26)	LDC_VCC	8
Light Blue (AWG26)	Light Blue (AWG26)	BK+	20
Orange (AWG26)	Orange (AWG26)	BK-	2
Gray (AWG26)	Gray (AWG26)	VCC	21
Red (AWG26)	Red (AWG26)	GND/ LDC_GND	7
Brown (AWG26)	Brown (AWG26)	LDC_SD+	14
Green (AWG26)	Green (AWG26)	LDC_SD-	13
-	-	-	19
Pink (AWG26)	Pink (AWG26)	CF_VCC	22
-	-	-	23
Black (AWG26)	Green (AWG26)	FG	24

PADP-24V-1-S (Japan Solderless Terminal)

Pin No.	Symbol	Electric Wire Color	
		Standard Cable	Robot Cable
1	ϕA	Blue (AWG22/19)	Blue (AWG22/19)
2	VMM	Orange (AWG22/19)	Orange (AWG22/19)
3	ϕB	Brown (AWG22/19)	Brown (AWG22/19)
4	VMM	Gray (AWG22/19)	Gray (AWG22/19)
5	ϕ_A	Green (AWG22/19)	Green (AWG22/19)
6	ϕ_B	Red (AWG22/19)	Red (AWG22/19)
11	SA _[mABS]	Light Blue (AWG26)	Light Blue (AWG26)
12	SB _[mABS]	Orange (AWG26)	Orange (AWG26)
13	A+	Green (AWG26)	Green (AWG26)
14	A-	Brown (AWG26)	Brown (AWG26)
15	B+	Gray (AWG26)	Gray (AWG26)
16	B-	Red (AWG26)	Red (AWG26)
18	VPS	Black (AWG26)	Black (AWG26)
7	LDC_VCC	Yellow (AWG26)	Yellow (AWG26)
9	BK+	Light Blue (AWG26)	Light Blue (AWG26)
10	BK-	Orange (AWG26)	Orange (AWG26)
17	VCC	Gray (AWG26)	Gray (AWG26)
19	GND/ LDC_GND	Red (AWG26)	Red (AWG26)
8	LDC_SD+	Brown (AWG26)	Brown (AWG26)
20	LDC_SD-	Green (AWG26)	Green (AWG26)
22	-	-	-
21	CF_VCC	Pink (AWG26)	Pink (AWG26)
23	-	-	-
24	FG	Black (AWG26)	Green (AWG26)

Note 1: It should be $\phi 9.1$ for 6m and more.

Note 2: It should be AWG22 for 5m and less of the cable length, and AWG19 for 6m and more.

- The cable length is available from 1m to 20m.

Specify the length in increments of 1m.

- The following shows a sample model number.

Cable length **1m** → CB-CAN-MA**010** (-RB)

Cable length **3m** → CB-CAN-MA**030** (-RB)

Cable length **10m** → CB-CAN-MA**100** (-RB)



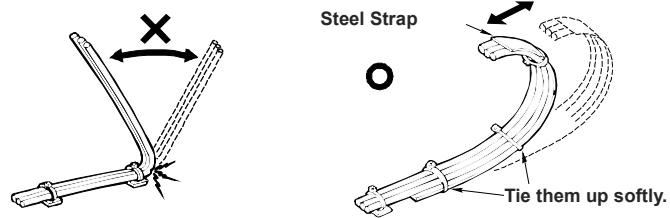
Caution

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

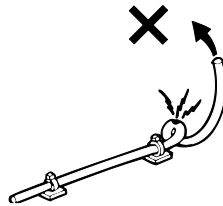
- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with 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.

**Caution**

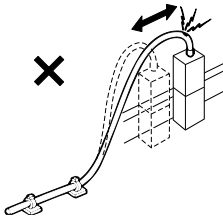
Have a sufficient radius for bending, and avoid a bend concentrating on one point.



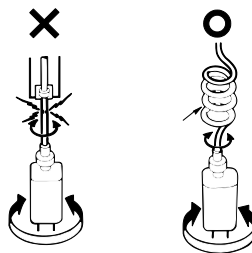
Do not let the cable bend, kink or twist.



Do not pull the cable with a strong force.



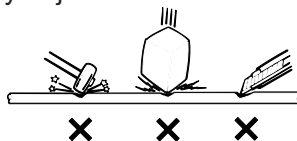
Pay attention not to concentrate the twisting force to one point on a cable.



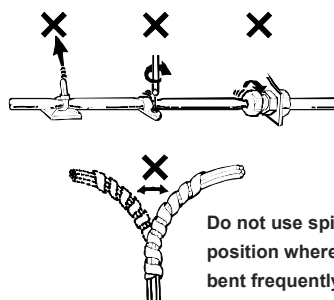


Caution

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

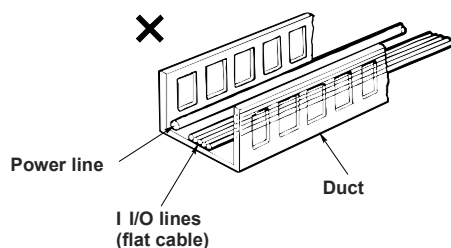


When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.



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

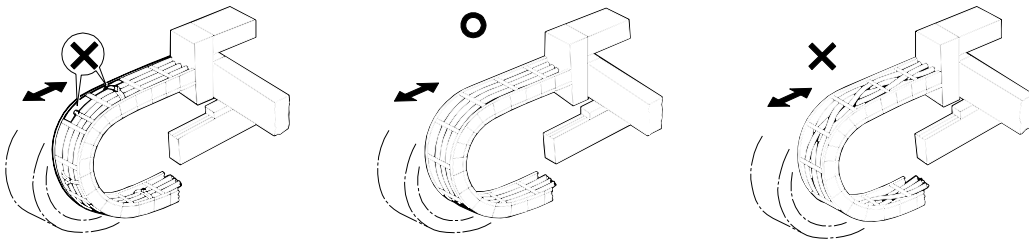
PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



**Caution**

Follow the instructions below when using a cable carrier.

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



ROBO Cylinder

Chapter 4

Maintenance and Inspection

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4.10	How to replace components (Loadcell Cable)	4-31
	How to Replace Loadcell Cable	4-31

4.1 Precautions for maintenance and inspection work

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



Caution

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

Wipe it off in case of any dripping.

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

Supply grease before the start of use.

→ For details, refer to [4.5 Greasing method].

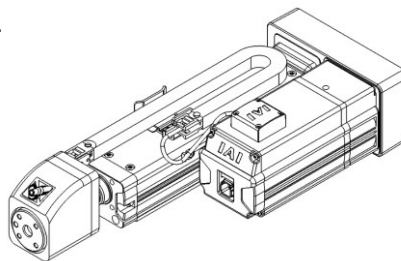
4.2 Inspection items and schedule

Follow the maintenance inspection schedule below.

It is assumed that the equipment is operating

8 hours per day.

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



Radial Cylinder

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

Period of Grease Supply for Ball Screw and Guides (Guideline)

Grease supply should be required at the prior timing of the following driving distance or number of months.

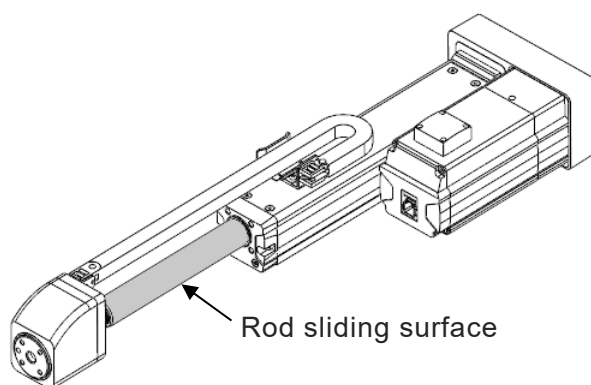
Maximum operating speed (mm/s)	Grease supply timing (Guideline)	
	Operation distance	Months
0 to 200 or less	1,250km	12 months

4.3 Visual inspection items

Refer to [4.6 to 4.10 How to replace components] for detailed information about specific component replacement and adjustment methods.

External visual inspection

Inspection items	Maintenance work
Is abnormal noise or vibration generated?	Take an action by referring to [Troubleshooting in Controller Instruction Manual].
Are actuator mounting bolts loose?	Tighten them further.
Is the cable scratched?	Replace if the damage is severe.
Is the connector loose?	Re-insert correctly.
Is the rod sliding surface 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 there foreign matter or dust adhered to the rod sliding surface?	Replenish with new grease after cleaning.
Is grease dripping out? (especially if vertically mounted)	Clean up any drips. Replenish the grease.



Refer to [4.6 to 4.10 How to replace components] for detailed information about specific component replacement and adjustment methods.

Internal visual inspection

Inspection items	Maintenance work
Are actuator mounting bolts loose?	Tighten them further.
Is the ball screw or guide grease not lubricating well? (Even if the grease is brown, lubrication is adequate if the running surface is shiny)	Wipe away the old grease, then replenish with new grease.
Is dust or foreign matter adhered to the ball screw or guide?	Replenish with new grease after cleaning.
Is there any abrasion, crack, missing tooth, fissure, hardened / softened part, deformation or cut on the belt?	In case any abnormality is found on the belt, replace it.
Is there any abrasion on the teeth of the pulley?	In case any abnormality is found on the pulley, replace it.

[1] Inspection on Main Body, Guides and Ball Screw

Visually inspect the interior of the equipment.

Inspection contents should be the lubrication state and whether dust or other foreign matter has gotten inside.

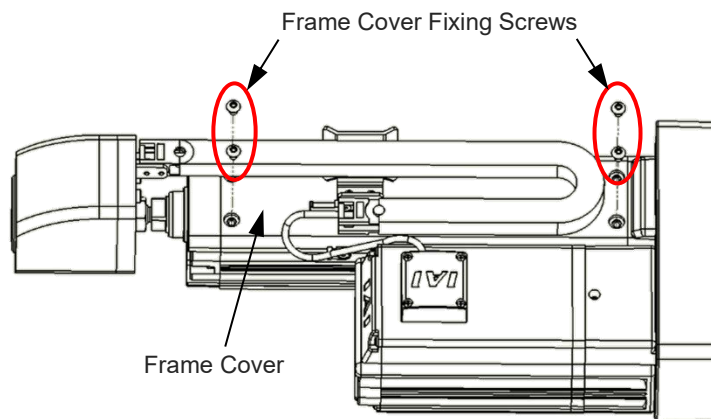
The lubrication may have turned brown. This is not a problem as long as the travel surfaces shine as though they are wet.

If the grease is mixed with dust and does not have a shiny appearance, or if the grease has lost its efficacy due to prolonged use, then clean each section and reapply grease.

The procedure for inspections is outlined below.

1

Confirming that the power is off, remove the hex socket button head screws (thin head FH type for RRA4R-LCT) at four places on the frame cover with using a hex wrench with 1.5mm parallel faces (RRA4R-LCT), 2.5mm parallel faces (RRA6R-LCT) and 3mm parallel faces (RRA7R-LCT), and take the frame cover off.



2

Perform inspection on the following items.

Extend the rod when inspection the ball screw. The ball screw will appear. Slide the rod manually with hand or move it with JOG operation of the controller.

Inspection area	Inspection items
Main unit	Loose mounting bolts, other loose items
Guide	Lubrication, buildup
Ball screw	Lubrication, buildup

3

After finishing the inspection, assemble back in the reverse order.

When affixing the frame cover, tighten the screws with the tightening torque described below.

Model Type	Screw • Bolt	Nominal Screw Diameter	Tightening Torque
RRA4R-LCT	Thin Head FH Type (Hex Pocket)	M3	0.62N·m
RRA6R-LCT	Hex Socket Button Head Screw (SUS)	M4	1.91N·m
RRA7R-LCT	Hex Socket Button Head Screw (SUS)	M5	4.14N·m

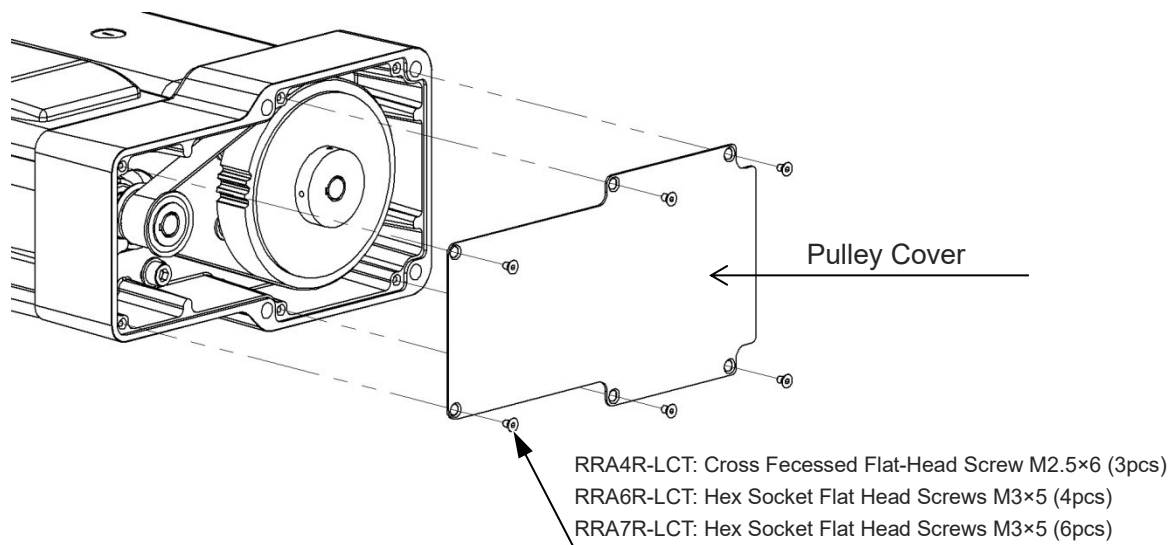
[2] Belt inspection

Remove the pulley cover and have a visual inspection.

Inspection if there is any foreign substance such as dust.

Shown below is the procedures for inspection.

- 1 Confirming that the power is off, remove the cross recessed flat-head screws or hex socket flat-head cap screws with using a hex wrench, and take the pulley cover off.



- 2 Perform inspection on the following items.

Inspection area	Inspection items
Pulley Teeth	Abrasion
Belt	Cut, Abrasion, Crack, Missing tooth, Fissure, Hardened / Softened Part, Deformation

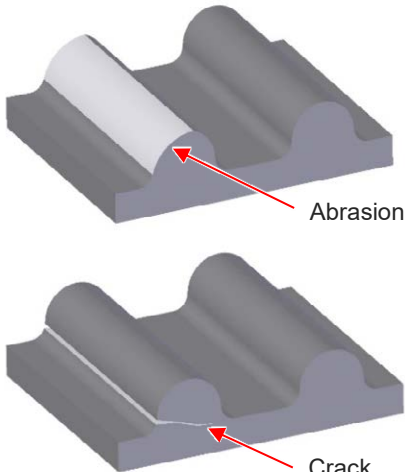
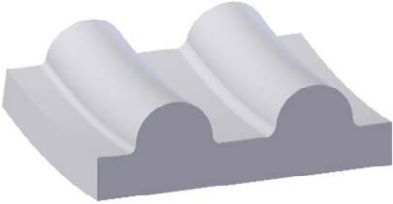
- Inspect the pulley teeth part by visual.

Inspection area	Contents of Inspection
Abrasion on Pulley Teeth Part Step due to abrasion	Is there any significant abrasion on pulley teeth?

- Inspection the belt visually.

The replacement period of the belt cannot be unconditionally defined as the durability of the belt is remarkably influenced by the duration of operation.

Since degradation such as abrasion proceeds along the duration of use, check these items shown below.

Inspection items	Contents of Inspection
Cut on Belt	• Is there any cut on belt?
Abrasion, Crack, Missing Tooth on Belt 	• Is the belt significantly worn out on the teeth area? • Is there any crack on the teeth area? • Is there any chipped tooth?
Hardened, Softened, Deformed Part on Belt 	• Is the belt hardened, softened or deformed (shrunk or expanded)?

3

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

Tighten the screws with the following tightening torque when putting the pulley cover on.

Model Type	Screw • Bolt	Nominal Screw Diameter	Quantity	Tightening Torque
RRA4R-LCT	Cross Fecessed Flat-Head Screw	M2.5	3pcs	0.29N·m
RRA6R-LCT	Hex Socket Flat-Head Cap Screw	M3	4pcs	0.74N·m
RRA7R-LCT	Hex Socket Flat-Head Cap Screw	M3	6pcs	0.74N·m

Replace the belt in case an abnormality was found on it or it has reached the period for replacing.

The replacement period cannot be determined in general because the durability of the deceleration belt can be greatly influenced by the conditions of operation.

It generally has life of hundreds of times for bending movement.

The timing belt requires replacement regularly under the following conditions as a reference since degradation such as abrasion proceeds as the time passes for usage.

- When remarkable abrasion is confirmed on the teeth or edges of the belt
- When the belt is swelled for such reasons as oil being attached on
- When damage is confirmed such as crack on the tooth or back of the belt

Also, since it is difficult to confirm the degradation of the core wires to retain the strength of the toothed belt by visual or looseness caused by being elongated, it is recommended to set regular replacement periods in advance in case the product is used under such conditions that gives the core wires great fatigue due to high acceleration and deceleration speed.

4.4 Cleaning

External cleaning

- Clean exterior surfaces as necessary.
- If grease base oil etc. drips on the rod sliding surface and its periphery, wipe it off with a soft cloth, etc.
- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air, as it may cause dust to get in through gaps.
- Do not use petroleum-based solvents as they can harm resin and painted surfaces.
- To remove severe buildup, wipe gently with a soft cloth soaked in a neutral detergent or alcohol.

Internal cleaning

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

4.5 Greasing method

Grease used

[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

Application location	During maintenance (recommended product)	Default (reference)
Ball screw	Kyodo Yushi Multemp LRL No.3	Kyodo Yushi Multemp LRL No.3
Guide		
Rod (sliding surface)		

Each manufacture has equivalent greases available for sales.
For details, state the name of the grease above to a manufacture and ask to select an equivalent product.



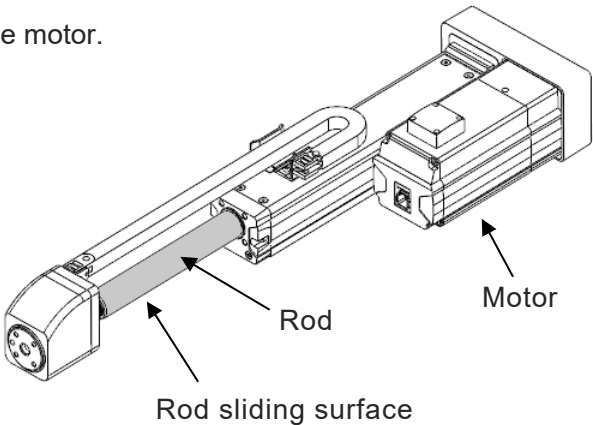
Warning

Do not attempt to apply any grease other than lithium grease.
Mixing in anything other than lithium grease does not only reduce the performance of the grease, it may even cause damage to the actuator.

Greasing method (Rod sliding surface)

[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

- 1 Pull out the rod to the side opposite the motor.
- 2 After cleaning the rod sliding surface, apply grease with hand.
- 3 Move the rod in the full range of its stroke to spread the grease evenly.



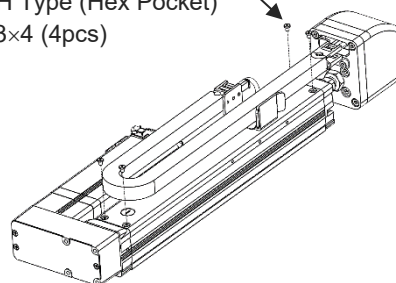
Greasing method (Ball screw and Guide)

[RRA4R-LCT]

- 1 Remove the frame cover fixing screws.

Frame Cover Fixing Screw

Thin Head FH Type (Hex Pocket)
M3×4 (4pcs)



- 2 Slide the frame cover so the nut holder can be seen.



Nut Holder

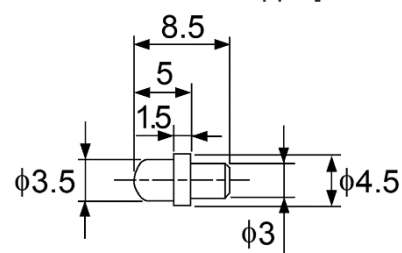
- 3 Supply grease at the grease nipple equipped on the side of the nut holder with using a grease gun.



Grease Nipple

Nut Holder

[Dimensions: Grease Nipple]



Follow the grease nipple diameter shown in the list below when preparing a grease gun.

Nipple Diameter	Amount of Grease Supply (Reference)	Grease Gun	Nozzle
φ3.5	0.5 to 1.0 cc	Grease gun of mounting screw R1/8 Example: GC-57K (Yamada Corporation)	NZ3 (NSK)

4

Tighten up the frame cover with the tightening torque below, and then move the rod in its full stroke range to make the grease spread evenly.

Screw	Quantity	Tightening Torque
Thin Head FH Type (Hex Pocket) M3 × 4	4pc	0.62N·m

[RRA6R-LCT/RRA7R-LCT]

1

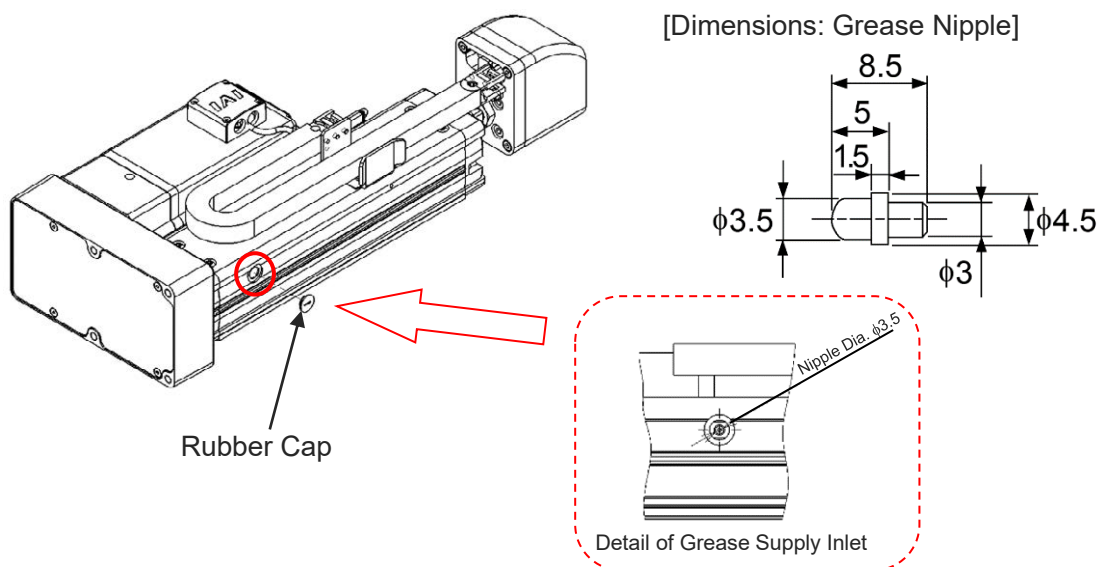
Move the rod to the home position.

2

Take the rubber cap off the side of the frame cover.

3

Supply greas at the grease nipple equipped on the side of the nut holder with using a grease gun.



Follow the grease nipple diameter shown in the list below when preparing a grease gun.

Nipple Diameter	Amount of Grease Supply (Reference)	Grease Gun	Nozzle
φ3.5	1.5 to 2.0 cc	Grease gun of mounting screw R1/8 Example: GC-57K (Yamada Corpora)	NZ3 (NSK)

4 Move the rod in its full stroke range to make the grease spread evenly.

5 Put the rubber cap on.



Caution

- Supplying too much grease may increase sliding resistance and load to the motor, resulting in a drop of performance.
Also, there is a concern that the excess grease applied to the ball screw may splash around and dirt the peripheral.
 - If the grease enters your eye, wash it with clean water for 15 minutes and immediately see a specialist physician for appropriate care.
 - After finishing the grease replenishment, wash your hands carefully with water and soap to rinse the grease off.
-

4.6 How to replace component (Belt)

Belt Maintenance Model Codes

The model codes for the belt maintenance are as shown below.

Model Type	IAI Maintenance Part Model Code
RRA4R-LCT	TB-RCS3-RA4R
RRA6R-LCT	TB-RCS3-RA6R
RRA7R-LCT	TB-RCS3-RA7R

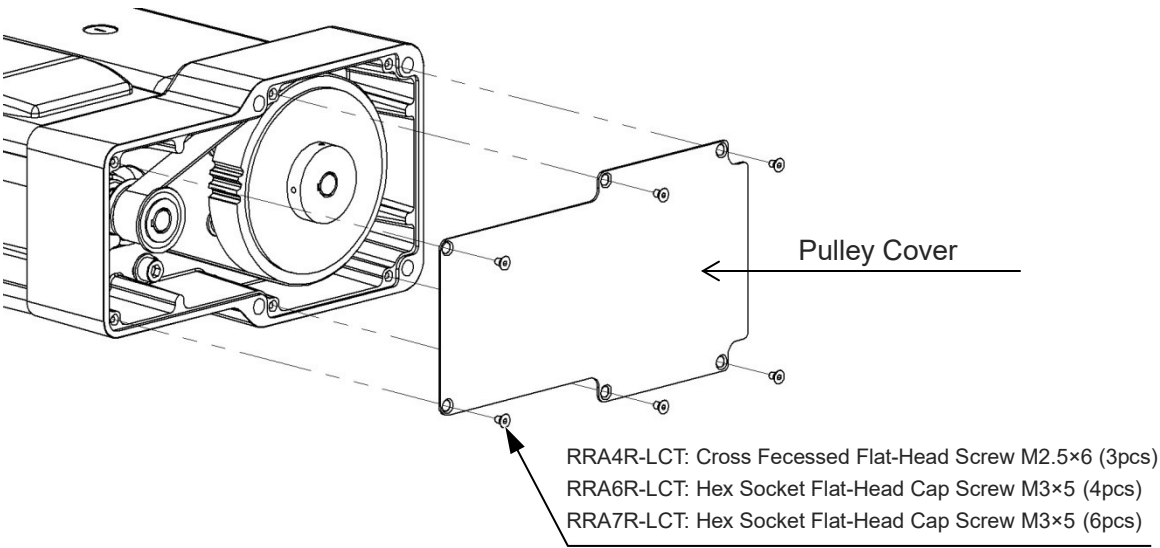
How to Replace Belt

[RRA4R-LCT/RRA6R-LCT/RRA7R-LCT]

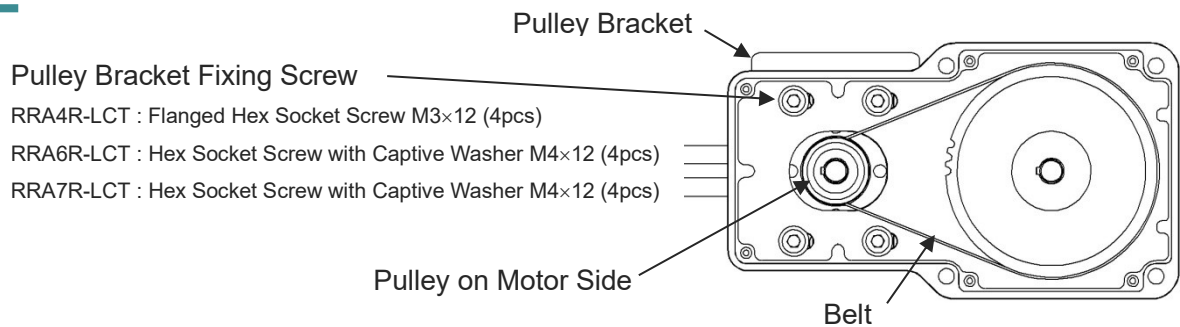
«Items Required for Replacemet Work»

- Belt for replacement
- Torque Wrench or Hex Wrench
 - RRA4R-LCT : 2.5mm of Parallel Face
 - RRA6R-LCT/RRA7R-LCT : 2mm and 3mm of Parallel Faces
- Phillips screwdriver
- Tension gauge (should be capable of pulling at 80N)
- Long zip tie (thin string)

- 1 Remove the cross recessed flat-head screws or hex socket flat-head cap screws, and take the pulley cover off.

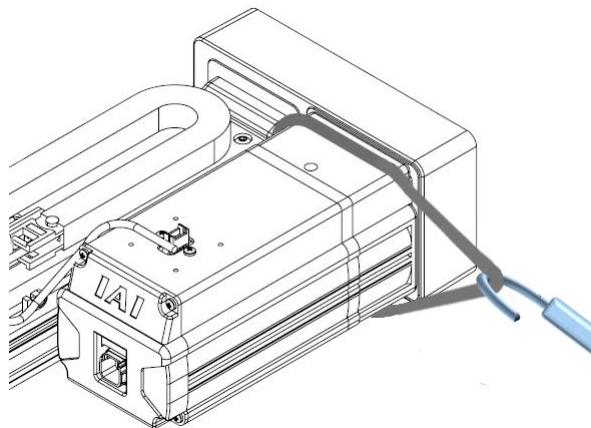
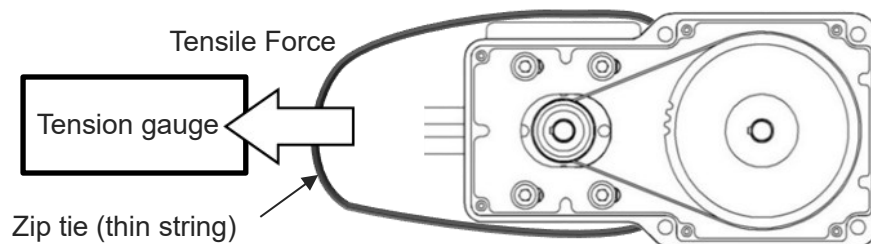


2 Loosen the screws holding the pulley bracket.



3 Take the belt off the pulley and apply a new belt for replacement.

4 Hang a zip tie (thin string) at the edge of the pulley bracket and apply tensile force as shown in the table below with a tension gauge. Hold the pulley bracket with the tensile force applied and tighten the screws to set it still.



Model Type	Tensile Force	Nominal Screw Diameter	Tightening Torque
RRA4R-LCT	24 to 34N	M3	1.62N·m
RRA6R-LCT	36 to 46N	M4	3.23N·m
RRA7R-LCT	70 to 80N	M4	3.23N·m

5

Attach the pulley cover and tighten up the cross recessed flat-head screws or hex socket flat-head cap screws.

Model Type	Screw • Bolt	Nominal Screw Diameter	Quantity	Tightening Torque
RRA4R-LCT	Cross Recessed Flat-Head Screw	M2.5	3pcs	0.29N·m
RRA6R-LCT	Hex Socket Flat-Head Cap Screw	M3	4pcs	0.74N·m
RRA7R-LCT	Hex Socket Flat-Head Cap Screw	M3	6pcs	0.74N·m

4.7 How to replace components (Motor Unit)

Motor Unit Maintenance Model Codes

The model codes for the motor unit are as shown below.

Model Type	Motor Reversed Direction	Brake	Cable Eject Direction	Model Code
RRA4R-LCT	In Common for Right and Left	None	—	RCP6-MUPP4R
		Equipped		RCP6-MUPP4R-B
	Left side	None	Bottom side	RCP6-MUPP4R-CJB-ML
			Out side	RCP6-MUPP4R-CJO-ML
			Top side	RCP6-MUPP4R-CJT-ML
		Equipped	Bottom side	RCP6-MUPP4R-B-CJB-ML
			Out side	RCP6-MUPP4R-B-CJO-ML
			Top side	RCP6-MUPP4R-B-CJT-ML
	Right side	None	Bottom side	RCP6-MUPP4R-CJB-MR
			Out side	RCP6-MUPP4R-CJO-MR
			Top side	RCP6-MUPP4R-CJT-MR
		Equipped	Bottom side	RCP6-MUPP4R-B-CJB-MR
			Out side	RCP6-MUPP4R-B-CJO-MR
			Top side	RCP6-MUPP4R-B-CJT-MR
RRA6R-LCT	Left side	None	—	RCP6-MUPP6R-ML
			Bottom side	RCP6-MUPP6R-CJB-ML
			Out side	RCP6-MUPP6R-CJO-ML
			Top side	RCP6-MUPP6R-CJT-ML
		Equipped	—	RCP6-MUPP6R-B-ML
			Bottom side	RCP6-MUPP6R-B-CJB-ML
			Out side	RCP6-MUPP6R-B-CJO-ML
			Top side	RCP6-MUPP6R-B-CJT-ML
	Right side	None	—	RCP6-MUPP6R-MR
			Bottom side	RCP6-MUPP6R-CJB-MR
			Out side	RCP6-MUPP6R-CJO-MR
			Top side	RCP6-MUPP6R-CJT-MR
		Equipped	—	RCP6-MUPP6R-B-MR
			Bottom side	RCP6-MUPP6R-B-CJB-MR
			Out side	RCP6-MUPP6R-B-CJO-MR
			Top side	RCP6-MUPP6R-B-CJT-MR

Model Type	Motor Reversed Direction	Brake	Cable Eject Direction	Model Code
RRA7R-LCT	Left side	None	—	RCP6-MUPP7R-ML
			Bottom side	RCP6-MUPP7R-CJB-ML
			Out side	RCP6-MUPP7R-CJO-ML
			Top side	RCP6-MUPP7R-CJT-ML
		Equipped	—	RCP6-MUPP7R-B-ML
			Bottom side	RCP6-MUPP7R-B-CJB-ML
			Out side	RCP6-MUPP7R-B-CJO-ML
	Right side	None	—	RCP6-MUPP7R-MR
			Bottom side	RCP6-MUPP7R-CJB-MR
			Out side	RCP6-MUPP7R-CJO-MR
			Top side	RCP6-MUPP7R-CJT-MR
		Equipped	—	RCP6-MUPP7R-B-MR
			Bottom side	RCP6-MUPP7R-B-CJB-MR
			Out side	RCP6-MUPP7R-B-CJO-MR
			Top side	RCP6-MUPP7R-B-CJT-MR

How to Replace Motor Unit

Follow the procedures below to take off and put on the motor unit.

«Items Required for Replacemet Work»

- Motor unit for replacement
- Torque Wrench or Hex Wrench
 - RRA4R-LCT : 2mm of Parallel Face
 - RRA6R-LCT/RRA7R-LCT : 2.5mm of Parallel Face
- Phillips screwdriver
- Zip Tie for RRA4R-LCT

1

[For RRA4R-LCT Only]

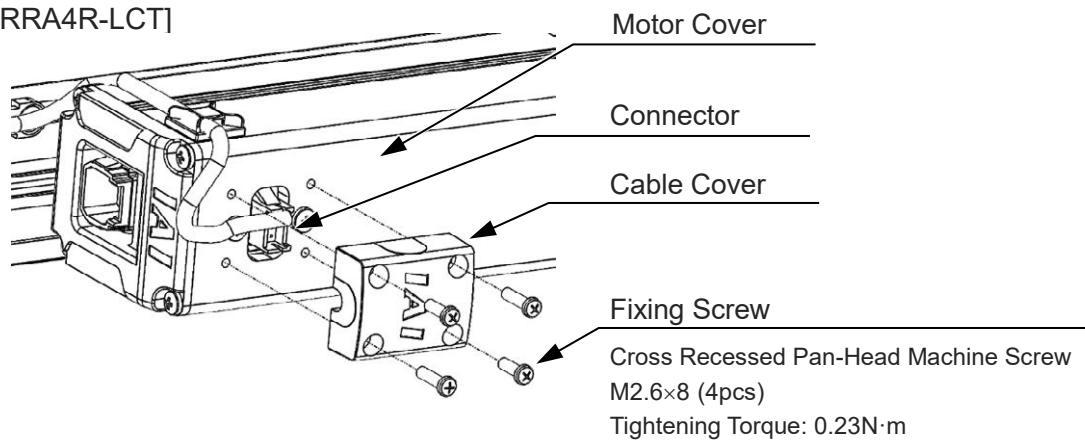
Cut off the zip tie holding the loadcell cable on the motor cover.



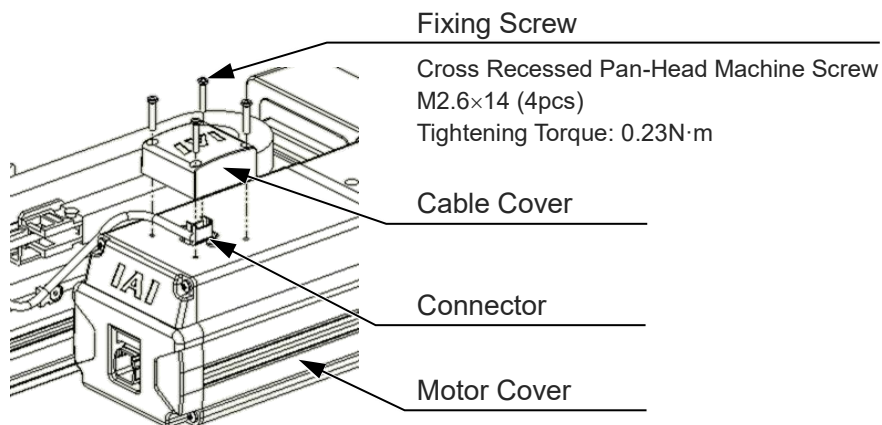
2

Take the cable cover off the motor cover and unplug the connector.

[RRA4R-LCT]



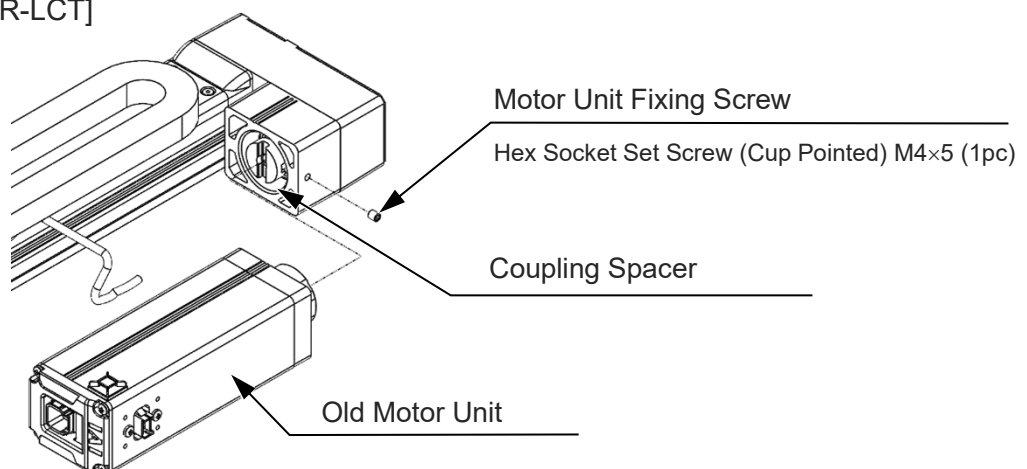
[RRA6R-LCT/RRA7R-LCT]



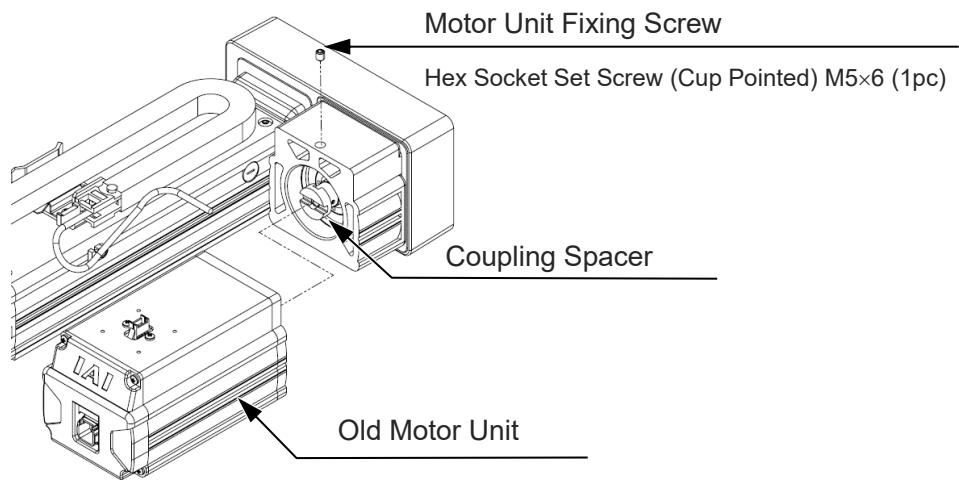
3

Remove the screw holding the motor unit and take off the old motor unit.

[RRA4R-LCT]

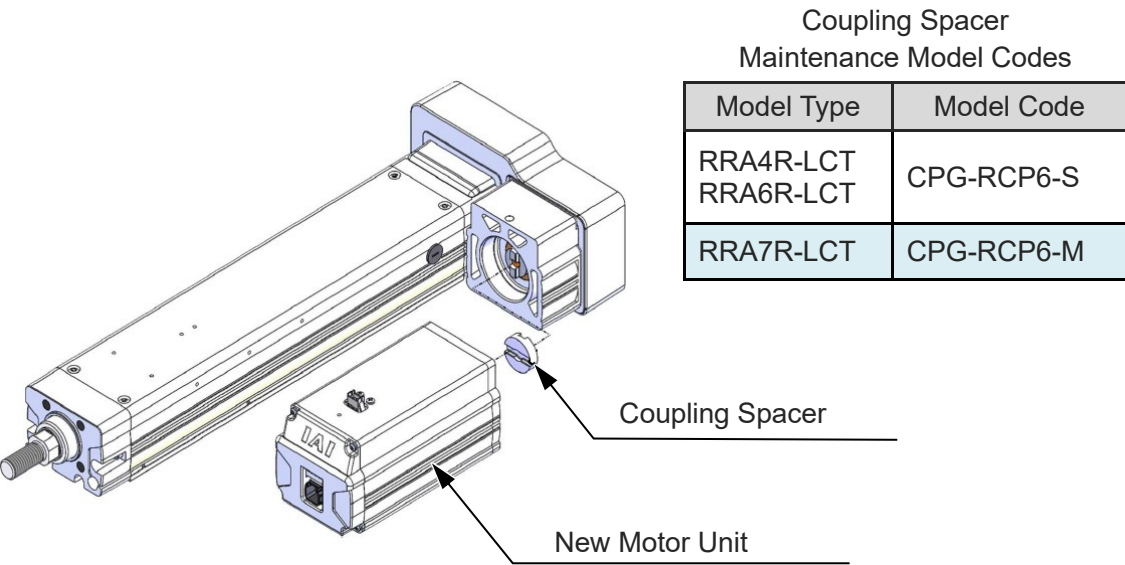


[RRA6R-LCT/RRA7R-LCT]



4

Apply grease (NOK NOXLUB TL 1010) on the matching area on the coupling spacer. Align the protrude on the actuator and the recess on the coupling spacer to each other and join them.



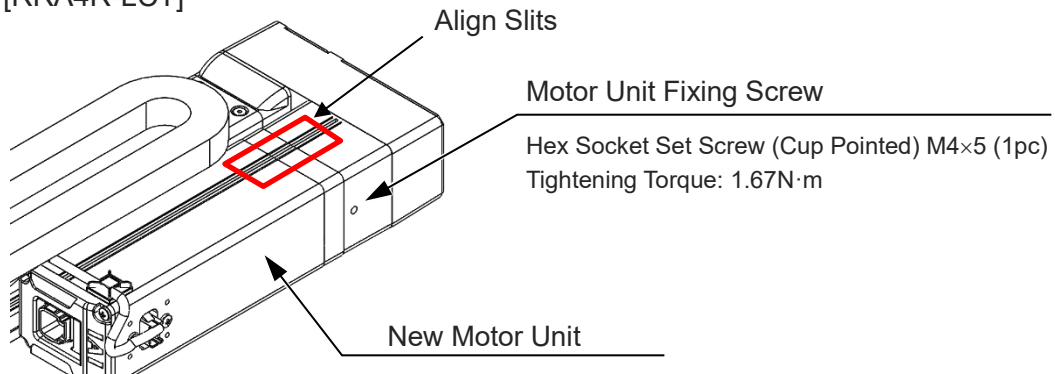
5

Align the protrude on the actuator and the recess on the coupling spacer to each other when join them together. That that time, make sure that the slit on the motor unit and the slit on the main unit align to each other as shown in the figure in Step 6.

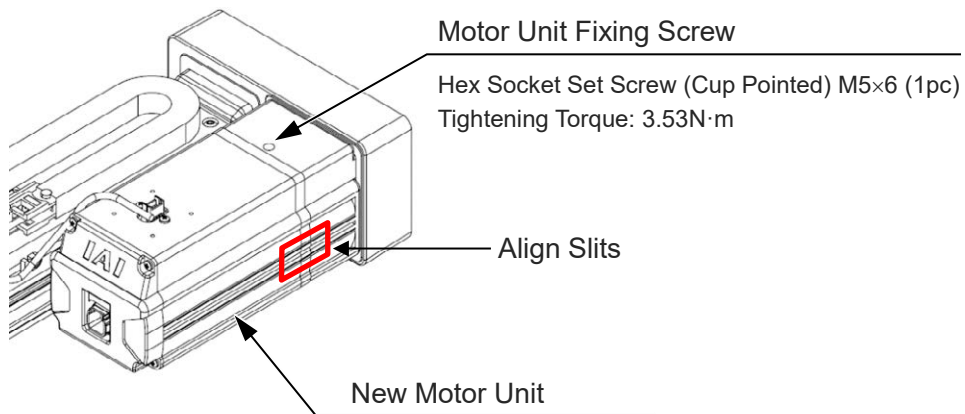
6

Hold the actuator and the motor unit with the set screws.

[RRA4R-LCT]



[RRA6R-LCT/RRA7R-LCT]



7

Build it up in the reversed order.



Caution

- Make sure to hold the rod so it would not move in case of replacing a motor on an actuator in vertical installation. It will be dangerous as the rod will be dropped, if it is not held, as soon as the motor gets taken off.



Notice

- Pay attention not to get the cable pinched when attaching the motor cover and end cover.

4.8 How to replace components (Cable Carrier)

Cable Carrier Maintenance Model Codes

The model codes for the cable carrier maintenance are as shown below.

Model Type	Stroke	Model Code
RRA4R-LCT	110mm	CVR-P6PP-16
	160mm	CVR-P6PP-18
	210mm	CVR-P6PP-23
	260mm	CVR-P6PP-28
	310mm	CVR-P6PP-31
RRA6R-LCT	115mm	CVR-P6PP-18
	165mm	CVR-P6PP-18
	215mm	CVR-P6PP-23
	265mm	CVR-P6PP-28
	315mm	CVR-P6PP-33
RRA7R-LCT	120mm	CVR-P6PP-18
	170mm	CVR-P6PP-23
	220mm	CVR-P6PP-23
	270mm	CVR-P6PP-28
	320mm	CVR-P6PP-33

How to Replace Cable Carrier

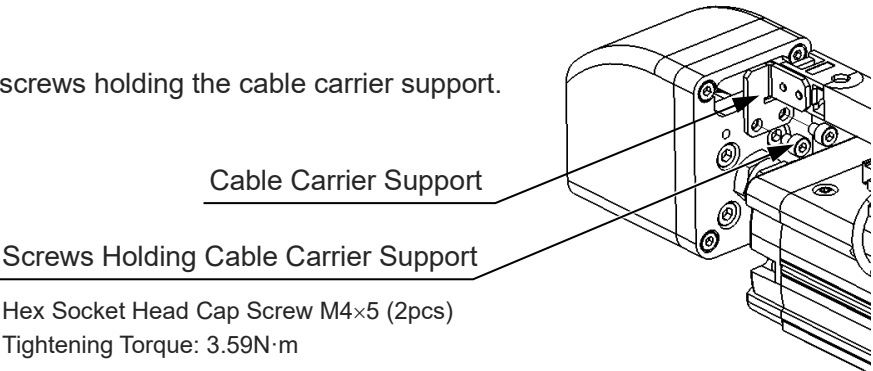
Follow the procedures below to take off and put on the cable carrier.

«Items Required for Replacemet Work»

- Cable carrier for replacement
- Torque Wrench or Hex Wrench: 2.5mm and 3mm of Parallel Faces
- Phillips screwdriver
- Slotted Screwdriver, etc.
- Zip Tie

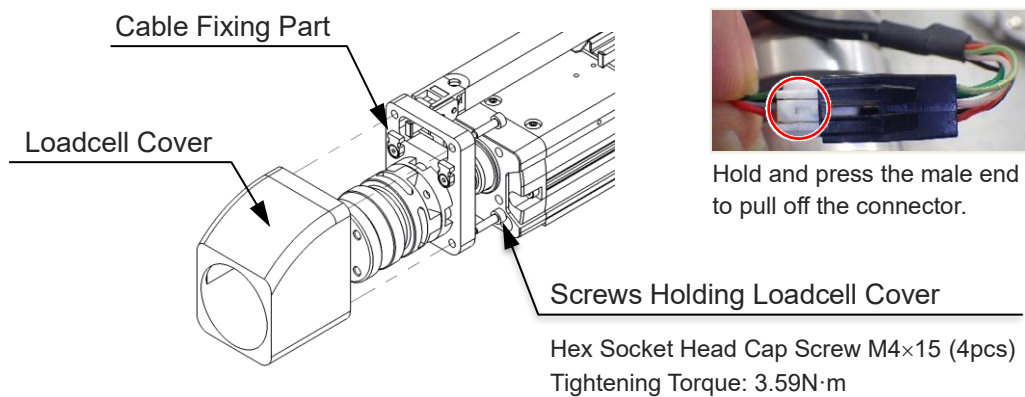
1

Remove the screws holding the cable carrier support.



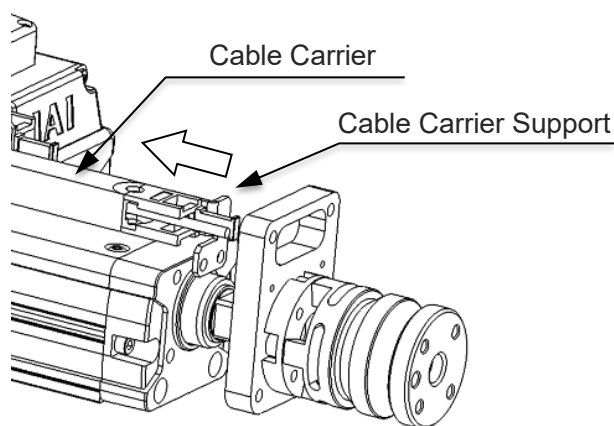
2

Remove the screws holding the loadcell cover to take off the loadcell cover.
Cut off the zip tie holding the cable and unplug the connector.



3

Take off the cable carrier and cable carrier support.



4

[For RRA4R-LCT Only]

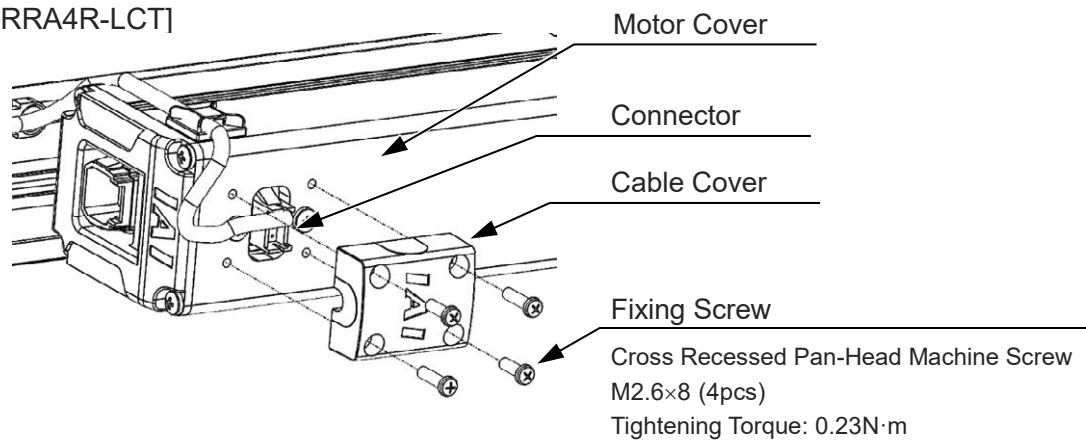
Cut off the zip tie holding the loadcell cable on the motor cover.



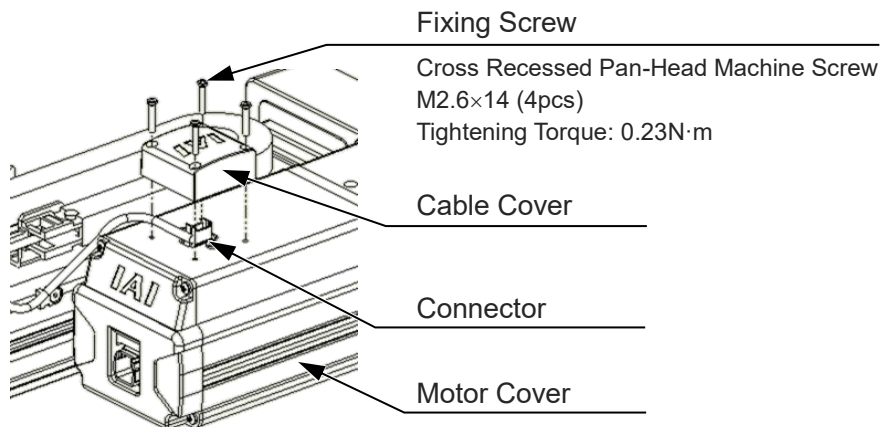
5

Take the cable cover off the motor cover and unplug the connector.

[RRA4R-LCT]

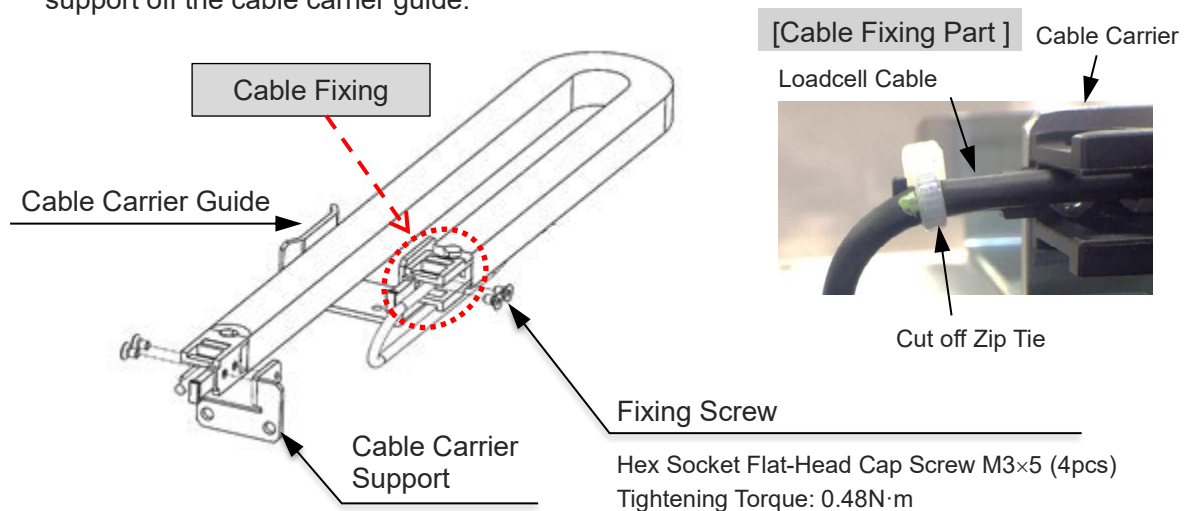


[RRA6R-LCT/RRA7R-LCT]



6

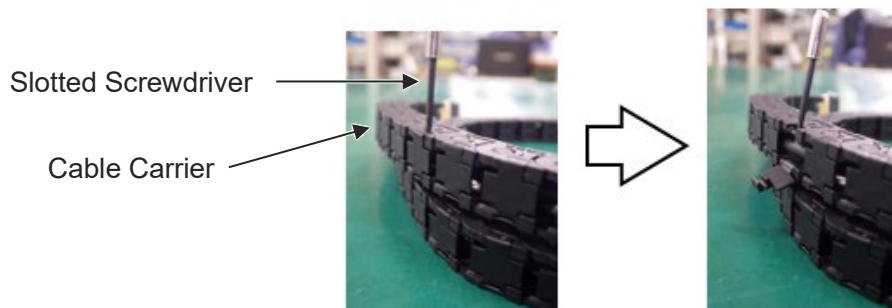
Cut off the zip tie holding the loadcell cable, and take the cable carrier and cable carrier support off the cable carrier guide.



7

Take the loadcell cable off the cable carrier.

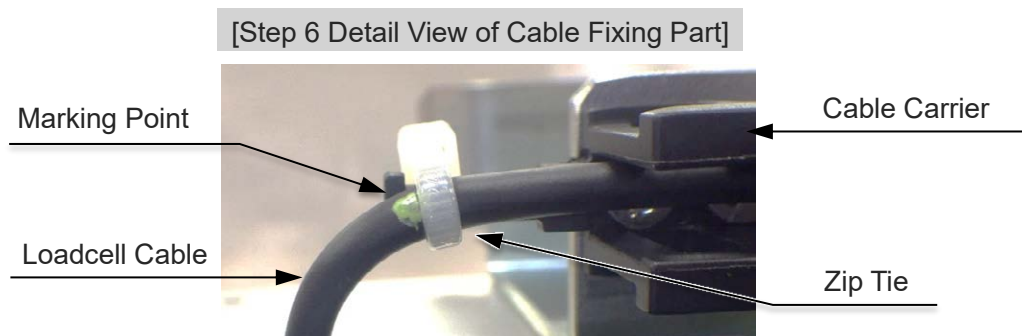
- * Insert a tool such as a slotted screwdriver on the side of the cable carrier to open up the cable carrier.



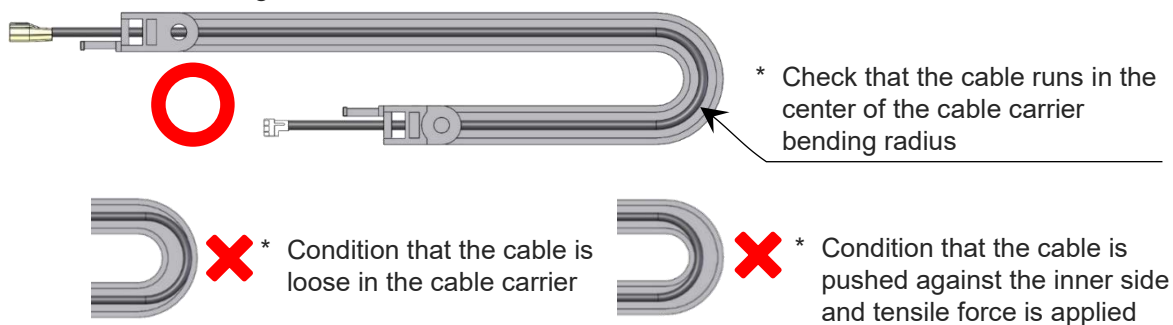
8

Put the loadcell cable on the new cable carrier.

Hold the loadcell cable and the cable carrier with a zip tie at the point with a marking on the loadcell cable.



- * Check the following after the loadcell cable is fixed.



9

Build it up in the reversed order.

4.9 How to replace components (Loadcell)

Loadcell Maintenance Model Codes

The model codes for the loadcell maintenance are as shown below.

Model Type	Model Code
RRA4R-LCT	K-TIAI/600N1-1-PT
RRA6R-LCT	K-TIAI/600N1-1-PT
RRA7R-LCT	K-TIAI/2KN1-1-PT

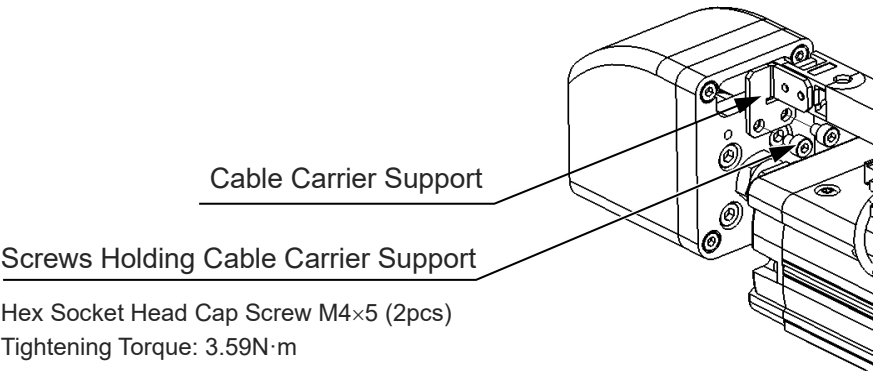
How to Replace Loadcell

Follow the procedures below to take off and put on the loadcell.

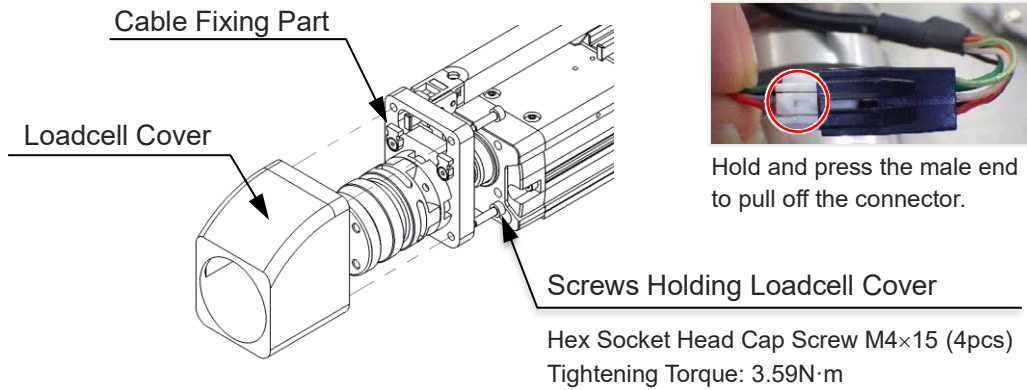
- «Items Required for Replacemet Work»
- Loadcell for replacement
 - Torque Wrench or Hex Wrench
RRA4R-LCT/RRA6R-LCT : 3mm and 4mm of Parallel Faces
RRA7R-LCT : 3mm and 6mm of Parallel Faces
 - Zip Tie

[How to Replace RRA6R-LCT]

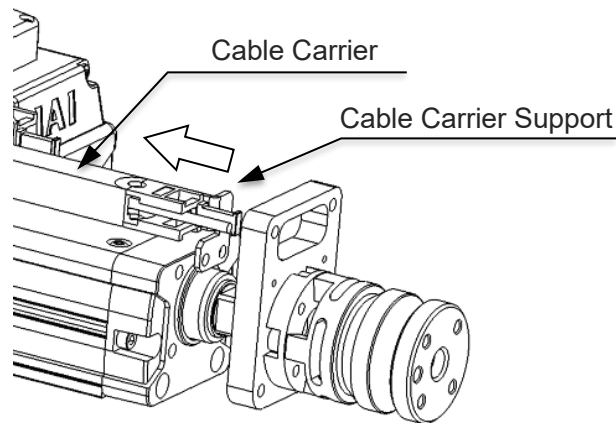
- 1 Remove the screws holding the cable carrier support.



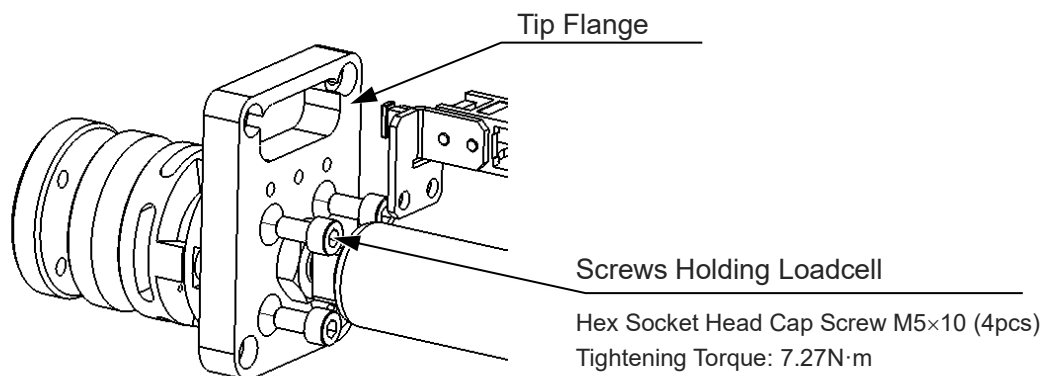
- 2** Remove the screws holding the loadcell cover to take off the loadcell cover.
Cut off the zip tie holding the cable and unplug the connector.



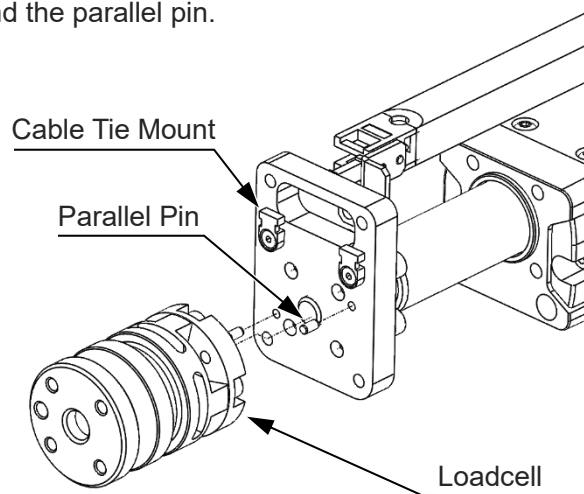
- 3** Take off the cable carrier and cable carrier support.



- 4** Remove the screws holding the loadcell on the tip flange.



5 Take off the loadcell and the parallel pin.



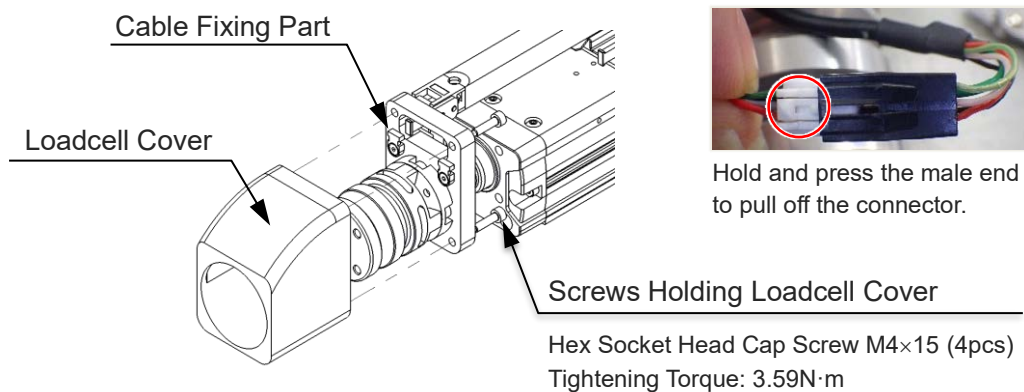
6 Attach the loadcell in the reversed order.

! Notice

- Make sure that you keep the hex socket head cap screw and parallel pin carefully so you would not lose them.

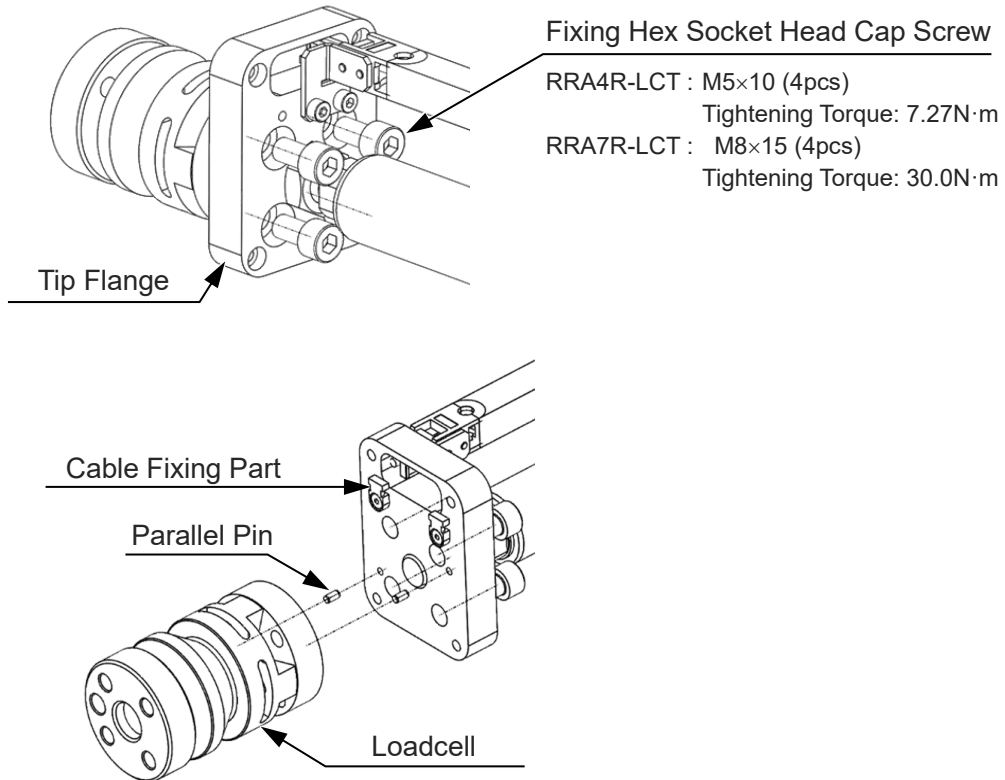
[How to Replace RRA4R-LCT/RRA7R-LCT]

1 Remove the screws holding the loadcell cover to take off the loadcell cover. Cut off the zip tie holding the cable and unplug the connector.



2

Remove the screws holding the loadcell on the tip flange.
Take off the loadcell and the parallel pin.



3

Attach the loadcell in the reversed order.

! Notice

- Make sure that you keep the hex socket head cap screw and parallel pin carefully so you would not lose them.

4.10 How to replace components (Loadcell Cable)

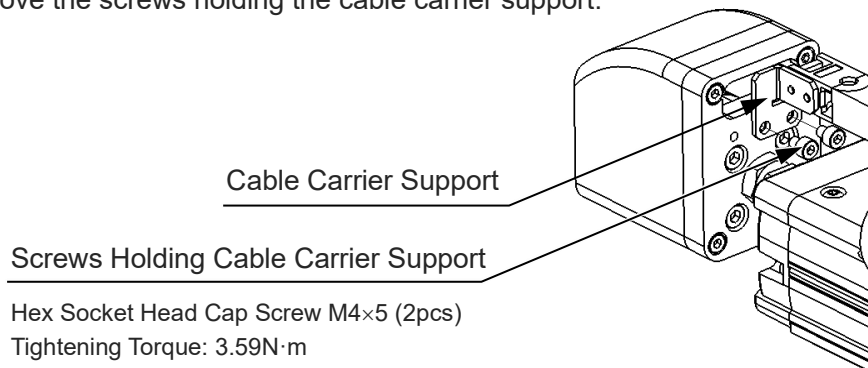
How to Replace Loadcell Cable

Follow the procedures below to take off and put on the loadcell cable.

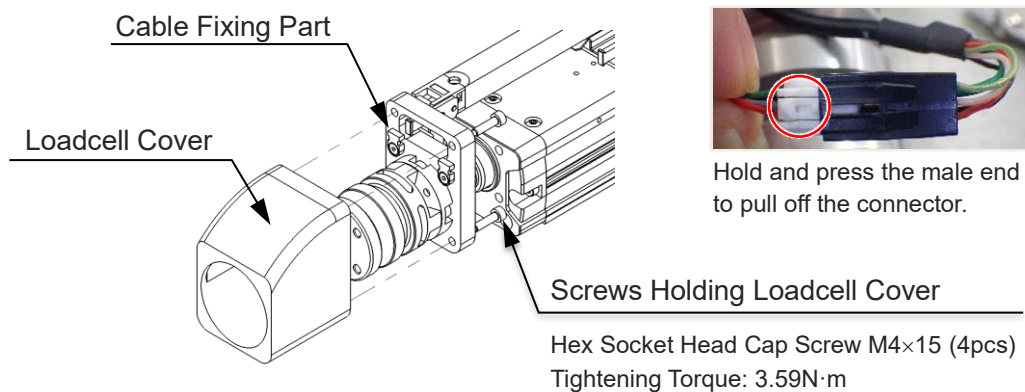
«Items Required for Replacemet Work»

- Loadcell cable for replacement
- Torque Wrench or Hex Wrench: 2.5mm and 3mm of Parallel Faces
- Phillips screwdriver
- Slotted Screwdriver, etc.
- Zip Tie

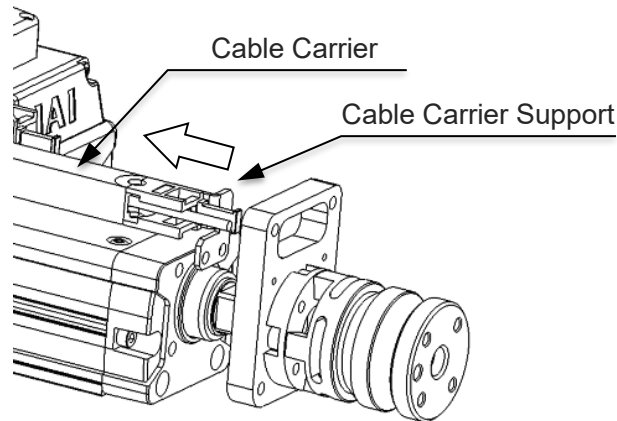
1 Remove the screws holding the cable carrier support.



2 Remove the screws holding the loadcell cover to take off the loadcell cover. Cut off the zip tie holding the cable and unplug the connector.



- 3 Take off the cable carrier and cable carrier support.

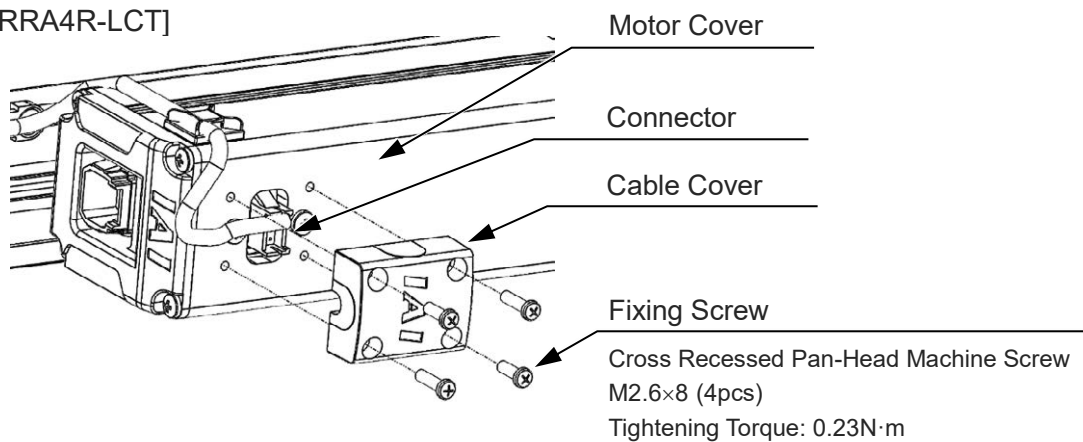


- 4 [For RRA4R-LCT Only]
Cut off the zip tie holding the loadcell cable on the motor cover.

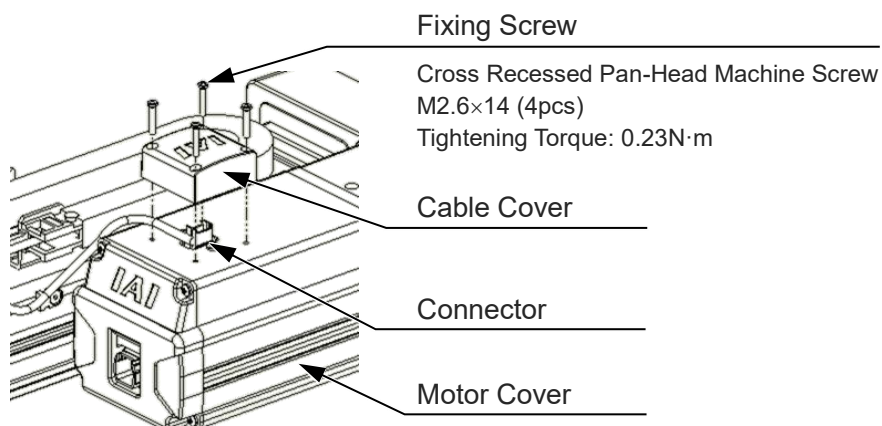


- 5 Take the cable cover off the motor cover and unplug the connector.

[RRA4R-LCT]

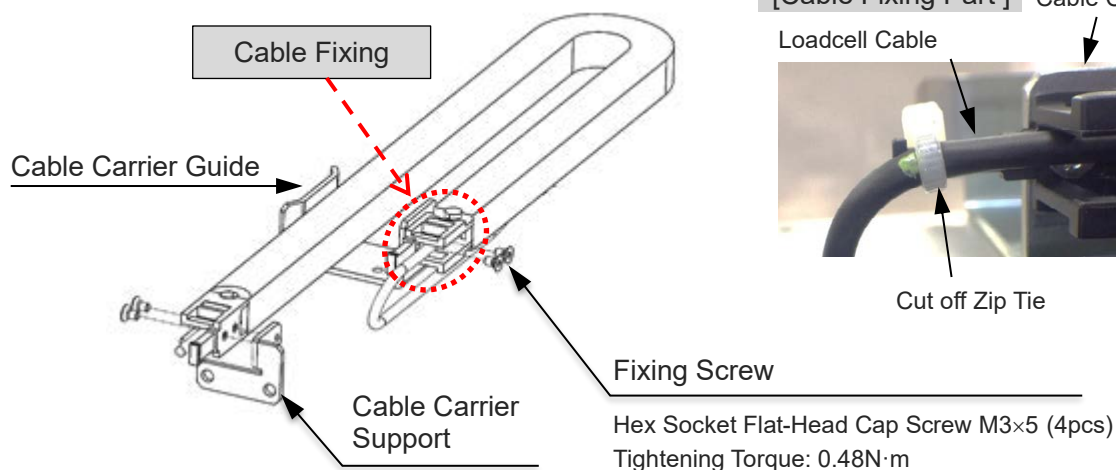


[RRA6R-LCT/RRA7R-LCT]



6

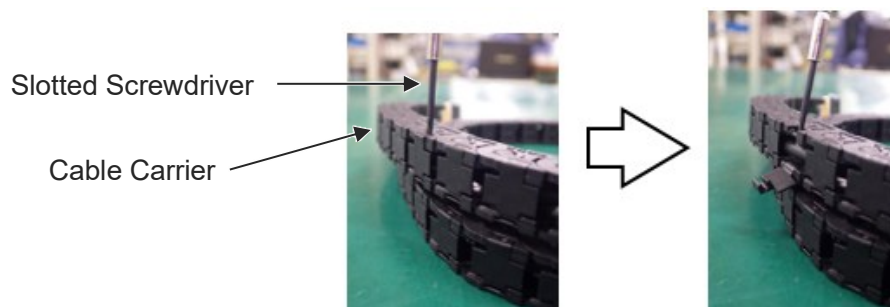
Cut off the zip tie holding the loadcell cable, and take the cable carrier and cable carrier support off the cable carrier guide.



7

Take the loadcell cable off the cable carrier.

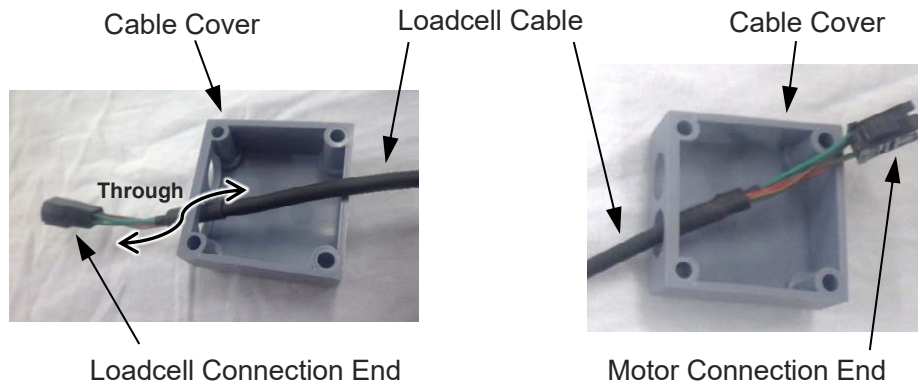
- * Insert a tool such as a slotted screwdriver on the side of the cable carrier to open up the cable carrier.



8

[For RRA6R-LCT/RRA7R-LCT Only]

Pull the cable cover off the old loadcell cable from the loadcell connection side.
Put the cable cover through the new loadcell cable from the loadcell connection side, and put the cover near the motor connection end.

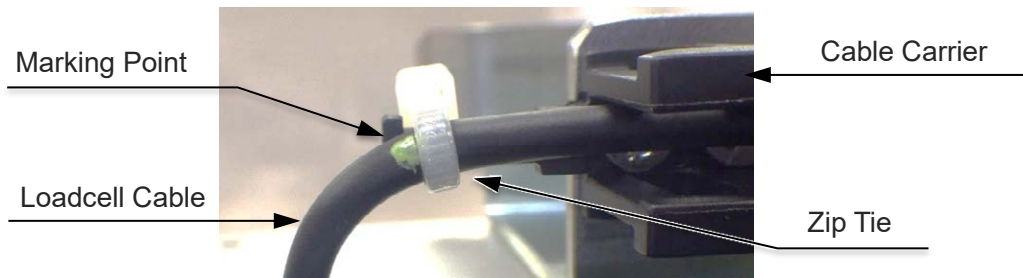


9

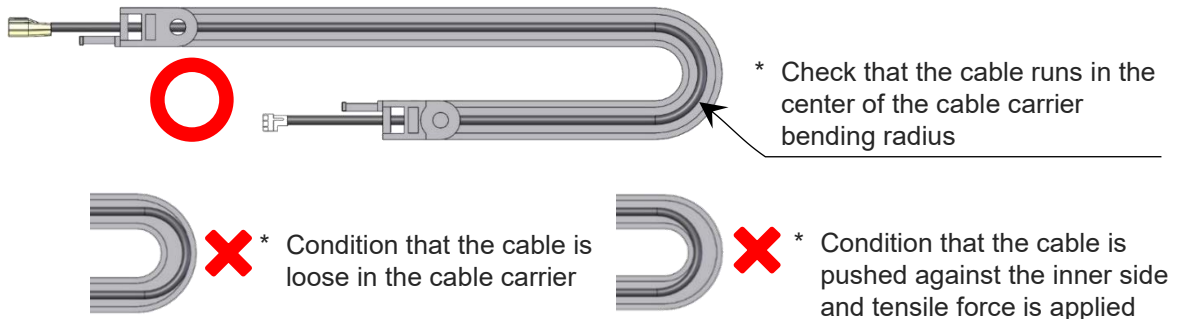
Put the loadcell cable on the new cable carrier.

Hold the loadcell cable and the cable carrier with a zip tie at the point with a marking on the loadcell cable.

[Step 6 Detail View of Cable Fixing Part]



* Check the following after the loadcell cable is fixed.



10

Build it up in the reversed order.

ROBO Cylinder

Chapter 5

External Dimensions

5.1 External Dimensions	5-1
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RCP6-RR6R-LCT: Foot Bracket (optional)	5-4
RCP6-RR7R-LCT	5-5
RCP6-RR7R-LCT: Foot Bracket (optional)	5-6

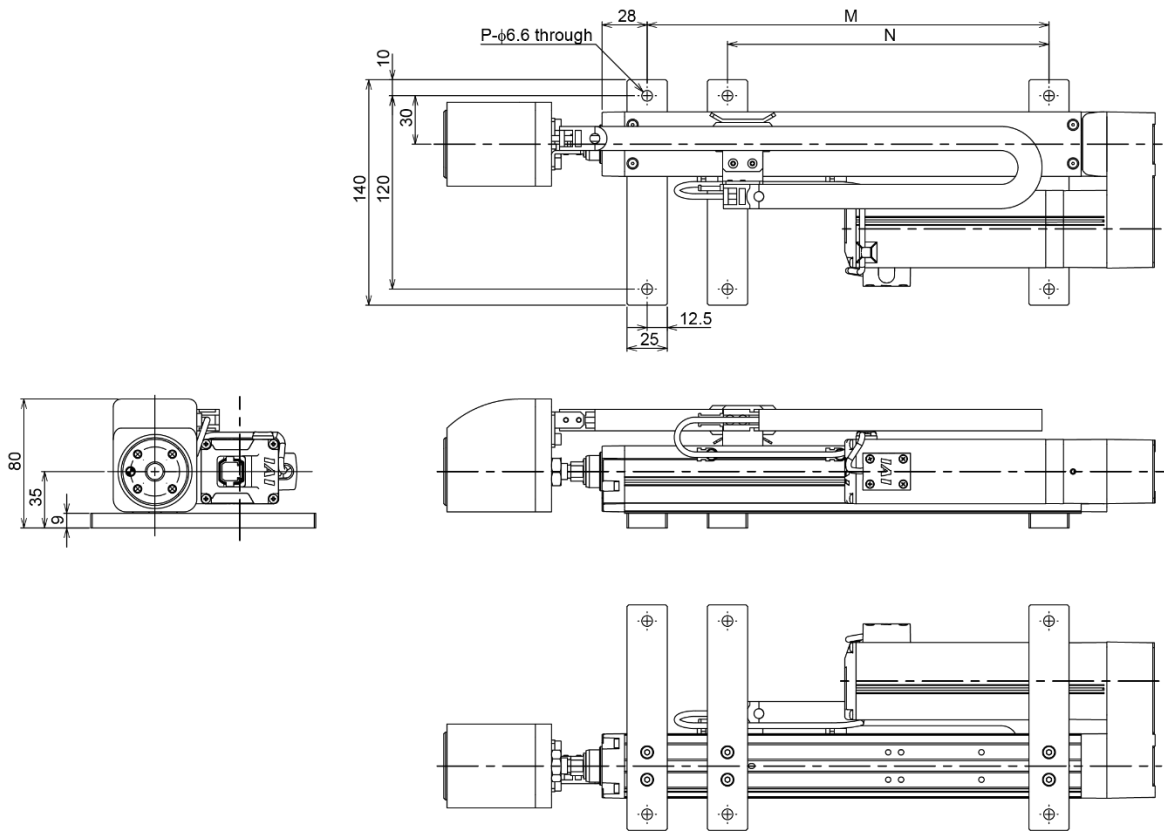
RCP6-RR4R-LCT

[illegible]

Unit (mm)

5-1

 RCP6-RR4R-LCT: Foot Bracket (optional)



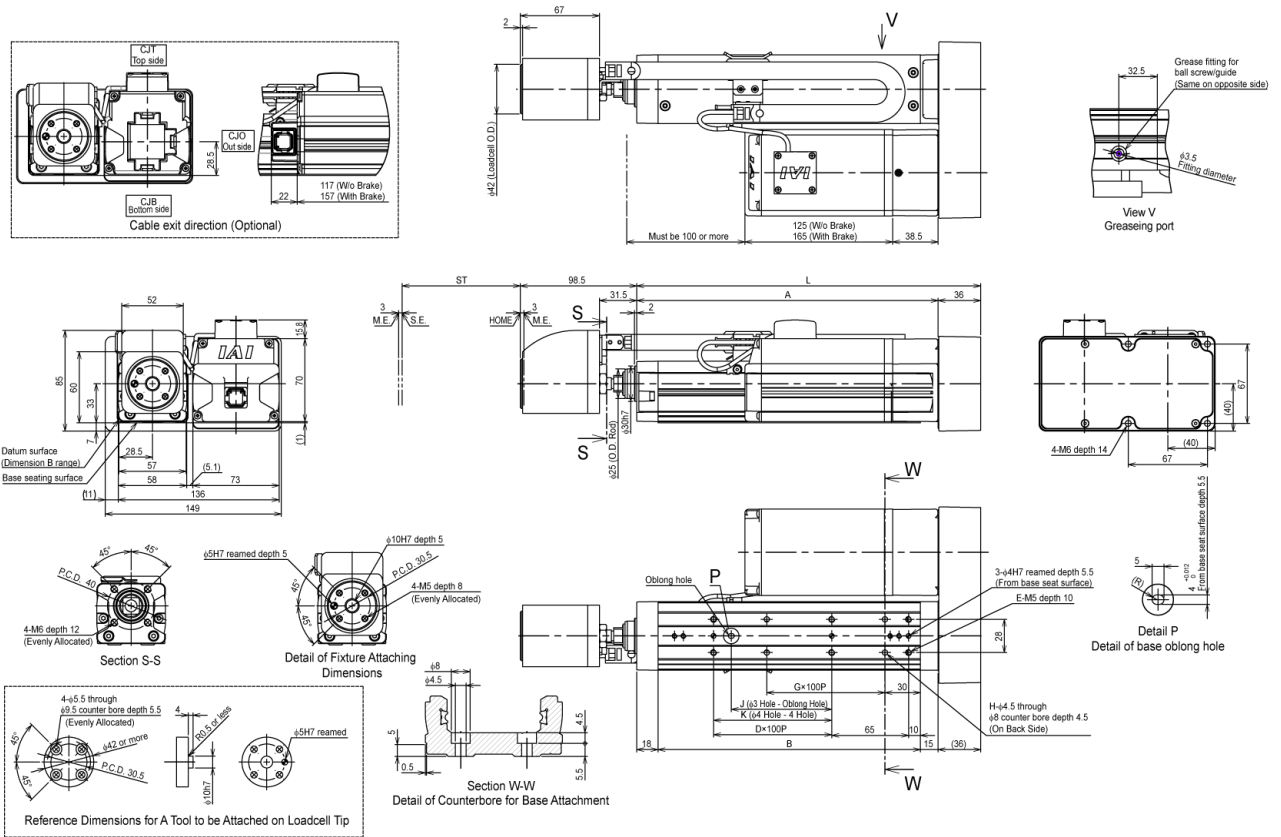
5. External Dimensions

Unit (mm)					
Stroke	110	160	210	260	310
M	150	200	250	300	350
N	0	0	200	200	200
P	4	4	6	6	6
Foot Bracket Quantity (pieces)	2	2	3	3	3

5.1 External Dimensions



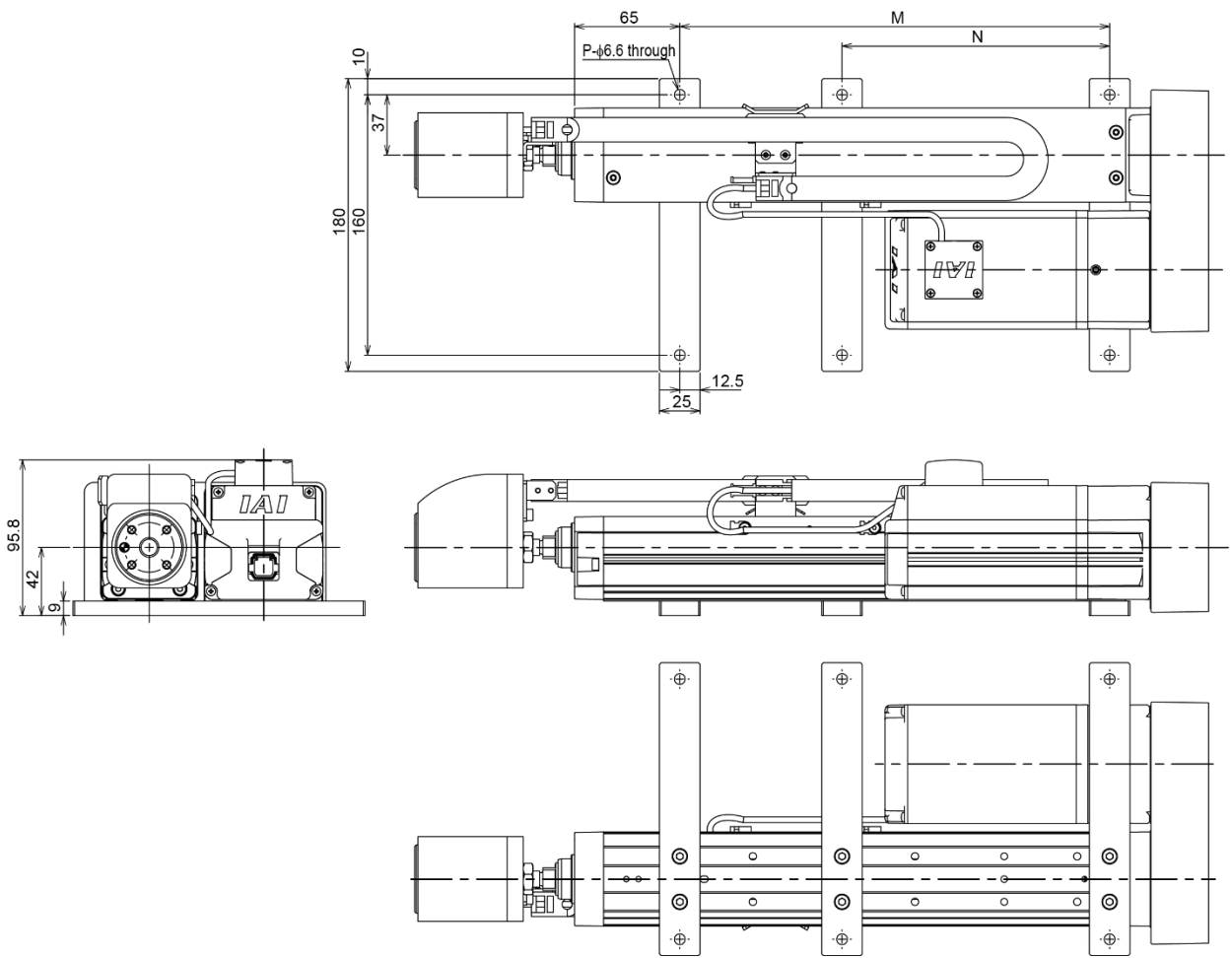
M.E.: Mechanical End, S.E.: Stroke End



Unit (mm)

Stroke (ST)		115	165	215	265	315
L		291	341	391	441	491
A		255	305	355	405	455
B		222	272	322	372	422
D		1	1	2	2	3
E		6	6	8	8	10
G		1	2	2	3	3
H		4	6	6	8	8
J		85	85	185	185	285
K		100	100	200	200	300
Mass (kg)	w/o Brake	4.0	4.2	4.5	4.7	4.9
	With Brake	4.2	4.4	4.6	4.9	5.1

 RCP6-RRA6R-LCT: Foot Bracket (optional)



5. External Dimensions

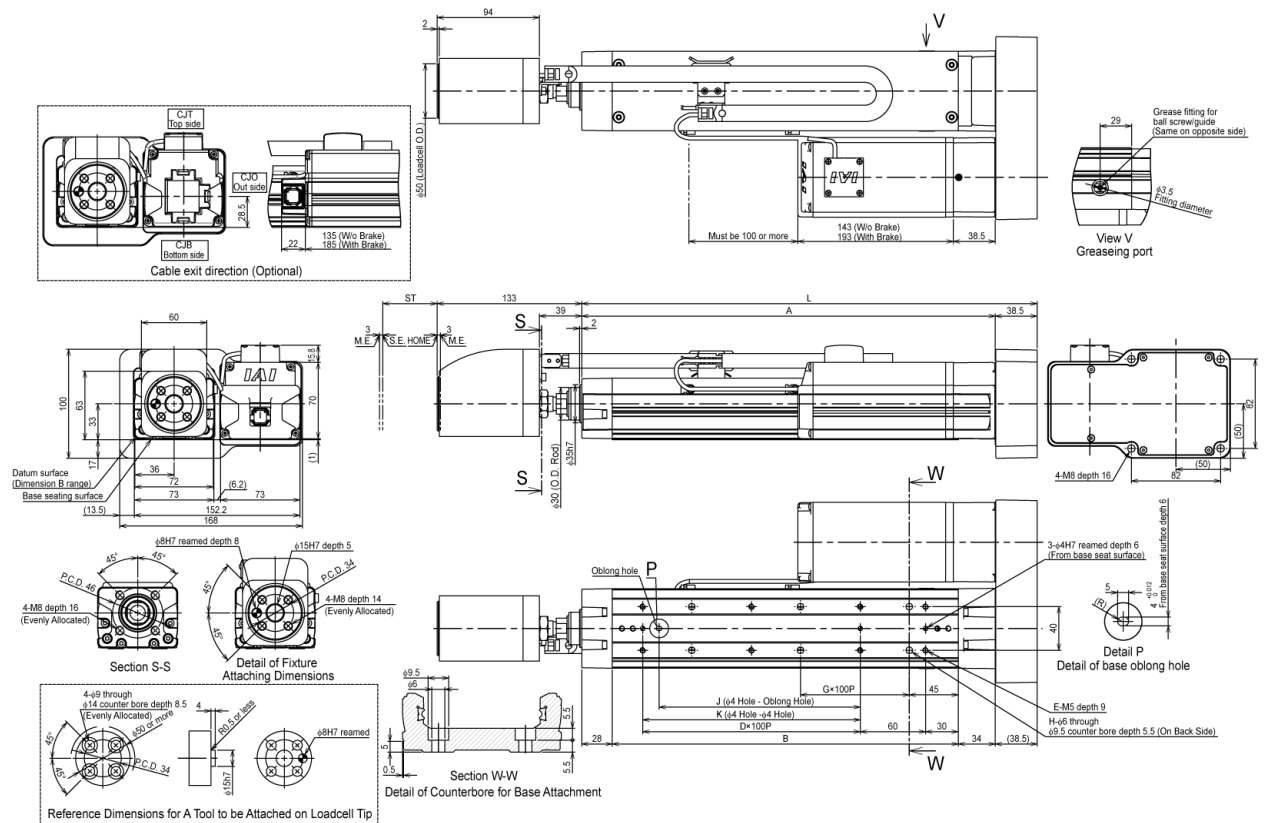
Unit (mm)

Stroke	115	165	215	265	315
M	165	165	265	265	365
N	0	0	165	165	165
P	4	4	6	6	6
Foot Bracket Quantity (pieces)	2	2	3	3	3

5.1 External Dimensions



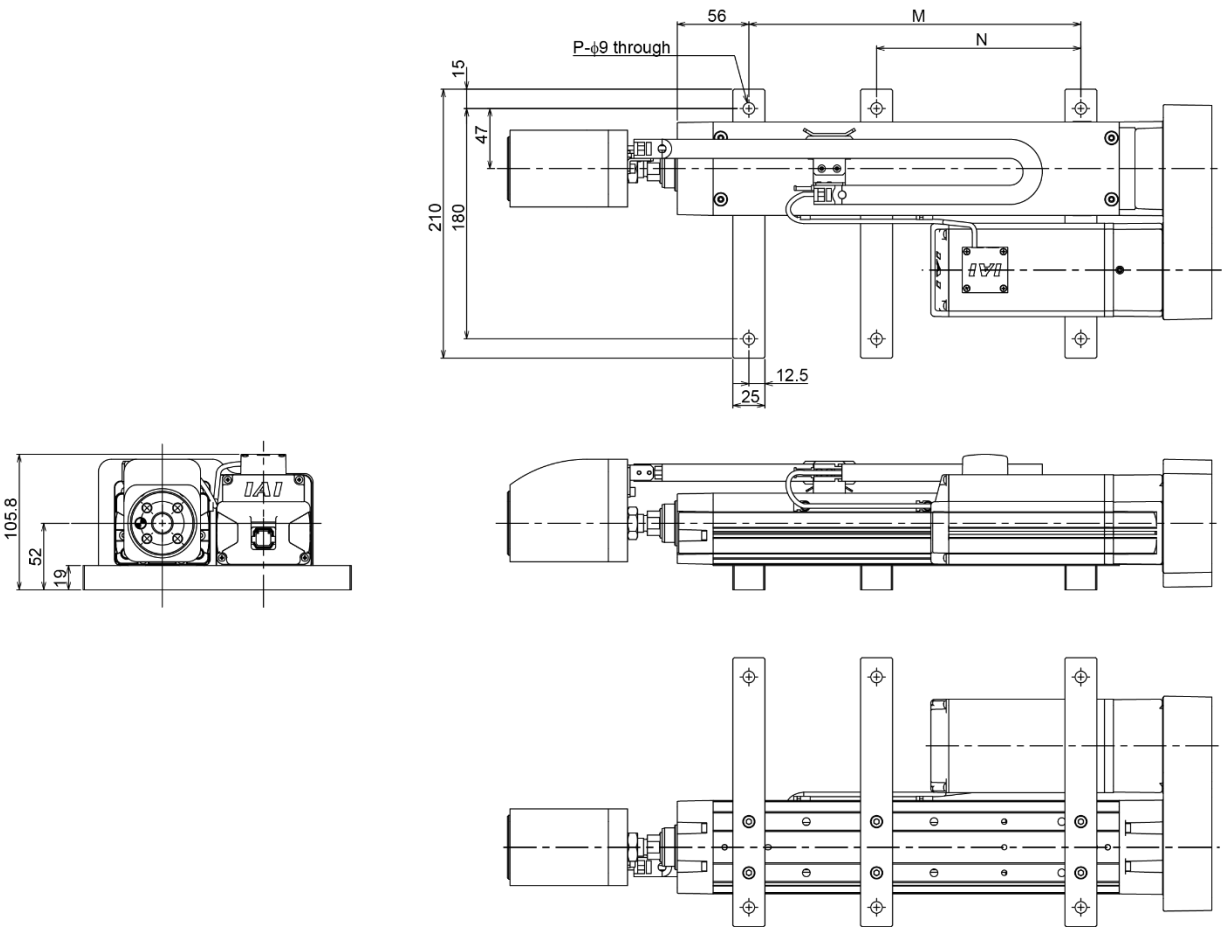
M.E.: Mechanical End, S.E.: Stroke End



Unit (mm)

Stroke (ST)		120	170	220	270	320
L		318.5	368.5	418.5	468.5	518.5
A		280	330	380	430	480
B		218	268	318	368	418
D		1	1	2	2	3
E		6	6	8	8	10
G		1	2	2	3	3
H		4	6	6	8	8
J		85	85	185	185	285
K		100	100	200	200	300
Mass (kg)	w/o Brake	6.0	6.3	6.6	6.9	7.2
	With Brake	6.6	6.9	7.2	7.5	7.8

 RCP6-RAA7R-LCT: Foot Bracket (optional)



5. External Dimensions

Unit (mm)					
Stroke	120	170	220	270	320
M	160	160	260	260	360
N	0	0	160	160	160
P	4	4	6	6	6
Foot Bracket Quantity (pieces)	2	2	3	3	3

ROBO Cylinder

Chapter 6

Life

6.1	Concept of life.....	6-1
	RCP6-RRA4R-LCT, RCP6-RRA6R-LCT, RCP6-RRA7R-LCT	6-1

6.1 Concept of life

RCP6-RAA4R-LCT, RCP6-RAA6R-LCT, RCP6-RAA7R-LCT

- Driving Life

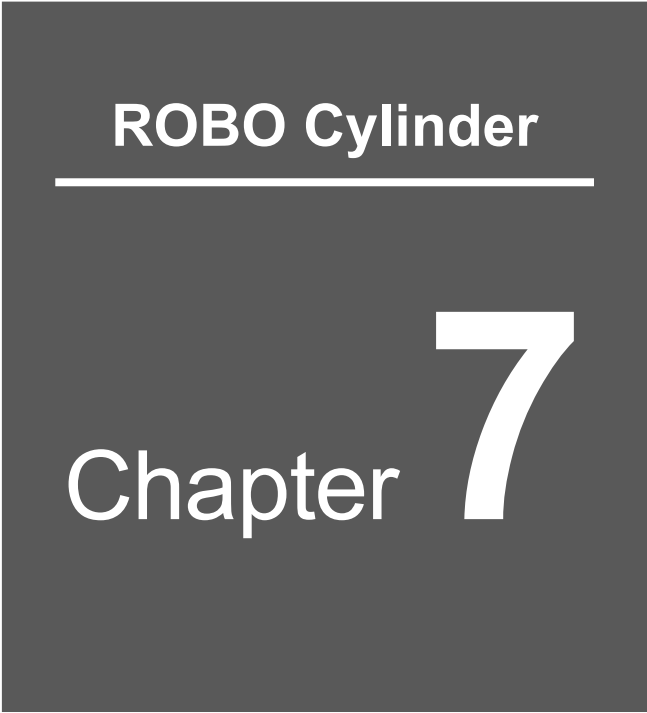
It is 5,000km as a reference when operation is made under the maximum payload and the maximum acceleration/deceleration.

- Upper Limit for Times of Pressing

When having maximum pressing force (70% of current boundary) with pressing distance at 1mm to operate the pressing movement, take the values for the times of pressing stated in the below as a reference for the upper limit.

(Note) The values for times of pressing stated in the below are those under assumption that there is no impact or vibration applied. The upper limit of times of pressing may differ depending on the operational conditions such as impact and vibration.

Type	Max. Pressing Force / Pulling Force	Pressing / Pulling Count
RRA4R-LCT	300N	196,000,000 times
RRA6R-LCT	600N	95,000,000 times
RRA7R-LCT	1000N	45,000,000 times
	2000N	13,000,000 times



Warranty

- 7.1 Warranty period 7-1
- 7.2 Scope of the warranty 7-1
- 7.3 Honoring the warranty 7-2
- 7.4 Limited liability 7-2
- 7.5 Conformance with applicable standards/regulations,etc.,
and application conditions 7-2
- 7.6 Other Items excluded from warranty 7-3

7.1 Warranty period

Whichever of the following periods is shorter:

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

7.2 Scope of the warranty

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

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

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

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

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

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

7.3 Honoring the warranty

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

7.4 Limited liability

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

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

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

7.6 Other Items excluded from warranty

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

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



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Revision history

Revision Date	Revised content
2021.05	First Edition
2021.10	1B Edition • Intro 1 to 7 Contents of Safety Guide revised • Intro 11 Complies with revised RoHS 3 Directive • 1-1 Inclusion of DVD discontinued • 1-7 , -11, -15 "current limit value" changed to "pressing command value" and "tension command value" • 4-15 Manufacturer Model Codes for Belt Maintenance Model Codes deleted • 5-1, -3, -5 Mention of cable connections deleted • General Typos corrected, expressions integrated
2025.01	1C Edition • 7. Calibration on Loadcell deleted
2026.01	1D Edition • Changes due to discontinuation of including the First Step Guide
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IAI Corporation

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

IAI America, Inc.

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

Technical Support available in Europe

IAI Industrieroboter GmbH

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

Technical Support available in Great Britain



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

IAI (Shanghai) Co., Ltd.

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

IAI Robot (Thailand) Co., Ltd.

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