



ROBO Cylinder

RCP2/RCP2W Actuator

Rod Type

Operation Manual

Fourteenth Edition

Standard types	Motor straight types	RCP2- RA2C·RA3C RA4C·RA6C·RA8C RA10C·RGS4C·RGS6C RGD3C·RGD4C·RGD6C
	Motor reversing types	RCP2- RA3R·RA4R·RA6R·RA8R
Dustproof/Splash proof type	Motor straight types	RCP2W-RA4C·RA6C·RA10C

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.

CE Marking

If a compliance with the CE Marking is required, please follow Overseas Standards Compliance Manual (ME0287) that is provided separately.

Table of Contents

Safety Guide.....	1
Precautions in Handling.....	8
Names of the Parts.....	11
1. Product Check	21
1.1 Parts.....	21
1.2 Operation Manuals for Controllers Supported by This Product.....	22
1.3 How to read the model plate	22
1.4 How to read the model No.	23
2. Specifications	24
3. Product Life	39
3.1 RCP2/RCP2W Rod Type for other than RCP2-RA8C, RA8R, RA10C and RCP2W-RA10C ..	39
3.2 RCP2-RA8C, RA8R	39
3.3 RCP2-RA10C, RCP2W-RA10C	40
4. Installation Environment, Storage and Preservation Environment	41
4.1 Installation Environment.....	41
4.2 Storage and Preservation Environment	41
5. Installation	42
5.1 Installing the Main Body	42
6. Connection the controller.....	53
6.1 Wiring.....	53
7. Cautions in Operation.....	57
7.1 Load on the Actuator	57
7.2 Caution for when setting to 60% or more of RCP2-RA8 pressing current limit value	58
8. Option	63
8.1 Brake.....	63
8.2 Flange Bracket.....	64
8.3 Foot Bracket.....	65
8.4 Single Guide.....	67
8.5 Reversed Home Specification.....	67
8.6 Connector cable exit direction changed	67
9. Motor • Encoder Cables.....	68
9.1 Cable for PMEC and PSEP Controllers	68
9.2 Cable for PCON and PSEL Controllers.....	69
10. Maintenance	71
10.1 Maintenance Schedule.....	71
10.2 Visual Inspection of the Machine Exterior	71
10.3 Cleaning	71

10.4	Applying Grease to the Ball Screw and Rod Slide Surface.....	72
10.4.1	Grease for Ball Screw	72
10.4.2	How to Apply Grease (Keep the spraying time to within 1 second per spray.).....	72
10.5	Grease Supply to Scraper.....	74
10.5.1	Grease	74
10.5.2	Grease Supply	74
11.	Belt Replacement and Adjustment	75
11.1	Belt Inspection.....	75
11.2	Belts to be used	75
11.3	Replacement Belt.....	76
12.	Process for Motor Replacement	78
12.1	Process to replace motor for RA8C and RA8R.....	78
12.1.1	Process to replace motor for RA8C	78
12.1.2	Process to replace motor for RA8R	83
12.2	Process to replace motor for RA10C	88
13.	Appendix.....	93
13.1	External Dimensions	93
13.1.1	RCP2-RA2C.....	93
13.1.2	RCP2-RA3C.....	94
13.1.3	RCP2-RA4C.....	95
13.1.4	RCP2-RA6C.....	96
13.1.5	RCP2-RA8C.....	97
13.1.6	RCP2-RA10C.....	98
13.1.7	RCP2-RA3R.....	99
13.1.8	RCP2-RA4R.....	100
13.1.9	RCP2-RA6R.....	101
13.1.10	RCP2-RA8R.....	102
13.1.11	RCP2-RGS4C	103
13.1.12	RCP2-RGS6C	104
13.1.13	RCP2-RGD3C	105
13.1.14	RCP2-RGD4C	106
13.1.15	RCP2-RGD6C	107
13.1.16	RCP2W-RA4C	108
13.1.17	RCP2W-RA6C	109
13.1.18	RCP2W-RA10C	110
14.	Warranty	111
14.1	Warranty Period	111
14.2	Scope of Warranty.....	111
14.3	Honoring the Warranty	111
14.4	Limited Liability.....	111
14.5	Conditions of Conformance with Applicable Standards/Regulations, Etc., and Applications ..	112
14.6	Other Items Excluded from Warranty	112
	Cange History.....	113

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. - Location where electric noise is generated - Location where high electrical or magnetic field is present - Location with the mains or power lines passing nearby - Location where the product may come in contact with water, oil or chemical droplets

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

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

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

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

Alert Indication

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

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

Precautions in Handling

1. Do not set the speed or acceleration/deceleration settings beyond the rated values.

It may cause an occurrence of vibration, malfunction, or shorten the product life.

Setting especially the acceleration/deceleration beyond the rated values may cause a creep or a slip of the coupling.

2. Set the allowable load moment within the allowable range.

If the robot is operated under a load equal to or greater than the allowable load moment, abnormal noise or vibration, failure, or shorter life may result. If an extreme load is applied, flaking may occur.

3. Back and forth operation in a short distance may cause wear of grease.

Continuous back and forth operation within a distance less than 30mm may cause wear of grease.

It is recommended to have 5 rounds of back and forth operation in a distance more than 50mm after every 5,000 to 10,000 rounds of the short distance operation. A layer of the grease will recover.

4. Turn the servo ON after putting the actuator or rod away from the mechanical end.

Turning the servo ON near the mechanical end may disturb the magnetic pole phase detection, and may cause the magnetic pole unconfirmed error or the excitation detection error.

Put the slider or rod away from the mechanical end when performing this operation.

5. Make sure to attach the actuator properly by following this operation manual.

Using the product with the actuator not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.

6. When installing the unit by mounting on the front bracket with the rod orienting upwards, have drain slots to avoid liquid from remaining around the scraper area.

On the optional front flange, there are drain slots. Be careful not to block the slots with an attached component.

7. For RA8C and RA8R, do not attempt to apply current exceeding 60% of the current limit at Parameter No. 12 Positioning Stop on the controller.

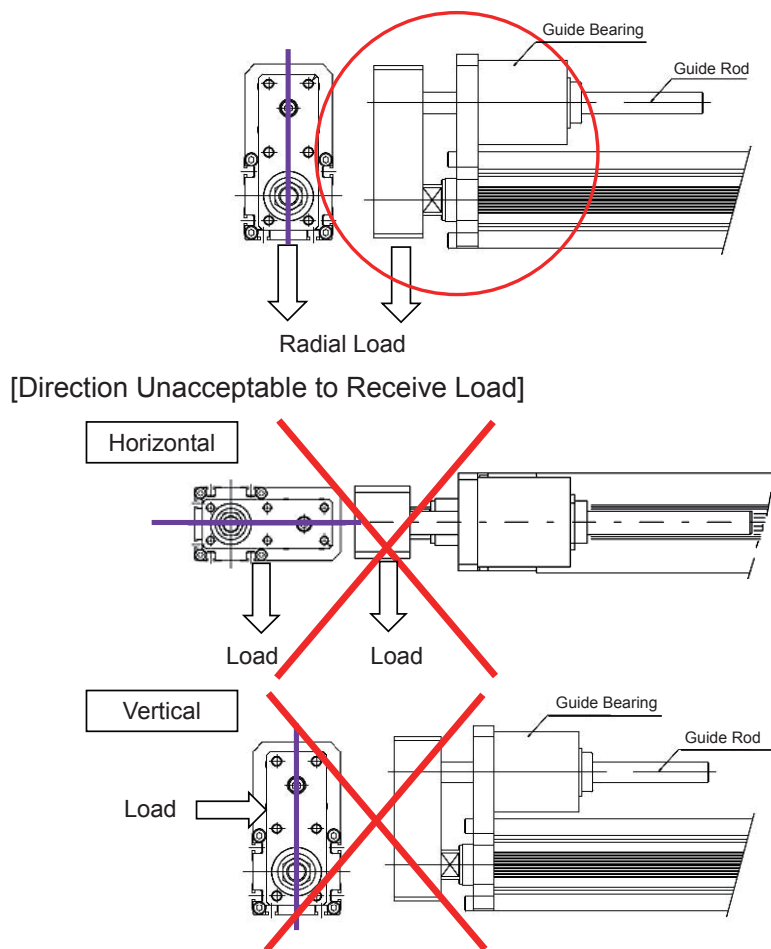
Setting to a value exceeding 60% may cause extreme high heat on the motor and could cause malfunction.

8. Grease flows out gradually from the end of the rod.

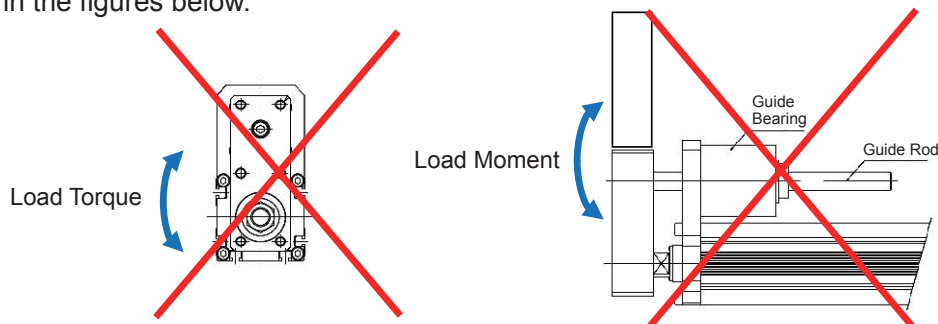
For the purpose of maintaining scraper lubrication, the grease flows out gradually. Have a protection to the peripheral in case the grease may be applied on it.

9. Do not attempt to apply any force except for the radial load to actuators equipped with the single guide. Applying force other than radial load could cause a failure on the actuator.

Single guide can receive load only to the vertical direction shown in the figure below (the direction of a line that the rod tip and guide rod tip are joined).



Do not attempt to use the unit in an environment that load torque or load moment can be applied as shown in the figures below.



10. Transportation

10.1 Handling a Single Actuator

Please adhere to the following when handling a single actuator.

10.1.1 Handling the Packed Unit

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

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

10.1.2 Handling the Actuator After Unpacking

- Do not carry an actuator by a cable or attempt to move it by pulling the cable.
- Hold the body base when transporting the actuator.
- Be careful not to bump the actuator into anything when moving it.
- Do not apply an excessive force to each part of the actuator. In particular, prevent the motor unit and rear bracket from receiving an unnecessary force.

Supplement) For the names of each part of the actuator, refer to 1, "Part Names".

10.2 Handling the Actuator Assembly

- When carrying the actuator, exercise caution not to bump it against nearby objects or structures.
- Secure the sliders to prevent sudden movement during transport.
- If any end of the actuator is overhanging, secure it properly to avoid significant movement due to external vibration.
- When transporting the assembly without the ends of the actuators fastened, do not subject the assembly to an impact of 0.3 G or more.
- When suspending the mechanical equipment (system) with ropes, avoid applying force to actuator, connector box, etc. Also, avoid the cables being pinched or caused an excessive deformation.

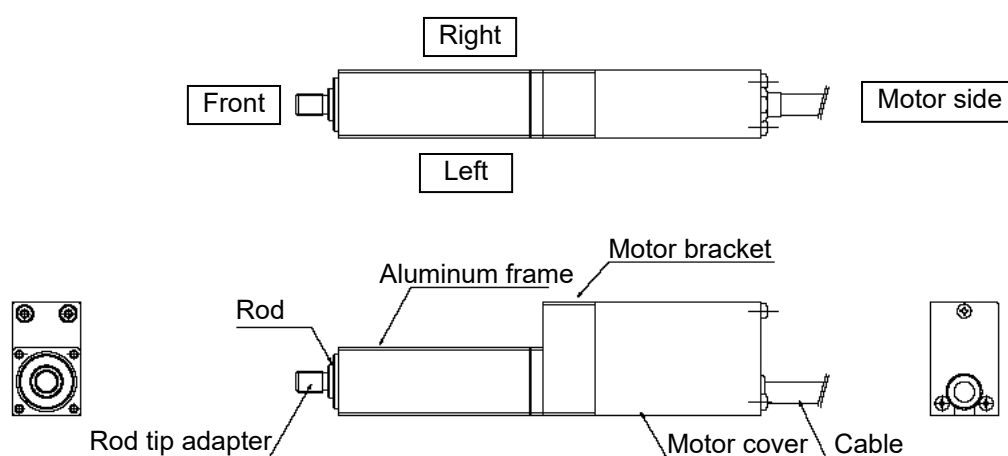
Names of the Parts

The names of the actuator parts are indicated below.

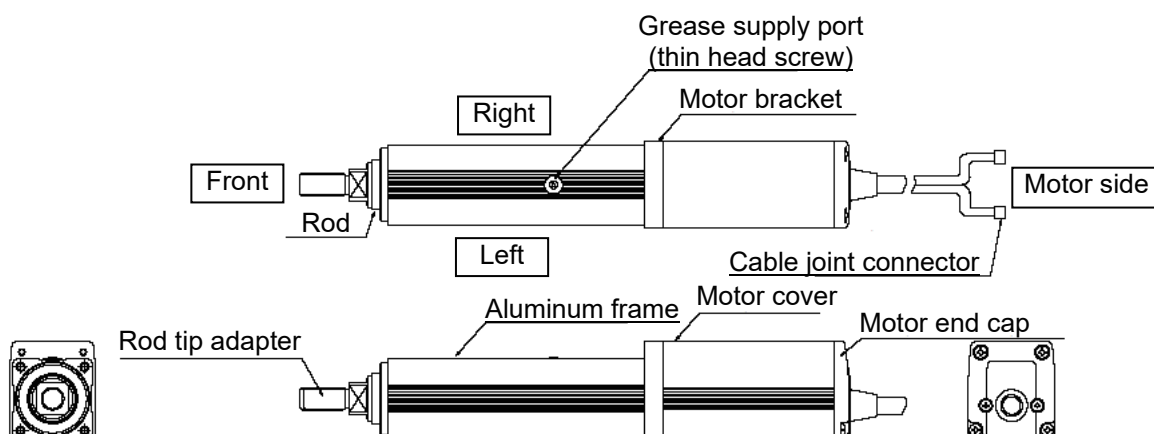
In this manual, the right and left are determined by viewing the horizontally placed actuator from the top and from the motor side. The front indicates the counter-motor side.

RCP2

RA2C type

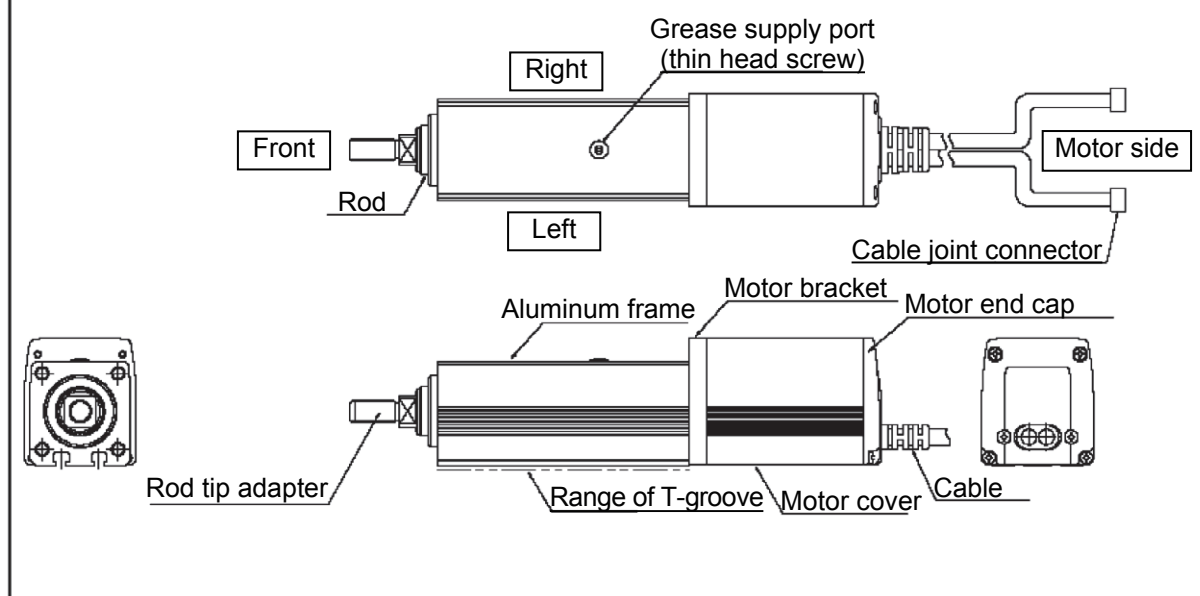


RA3C type

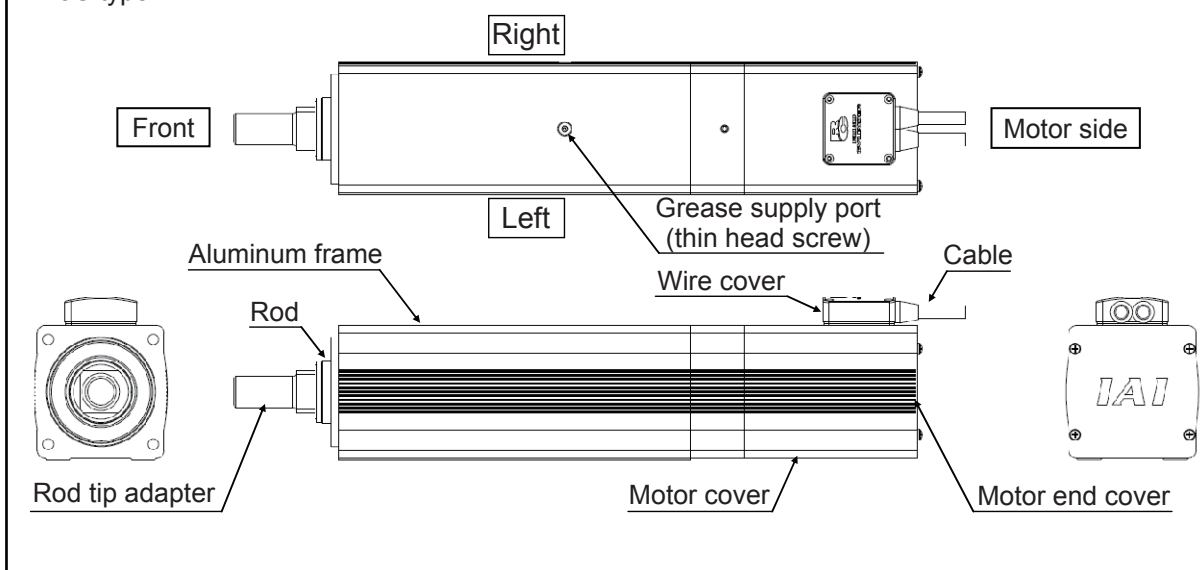


RCP2

RA4C type
RA6C type

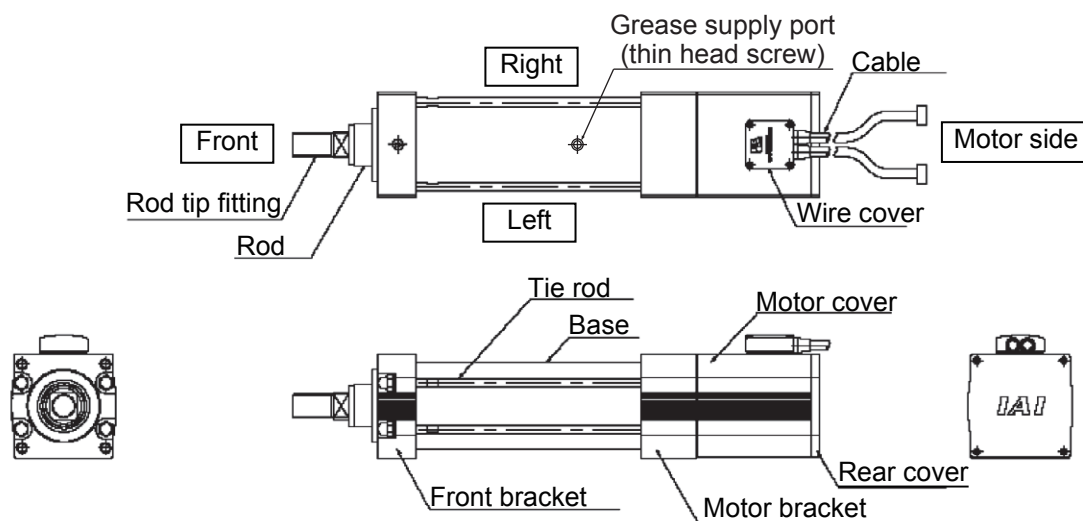


RA8C type



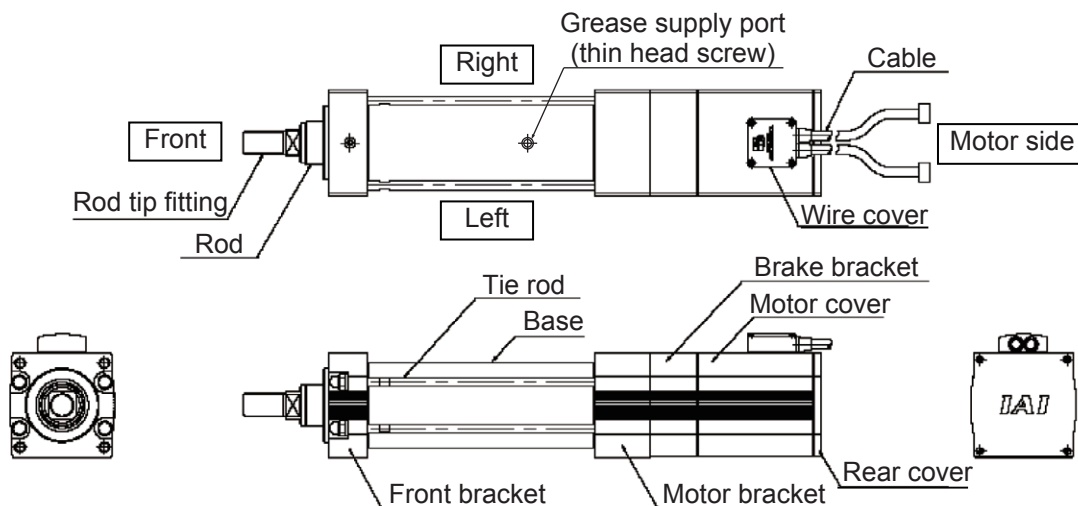
RCP2

RA10C type



(Note) There is no grease supply port on those manufactured in the early time.

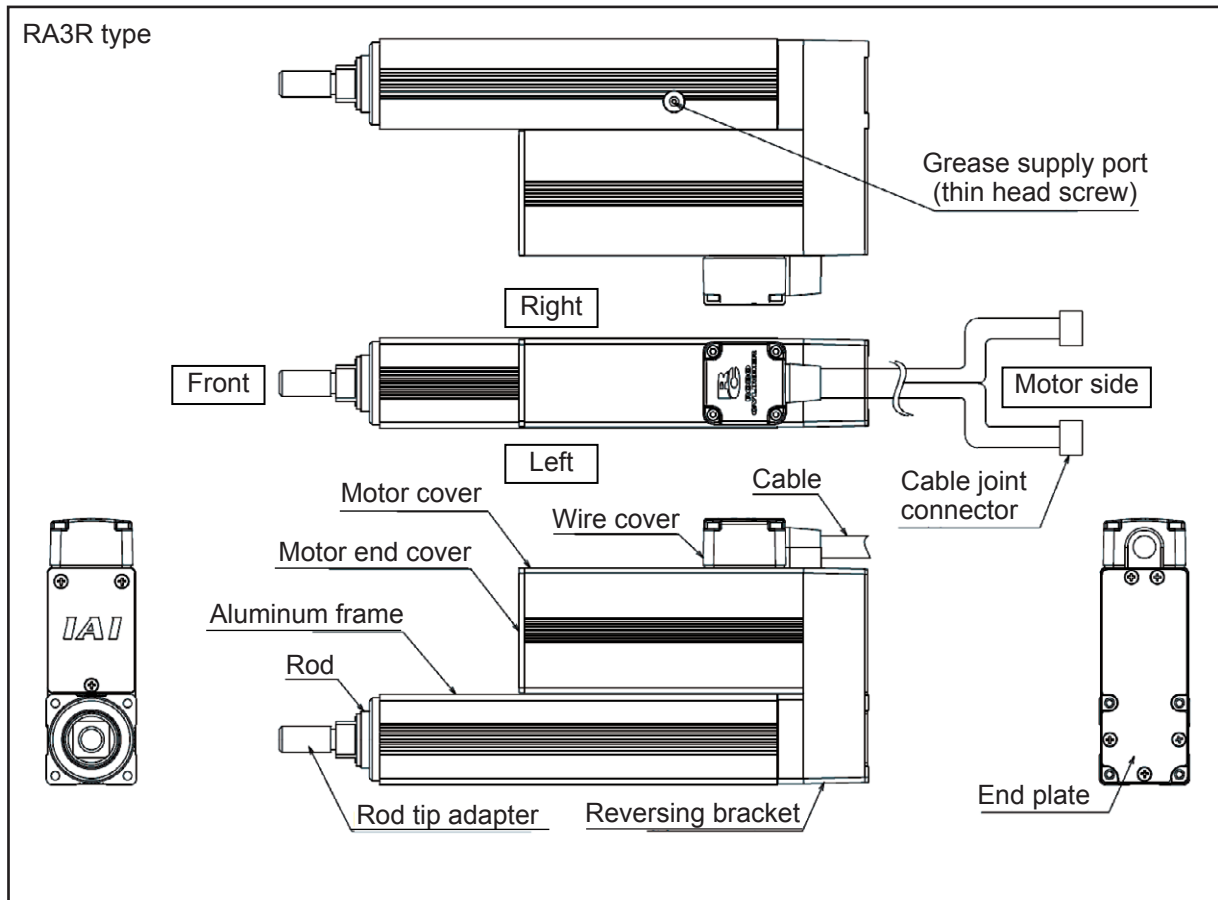
RA10C type Brake type specification



(Note) There is no grease supply port on those manufactured in the early time.

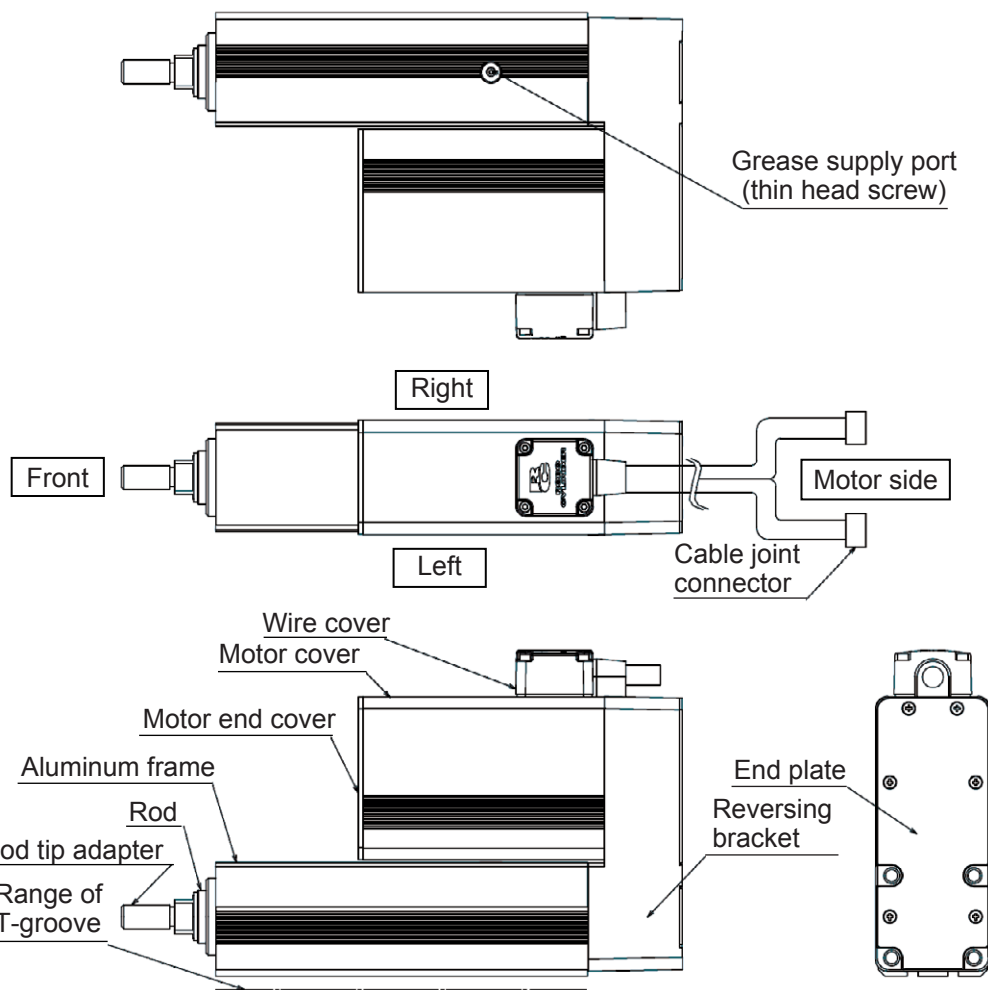
RCP2

RA3R type



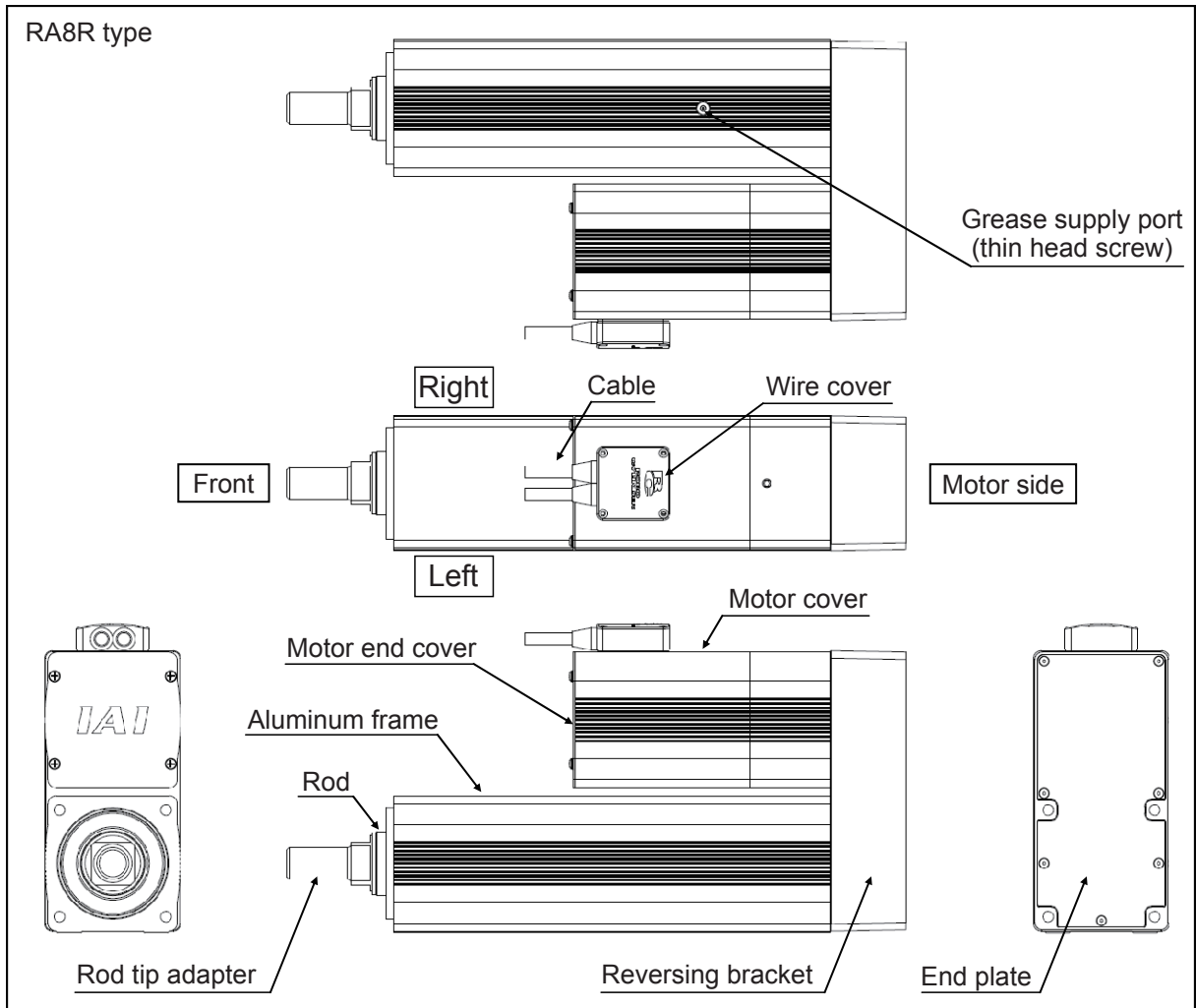
RCP2

RA4R type
RA6R type



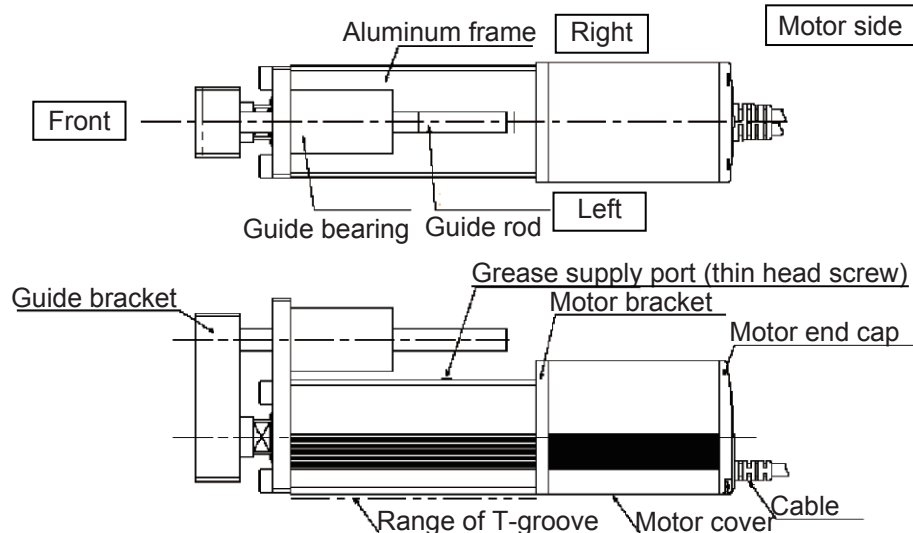
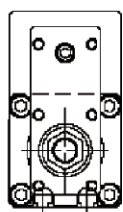
RCP2

RA8R type

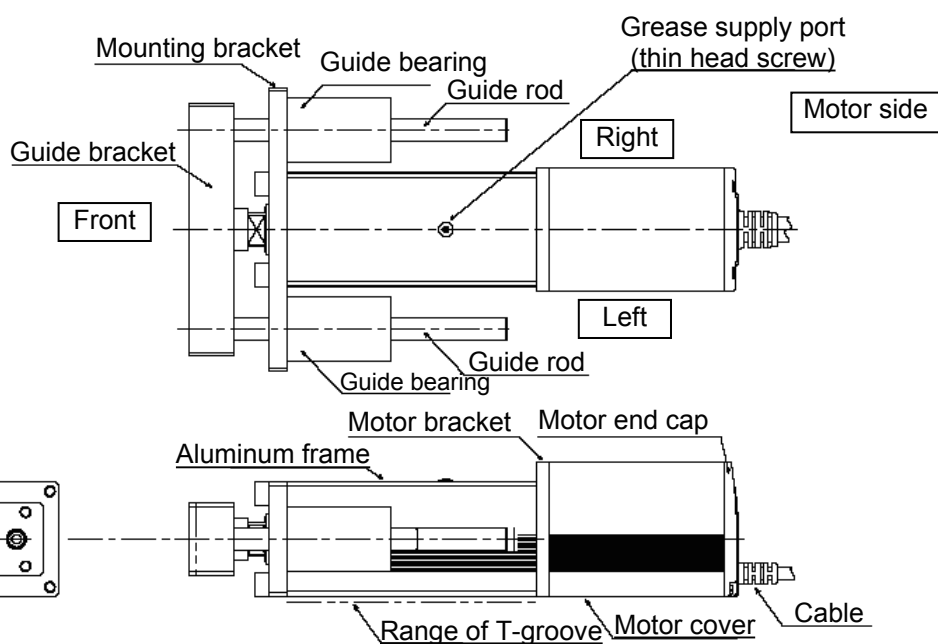
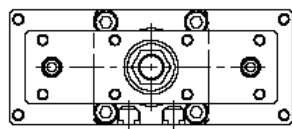


RCP2

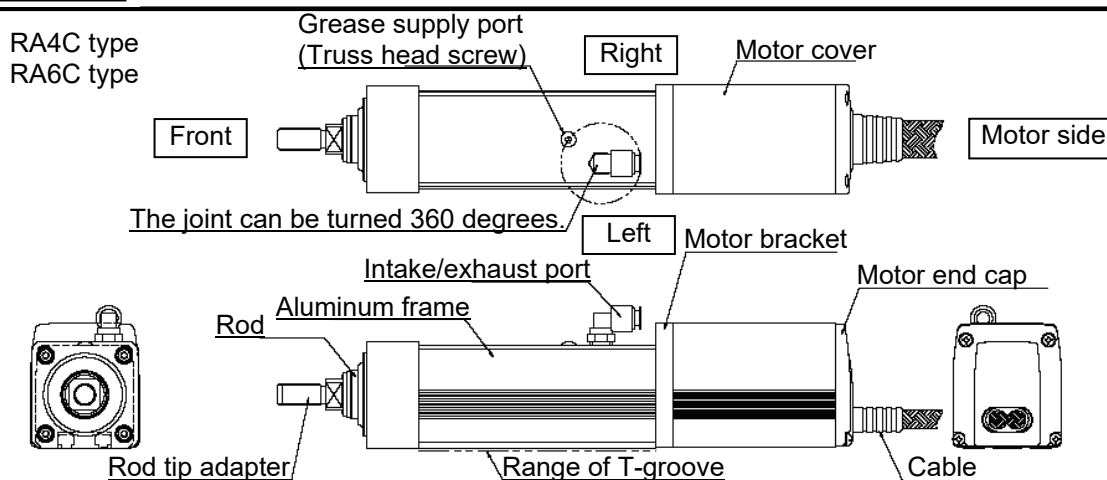
RGS4C type
RGS6C type
(Single guide type)



RGD3C type
RGD4C type
RGD6C type
(Double guide type)

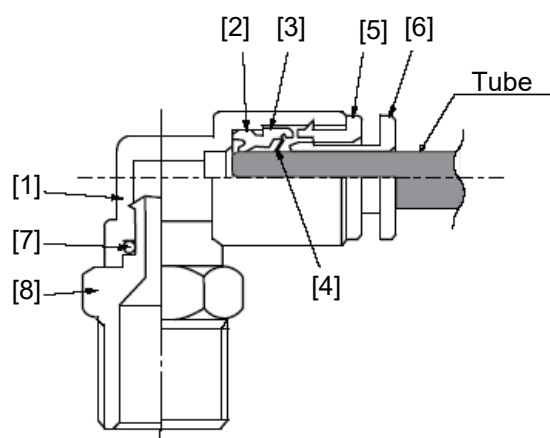


RCP2W



- Connect a tube to the intake/exhaust port and extend the other end of the tube to a location not subject to water, etc.

Internal structure of intake/exhaust port



- Insert the tube all the way until it contacts the gasket [2] shown to the left. If the tube is not inserted fully and the tip of the tube stops at the chuck [4], water or other foreign matter will enter the interior, causing the actuator to malfunction.

Part No.	Name	Material
[1]	Intake/exhaust port	PBT
[2]	Gasket	NBR
[3]	Holder	C3604BD
[4]	Chuck	SUS301
[5]	Outer ring	C3604BD
[6]	Push ring	Polyacetal
[7]	O-ring	NBR
[8]	Driven nipple	C3604BD

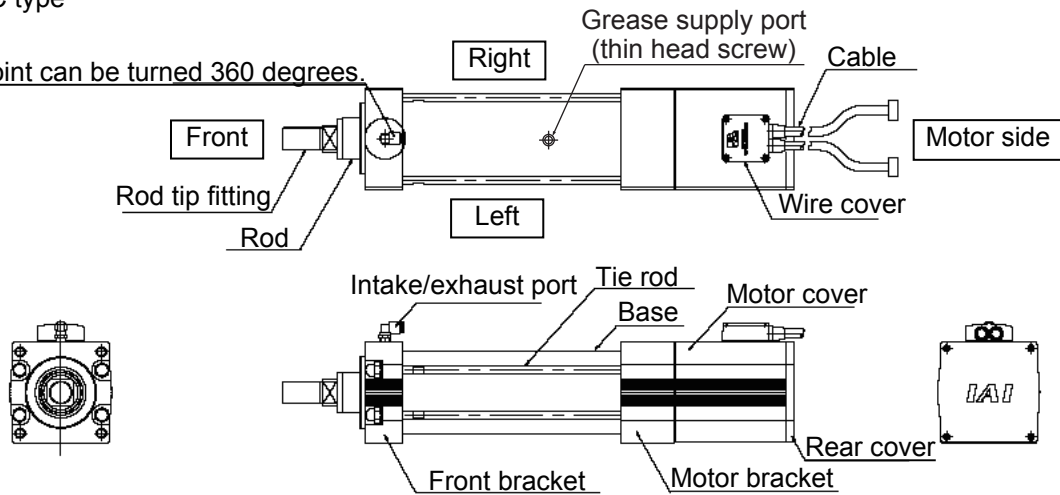
Intake/exhaust port
Joint CL-061 by Aoi
Applicable tube (Aoi)

Model	Outer diameter x inner diameter mm	Material
U-9506	6 X 4	Polyurethane

RCP2W

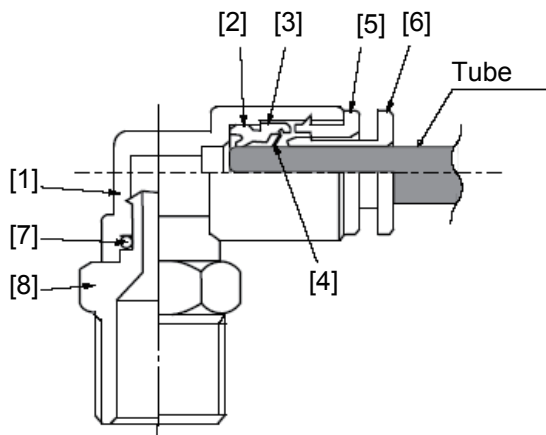
RA10C type

The joint can be turned 360 degrees.



- Connect a tube to the intake/exhaust port and extend the other end of the tube to a location not subject to water, etc.
(Note) There is no grease supply port on those manufactured in the early time.

Internal structure of intake/exhaust port



- Insert the tube all the way until it contacts the gasket [2] shown to the left. If the tube is not inserted fully and the tip of the tube stops at the chuck [4], water or other foreign matter will enter the interior, causing the actuator to malfunction.

Part No.	Name	Material
[1]	Intake/exhaust port	PBT
[2]	Gasket	NBR
[3]	Holder	C3604BD
[4]	Chuck	SUS301
[5]	Outer ring	C3604BD
[6]	Push ring	Polyacetal
[7]	O-ring	NBR
[8]	Driven nipple	C3604BD

Intake/exhaust port
Joint CL-061 by Aoi
Applicable tube (Aoi)

Model	Outer diameter x inner diameter mm	Material
U-9506	6 X 4	Polyurethane

1. Product Check

This product is comprised of the following parts if it is of standard configuration.



Caution: Check the packing list to confirm what is in the package. If you find any fault in the contained model or any missing parts, contact us or our distributor.

1.1 Parts

No.	Part Name	Model	Remarks
1	Actuator Main Body	Refer to "How to read the model plate", "How to read the model No."	
Accessories			
2	Motor • Encoder Cable*1		
3	Nut		Refer to list below
4	Safety Guide		

*1 Enclosed motor cable and encoder cable differ depending on the applied controller.
[Refer to 9. Motor • Encoder Cables]

Model No.	Nut M10×1.25	Nut M12×1.25	Nut M14×1.5	Nut M20×1.5	Nut M22×1.5	Square Nut 7×7 M4	Square Nut 10×10 M6
RCP2-RA2C							
RCP2-RA3C	1						
RCP2-RA4C	1					4	
RCP2-RA6C			1				4
RCP2-RA8C				1			
RCP2-RA10C					1		
RCP2-RA3R	1						
RCP2-RA4R	1					4	
RCP2-RA6R			1				4
RCP2-RA8R				1			
RCP2-RGS4C						4	
RCP2-RGS6C							4
RCP2-RGD3C							
RCP2-RGD4C						4	
RCP2-RGD6C							4

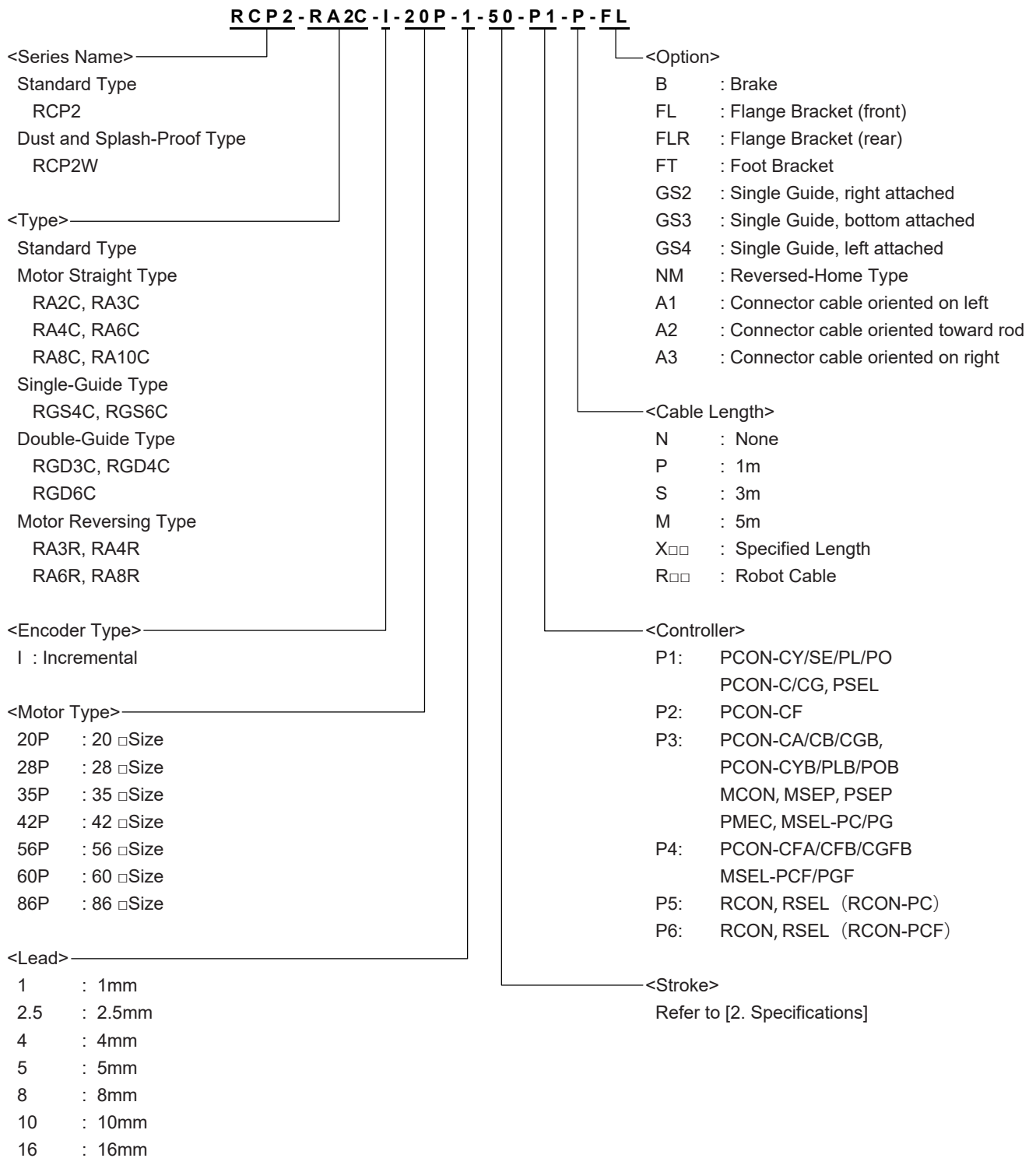
1.2 Operation Manuals for Controllers Supported by This Product

No.	Name	Manual No.
1	Operation Manual for PSEL Controller	ME0172
2	Operation Manual for PCON-C/CG/CF Controller	ME0170
3	Operation Manual for PCON-CY Controller	ME0156
4	Operation Manual for PCON-SE Controller	ME0163
5	Operation Manual for PCON-PL/PO Controller	ME0164
6	Operation Manual for MEC Controller	ME0245
7	Operation Manual for PSEP/ASEP Controller	ME0216
8	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
9	Operation Manual for PC Software RCM-101-MW/RCM-101-USB	ME0155
10	Operation Manual for MEC PC Software	ME0248
11	Operation Manual for Teaching Pendant SEL-T/TD	ME0183
12	Operation Manual for Teaching Pendant CON-T/TG	ME0178
13	Operation Manual for Touch Panel Teaching Pendant CON-PT/PD/PG	ME0227
14	Operation Manual for Touch Panel Teaching Pendant SEP-PT	ME0217
15	Operation Manual for Simple Teaching Pendant RCM-E	ME0174
16	Operation Manual for Data Setter RCM-P	ME0175
17	Operation Manual for Touch Panel Display RCM-PM-01	ME0182

1.3 How to read the model plate

Model → MODEL RCP2-RA2C-I-42P-12-50-P1-P-BE
 Serial No. → SERIAL No. 600090266 MADE IN JAPAN

1.4 How to read the model No.



2. Specifications

(1) Maximum Speed

The maximum speed for the actuator is limited due to the resonance of the ball screw axis and the limitation of the number of motor rotation.

Make sure that the maximum speed of your actuator does not exceed the applicable limit specified in the table below.

[Standard]

Restriction in Stroke and Maximum Speed (unit: mm/s)

Type	Motor Type	Lead (mm)	Stroke (mm)			
			25	50	75	100
RCP-RA2C	20P	1	25			

Restriction in Stroke and Maximum Speed (unit: mm/s)

Type	Motor Type	Lead (mm)	Stroke (mm)					
			50	100	150	200	250	300
RCP2-RA3C	28P	2.5	114				-	-
		5	187				-	-
RCP2-RA4C	42P	2.5	125<114>				118<114>	87
		5	250				237	175
		10	458					350
RCP2-RA6C	56P	4	130					
		8	210					
		16	450<400>					
RCP2-RA8C	60P	5	150					
		10	300					
RCP2-RA10C	86P	2.5	63					
		5	125					
		10	250<167>					

(Note) Values in brackets < > are the maximum speed when vertically oriented.

[Motor Reversing]

Restriction in Stroke and Maximum Speed (unit: mm/s)

Type	Motor Type	Lead (mm)	Stroke (mm)					
			50	100	150	200	250	300
RCP2-RA3R	28P	2.5	114<93>				-	-
		5	187				-	-
RCP2-RA4R	42P	2.5	125<114>				118<114>	87
		5	250				237	175
		10	458					350
RCP2-RA6R	56P	4	110					
		8	210					
		16	400					
RCP2-RA8R	60P	5	100					
		10	200					

(Note) Values in brackets < > are the maximum speed when vertically oriented.

[With single guide]

Restriction in Stroke and Maximum Speed (unit: mm/s)

Type	Motor Type	Lead (mm)	Stroke (mm)					
			50	100	150	200	250	300
RCP2-RGS4C	42P	2.5	125<114>				118<114>	87
		5	250				237	175
		10	458					350
RCP2-RGS6C	56P	4	130					
		8	210					
		16	450<400>					

(Note) Values in brackets < > are the maximum speed when vertically oriented.

[With double guides]

Restriction in Stroke and Maximum Speed (unit: mm/s)

Type	Motor Type	Lead (mm)	Stroke (mm)					
			50	100	150	200	250	300
RCP2-RGD3C	28P	2.5	114<93>				-	-
		5	187				-	-
RCP2-RGD4C	42P	2.5	125<114>				118<114>	87
		5	250				237	175
		10	458					350
RCP2-RGD6C	56P	4	130					
		8	210					
		16	450<400>					

(Note) Values in brackets < > are the maximum speed when vertically oriented.

[Splash proof type]

Restriction in Stroke and Maximum Speed (unit: mm/s)

Type	Motor Type	Lead (mm)	Stroke (mm)					
			50	100	150	200	250	300
RCP2W-RA4C	42P	2.5	125<115>				115	85
		5	190					175
		10	450<250>					350<250>
RCP2W-RA6C	56P	4	100					
		8	200					
		16	320<265>					
RCP2W-RA10C	86P	2.5	63					
		5	125					
		10	250<167>					

(Note) Values in brackets < > are the maximum speed when vertically oriented.



Caution: Please do not set the speed or acceleration/deceleration settings beyond the rated values. It may cause an occurrence of vibration, malfunction, or shorten the product life.
When having the actuator run to synchronize with multiple axes, adjust the speed setting of the axis with the maximum speed and the acceleration/deceleration of the axis with the minimum acceleration/deceleration.
Setting especially the acceleration/deceleration beyond the rated values may cause a creep or a slip of the coupling.

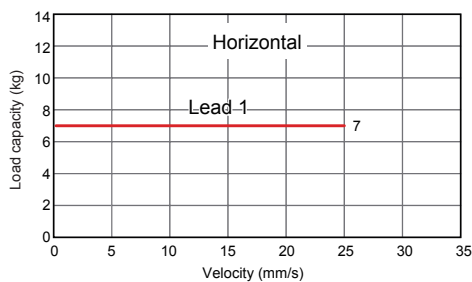
(2) Speed and Transportable Weight



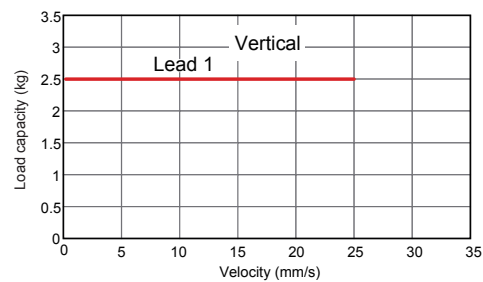
Caution: Since RCP2 Series apply the pulse motor, the thrust would drop when it reaches the maximum speed, thus the transportable weight would also decrease. Check the transportable weight at the speed that you would operate the actuator at on the graphs of speed and transportable weight shown below.

• Standard [RCP2-RA2C]

Acceleration at Horizontal Mount : 0.05G

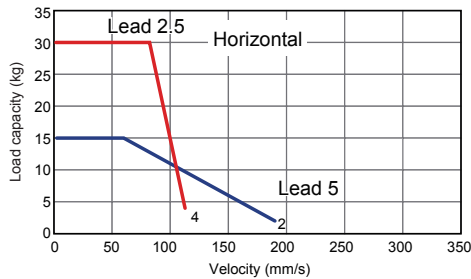


Acceleration at Vertical Mount : Acceleration 0.05G

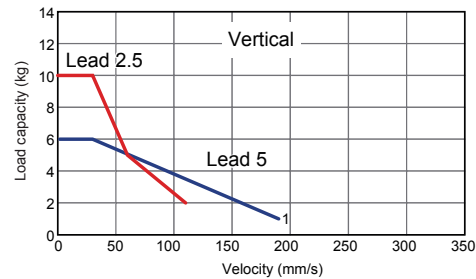


[RCP2-RA3C]

Acceleration at Horizontal Mount : 0.2G

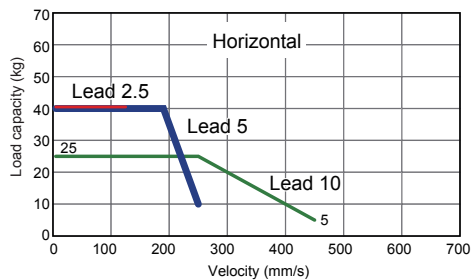


Acceleration at Vertical Mount : Acceleration 0.2G

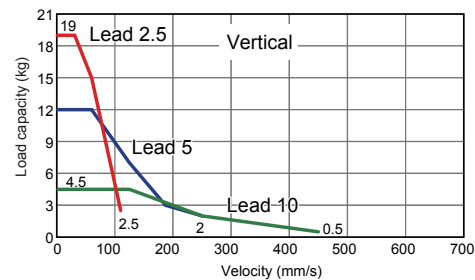


[RCP2-RA4C]

Acceleration at Horizontal Mount : 0.2G

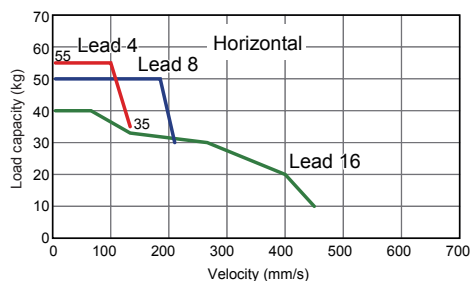


Acceleration at Vertical Mount : Acceleration 0.2G

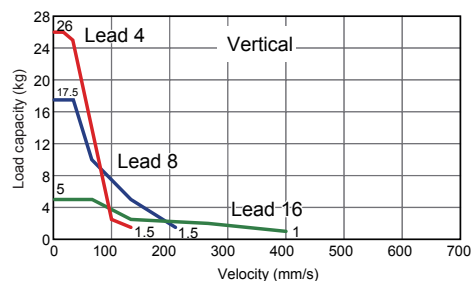


[RCP2-RA6C]

Acceleration at Horizontal Mount : 0.2G

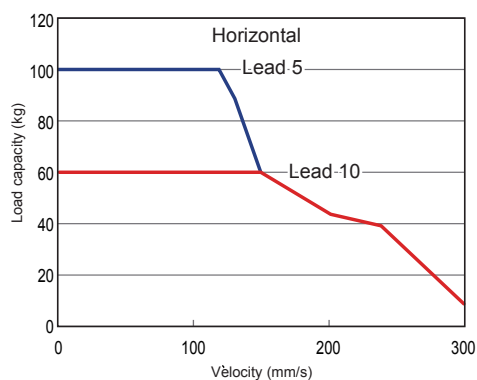


Acceleration at Vertical Mount : Acceleration 0.2G

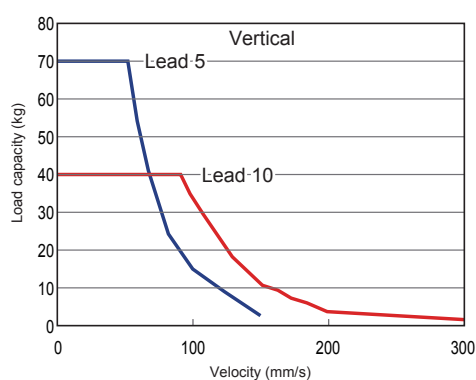


[RCP2-RA8C]

Acceleration at Horizontal Mount : Lead 5 0.1G
Lead10 0.2G

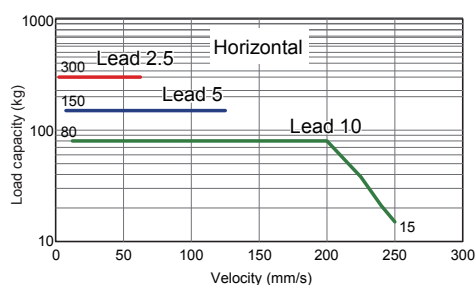


Acceleration at Vertical Mount : Lead 5 0.1G
Lead10 0.2G

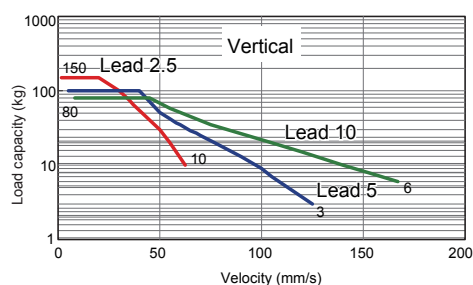


[RCP2-RA10C]

Acceleration at Horizontal Mount : Lead 2.5 0.01G
Lead 5 0.02G
Lead10 0.04G

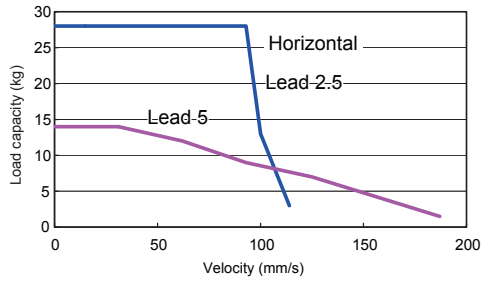


Acceleration at Vertical Mount : Lead 2.5 0.01G
Lead 5 0.02G
Lead10 0.04G

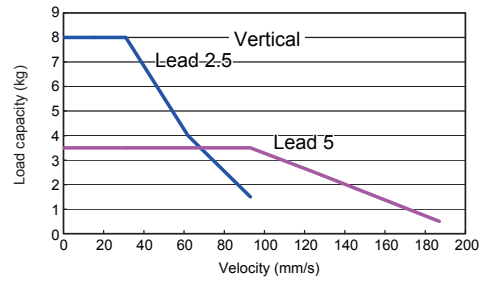


• Motor Reversing [RCP2-RA3R]

Acceleration at Horizontal Mount : Lead 2.5 0.2G
Lead 5 0.2G

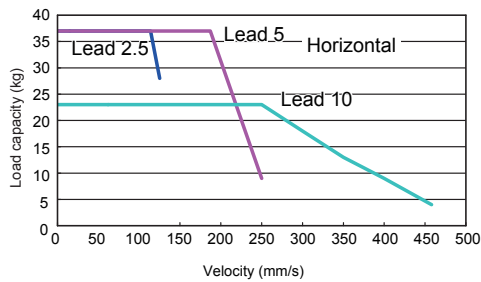


Acceleration at Vertical Mount : Lead 2.5 0.2G
Lead 5 0.2G

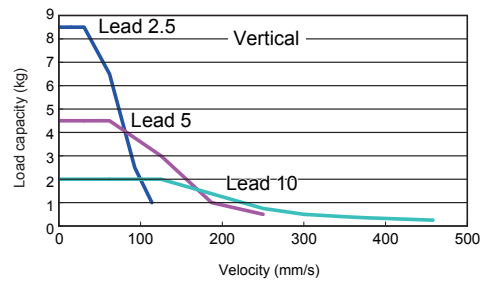


[RCP2-RA4R]

Acceleration at Horizontal Mount : Lead 2.5 0.2G
Lead 5 0.2G
Lead10 0.2G

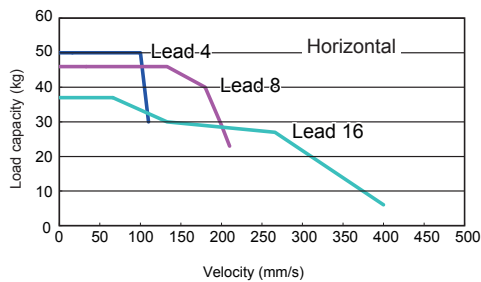


Acceleration at Vertical Mount : Lead 2.5 0.2G
Lead 5 0.2G
Lead10 0.2G

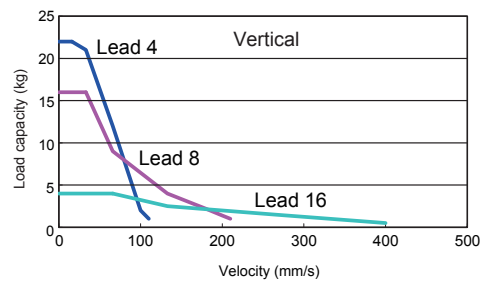


[RCP2-RA6R]

Acceleration at Horizontal Mount : Lead 4 0.2G
Lead 8 0.2G
Lead16 0.2G

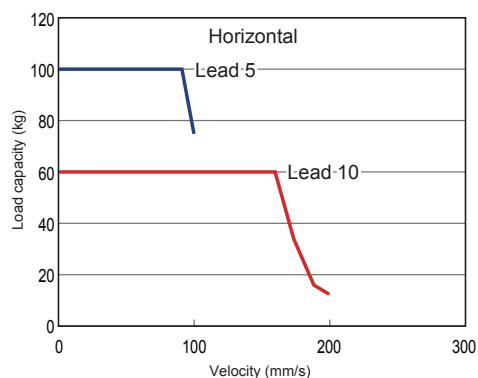


Acceleration at Vertical Mount : Lead 4 0.2G
Lead 8 0.2G
Lead16 0.2G

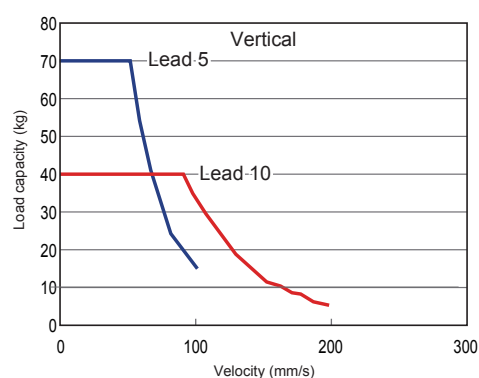


[RCP2-RA8R]

Acceleration at Horizontal Mount : Lead 5 0.1G
Lead10 0.2G

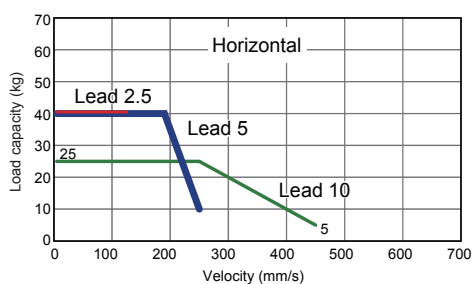


Acceleration at Vertical Mount : Lead 5 0.1G
Lead10 0.2G

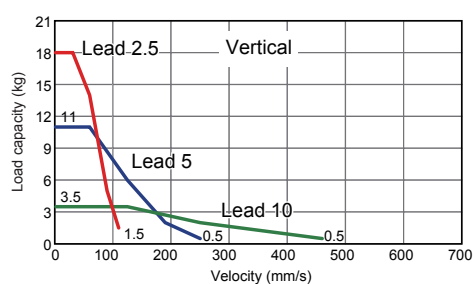


• With Single guide [RCP2-RGS4C]

Acceleration at Horizontal Mount : 0.2G

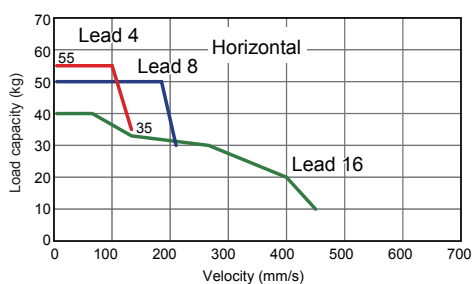


Acceleration at Vertical Mount : Acceleration 0.2G

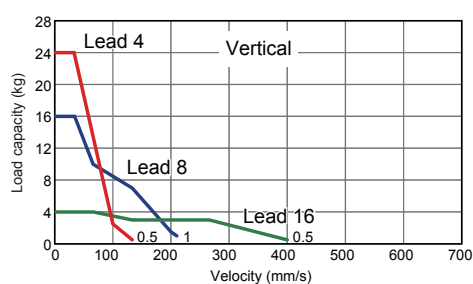


[RCP2-RGS6C]

Acceleration at Horizontal Mount : 0.2G

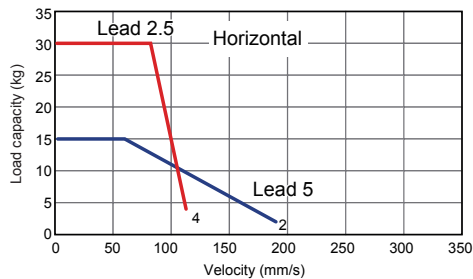


Acceleration at Vertical Mount : Acceleration 0.2G

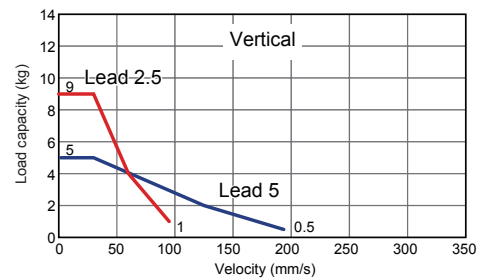


- With Double guide
[RCP2-RGD3C]

Acceleration at Horizontal Mount : 0.2G

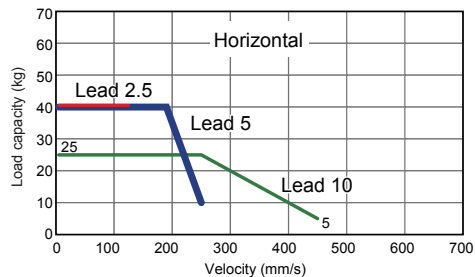


Acceleration at Vertical Mount : Acceleration 0.2G

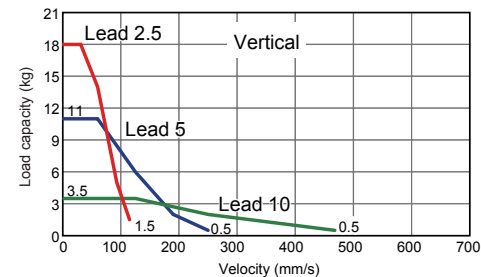


[RCP2-RGD4C]

Acceleration at Horizontal Mount : 0.2G

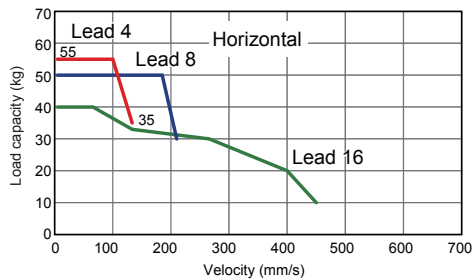


Acceleration at Vertical Mount : Acceleration 0.2G

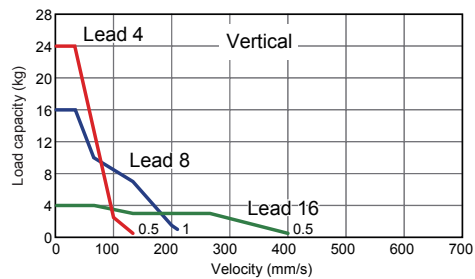


[RCP2-RGD6C]

Acceleration at Horizontal Mount : 0.2G

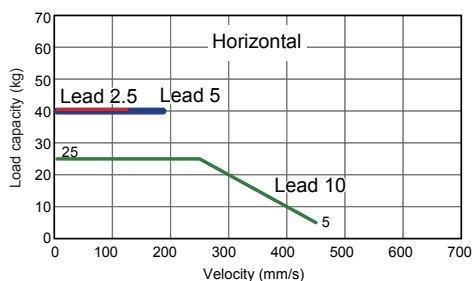


Acceleration at Vertical Mount : Acceleration 0.2G

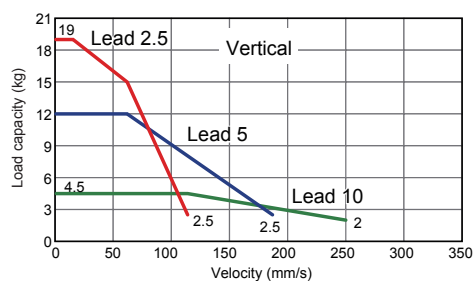


• Splash-Proof Type
[RCP2W-RA4C]

Acceleration at Horizontal Mount : 0.2G

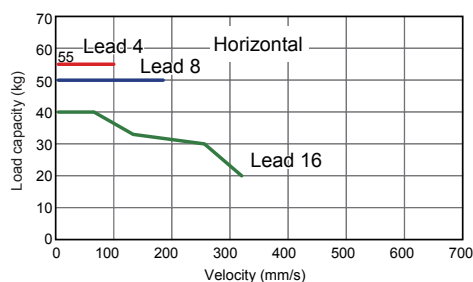


Acceleration at Vertical Mount : Acceleration 0.2G

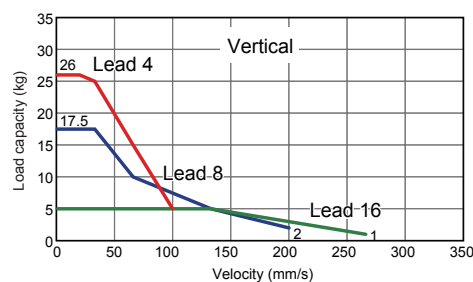


[RCP2W-RA6C]

Acceleration at Horizontal Mount : 0.2G

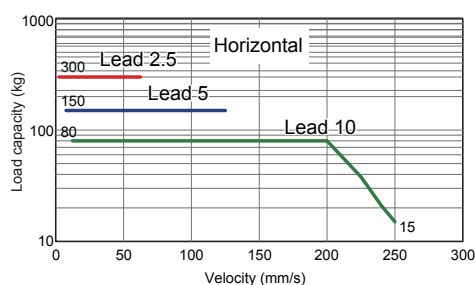


Acceleration at Vertical Mount : Acceleration 0.2G

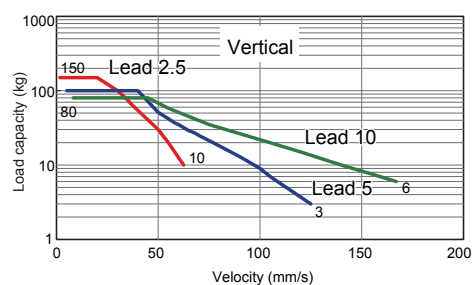


[RCP2W-RA10C]

Acceleration at Horizontal Mount : Lead 2.5 0.01G
Lead 5 0.02G
Lead 10 0.04G



Acceleration at Vertical Mount : Lead 2.5 0.01G
Lead 5 0.02G
Lead 10 0.04G



(3) Drive system

Type	Motor Type	Lead	Number of Encoder Pulses*1	Drive system	
RCP2-RA2C*2	20P	1	800	Ball screw φ6mm	Rolled C10
		Reducing ratio 1/2		Speed Reducer	-
RCP2-RA3C RCP2-RA3R RCP2-RGD3C	28P	2.5		Ball screw φ8mm	Rolled C10
		5			
RCP2-RA4C RCP2-RA4R RCP2-RGS4C RCP2-RGD4C RCP2W-RA4C	42P	2.5		Ball screw φ8mm	Rolled C10
		5			
		10			
RCP2-RA6C RCP2-RA6R RCP2-RGS6C RCP2-RGD6C RCP2W-RA6C	56P	4		Ball screw φ12mm	Rolled C10
		8			
		16			
RCP2-RA8C RCP2-RA8R	60P	5		Ball screw φ16mm	Rolled C10
		10			
RCP2-RA10C RCP2W-RA10C	86P	2.5		Ball screw	Rolled C10
		5			
		10			

*1 It is the number of pulses input to controller.

*2 A ball screw with 1mm of its lead length and a speed reducer with 1/2 of reducing ratio are joined directly for RCP2-RA2C.

(4) Rod Non-rotating Accuracy

● Standard

Type	Motor Type	Lead	Rod Diameter	Rod Non-rotating Accuracy
RCP2-RA2C	20P	1	φ12mm	±2.1°
RCP2-RA3C	28P	2.5	φ22mm	±1.5°
		5		
RCP2-RA4C	42P	2.5	φ22mm	±1.5°
		5		
		10		
RCP2-RA6C	56P	4	φ30mm	±1.0°
		8		
		16		
RCP2-RA8C	60P	5	φ40mm	±1.0°
		10		
RCP2-RA10C	86P	2.5	φ40mm	±1.0°
		5		
		10		

• Motor Reversing

Type	Motor Type	Lead	Rod Diameter	Rod Non-rotating Accuracy
RCP2-RA3R	28P	2.5	φ22mm	±1.5°
		5		
RCP2-RA4R	42P	2.5	φ22mm	±1.5°
		5		
		10		
RCP2-RA6R	56P	4	φ30mm	±1.0°
		8		
		16		
RCP2-RA8R	60P	5	φ40mm	±1.0°
		10		

• With Single guide

Type	Motor Type	Lead	Rod Diameter	Rod Non-rotating Accuracy
RCP2-RGS4C	42P	2.5	φ22mm	±0.05°
		5		
		10		
RCP2-RGS6C	56P	4	φ30mm	±0.05°
		8		
		16		

• With Double guide

Type	Motor Type	Lead	Rod Diameter	Rod Non-rotating Accuracy
RCP2-RGD3C	28P	2.5	φ22mm	±0.05°
		5		
RCP2-RGD4C	42P	2.5	φ22mm	±0.05°
		5		
		10		
RCP2-RGD6C	56P	4	φ30mm	±0.05°
		8		
		16		

• Splash-Proof Type

Type	Motor Type	Lead	Rod Diameter	Rod Non-rotating Accuracy
RCP2W-RA4C	42P	2.5	φ22mm	±1.5°
		5		
		10		
RCP2W-RA6C	56P	4	φ30mm	±1.0°
		8		
		16		
RCP2W-RA10C	86P	2.5	φ40mm	±1.0°
		5		
		10		

(5) Protection Structure of Dustproof Type

Type	Motor Type	Lead	Protection Structure
RCP2W-RA4C	42P	2.5	IP65
		5	
		10	
RCP2W-RA6C	56P	4	
		8	
		16	
RCP2W-RA10C	86P	2.5	IP54

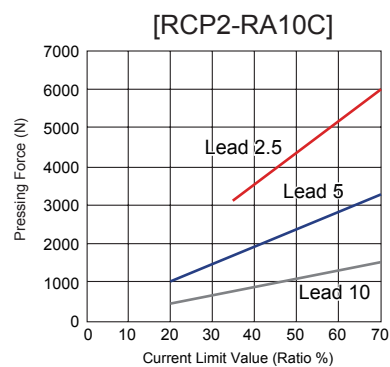
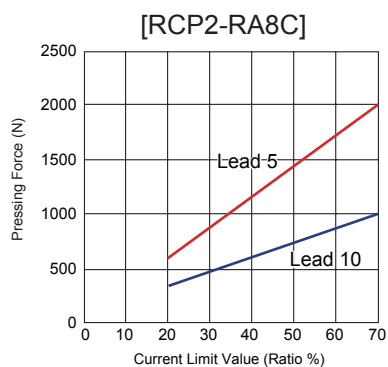
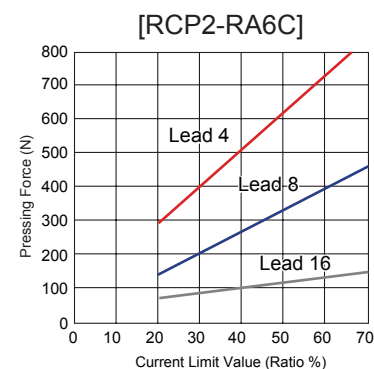
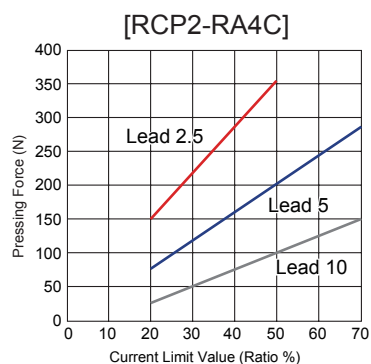
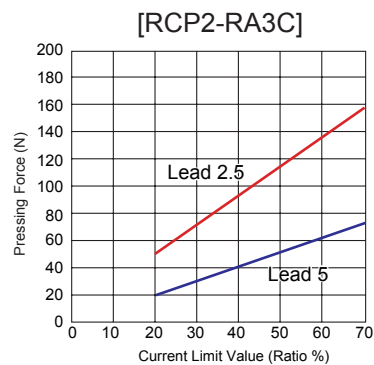
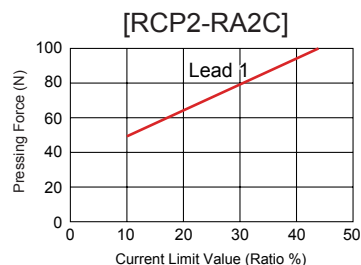
(6) Common Specifications

Item	Specification
Positioning Accuracy Repeatability*1	±0.02mm
Lost Motion*1	0.1mm or less

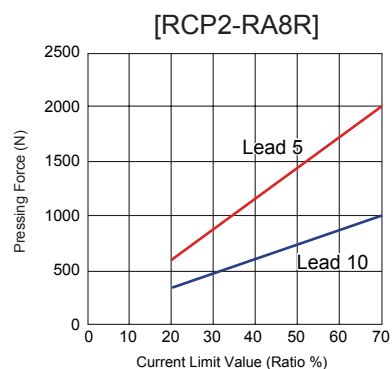
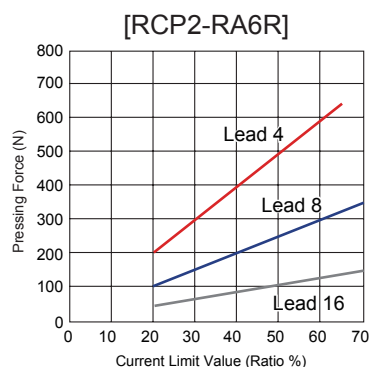
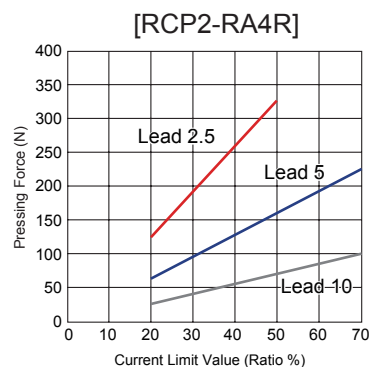
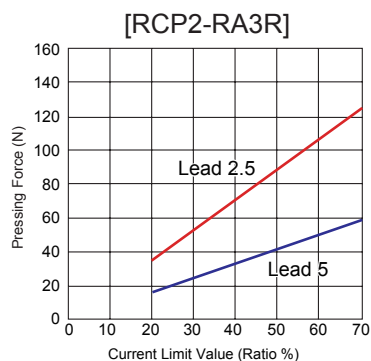
*1 Initial Value

(7) Relationship of Current-limiting Value and Push Force

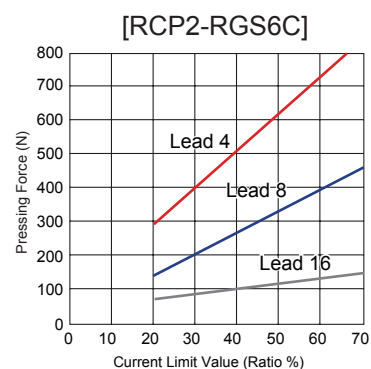
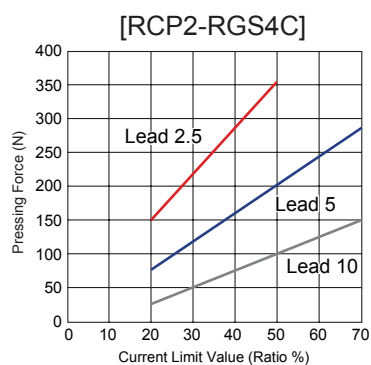
- Standard



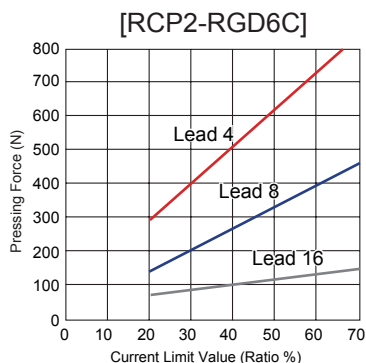
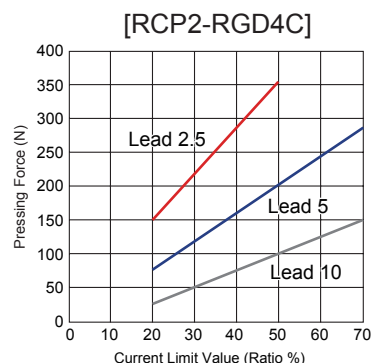
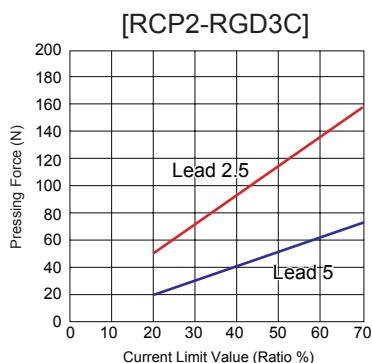
- Motor Reversing



- With Single guide



- With Double guide



Caution:

- The above relationship of push force and current-limiting value represents reference values, and the actual values may vary slightly from the graph.
- There may be a variance to the push force if the current-limiting value is low. For RA10C, use Lead 10 and Lead 5 with 20% or greater and Lead 2.5 with 35% or greater.
- The actuator speed is fixed to 10 mm/s during push & hold operation.
The graph assumes that the actuator pushes at a speed of 10 mm/s. Take note that the push force will drop when the speed changes.
(Consult IAI if you need to use a different speed during push & hold operation.)

3. Product Life

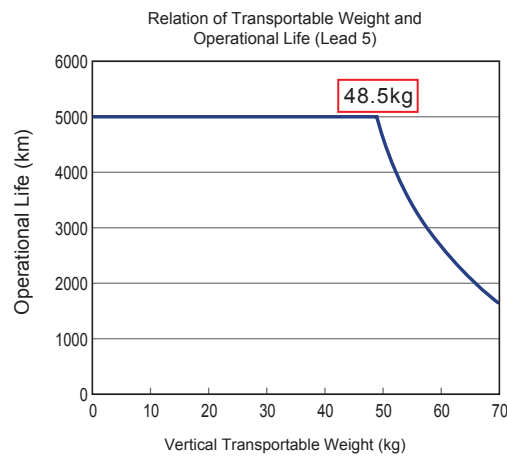
3.1 RCP2/RCP2W Rod Type for other than RCP2-RA8C, RA8R, RA10C and RCP2W-RA10C

The life is 5,000km (reference) under the condition that it is operated with maximum transportable weight, acceleration and deceleration.

3.2 RCP2-RA8C, RA8R

The life of Lead 5 is estimated to be 5,000km (reference) under the condition of maximum transportable weight and maximum acceleration/deceleration.

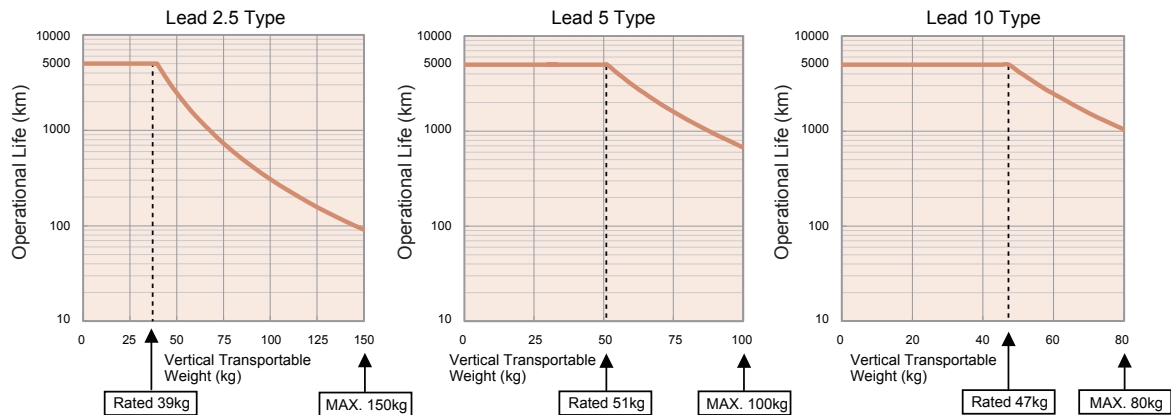
The life of Lead 5 varies due to the transportable weight. The following graph shows the relation of the transportable weight and the life.



3.3 RCP2-RA10C, RCP2W-RA10C

Since the maximum thrust is set greater than other models, the life varies considerably with the transportable weight.

The graphs below show the relation of transportable weight and life.



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 table below as a reference for the upper limit.

(Note) The values for times of pressing stated in the table 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.

Lead	2.5	5	10
Times of pressing	1,400,000 times	25,000,000 times	157,600,000 times

4. Installation Environment, Storage and Preservation Environment

4.1 Installation Environment

The actuator should be set up in an environment, which meets the following criteria:

- Avoid direct sunlight.
- Avoid radiant heat from strong heat sources such as a furnace.
- Surrounding air temperature should be 0 ~ 40°C.
- The humidity should be less than 85% and there should be no condensation.
- Avoid exposure to corrosive or combustible gases.
- The area should have very little dust and be suitable for normal assembly operations.
- Avoid exposure to oil mist or fluids used in cutting.
- The unit should not be subject to impact or vibration.
- Avoid extreme electromagnetic waves, ultraviolet rays and radiation.
- This product is not intended to be used in a chemical environment.

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

- * If you are considering the dustproof/splashproof type (RCP2W), consult IAI for the applicable installation environment.

4.2 Storage and Preservation Environment

The storage and preservation environment should comply with the same standards as those for the installation environment. In particular, when the machine is to be stored and preserved for a long time, pay close attention to environmental conditions so that no dew condensation forms.

Unless specially specified, moisture absorbency protection is not included in the package when the machine is delivered. In the case that the machine is to be stored and preserved in an environment where dew condensation is anticipated, take the condensation preventive measures from outside of the entire package, or directly after opening the package.

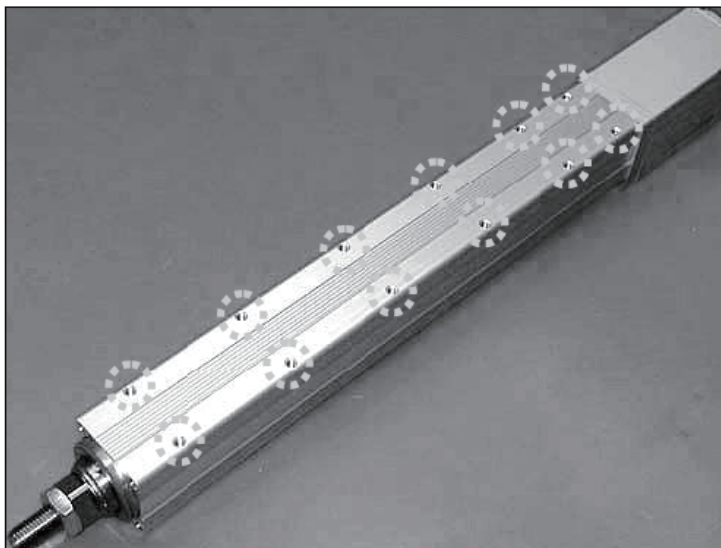
For storage and preservation temperature, the machine withstands temperatures up to 60°C for a short time, but in the case of the storage and preservation period of 1 month or more, control the temperature to 50°C or less.

5. Installation

5.1 Installing the Main Body

(1) Using tapped mounting holes at back

[A] Applicable models: RA2C, RA3C, RA3R, RGD3C, RA8C, RA8R types



Tapped mounting holes are provided at the back of the actuator. Install the actuator using these tapped holes.

The thread depths of mounting holes provided in the base of respective actuators are specified below. Exercise caution to make sure the end of the bolt will not project from the thread.

Model	Tapped hole size	Effective thread depth
RA2C	M3	5 mm
RA3C, RA3R, RGD3C	M4	6 mm
RA8C, RA8R	M8	16 mm

[B] Applicable models: RA10C

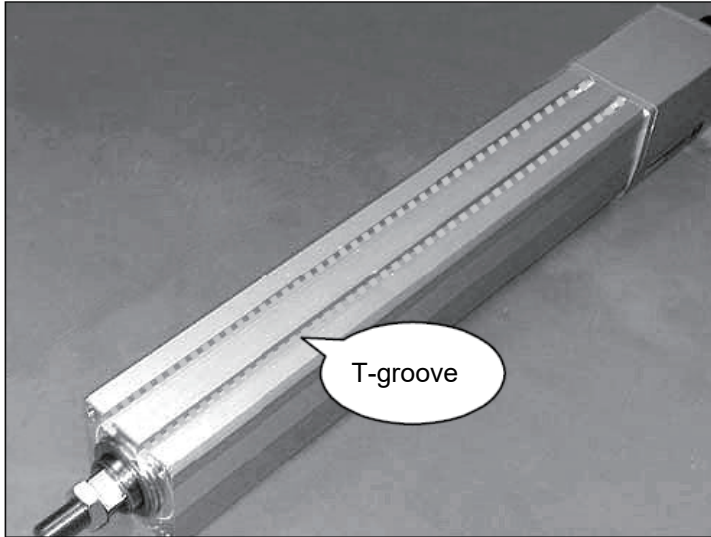


Tapped mounting holes are provided at the back of the actuator. Install the actuator using these tapped holes.

Tapped hole size	Effective thread depth
M10	18 mm

(2) Using T-grooves and square nuts

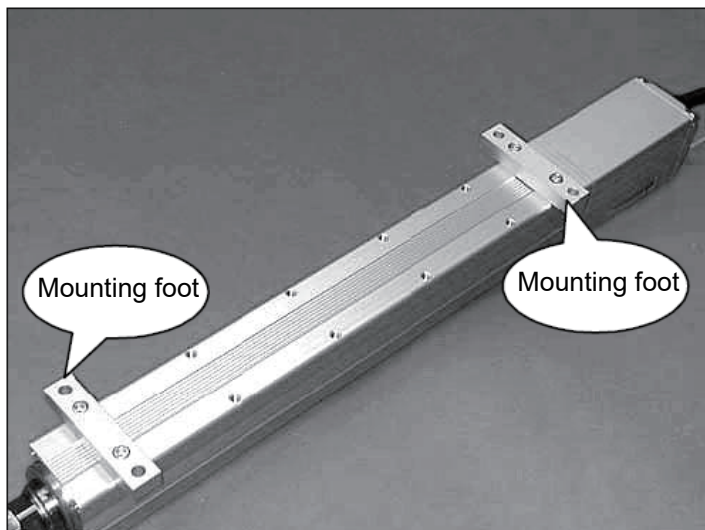
Applicable models: RA4C, RA6C, RA4R, RA6R, RGS4C, RGS6C, RGD4C, RGD6C types



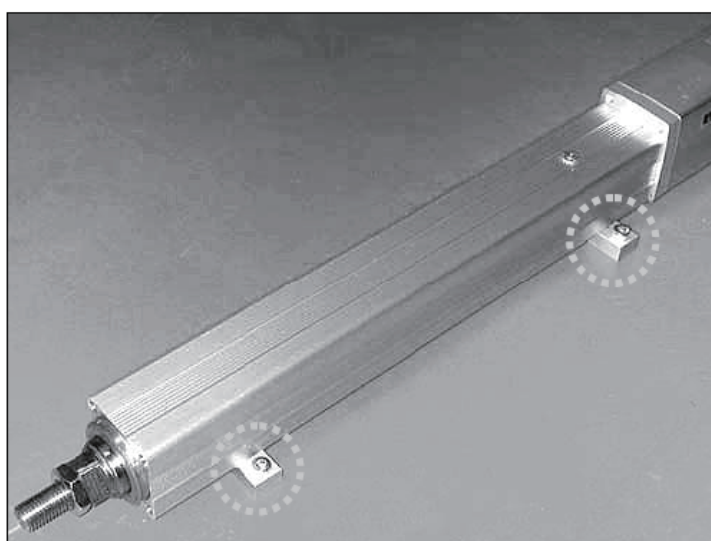
T grooves are provided on the actuator surface. Slide square nuts into the T-grooves to install the actuator to the mounting frame.

(3) Using mounting feet

[A] Applicable models: RA2C, RA3C, RA3R, RGD3C, RA8C, RA8R types

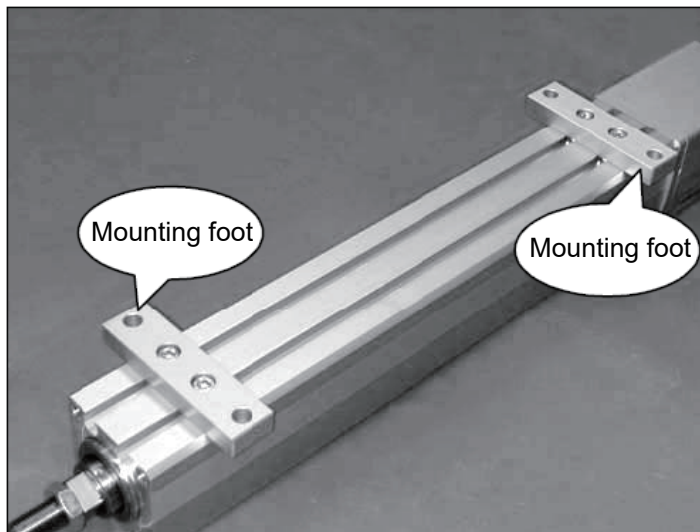


[1] To install the RA3C type, first install mounting feet using the tapped mounting holes at the back of the actuator.

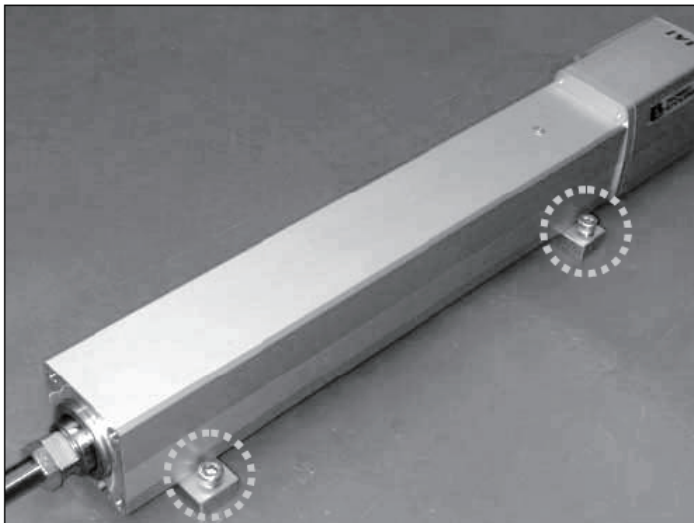


[2] Install the mounting feet to the mounting frame with bolts.

[B] Applicable models: RA4C, RA6C, RA4R, RA6R, RGS4C, RGS6C, RGD4C, RGD6C types

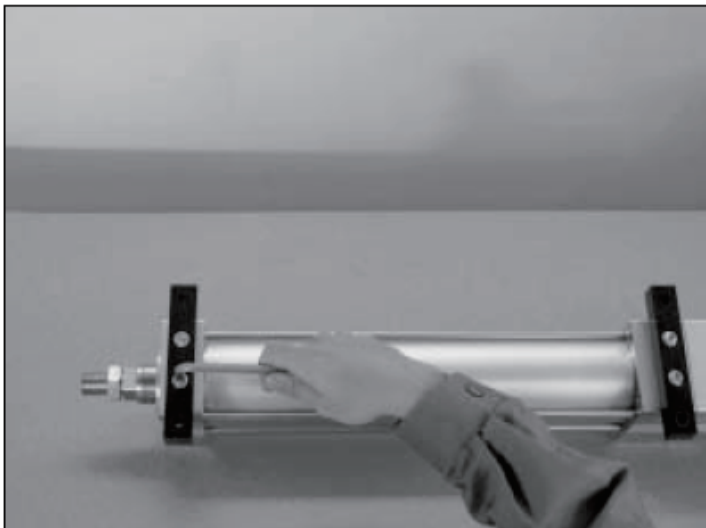


- [1] Install mounting feet using the square nuts inserted into the T-grooves.

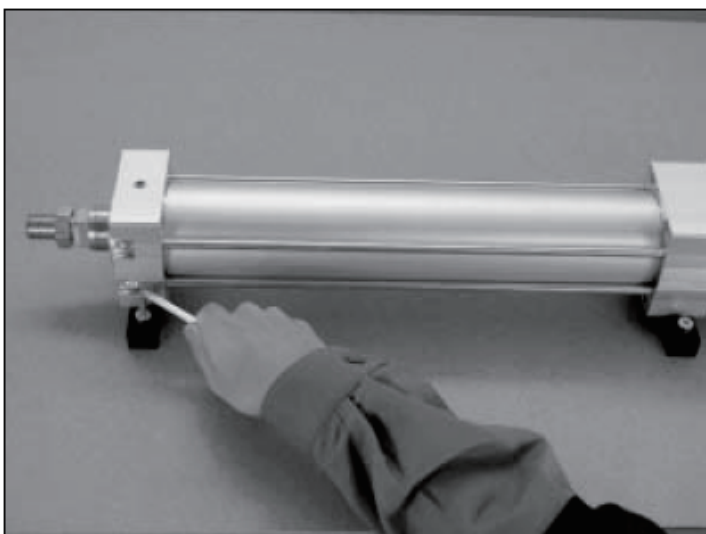


- [2] Install the mounting feet to the mounting frame with bolts.

[C] Applicable models: RA10C (optional)



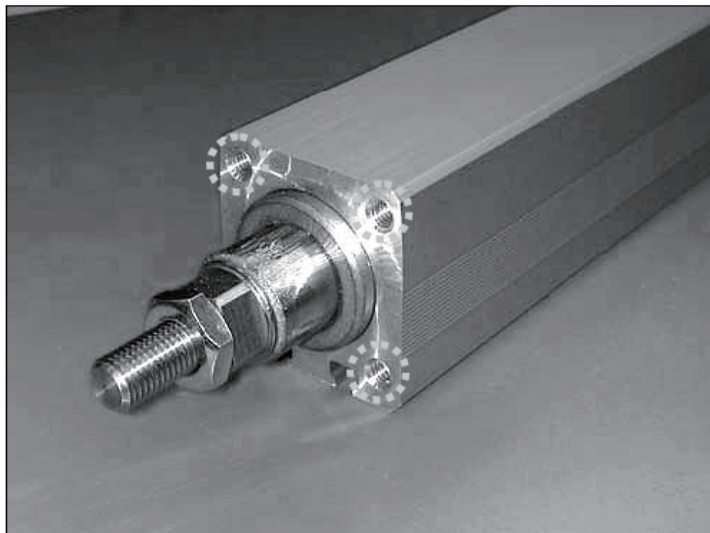
[1] Install mounting feet using the tapped mounting holes at the back of the actuator.



[2] Install the mounting feet to the mounting frame with bolts (M8).

(4) Using tapped holes on datum surface

[A] Applicable models: RA2C, RA3C, RA4C, RA6C, RA3R, RA4R, RA6R, RA10C types
(Not applicable to guide types)

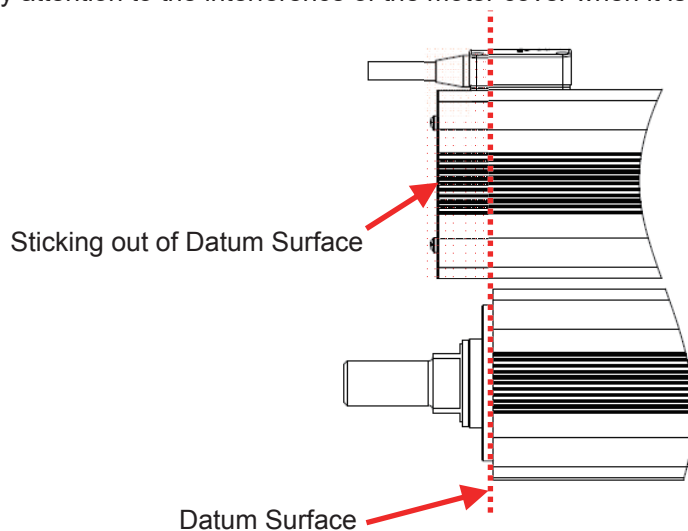


Tapped mounting holes are provided on the datum surface. Install the actuator using these tapped holes.

The thread depths of mounting holes provided in the respective actuators are shown below.

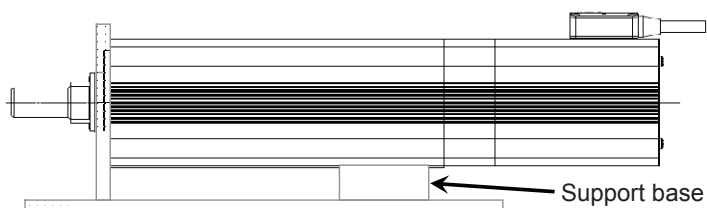
Model	Tapped hole size	Effective thread depth
RA2C	M3	6 mm
RA3C, RA3R	M4	10 mm
RA4C, RA4R	M6	12 mm
RA6C, RA6R	M8	15 mm
(RCP2W-RA4C)	M8	12 mm
RA8C, RA8R	M8	16 mm
RA10C	M10	18 mm

For RCP2-RA4R, RA6R, RA8R 50st equipped with the brake, the motor cover/motor-end cover exceed the datum surface line. Pay attention to the interference of the motor cover when it is installed.



RA4R, RA6R, RA8R (50st, with brake)

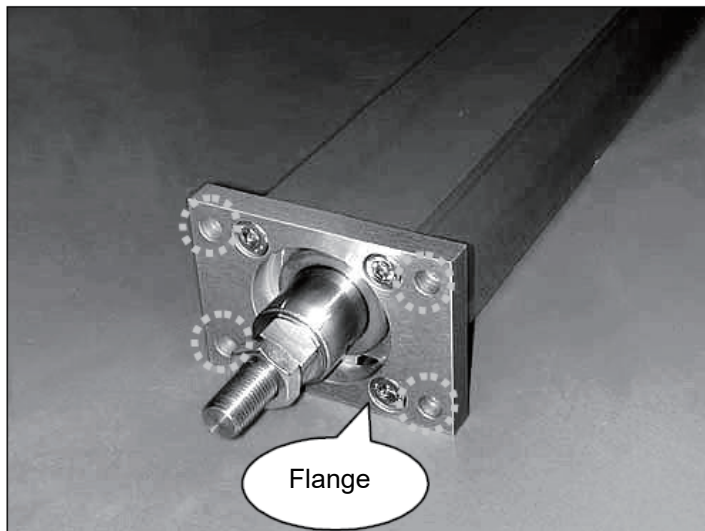
When mounting the unit in the horizontal orientation using the tapped holes on the datum surface, have a support base as shown in the figure below.



⚠ Caution: When mounting the unit with using the datum surface and the back surface, pay attention so the external force is not applied to the main body. The body or the attachment part on the back may get damaged.

(5) Using a flange

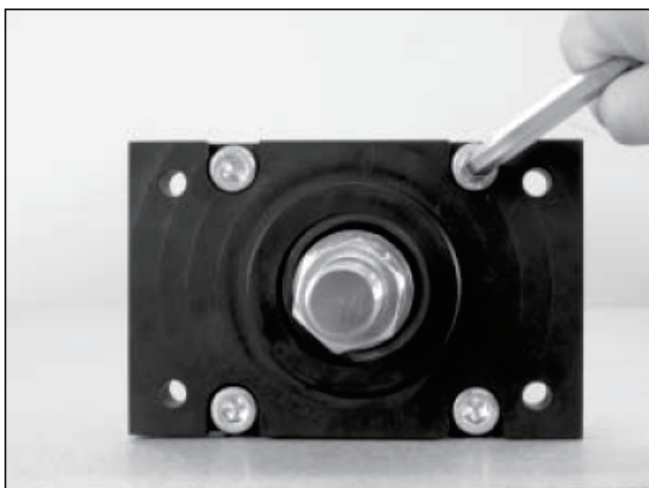
[A] Applicable models: RA3C, RA4C, RA6C, RA3R, RA4R, RA6R, RGD4C, RGD6C, RA8C, RA8R types



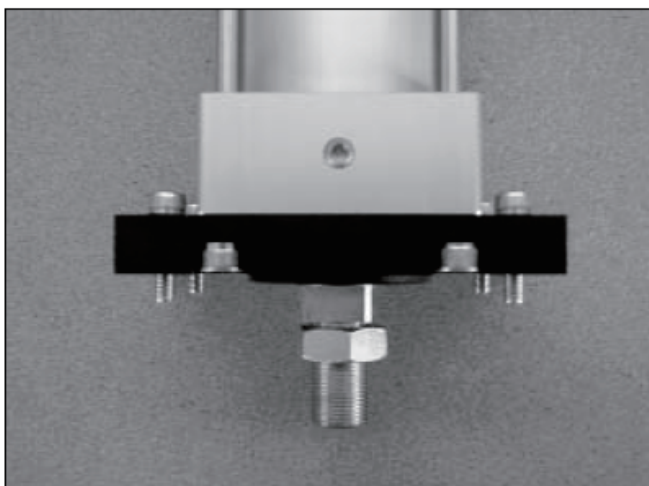
Install a flange on the reference surface using bolts (this method is not applicable to guide types).

Next, install the flange to the mounting frame using bolts (use the mounting bracket for the double guide type).

[B] Applicable models: RA10C (optional)

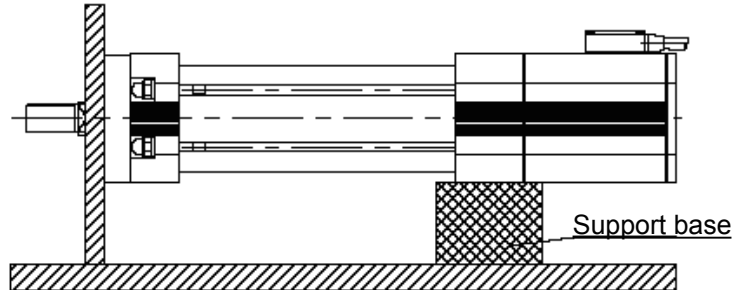


[1] Install a flange using the tapped holes on the reference surface.



[2] Install the flange to the mounting frame using bolts (M8).

When mounting the unit in the horizontal orientation using the flange, have a support base as shown in the figure below.

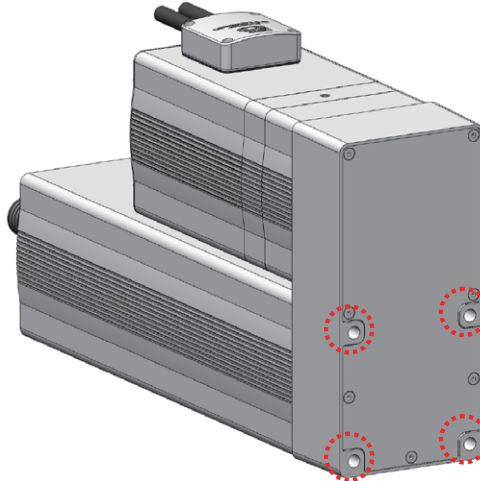


⚠ Caution: When mounting the unit with using the datum surface and the back surface, pay attention so the external force is not applied to the main body. The body or the attachment part on the back may get damaged.

(6) Method to Use Tapped Holes on Back

Applicable model : RA3R, RA4R, RA6R, RA8R

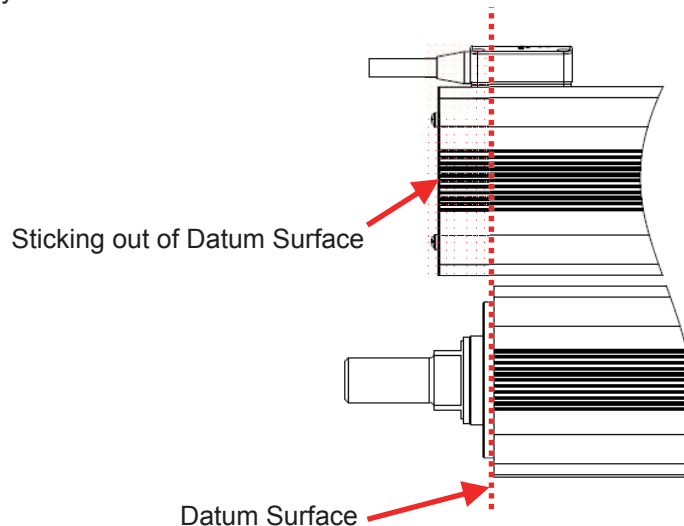
There are tapped holes on the back for attachment. Utilize these holes for installation.



The depth of attachment screw is as shown below:

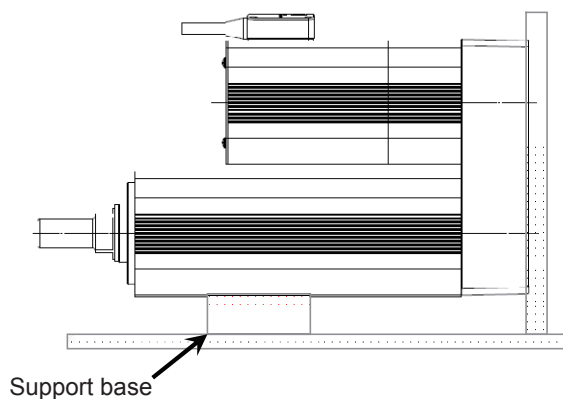
Model name	Tapped hole size	Effective thread depth
RA3R	M3	10mm
RA4R	M6	15mm
RA6R	M8	16mm
RA8R	M8	16mm

For RCP2-RA4R, RA6R, RA8R 50st equipped with the brake, the motor cover/motor-end cover exceed the datum surface line. Pay attention to the interference of the motor cover when it is installed.



RA4R, RA6R, RA8R (50st, with brake)

When mounting the unit in the horizontal orientation using the tapped holes on the back surface, have a support base as shown in the figure below.



Caution: When mounting the unit with using the datum surface and the back surface, pay attention so the external force is not applied to the main body. The body or the attachment part on the back may get damaged.

(7) Tightening bolts

Install the actuator using Unichro hexagon socket head bolts of strength category 10.9 or higher.

Mounting bolt	Tightening torque	
	In the case that steel is used for the seating surface	In the case that aluminum is used for the seating surface
M3	154N·cm (15.8kgf·cm)	83N·cm (8.47kgf·cm)
M4	359N·cm (36.7kgf·cm)	176N·cm (18.0kgf·cm)
M6	1234N·cm (126kgf·cm)	536N·cm (54.7kgf·cm)
M8	2997N·cm (306kgf·cm)	1148N·cm (117kgf·cm)
M10	5937N·cm (606kgf·cm)	

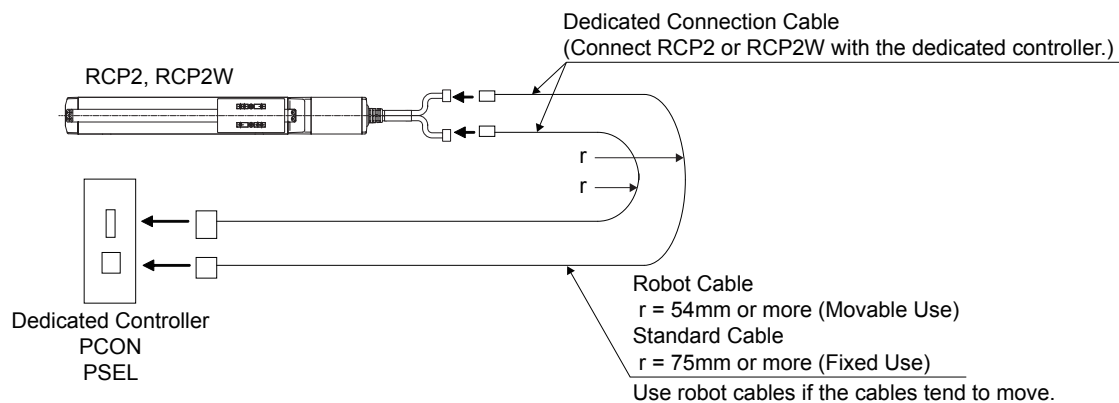
6. Connection the controller

6.1 Wiring

- In a use of the actuator with the cables not fixed, consider to ease the load to the cables by using the actuator in the range of the cable bends only with its weight or by using a stand-alone cable hose to gain a large radius bending.
- Do not cut and extend, shorten or rejoin the cables.
- Standard cable is not for robot application even though it has a great durability to bending.
- Apply robot cables when putting them into a flexible cable duct (such as cable carrier) is required.

Please contact us if a change to the cable type is desired.

[Connection to the PCON, PSEL controller]



(Note) Only PCON-CF Controller can be connected to RCP2-RA8C/RA8R/RA10C and RCP2W-RA10C

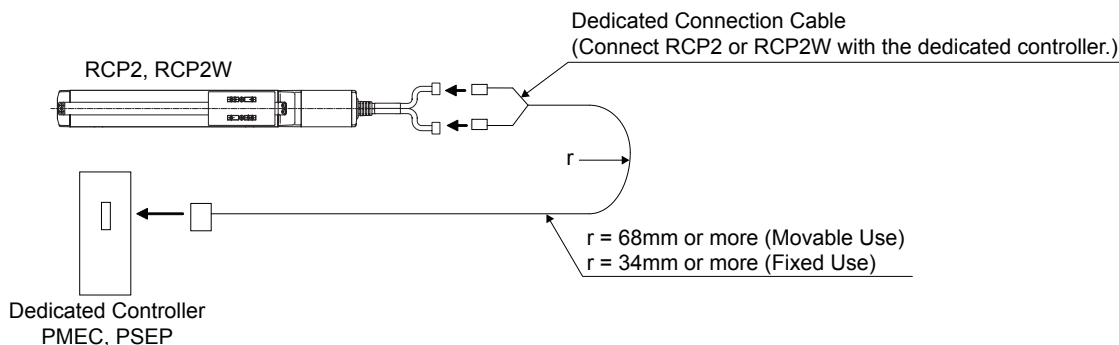
Dedicated Connection Cable

- Motor Cable (Robot Cable) CB-RCP2-MA□□□
- For RCP2-RA8C/RA8R/RA10C and RCP2W-RA10C Motor Cable CB-RFA-MA□□□
Encoder Cable CB-RCP2-PB□□□/Encoder Cable Robot Cable CB-RCP2-PB□□□-RB
- For RCP2-RA8C/RA8R/RA10C and RCP2W-RA10C
Encoder Cable CB-RFA-RA□□□/Encoder Cable Robot Cable CB-RFA-PA□□□-RB

□□□ shows the cable length. The max. length should be 20m.

Example) 080=8m

[Connection to the PMEC, PSEP controller]

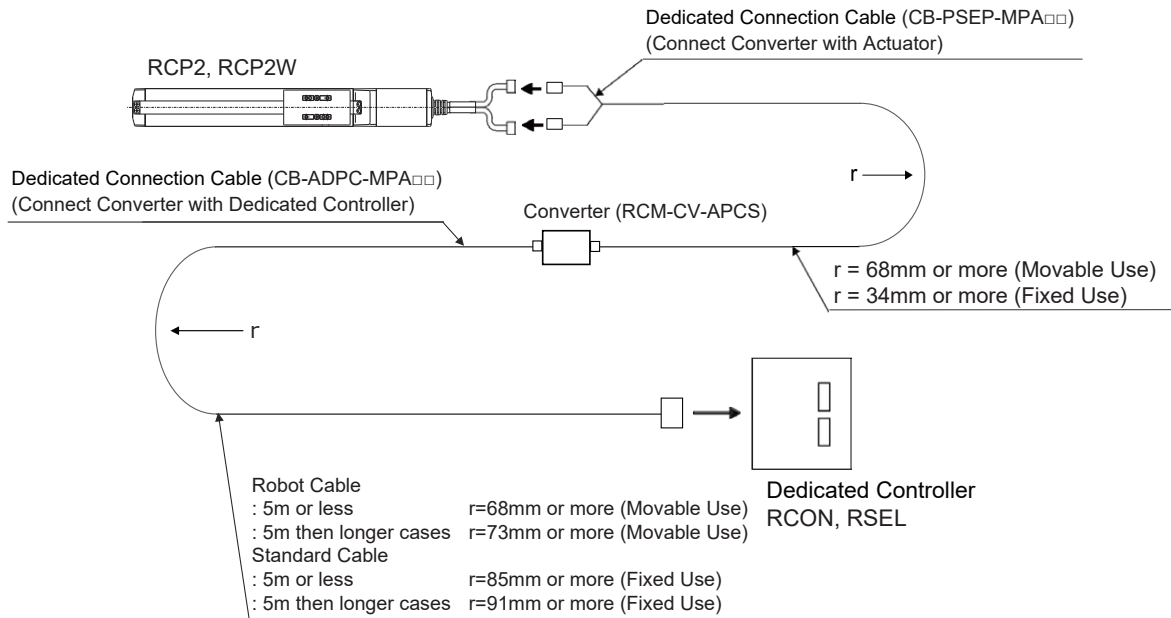


Dedicated Connection Cable

- Motor Encoder Cable CB-PSEP-MPA□□□

*** shows the cable length. The max. length should be 20m.
Example) 080=8m

[Connection to the RCON, RSEL controller]



Dedicated Connection Cable

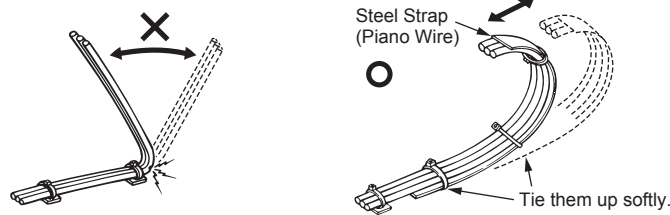
- Motor Encoder Integrated Cable: CB-PSEP-MPA□□□
- Motor Encoder Integrated Cable: CB-ADPC-MPA□□□
- Motor Encoder Integrated Robot Cable: CB-ADPC-MPA□□□-RB

* □□□ shows the cable length. Example) 080=8m

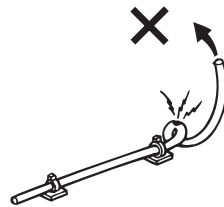
No matter if there is a converter or not, the cable length from an actuator to a controller should be 20m at the maximum.

When constructing an application system using the actuators and controllers, inappropriate wiring and connection of the cables may cause unexpected troubles such as cable break and connection failure. Listed below are the prohibited things to be done in cable handling and treatment.

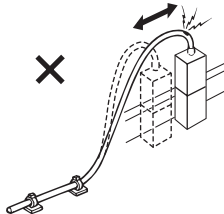
- Do not cut and extend, shorten or rejoin the cables.
- When cables cannot be fixed, consider the way to ease the load to the cables with such method as by using the actuator in the range of the cable bends only with its weight or by using a stand-alone cable hose to gain a large radius bending.
- Do not let the cable flex at a single point.



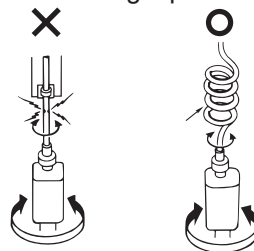
- Do not let the cable bend, kink or twist.



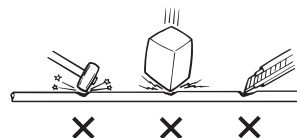
- Do not pull the cable with a strong force.



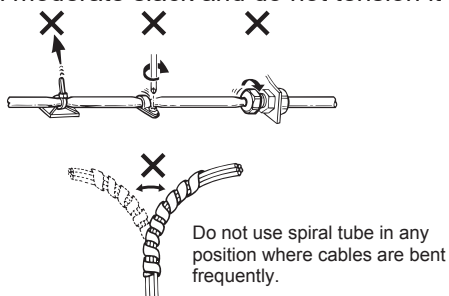
- Do not let the cable receive a turning force at a single point.



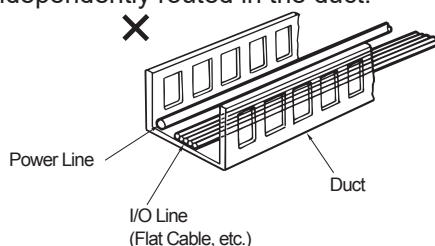
- Do not pinch, drop a heavy object onto or cut the cable.



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

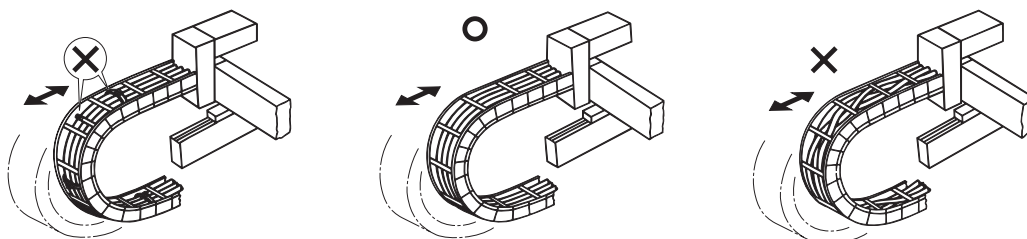


- Separate the I/O line, communication line and power line from each other. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable 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.



Warning:

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

7. Cautions in Operation

7.1 Load on the Actuator

- The actual load should not exceed the value specified in the catalog.
- Be sure to align the shaft center of the rod and the moving direction of the load.

- Lateral load may cause damage or breakdown of the actuator.
- If the rod may receive lateral load, provide a guide or other appropriate mechanism to support the actuator in the moving direction of the load.

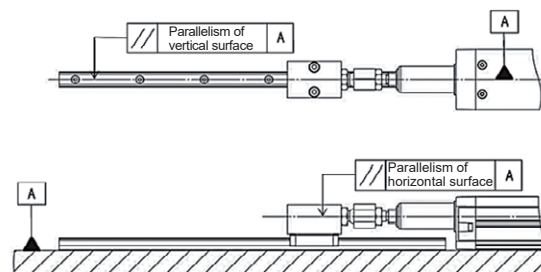


- Do not allow the rod (slide shaft) to receive rotational torque.
* Doing so may damage the internal parts.

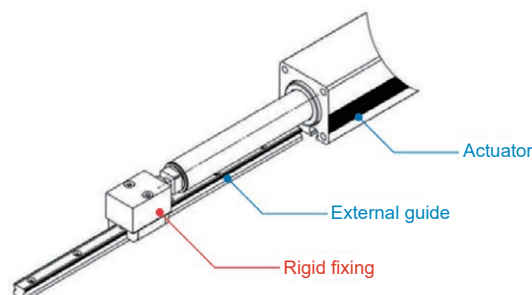
Tighten the nut at the tip of the rod, while securely holding the rod using a wrench of size 17 (3C/3R/4C/4R type), 22 (6C/6R type), 27 (8C/8R type) or 32 (10C type).

[External guide mounting]

- If the parallelism between the Actuator and external guide (horizontal/vertical surfaces) is not adjusted with sufficient precision, malfunctions and premature Actuator damage may occur.
- When mounting the guide, perform centering for the Actuator and guide. Make sure that the sliding resistance is constant over the entire stroke.
- Make sure that the current value is constant, using the monitoring function of the teaching tool.



- "Rigid fixing" * is recommended for the method of fixing to the external guide.
- If a "floating joint" is used, the rod rotation direction will not be restricted. Therefore, when operating the Actuator, force will be applied to the internal rotation-stopper in the direction of rod rotation, which may cause premature wear of the rotation-stopper. (Floating joints with rotation direction restrictions are acceptable.)



* Rigid fixing is a way to fix to prevent the rod turning, which can be achieved by e.g. fixing the rod directly to the moving part of the guide.

7.2 Caution for when setting to 60% or more of RCP2-RA8 pressing current limit value

When the pressing current limit value, which determines the pressing force of the pressing operation, is 60% or less, continuous pressing and continuous operation are available.

Set the pressing current control value to the following.

- PCON Controller: Pressing setting in Position Table

The pressing current limit value can be set up to 70%.

When setting to a value from 60% to 70%, have a calculation to see if it satisfies the following operation conditions to check if the continuous pressing and continuous operation are available. If continuous pressing and continuous operation are not available, try to shorten the pressing duration and stop duration so the setting satisfy the operational conditions.

[Operation conditions]

- Conditions 1 The pressing duration or the stop duration against the current control value should be less than the maximum duration.
- Conditions 2 The continuous operational torque in 1 cycle should be 2.08Nm or less.
- Conditions 3 The stop or pressing of which the current control value is greater than 60% should be once in 1 cycle.

⚠ Caution: When operating with the pressing current limit value from 60% to 70%, make sure to satisfy the operational condition.
Not satisfying the operation conditions may generate excessive heat on the motor and may result in serious damage.

(1) Operational Conditions

- 1) Condition 1 Either the pressing duration or the stop duration against the current limit value is less than the maximum duration.

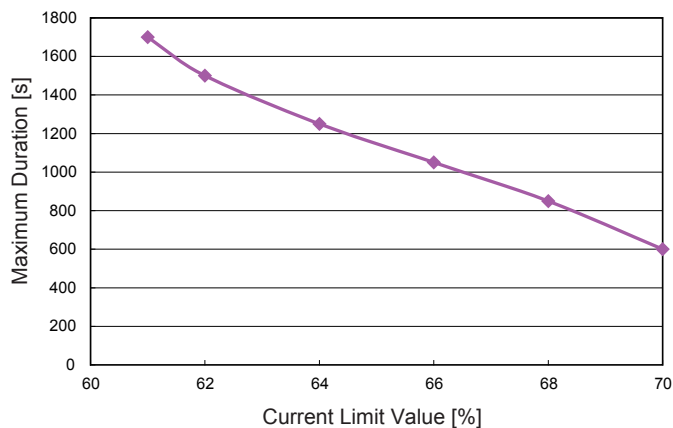
The maximum duration of pressing duration and stop duration against the current limit value is shown in Table 1 and Graph 1.

Confirm that the pressing duration or stop duration against the current limit value is less than the maximum duration.

Table 1: Current Limit Value and Maximum Duration

Pressing/Stop Current Limit Value [%]	Maximum Duration [s]
70	600
68	850
66	1050
64	1250
62	1500
61	1700
60 or less	(Continuous Operation Available)

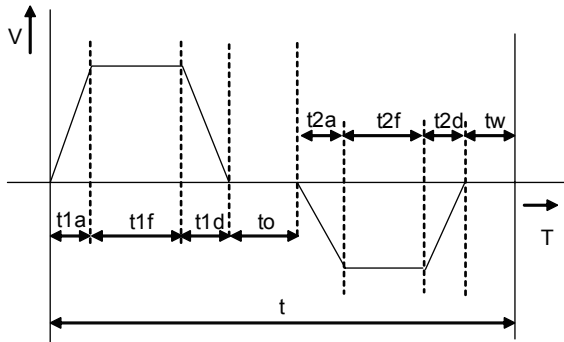
Graph 1: Current Limit Value and Maximum Duration



- 2) Condition 2 The continuous operation torque of the cycle should be 2.08N•m or less.

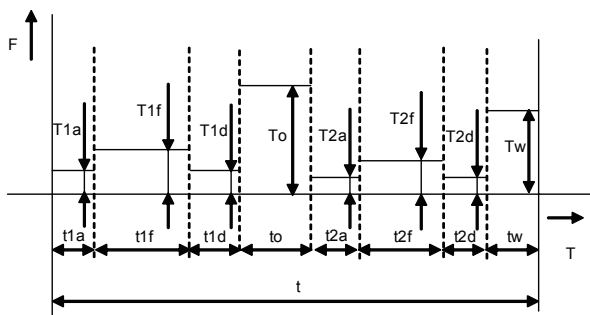
Calculate the torque for continuous operation.

In Graph 2, shows the speed change of the actuator in continuous operation on the time-basis. In Graph 3, shows the torque change in time-basis.



Graph 2: Actuator Speed Change on Time-basis

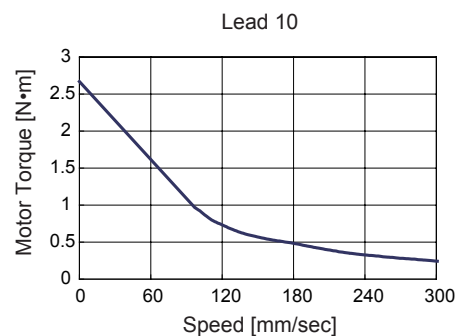
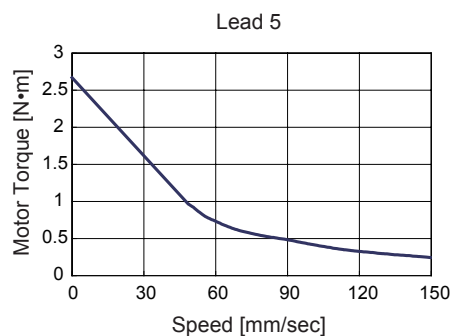
t : Operation time in 1 cycle [s]
t1a : Acceleration time 1
t1f : Constant speed operation time 1
t1d : Deceleration time 1
to : Pressing operation time
*within the range of Condition 1
t2a : Acceleration time 2
t2f : Constant speed operation time 2
t2d : Deceleration time 2
tw : Standby time



Graph 3: Torque Change on Time-basis

T1a : Motor torque required for acceleration 1
T1f : Motor torque required for constant operation1
T1d : Motor torque required for deceleration 1
To : Motor torque required for pressing operation
T2a : Motor torque required for acceleration 2
T2f : Motor torque required for constant operation 2
T2d : Motor torque required for deceleration 2
Tw : Motor torque required for standby

Read the motor torques T1a, T1f, T1d, T2a, T2f, T2d except for To and Tw shown in Graph 3 from Graph 4. For the motor torques required for acceleration/deceleration, read the motor torque of reached speed (constant speed) / 2 for the motor torque required for acceleration/deceleration.

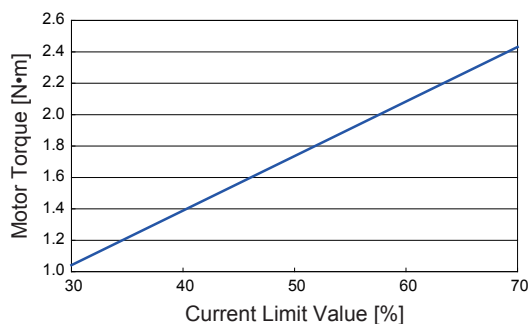


Graph 4: Speed and Motor Torque

Read the values for T_o and T_w from Table 2 and Graph 5.

Pressing/Stop Current Limit Value [%]	Motor Torque [N•m]
70	2.43
60	2.08
50	1.74
40	1.39
30	1.04

Table 2: Current Limit Value and Motor Torque



Graph 5: Current Limit Value and Motor Torque

Substitute the read torque value to Formula 1 to calculate the continuous operation torque T_t .

$$T_t = \sqrt{\frac{T_{1a}^2 \cdot t_{1a} + T_{1f}^2 \cdot t_{1f} + T_{1d}^2 \cdot t_{1d} + T_o^2 \cdot t_o + T_{2a}^2 \cdot t_{2a} + T_{2f}^2 \cdot t_{2f} + T_{2d}^2 \cdot t_{2d} + T_w^2 \cdot t_w}{t}} \quad \dots \text{(Formula 1)}$$

If the value for continuous operation torque T_t is 2.08N or less, the continuous operation is available.

$$T_t \leq 2.08 \quad \dots \text{(Formula 2)}$$

- 3) Condition 3 The stop or pressing the current limit value is greater than 60% should be only 1 time in 1 cycle.

(2) Example of calculation and operation availability judgment

As an example of a calculation, let's see if the continuous operation is available under the following operational conditions.

Used Model: RCP2-RA8 Lead 10

Speed: 200mm/sec

Acceleration/Deceleration: 1.96m/s² (0.2G)

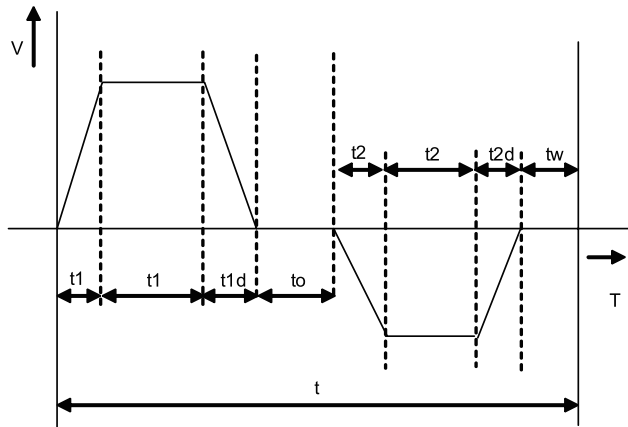
Operation Distance: 100mm

Pressing Command Value: 70% (1000N)

Pressing Duration: 60sec

Stop Current Limit Value: 40%*1

Standby Duration: 36sec



Graph 6: Operational Pattern

Pressing after 100mm moving forward and standby after 100mm backwards

Refer to Graph 6 for the operation pattern.

*1 The current value when stopped is as shown in the following parameter.

- PCON Controller: No.12 Current Limit Value at Positioning Stop (60% when delivered)

1) Condition 1 Confirmation of pressing duration

According to Table 1, the maximum pressing duration at 70% of the pressing command value is 600s. On the other hand, the operation pattern is 60s. Thus, the pressing duration should be okay.

2) Condition 2 Confirmation of continuous operation torque.

Figure out the continuous operation torque using Formula 1 that is for continuous torque calculation.

$$T_t = \sqrt{\frac{T_{1a}^2 \cdot t_{1a} + T_{1f}^2 \cdot t_{1f} + T_{1d}^2 \cdot t_{1d} + T_o^2 \cdot t_o + T_{2a}^2 \cdot t_{2a} + T_{2f}^2 \cdot t_{2f} + T_{2d}^2 \cdot t_{2d} + T_w^2 \cdot t_w}{t}} \dots \text{(Formula 1)}$$

$T_{1a} = T_{1d} = T_{2a} = T_{2d} = 0.93\text{N}\cdot\text{m}$ (Speed 200mm/sec $\div$ 2 = 100mm/sec $\rightarrow$ Read the torque at 100mm/sec from Graph 4)

$T_{1f} = T_{2f} = 0.42\text{N}\cdot\text{m}$ (Speed 200mm/sec $\rightarrow$ Read the torque from Graph 4)

$T_o = 2.43\text{N}\cdot\text{m}$ (70% $\rightarrow$ Read torque from Graph 2)

$T_w = 1.39\text{N}\cdot\text{m}$ (40% $\rightarrow$ Read torque from Graph 2)

$t_{1a} = t_{1d} = t_{2a} = t_{2d} = 0.2\text{s}$. $t_{1f} = t_{2f} = 0.9\text{s}$. $T_o = 60\text{s}$. $T_w = 36\text{s}$.

The continuous operation torque with the operation pattern above is:

$$T_t = 2.076$$

It can be defined as okay since the continuous operation torque is 2.08N·m or less.

- 3) Condition 3 Confirmation of the stop or pressing that the current limit value greater than 60% is only 1 time in 1 cycle.

There is only 1 time in 1 cycle that the current limit value is greater than 60%, thus, it can be defined as okay.

Since all of 1, 2 and 3 are okay, example of the calculation is defined available for the continuous operation.

8. Option

8.1 Brake

This is a function to protect the object attached to the actuator from being damaged when the slider is dropped at the power cut or the servo is turned off in the case the actuator is used in the vertical mount orientation.

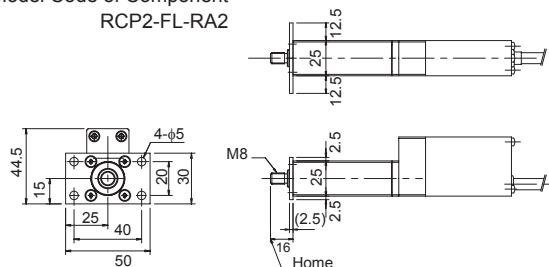
An optional brake is required when the axis is used in the vertical position.

The model code is expressed with "B".

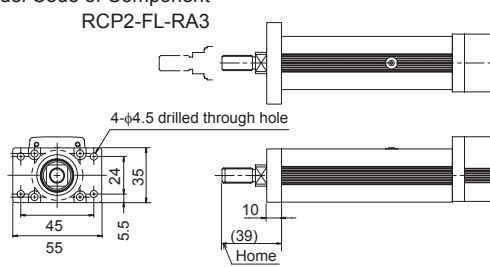
8.2 Flange Bracket

It is a flanged metal plate to fix the main body of the actuator on the rod side. The model code is expressed with "FL".

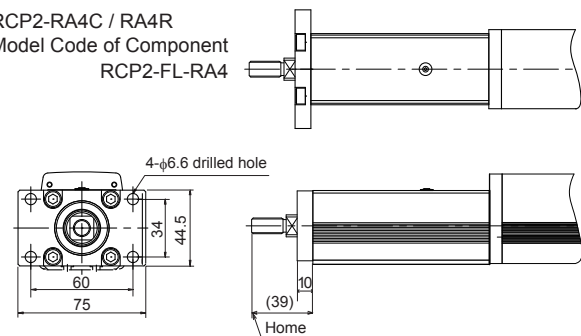
RCP2-RA2C
Model Code of Component
RCP2-FL-RA2



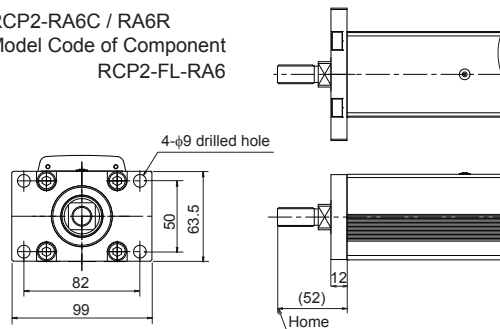
RCP2-RA3C / RA3R
Model Code of Component
RCP2-FL-RA3



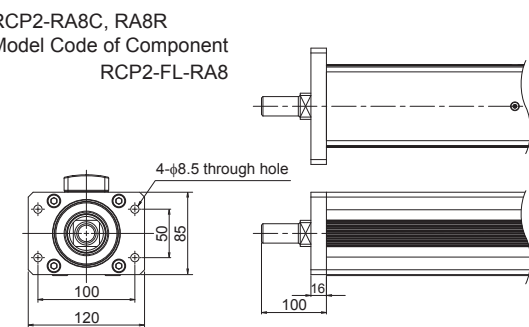
RCP2-RA4C / RA4R
Model Code of Component
RCP2-FL-RA4



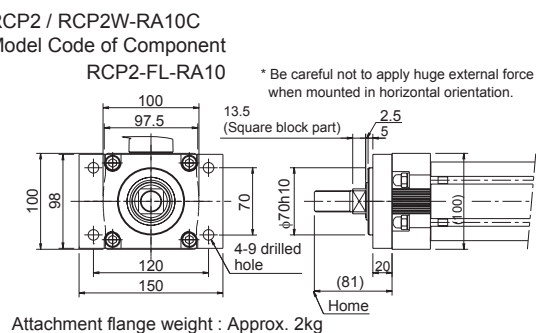
RCP2-RA6C / RA6R
Model Code of Component
RCP2-FL-RA6



RCP2-RA8C, RA8R
Model Code of Component
RCP2-FL-RA8

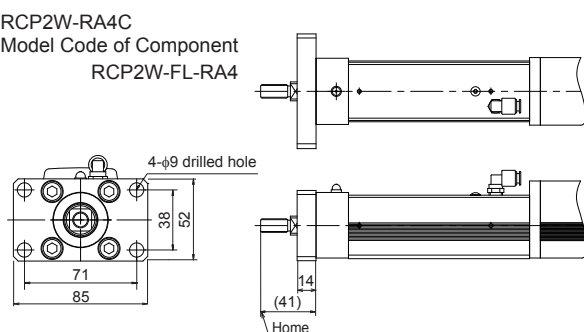


RCP2 / RCP2W-RA10C
Model Code of Component
RCP2-FL-RA10

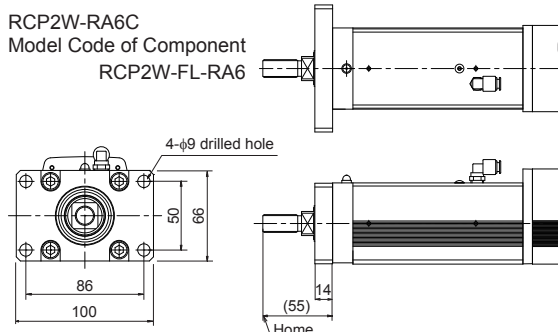


Attachment flange weight : Approx. 2kg

RCP2W-RA4C
Model Code of Component
RCP2W-FL-RA4



RCP2W-RA6C
Model Code of Component
RCP2W-FL-RA6

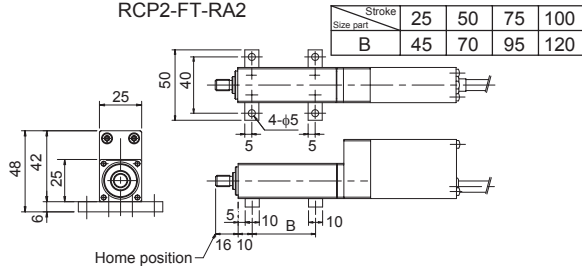


8.3 Foot Bracket

It is a metal component to fix the main body of the actuator with screws from top.
The model code is expressed with "FT".

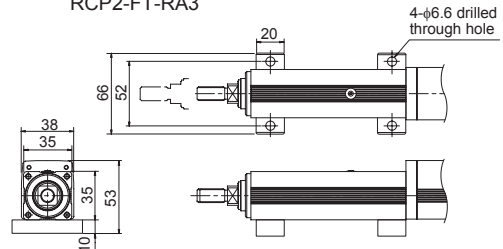
RCP2-RA2C

Model Code of Component
RCP2-FT-RA2



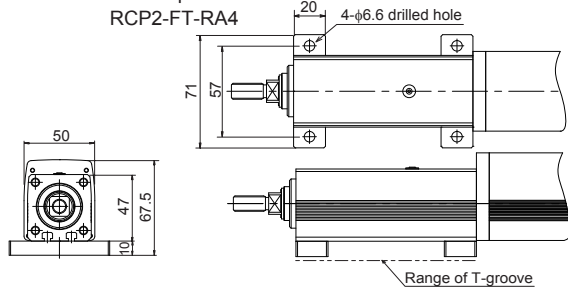
RCP2-RA3C / RA3R / RGD3C

Model Code of Component
RCP2-FT-RA3



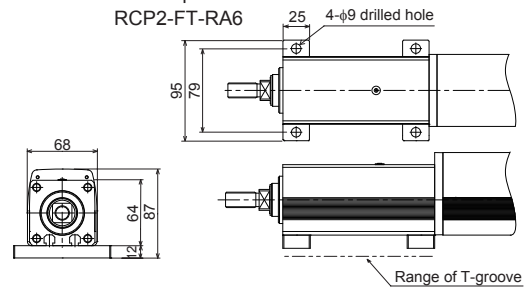
RCP2-RA4C / RA4R / RGS4C / RGD4C

Model Code of Component
RCP2-FT-RA4



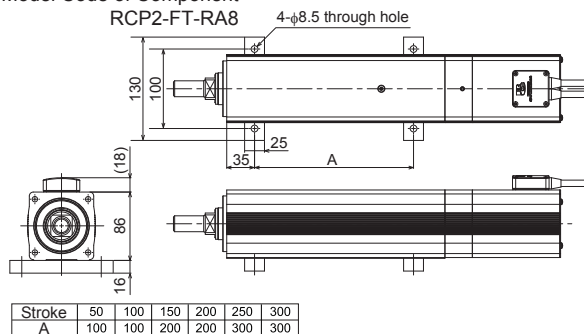
RCP2-RA6C / RA6R / RGS6C / RGD6C

Model Code of Component
RCP2-FT-RA6



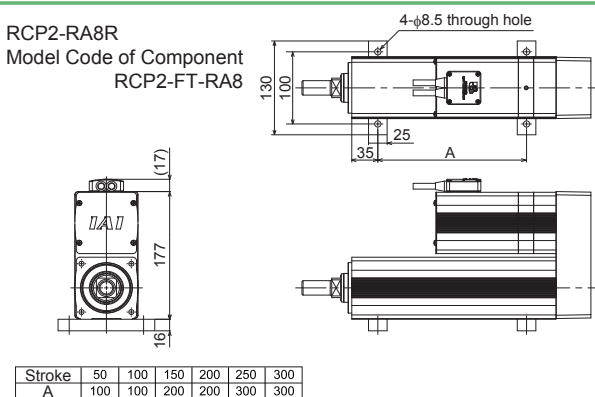
RCP2-RA8C

Model Code of Component
RCP2-FT-RA8



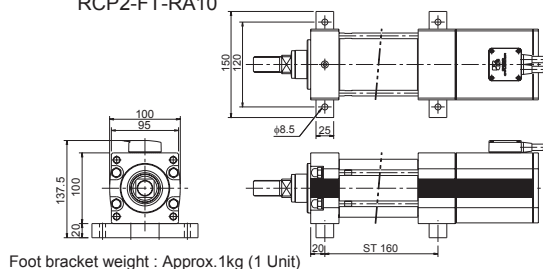
RCP2-RA8R

Model Code of Component
RCP2-FT-RA8

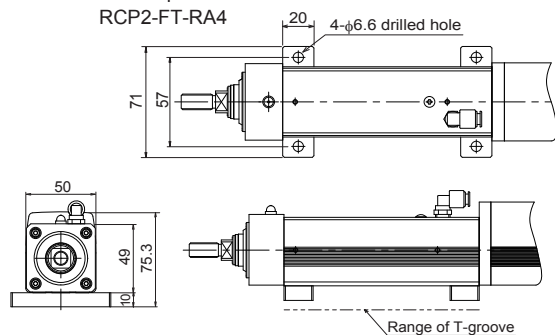


RCP2-RA10C / RCP2W-RA10C

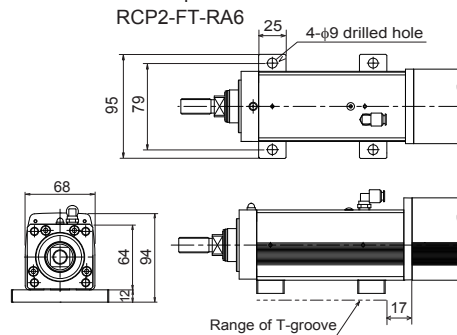
Model Code of Component
RCP2-FT-RA10



RCP2W-RA4C
Model Code of Component
RCP2-FT-RA4



RCP2W-RA6C
Model Code of Component
RCP2-FT-RA6



8.4 Single Guide

The position of the rod for each model equipped with the single guide is as shown below:

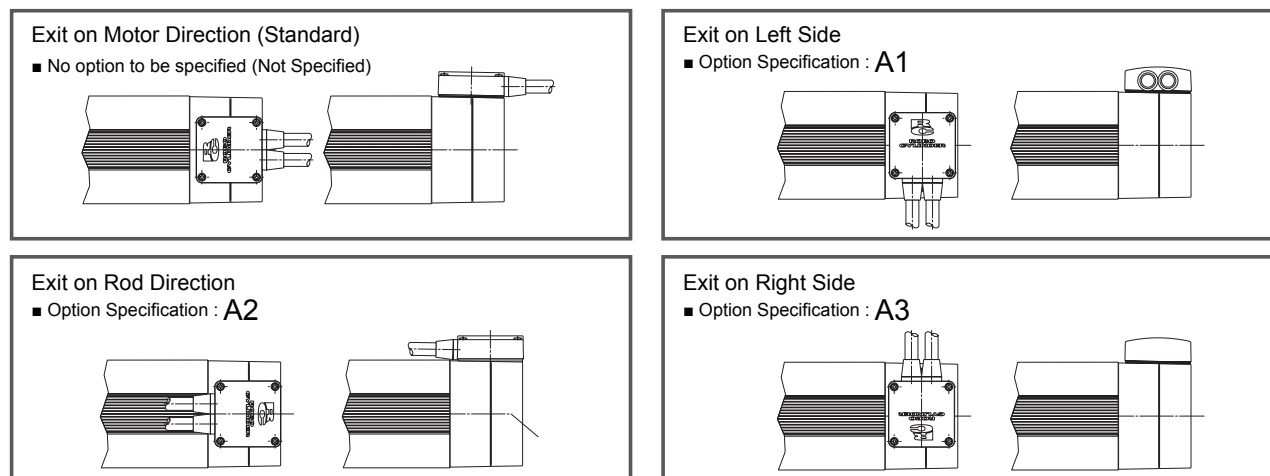
- Attached on Right : Model GS2
- Attached on Bottom : Model GS3
- Attached on Left : Model GS4

8.5 Reversed Home Specification

The reversed home type has the home position on the opposite side of the motor. The model code is expressed with "NM". If a change to the home position is required after the product is delivered, it is necessary to adjust the movement direction parameters. Please contact us for a support.

8.6 Connector cable exit direction changed

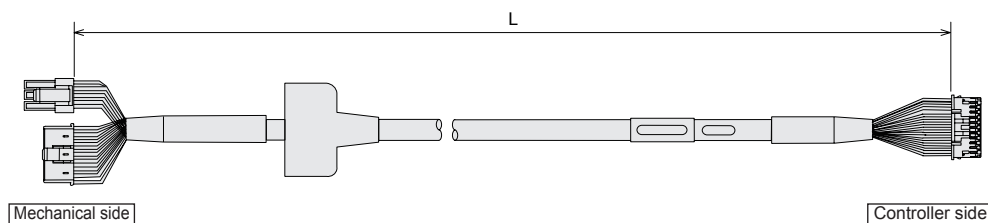
There are 4 types of the connector cable exit directions as shown below:



9. Motor • Encoder Cables

9.1 Cable for PMEC and PSEP Controllers

1) Motor • Encoder Integrated Cable CB-PSEP-MPA□□□



Mechanical side Terminal No.		Controller side Terminal No.
1	BK [φA]	1
2	WT [VMM]	2
4	RD [φB]	3
5	GN [VMM]	4
3	BR [φ/A]	5
6	YW [φ/B]	6
16	OR [BK+]	9
17	GY [BK-]	10
5	NC	11
6	NC	12
13	BK [LS+]	7
14	BR [LS-]	8
1	WT [A+]	13
2	YW [A-]	14
3	RD [B+]	15
4	GN [B-]	16
10	WT (Identification tape) [VCC]	17
11	YW (Identification tape) [VPS]	18
9	RD (Identification tape) [GND]	19
12	GN (Identification tape) [(Reserve)]	20
15	NC	21
7	NC	22
8	NC	23
18	Shield [FG]	24

* □□□ indicates the cable length.

Max. 20m.

Example) 080 = 8m

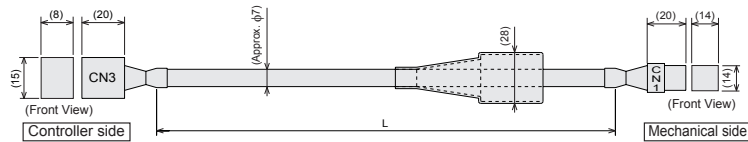
[Minimum bendable radius]

Movable Use : 84mm

Fixed Use : 42mm

9.2 Cable for PCON and PSEL Controllers

1) Motor cable CB-RCP2-MA□□□



CN3			M Cable			CN1		
I-1318119-3 (AMP)	OR	A	A1	1	A	YW	SLP-06V (J.S.T. Mfg.)	
	GY	VMM	A2	2	VMM	GY		
	WT	B	A3	3	A	OR		
	YW	A	B1	4	B	YW(GN)		
	PK	VMM	B2	5	VMM	PK		
	YW(GN)	B	B3	6	B	WT		

* □□□ indicates the cable length.

Max. 20m.

Example) 080 = 8m

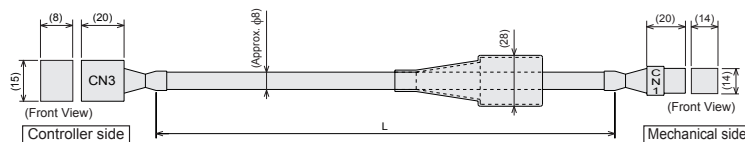
[Minimum bendable radius]

Movable Use : 42mm

Fixed Use : 28mm

2) Motor cable CB-RFA-MA□□□

(for RCP2-RA8C/RA8R/RA10C, RCP2W-RA10C)



CN3			M Cable			CN1		
I-1318119-3 (AMP)	OR	A	A1	1	A	YW	SLP-06V (J.S.T. Mfg.)	
	GY	VMM	A2	2	VMM	GY		
	WT	B	A3	3	A	OR		
	YW	A	B1	4	B	YW(GN)		
	PK	VMM	B2	5	VMM	PK		
	YW(GN)	B	B3	6	B	WT		

* □□□ indicates the cable length.

Max. 20m.

Example) 080 = 8m

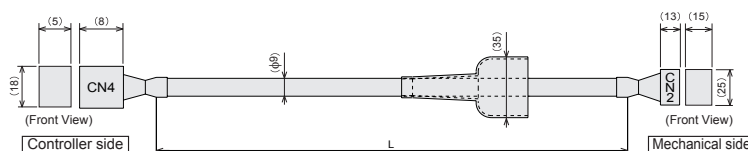
[Minimum bendable radius]

Movable Use : 47mm

Fixed Use : 31mm

3) Encoder cable CB-RCP2-PB□□□

Encoder Robot Cable CB-RCP2-PB***-RB



CN4			Signal Name			Pin		
PHDR-18VS (J.S.T. Mfg.)	Standard Cable	Robot Cable	Signal Name	Pin	Shielded Wire Drain Wire	Pin	Signal Name	Cable Color
	BL(RD1)	OR(BK2)	LS+	16				
	WT	OR(RD2)	LS-	15				
	RD	OR(BK1)	BK+	14				
	GY	OR(RD1)	BK-	13				
	BR	LGY(BK1)	ENA	12				
	GN	LGY(RD1)	ENA	11				
	PL	WT(BK1)	ENB	10				
	PK	WT(RD1)	ENB	9				
	—	—	—	8				
	YW(BK1)	VPS	7	7				
	OR	PK(RD1)	VBB	6				
	BL	PK(BK1)	GND	5				
	—	—	(N.C.)	4				
	—	—	(N.C.)	3				
	—	—	(N.C.)	2				
	Drain	Drain	F.G	1				

* □□□ indicates the cable length.

Max. 20m.

Example) 080 = 8m

[Minimum bendable radius]

Robot Cable

Movable Use : 54mm

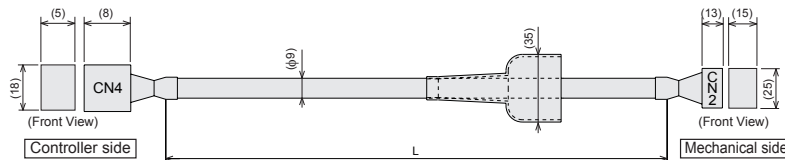
Standard Cable

Fixed Use : 75mm

4) Encoder cable CB-RFA-PA□□□

Encoder Robot Cable CB-RFA-PA□□□-RB

(For RCP2-RA8C, RA8R, RA10C and RCP2W-RA10C)



* □□□ indicates the cable length.

Max. 20m.

Example) 080 = 8m

[Minimum bendable radius]

Robot Cable

Movable Use : 54mm

Standard Cable

Fixed Use : 75mm

CN2			
Cable Color	Signal Name	Pin Name	
Robot Cable	Standard Cable		
—	(Reserved)	16	
—	(Reserved)	15	
OR(BK1)	RD BK+	14	
OR(RD1)	GY BK-	13	
LGY(BK1)	BR ENA	12	
LGY(RD1)	GN ENA	11	
WT(BK1)	PL ENB	10	
WT(RD1)	PK ENB	9	
—	(Reserved)	8	
YW(BK1)	YW VPS	7	
—	—	6	
PK(BK1)	BL GND	5	
PK(RD1)	OR 5V	4	
—	—	3	
—	—	2	
Drain	Drain	F.G	1

Housing : PHDR-16VS (J.S.T. Mfg.)
Contact : SPHD-001T-P0.5

CN1			
Pin Name	Signal Name	Standard Cable	Robot Cable
1	ENA	BR	LGY(BK1)
2	ENA	GN	LGY(RD1)
3	ENB	PL	WT(BK1)
4	ENB	PK	WT(RD1)
5	—	—	—
6	—	—	—
7	—	—	—
8	—	—	—
9	GND	BL	PK(BK1)
10	—	—	—
11	VPS	YW	YW(BK1)
12	5V	OR	PK(RD1)
13	—	—	—
14	—	—	—
15	—	—	—
16	BK+	RD	OR(BK1)
17	BK-	GY	OR(RD1)
18	F.G	Drain	Drain

Housing : XMP-18V (J.S.T. Mfg.)
Contact : BXA-001T-P0.6
Retainer : MS-09V

10. Maintenance

10.1 Maintenance Schedule

Perform maintenance work according to the schedule below.

The schedule is set assuming eight hours of operation a day. When the operation time is long such as 24-hour operation, shorten the maintenance intervals as needed.

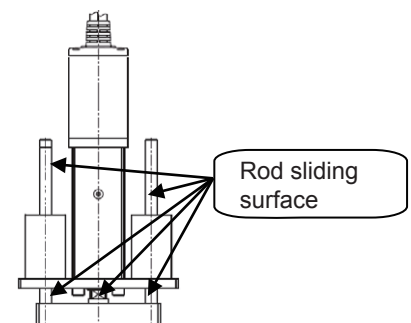
	Visual inspection	Grease supply	
Start of operation	○		
After 1 month of operation	○		
After 3 months of operation or every 300 km of operated distance	○	○ (Sliding surface of the rod and scraper)	*1 *2
Every 3 months thereafter or every 300 km of operated distance	○	○ (Sliding surface of the rod and scraper)	*1 *2
After 3 years of operation, or upon reaching 5,000 km in traveled distance	○	○ (Ball screws)	*3
Every year thereafter	○	○ (Ball screws)	*3

- *1 Apply grease to the sliding surface of the rod at the startup check if grease has been consumed, or every three months.
First, wipe off the old grease and then supply new grease.
Sometimes grease is separated from the base oil due to the installing posture or operating conditions and the base oil leaks from the inside of actuator to the outside. Check visually whether the oil drips or not when supplying grease.
- *2 For the dust proof and drip proof rod type, make sure to supply grease on the scraper regularly every 3 months, or operate it for 300km regularly to keep the sealing performance. Not doing so may cause malfunction.
- *3 On the RA2C type, grease is not supplied to the ball screw.

10.2 Visual Inspection of the Machine Exterior

Check the following items visually.

Body	Loose mounting bolts
Rod sliding surface	Grease lubrication Dripping of grease base oil, etc. Dust or foreign objects on sliding surface
Cables	Damage to cables or connection to connector box
General	Unusual noise or vibrations



10.3 Cleaning

- Clean the exterior as needed.
- If the grease base oil or others drip on the rod sliding surface and its periphery, wipe it off with a soft cloth, etc.
- Wipe off dirt with a soft cloth.
- Do not use strong compressed air on the actuator as this may force dust into the crevices.
- Do not use petroleum-based solvent on plastic parts or painted surfaces.
- If the unit is badly soiled, apply a neutral detergent or alcohol to a soft cloth, and wipe gently.

10.4 Applying Grease to the Ball Screw and Rod Slide Surface

10.4.1 Grease for Ball Screw or Rod Slide Surface

The dedicated grease specified below has been applied to the ball screw or rod slide surface before the shipment.

Kyodo Yushi	Multemp LRL No.3
-------------	------------------

The following grease is applied to RCP2-RA8C, RA8R, RA10C and RCP2W-RA10C only.

Kyodo Yushi	Maltemp PS No.2
-------------	-----------------

When maintaining your actuator, use a lithium grease spray. Keep the spraying time to within 1 second per spray.

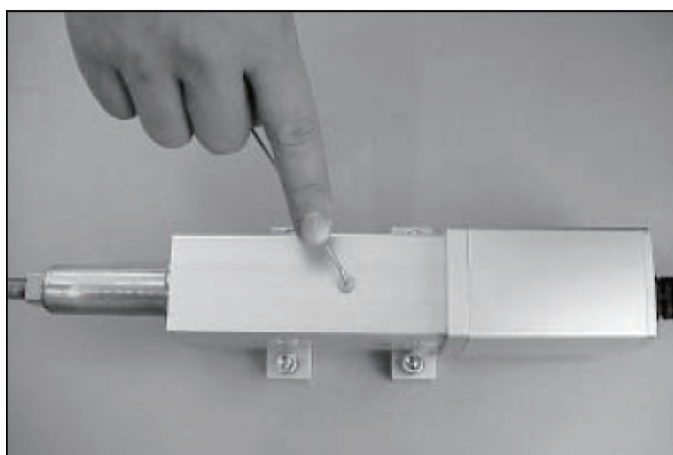
WAKO CHEMICAL, LTD.	Spray Grease No.A161 or equivalent
---------------------	------------------------------------

There is AQ Collar attached on RCP2-RA8C/RA8R, RCP2-RA10C and RCP2W-RA10C. However, to keep a stable condition for a long term, it is recommended to have grease-ups frequently in the regular maintenance works.

⚠ Warning: Warning: Never use any fluorine-based grease. It will cause a chemical reaction when mixed with a lithium-based grease and may cause damage to the actuator. Keep the spraying time to within 1 second. Do not spray grease continuously for more than 1 second or repeat spraying twice or more. Doing so may cause problems.

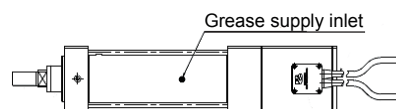
10.4.2 How to Apply Grease (Keep the spraying time to within 1 second per spray.)

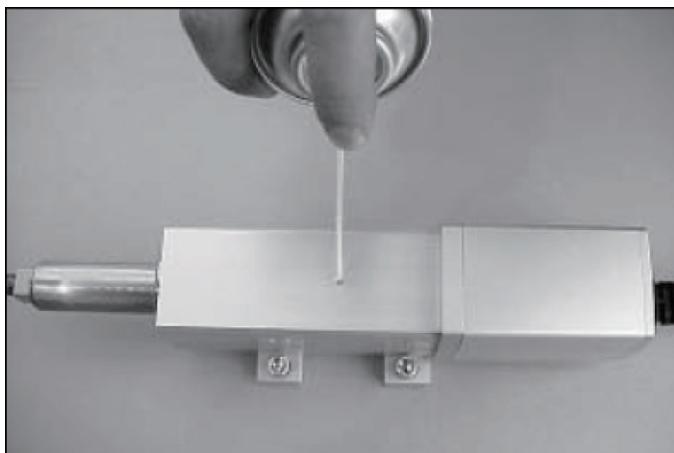
Applicable Units : RCP2-RA3C, RA4C, RA6C, RA8C, RA8R, RA10C, RGS4C, RGS6C, RGD3C, RGD4C, RGD6C, RCP2W-RA4C, RA6C, RCP2W-RA10C



- [1] Remove the thin head screw at the position shown in the photograph on the left.

For RA10C Type, supply grease from the supply inlet shown below.



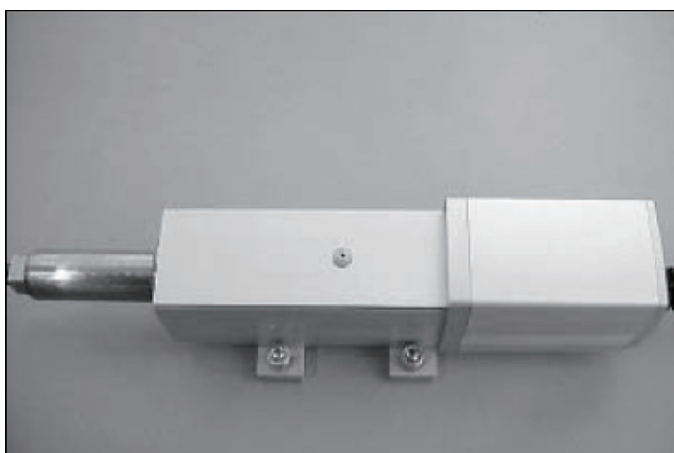


- [2] Before applying grease, move the rod by more than a half the stroke. To apply grease to the ball screw, spray grease into the screw hole. (Keep the spraying time to within 1 second.)

Apply grease to the rod slide surface using your fingers.

Apply grease to the rod slide surface using your fingers after cleaning up the rod slide surface.

(Note) In case old grease is remained on the rod slide surface, the grease ingredient may get separate and the base oil may drip.



- [3] After the necessary parts have been greased, move the rod back and forth to let the grease spread evenly.

- [4] Apply thin head screw removed in [1], in the original position.

For RCP2W dust-proof and splash-proof types, apply an adhesive on the thread when installation.

- Adhesive used at delivery:
SU Clear (Konishi Co.,Ltd)

⚠ Caution: Never use spray oil instead of grease, but always use spray grease. Also keep the spraying time to within 1 second. Do not spray grease continuously for more than 1 second or repeat spraying twice or more. If an excess amount of grease is applied, oil may flow into the electronic components and cause malfunction.

In case the grease got into your eye, immediately go to see the doctor to get an appropriate care.

After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

10.5 Grease Supply to Scrape

Applicable Units : RCP2W-RA4C, RCP2W-RA6C

10.5.1 Grease

The dedicated grease specified below has been applied to the scraper before the shipment.

Kyodo Yushi	Multemp LRL No.3
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Apart from above, there are equivalent sorts of grease sold in the market. For more detailed information, ask the supplier to find an equivalent for you by telling them the name of the grease.

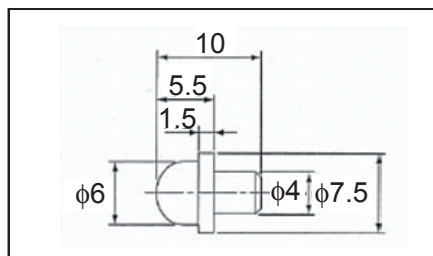
Warning: Never use any fluorine-based grease. Mixing with other grease may cause not only to drop the grease performance, but also have a risk that the actuator is damaged.

10.5.2 Grease Supply

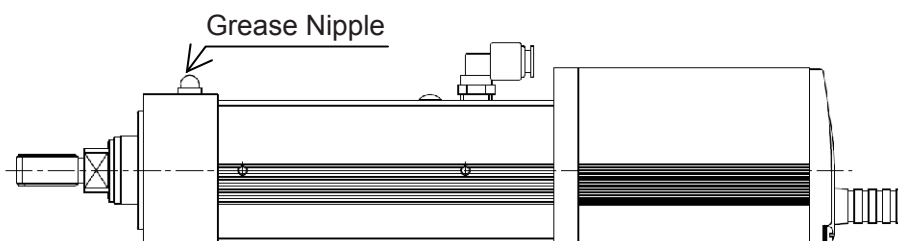
Grease supply to the scraper is to be conducted at the grease nipple on the top of the front surface.

⊙ Size of grease nipple

(Note) The dimensions of the used grease nipple are as shown below. Use a grease gun that suits to the size of the grease nipple.



- [1] Hold a grease gun on the grease nipple and supply grease.
(The reference volume for grease supply is 2cc.) Note that supplying too much grease may cause malfunction.



- [2] Move the rod back and forth manually with hand or by using the jog operation on the controller to spread the grease.

Warning: In case the grease got into your eye, immediately go to see the doctor to get an appropriate care.
After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

11. Belt Replacement and Adjustment

Applicable Unit : RCP2-RA8R

11.1 Belt Inspection

Remove the end plate and check the belt visually for the inspection process. The condition of the belt deteriorates as the time passes and would cause such problems as abrasion. Regular replacements are recommended in intervals of such occasions as when;

- the teeth or the edges on the belt are considerably worn out,
- the belt is swelled due to oil being applied, or
- the teeth or the back of the belt is torn (cracked)

It is recommended to set the regular intervals to replace the core wire for the reinforcement of the toothed belt because it is difficult to clarify if it is deteriorated or not by checking the appearance or looseness.

11.2 Belts to be used

The following belt is applied when the product is shipped out from our factory.

IAI Maintenance Parts Model	Supplier Model
TB-RCP2-RA8R	200HP-S5M300 High Performance Super Torque Synchronous Belt (Bando Chemical Industries, Ltd.)

* The belt used to the product is as described above. However it may be replaced with an equivalent belt in some cases.

11.3 Replacement Belt

[Requirements for Replacement]

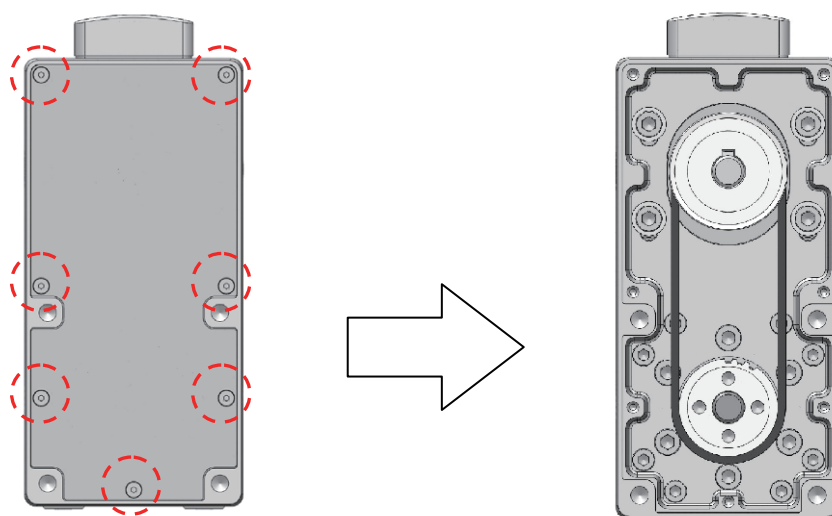
- Replacement Belt
- Hex Wrench (Width across flat = 2mm, 5mm)
- Tension Gauge (should be capable of 25kgf tension)
- Long Zip Tie (or thin string)

<Procedures>

- 1) Remove the end plate.

Dropping tools to be used : Hex Wrench (Width across flat = 2mm)

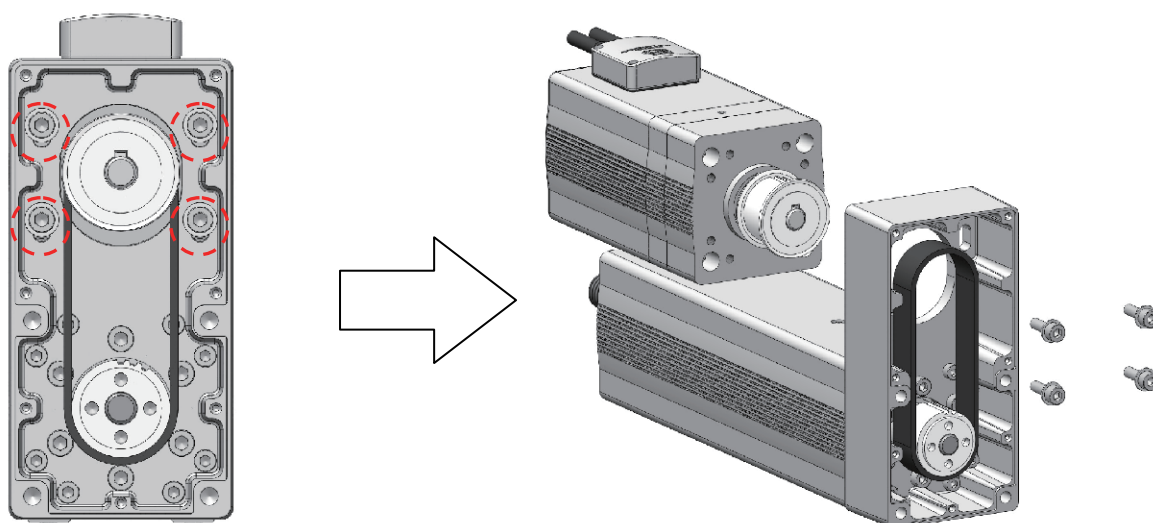
Screw to be used : Hex socket flat head cap screw (M3×6) 7 pieces



- 2) Remove the motor unit.

Dropping tools to be used : Hex Wrench (Width across flat = 5mm)

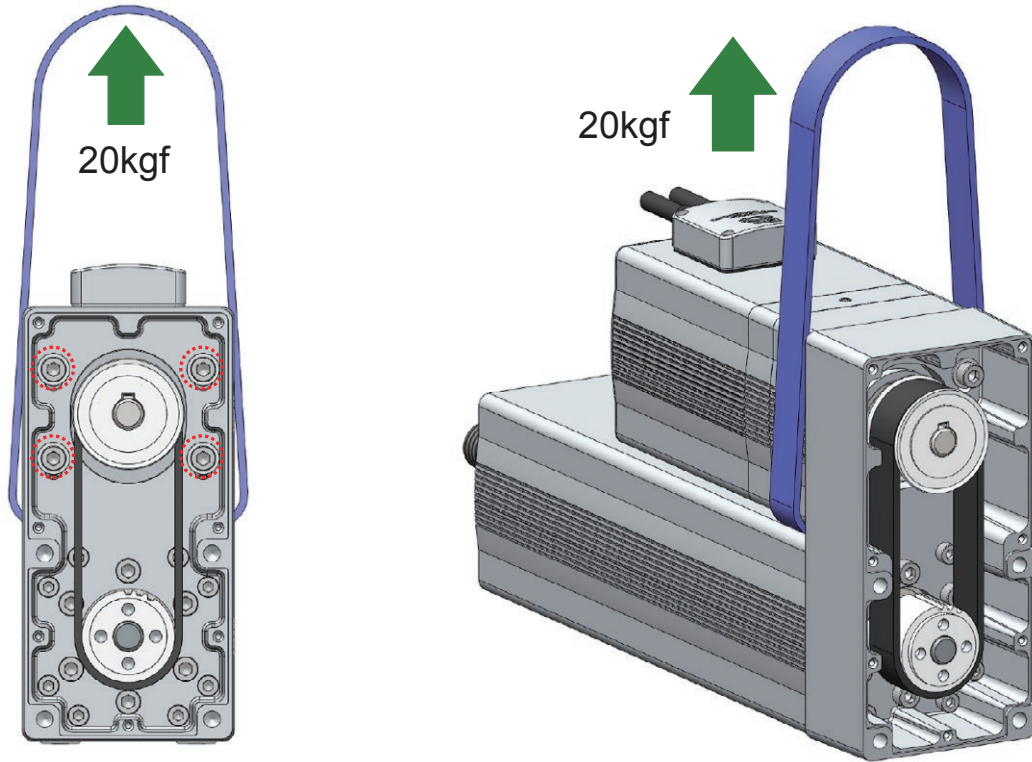
Screw to be used : Hexagon socket head cap bolt (M6×20), plain washer 4 for each



3) Replace the belt and adjust the belt tension.

Dropping tools to be used : Hex Wrench (Width across flat = 5mm), Long Zip Tie(or thin string),
Tension Gauge

Screw to be used : Hexagon socket head cap bolt (M6×20), plain washer 4 for each

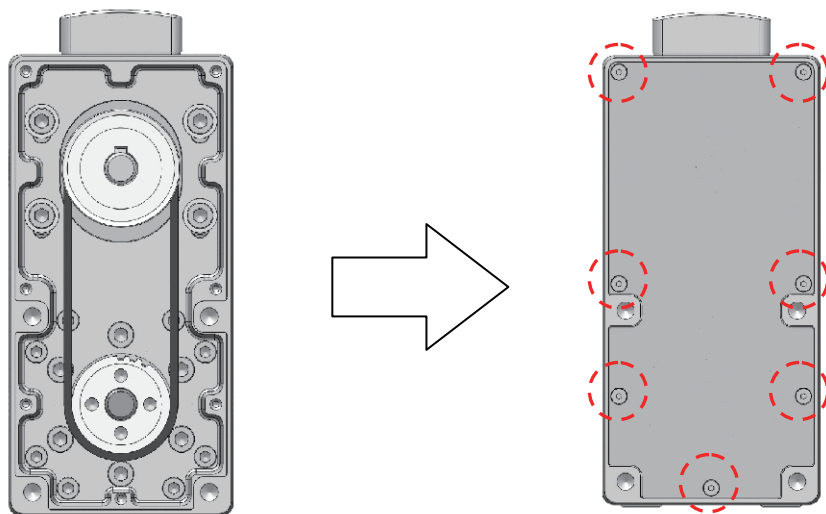


- Hang a zip tie (thin string) on the motor unit and pull it with a specified load using the tension gauge
- Tighten the bolt to keep it in the position once the tension reaches the specified tension.

4) Attach the end plate

Dropping tools to be used : Hex Wrench (Width across flat = 2mm)

Screw to be used : Hex socket flat head cap screw (M3×6) 7 pieces



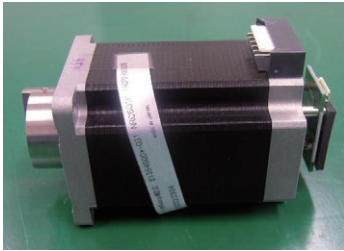
12. Process for Motor Replacement

12.1 Process to replace motor for RA8C and RA8R

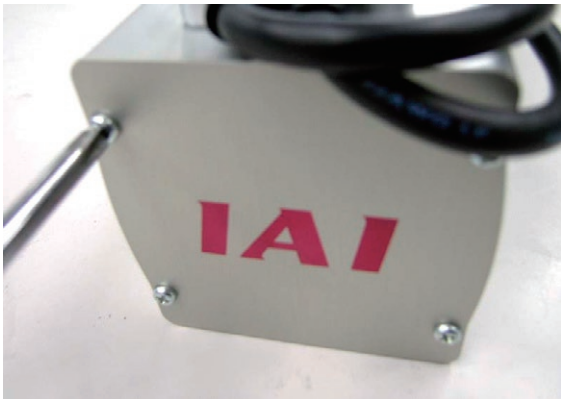
12.1.1 Process to replace motor for RA8C

[Requirements for Replacement]

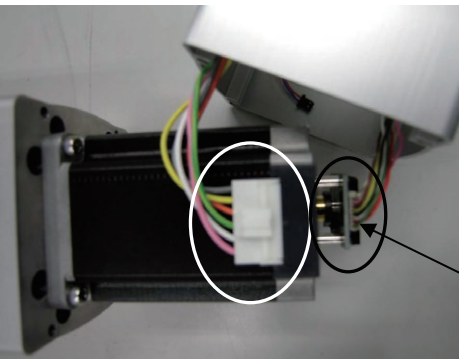
- Hex Wrench
- Phillips screwdriver
- New motor for replacement



[Replacement Procedures]

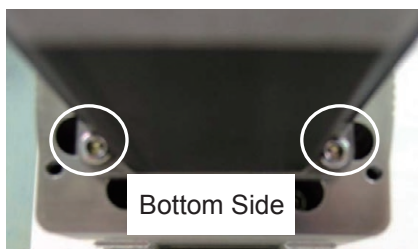
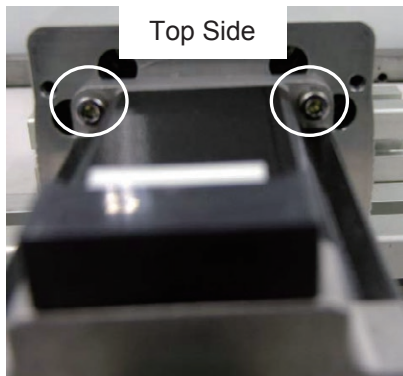


- 1) Remove the 4 screws retaining the motor cover using a Phillips screwdriver.
The motor cover will come off.

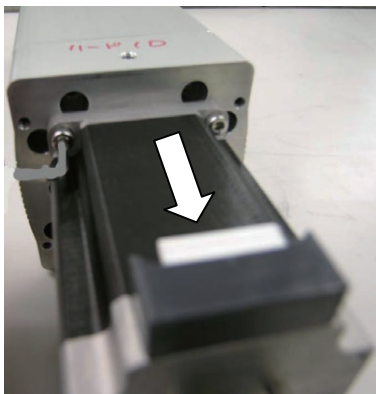


Encoder PCB

- 2) Disconnect the motor connector and encoder connector.
Pay special attention to the encoder PCB so you would not touch it during the work.

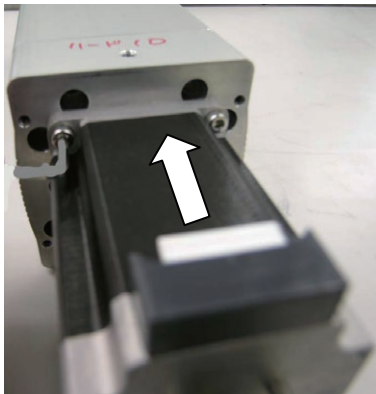
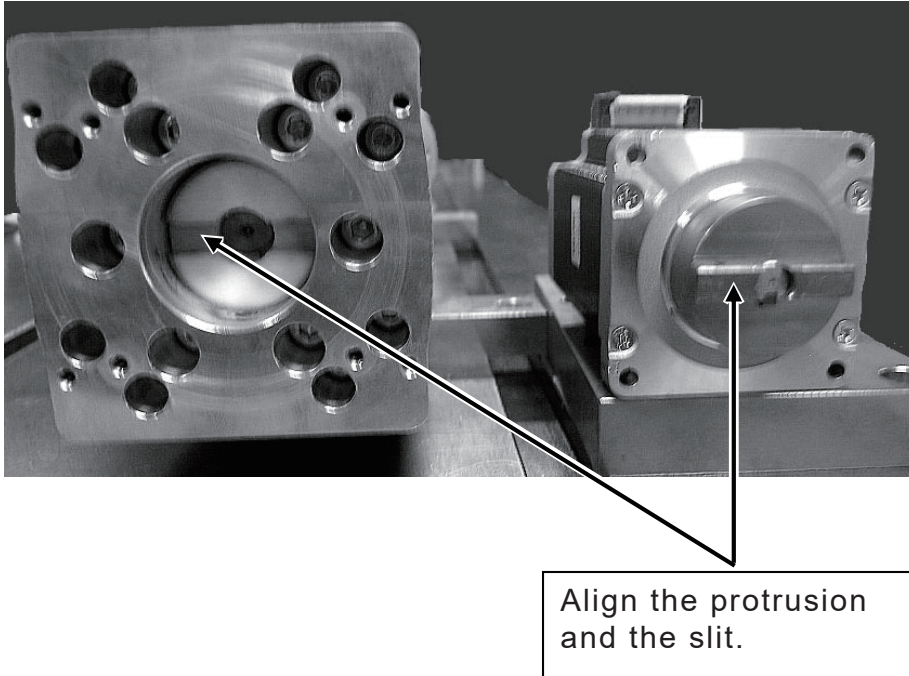


- 3) Remove the 4 screws (M4 × 14) retaining the motor using a 3mm sized hex wrench.

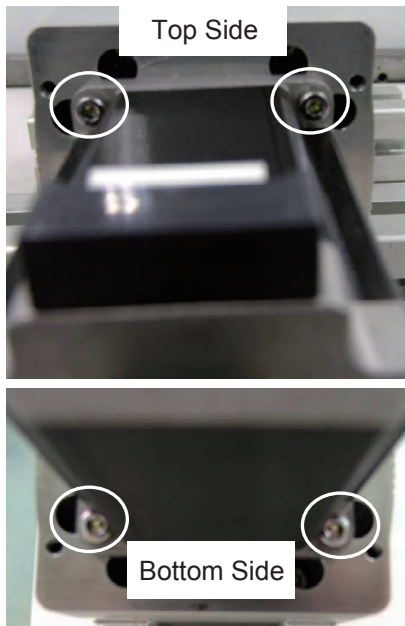


- 4) Pull out the motor.

- 5) Align the slit on the actuator main body and the protrusion on the motor for replacement.

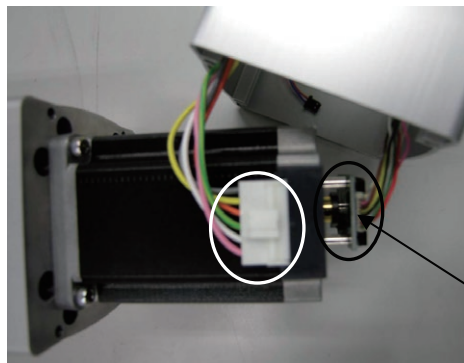


- 6) Insert the motor after confirming that the direction of the protrusion on the main unit and the slit on the motor are in the same position.

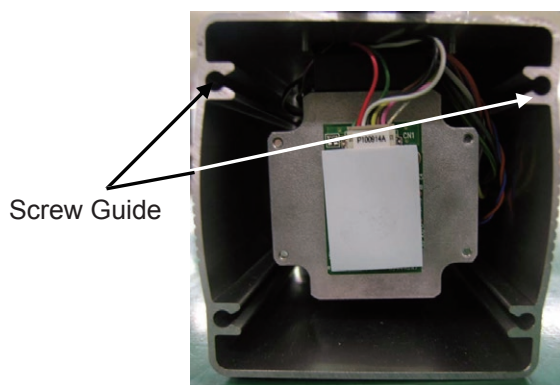


- 7) Tighten the 4 screws (M4 × 14) using a 3mm sized hex wrench to hold the motor.

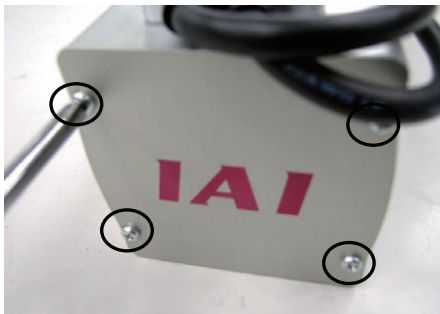
Tightening Torque : 176N·cm (18.0kgf·cm)



- 8) Plug the motor connector and encoder connector. Pay special attention to the encoder PCB so you would not touch it during the work.



- 9) Attach the motor cover. Pay attention to the power cables so they would not get into the screw guides. Also avoid the cables getting pinched between the main unit, motor cover, end cover, etc.

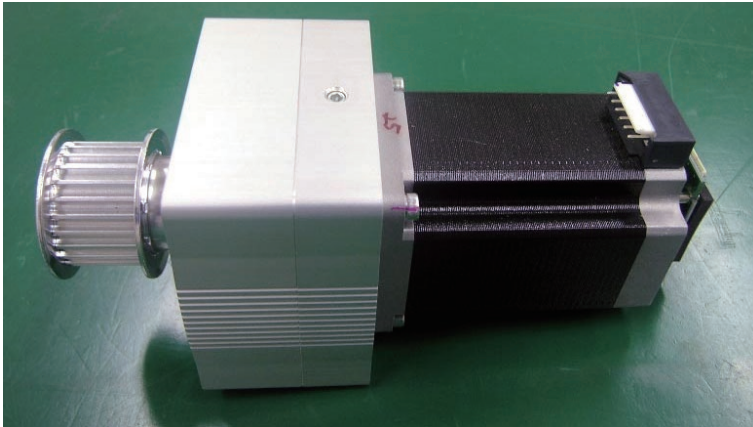


- 10) Hold the motor cover with 4 screws and tighten them with a Phillips screwdriver.

12.1.2 Process to replace motor for RA8R

[Requirements for Replacement]

- Hex Wrench (Width across flat = 2mm, 5mm)
- Tension Gauge (should be capable of 25kgf tension)
- Long Zip Tie (or thin string)
- Replacement motor unit (with pulley)

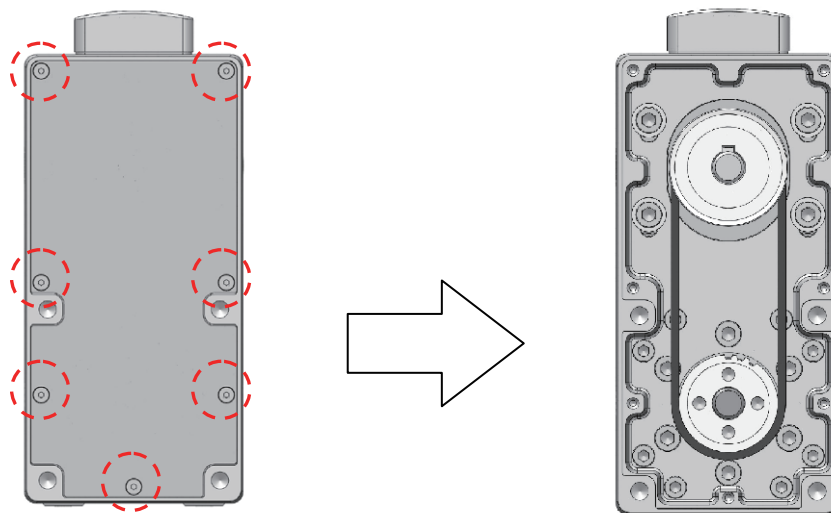


[Replacement Procedures]

- 1) Remove the end plate.

Dropping tools to be used : Hex Wrench (Width across flat = 2mm)

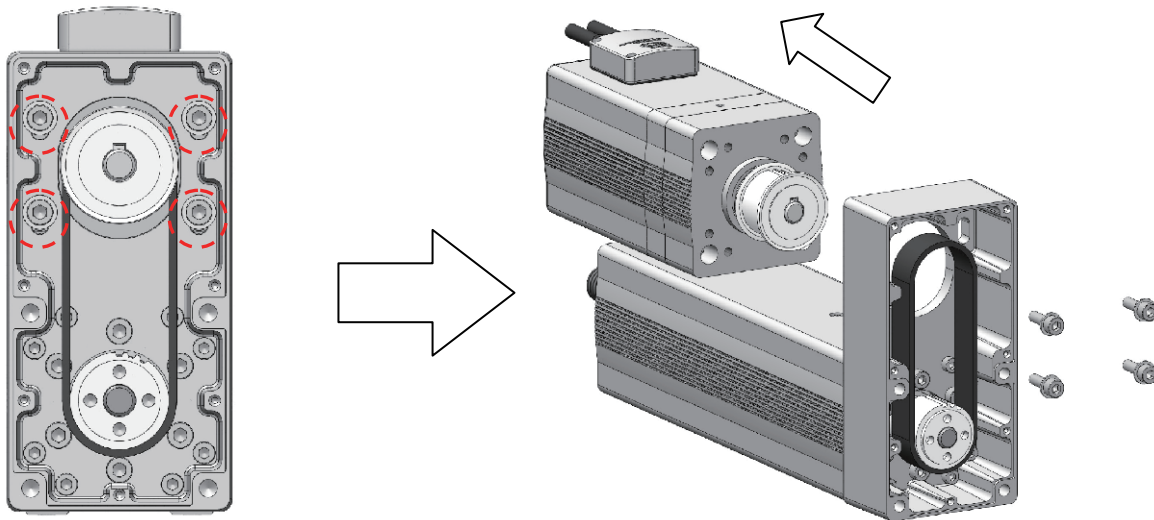
Screw to be used : Hex socket flat head cap screw (M3×6) 7 pieces



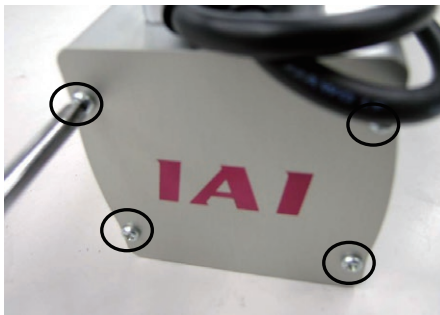
2) Remove the motor unit.

Dropping tools to be used : Hex Wrench (Width across flat = 5mm)

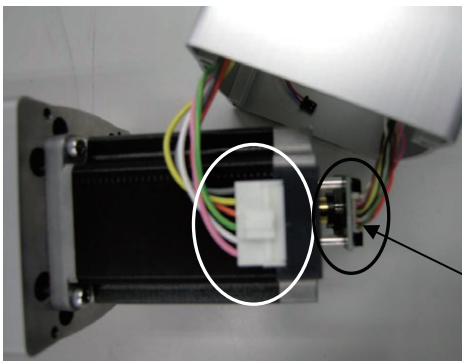
Screw to be used : Hexagon socket head cap bolt (M6×20), plain washer 4 for each



3) Remove the motor cover and attach the motor for replacement.

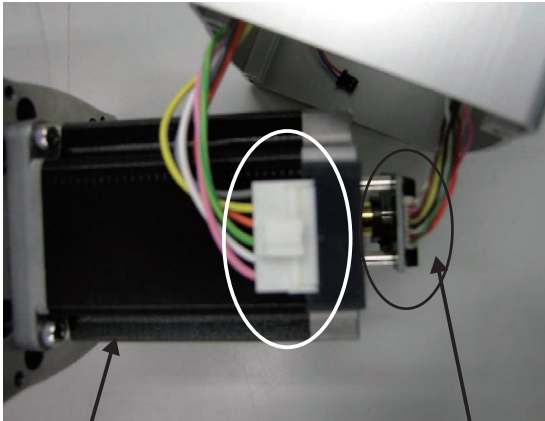


- a. Remove the 4 screws retaining the motor cover using a Phillips screwdriver.
The motor cover will come off.



- b. Disconnect the motor connector and encoder connector.

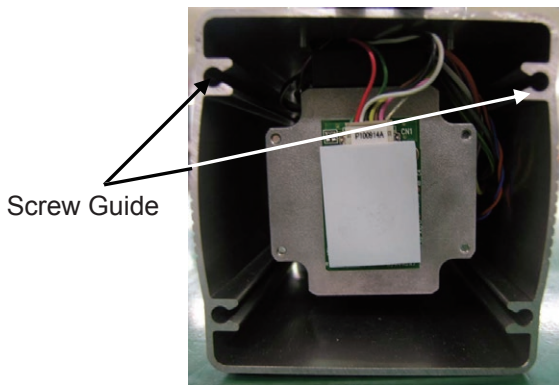
Encoder PCB



Replacement Motor

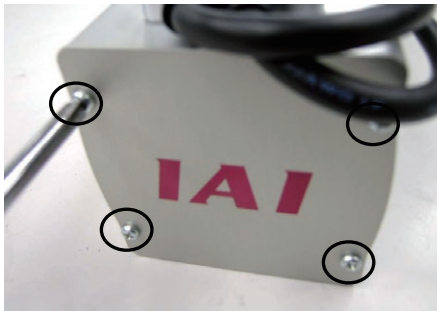
Encoder PCB

- c. Plug the motor connector and the encoder connector into the connectors on the replacement motor. Plug the motor connector and encoder connector. Pay special attention to the encoder PCB so you would not touch it during the work.



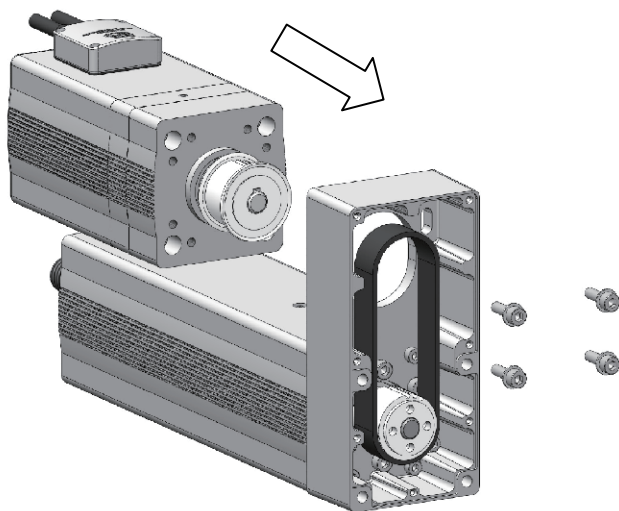
Screw Guide

- d. Attach the motor cover. Pay attention to the power cables so they would not get into the screw guides. Also avoid the cables getting pinched between the main unit, motor cover, end cover, etc.



- e. Hold the motor cover with 4 screws and tighten them with a Phillips screwdriver.

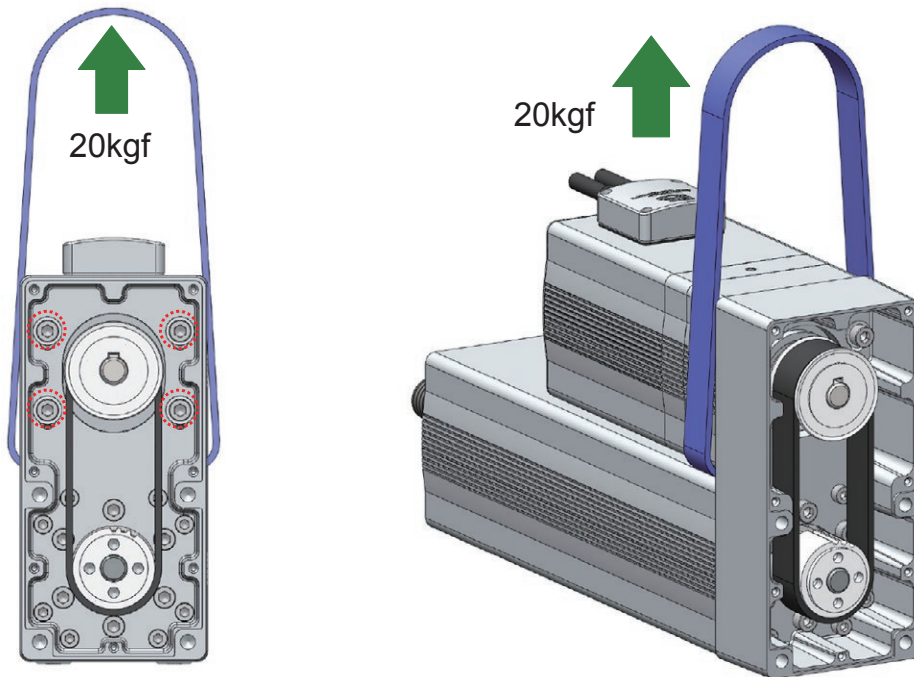
- 4) Attach the Replacement motor unit.



- 5) Hang a zip tie (thin string) on the motor unit and pull it with a specified load using the tension gauge.
Tighten the bolt to keep it in the position once the tension reaches the specified tension.
Dropping tools to be used : Hex Wrench (Width across flat = 5mm), Long Zip Tie (or thin string),

Tension Gauge

Screw to be used : Hexagon socket head cap bolt (M6×20), plain washer 4 for each

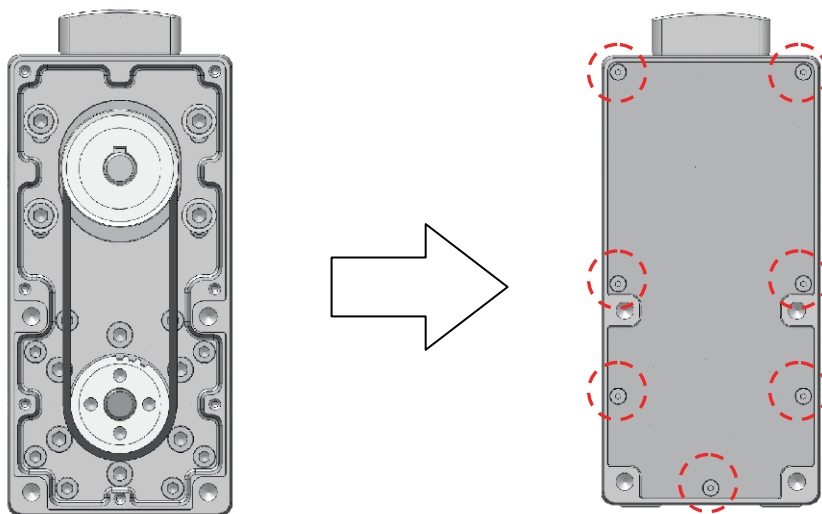


Tightening Torque : 536N·cm (54.7kgf·cm)

- 6) Attach the end plate.

Dropping tools to be used : Hex Wrench (Width across flat = 2mm)

Screw to be used : Hex socket flat head cap screw (M3×6) 7 pieces



Tightening Torque : 73.7N·cm (7.52kgf·cm)

12.2 Process to replace motor for RA10C

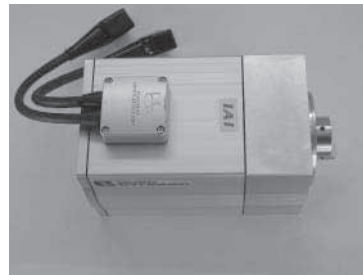
[Requirements for Replacement]

- Hex Wrench
- Motor for replacement shown below (ASSY)

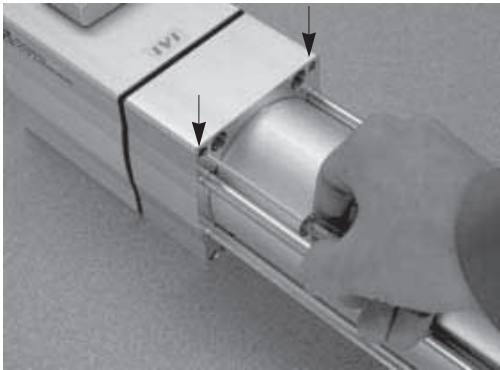
Replacement motor for standard type



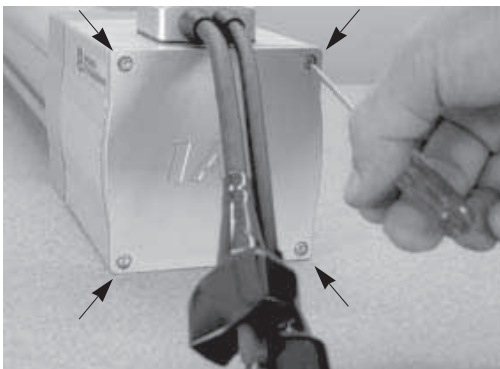
Replacement motor ass'y equipped with a brake for brake-equipped type



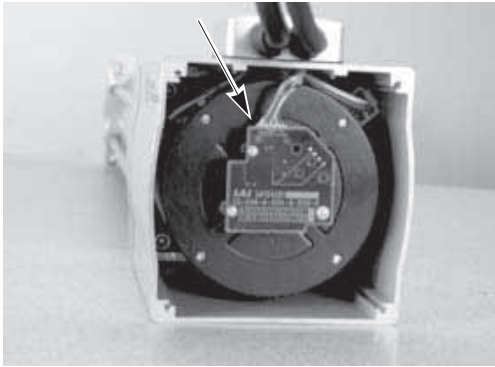
(1) Standard Type (without brake)



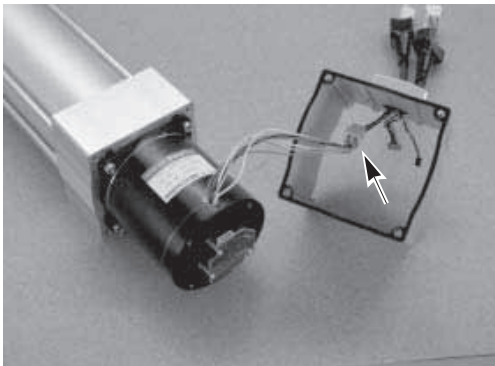
- 1) Remove the 4 screws (M3) retaining the motor cover from the motor bracket side.
(Arrowed points shown in the picture on the left and 2 places on the bottom)



- 2) Remove the screw (M3) retaining the rear cover to the motor cover.



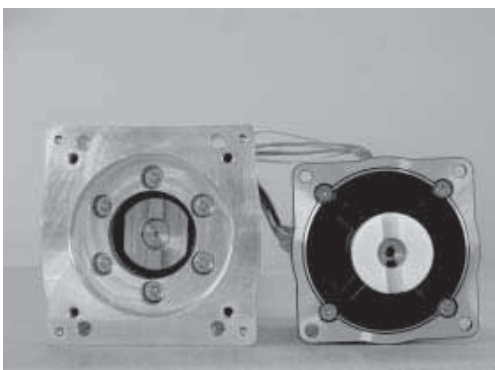
- 3) Disconnect the encoder connector shown with an arrow.



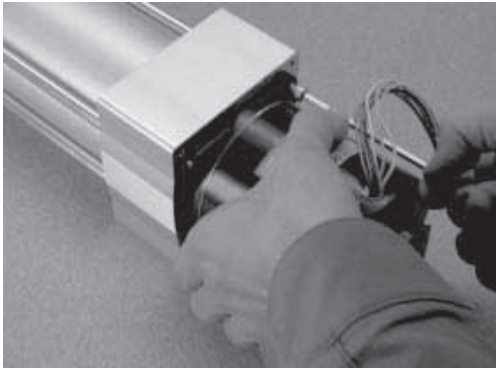
- 4) Slide the motor cover away from the motor to disconnect the motor cable connector.



- 5) Remove the 4 screws (M5) retaining the motor onto the motor bracket.
The motor will come off.

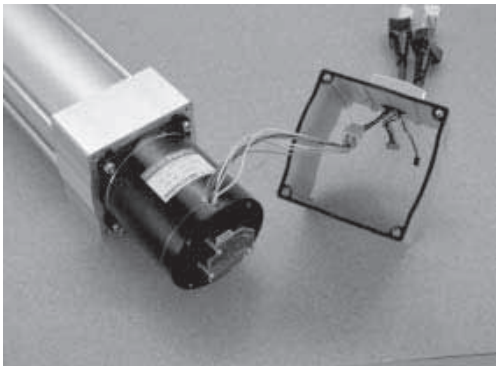


- 6) Align the positions of the new motor and the coupling on the bracket side.

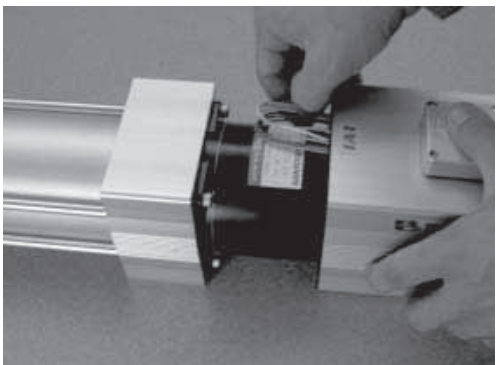


- 7) Attach the motor to the motor bracket with the screws (M5).

Tightening Torque : 727N·cm (74.2kgf·cm)

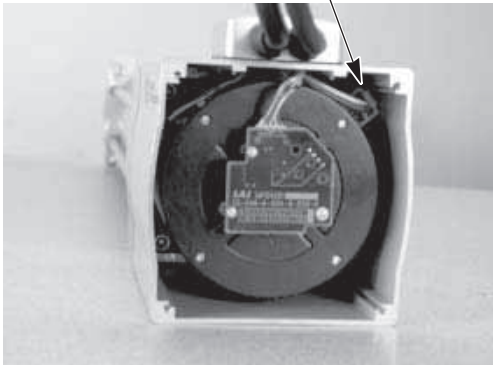


- 8) Connect the motor cable connector.

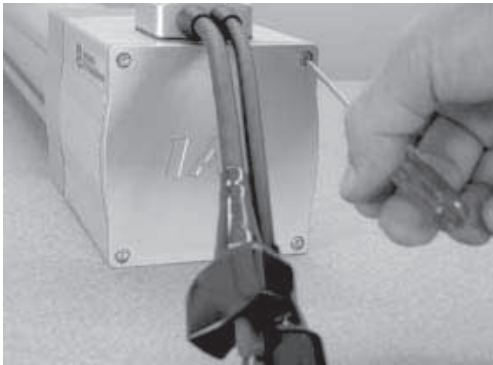


- 9) Put the motor cover over the motor.
Tidy the motor cable so it comes to the position as shown on the left.

Motor Cable Connector

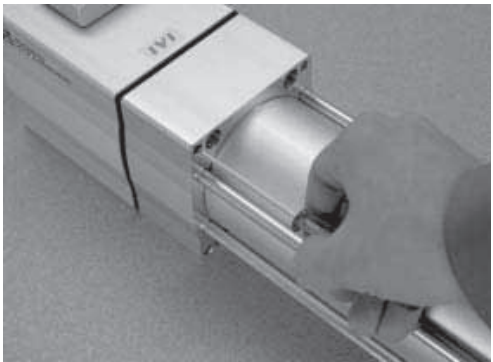


- 10) Confirm that the motor cable connector is in the position as shown on the left.
Connect the encoder connector.



- 11) Attach the rear cover.

Tightening Torque : Approx. 80N·cm

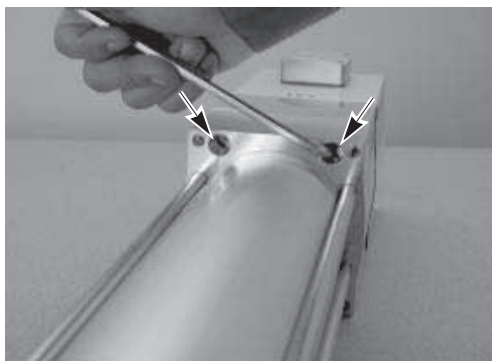


- 12) Attach the motor cover from the motor bracket side.

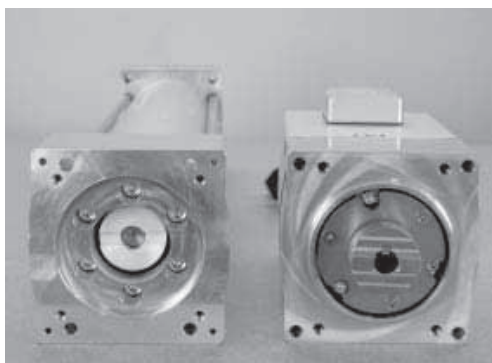
Tightening Torque : Approx. 80N·cm

(2) Brake-equipped Type

For the brake-equipped type, the replacement is done with the whole unit of the motor ass'y equipped with a brake.



- 1) Remove the 4 screws (M6) retaining the motor cover from the motor bracket side.
(Arrowed points shown in the picture on the left and 2 places on the bottom)
The motor ass'y equipped with a brake comes off.



- 2) Align the positions of the new motor ass'y and the coupling on the bracket side.

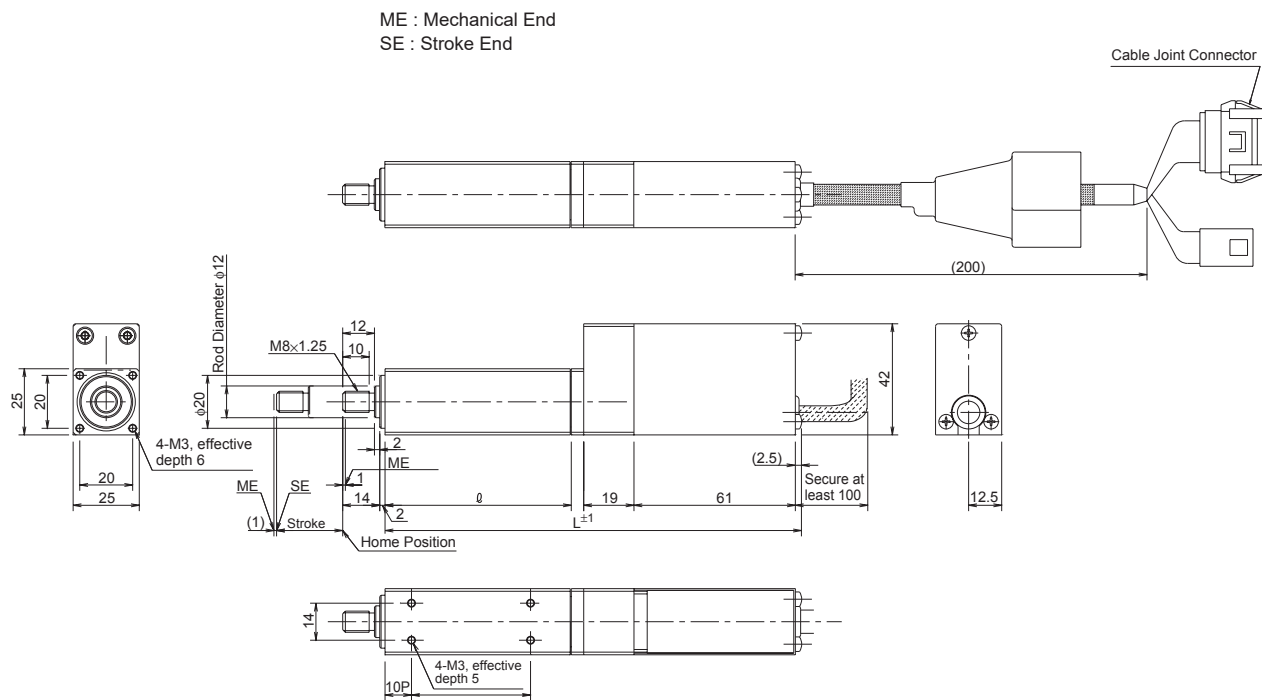
- 3) Attach in the reversed order.

M6 Tightening Torque : 536N·cm (54.7kgf·cm)

13. Appendix

13.1 External Dimensions

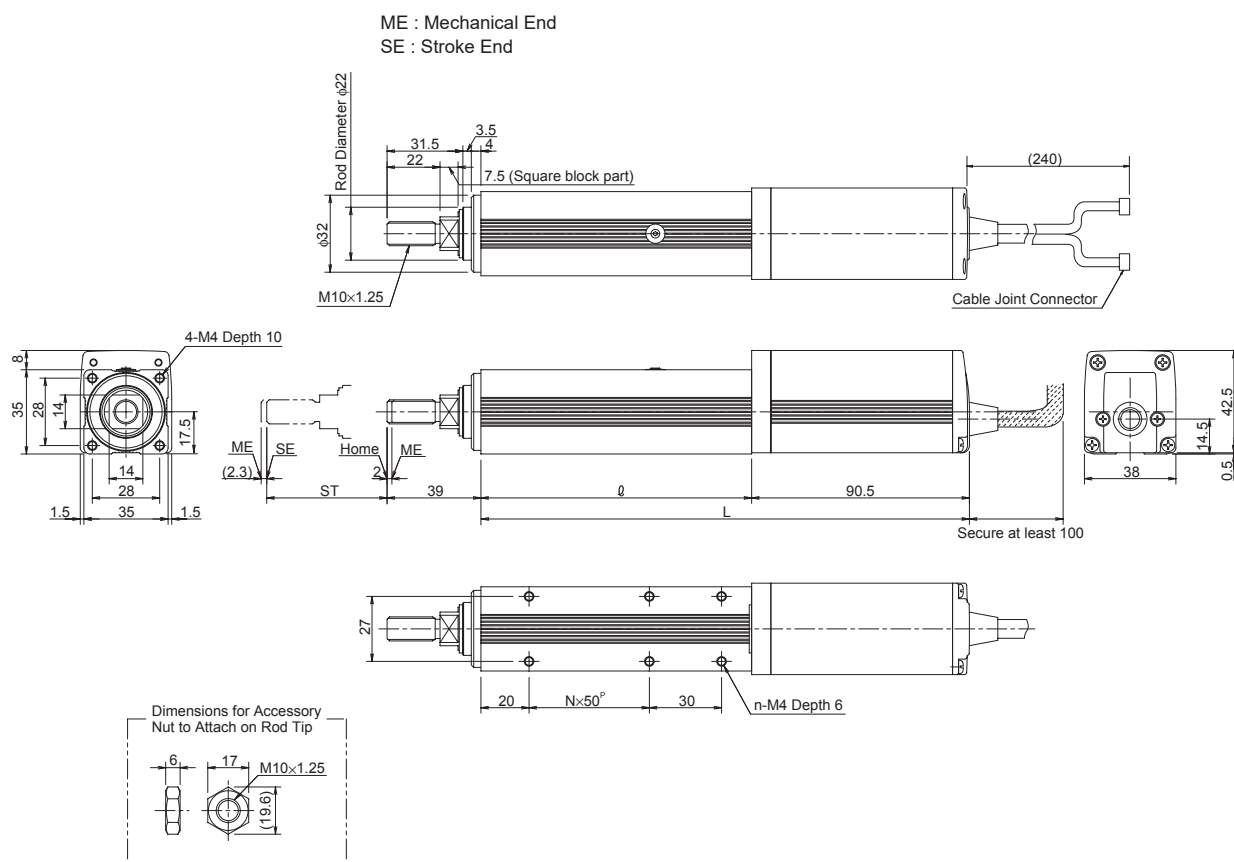
13.1.1 RCP2-RA2C



■ Dimensions for each Stroke

Stroke	25	50	75	100
l	70	95	120	145
L	157.5	182.5	207.5	232.5
P	45	70	95	120
Weight [kg]	0.4	0.5	0.6	0.7

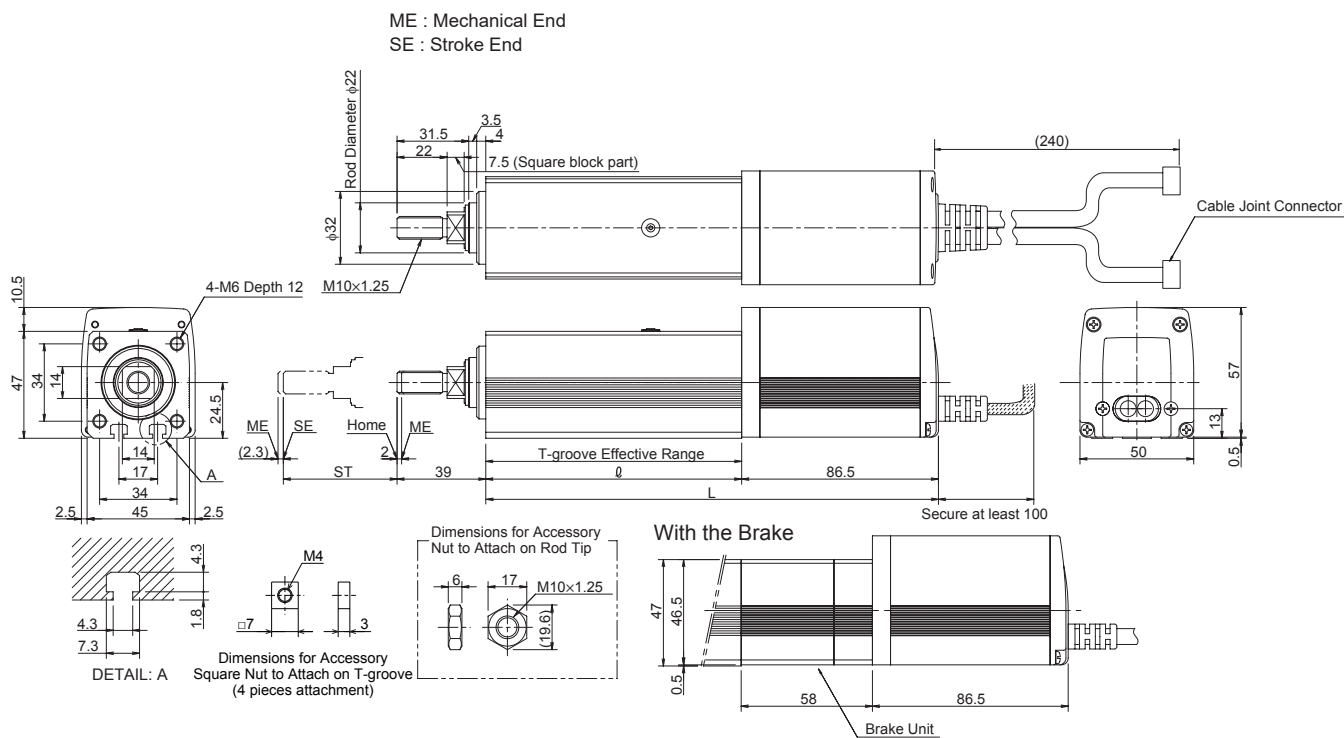
13.1.2 RCP2-RA3C



■ Dimensions for each Stroke

Stroke	50	100	150	200
ℓ	112.5	162.5	212.5	262.5
L	203	253	303	353
N	1	2	3	4
n	6	8	10	12
Weight [kg]	0.8	0.95	1.1	1.25

13.1.3 RCP2-RA4C



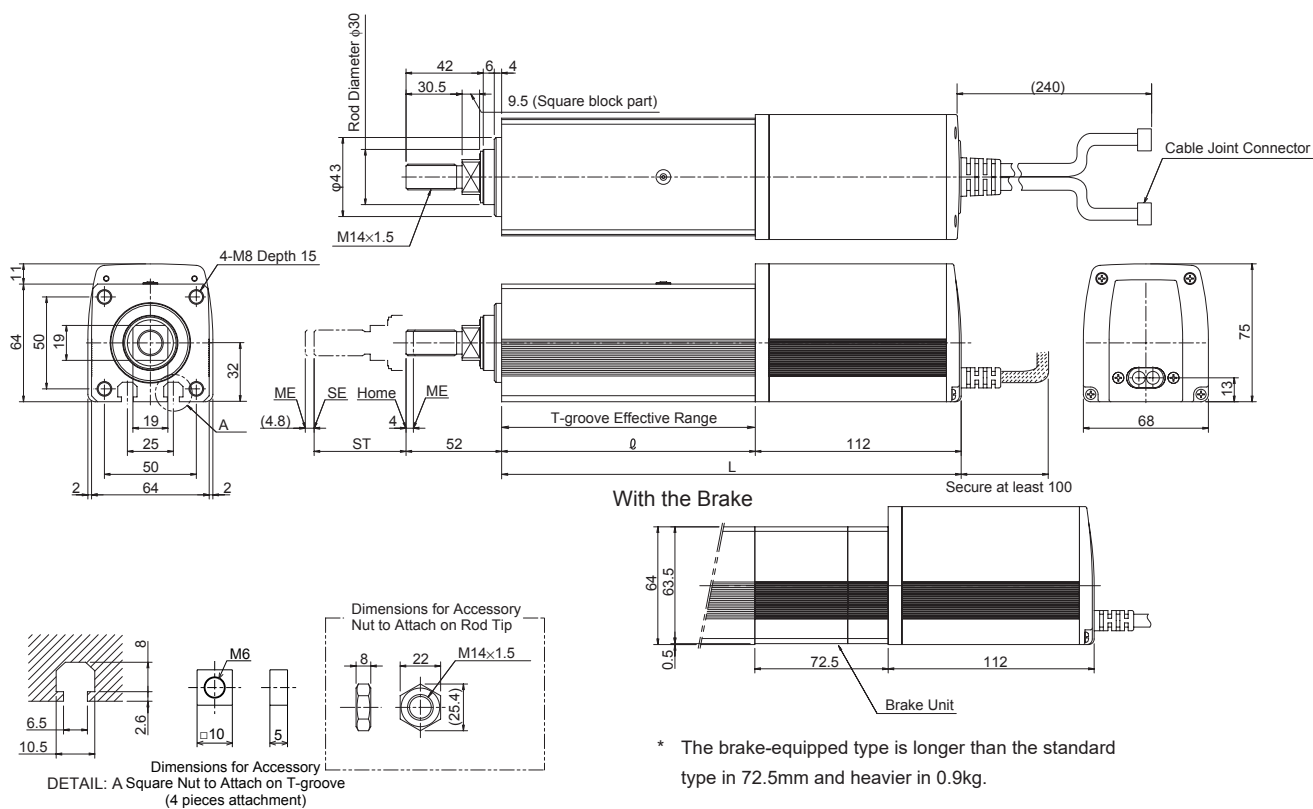
* The brake-equipped type is longer than the standard type in 58mm and heavier in 0.4kg.

■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
ℓ	112.5	162.5	212.5	262.5	312.5	362.5
L	199	249	299	349	399	449
Weight [kg]	1.35	1.6	1.85	2.1	2.35	2.6

13.1.4 RCP2-RA6C

ME : Mechanical End
SE : Stroke End

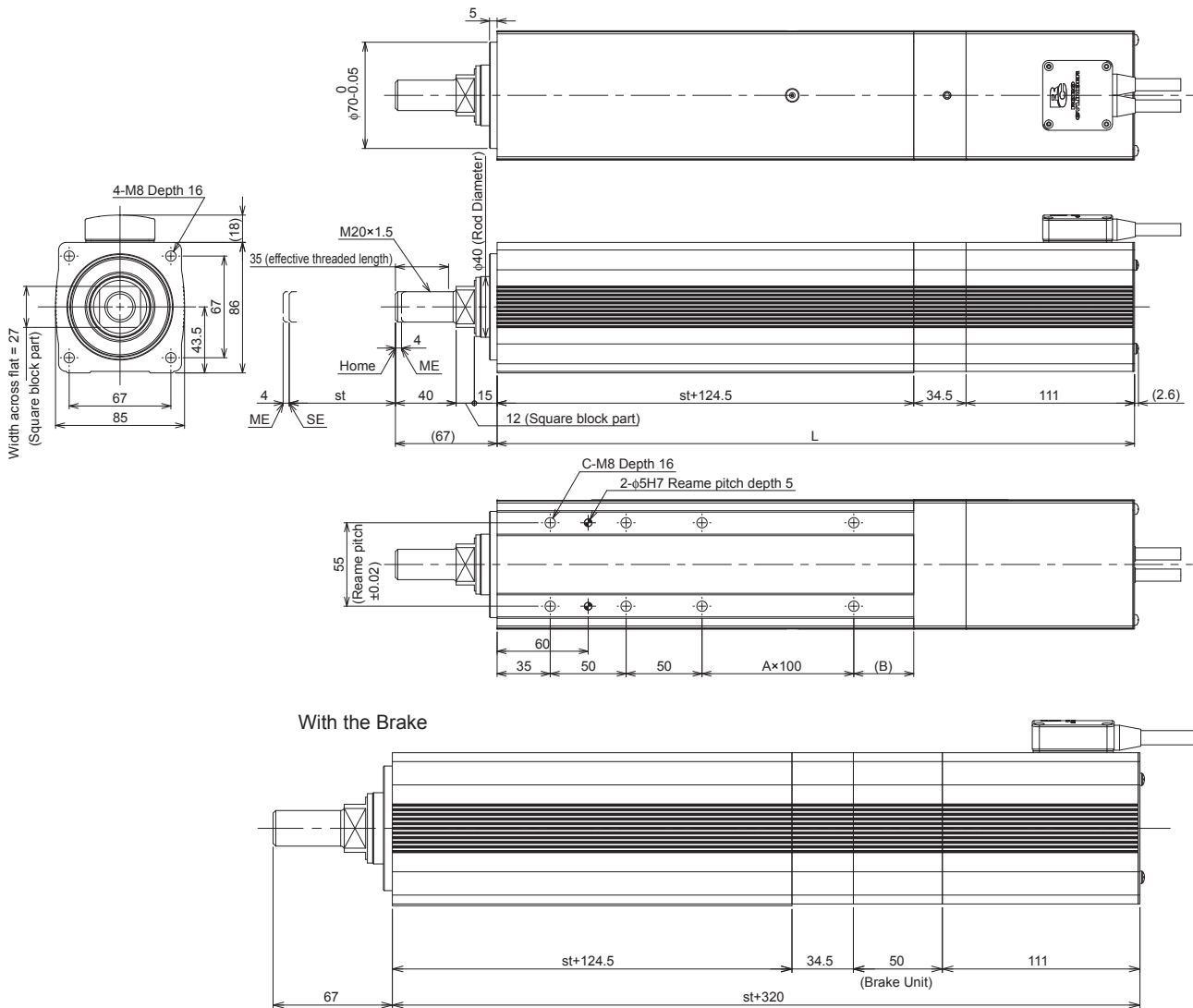


■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
ℓ	138	188	238	288	338	388
L	250	300	350	400	450	500
Weight [kg]	3.1	3.6	4.1	4.6	5.1	5.6

13.1.5 RCP2-RA8C

ME : Mechanical End
SE : Stroke End

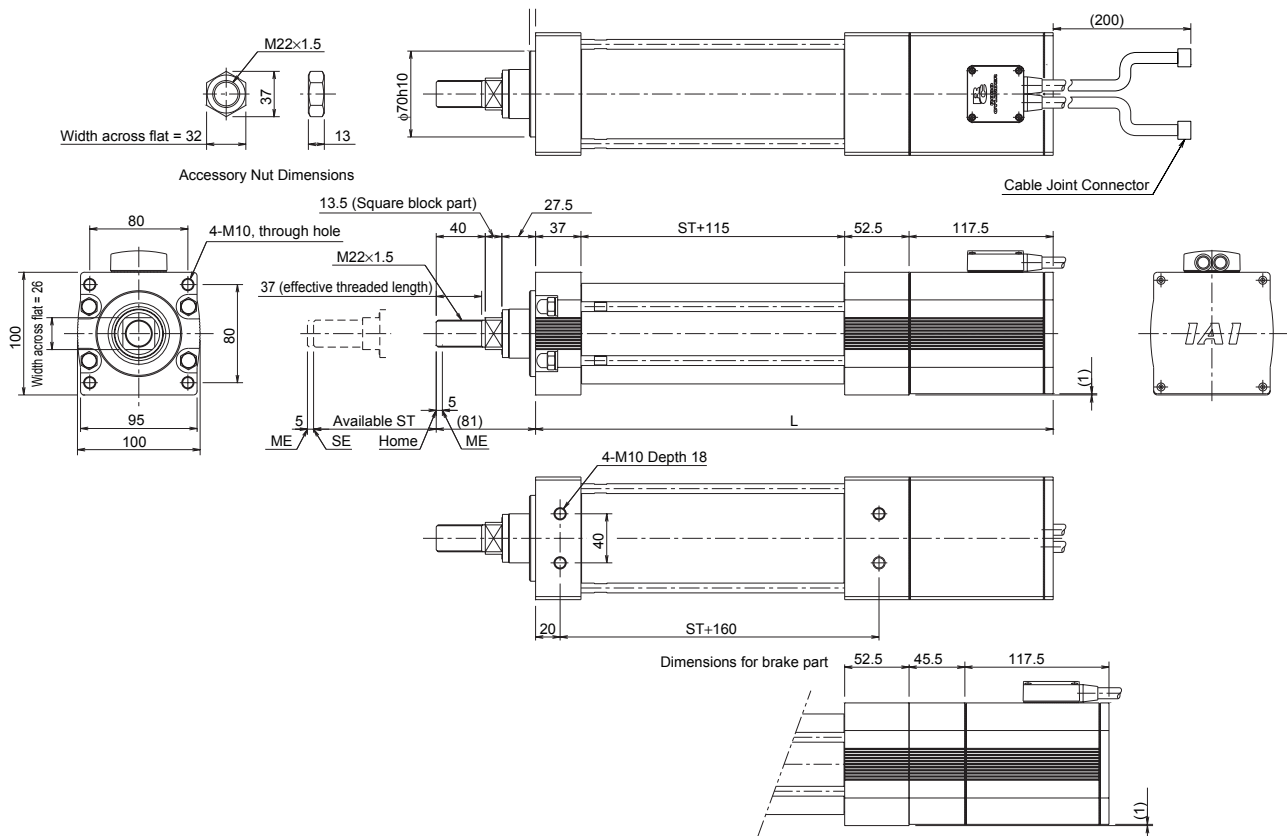


■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
L	320	370	420	470	520	570
A	0	0	1	1	2	2
B	39.5	89.5	39.5	89.5	39.5	89.5
C	6	6	8	8	10	10
D	100	100	200	200	300	300
Weight [kg]	w/o Brake	6.5	7.4	8.2	9.1	10.7
	w/ Brake	7.5	8.4	9.2	10.1	11.7

13.1.6 RCP2-RA10C

ME : Mechanical End
SE : Stroke End



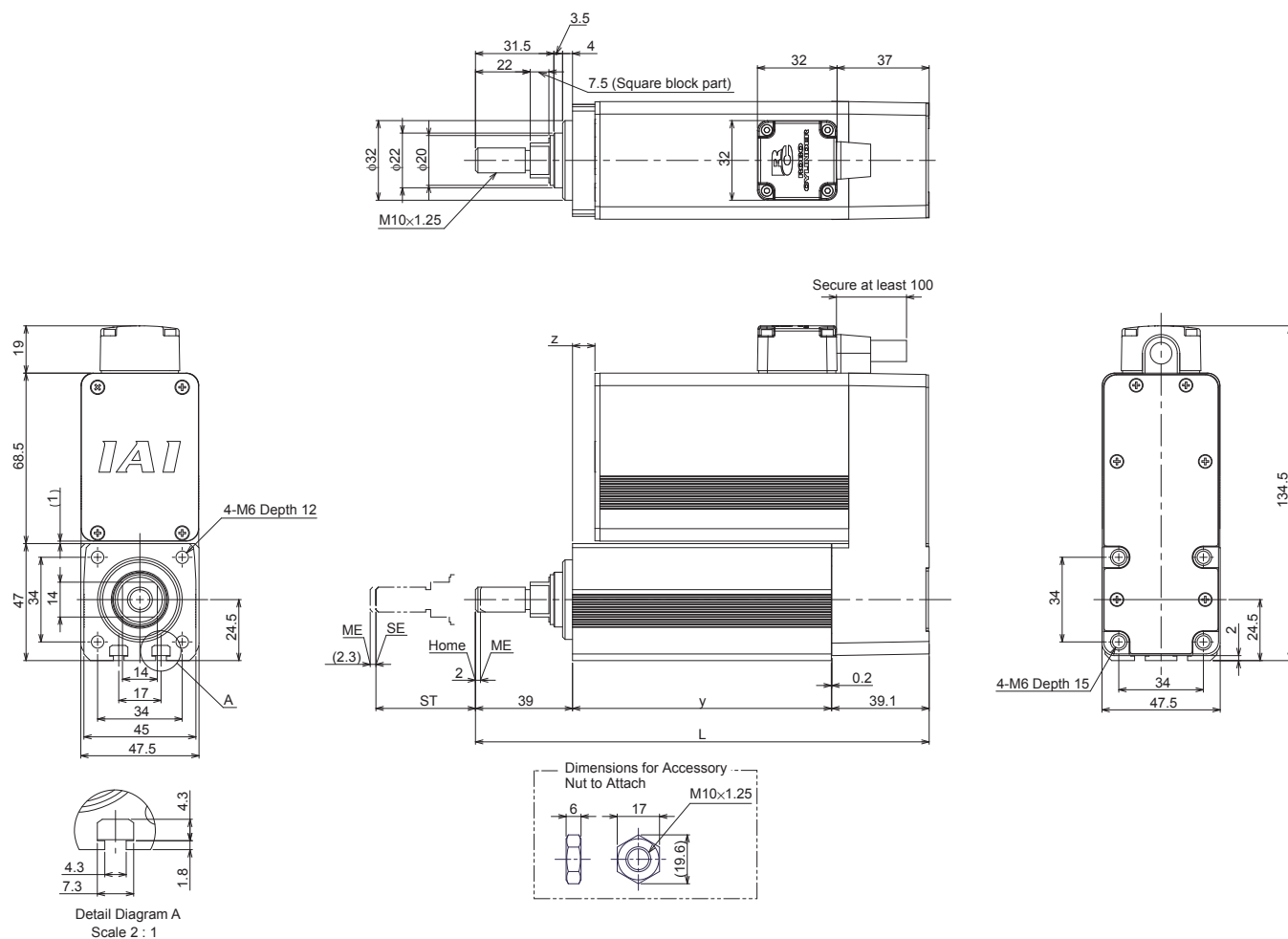
* The brake-equipped type is longer than the standard type in 45.5mm and heavier in 1.5kg.

■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
L	372	422	472	522	572	622
Weight [kg]	9	9.5	10	10.5	11	11.5

13.1.8 RCP2-RA4R

ME : Mechanical End
SE : Stroke End

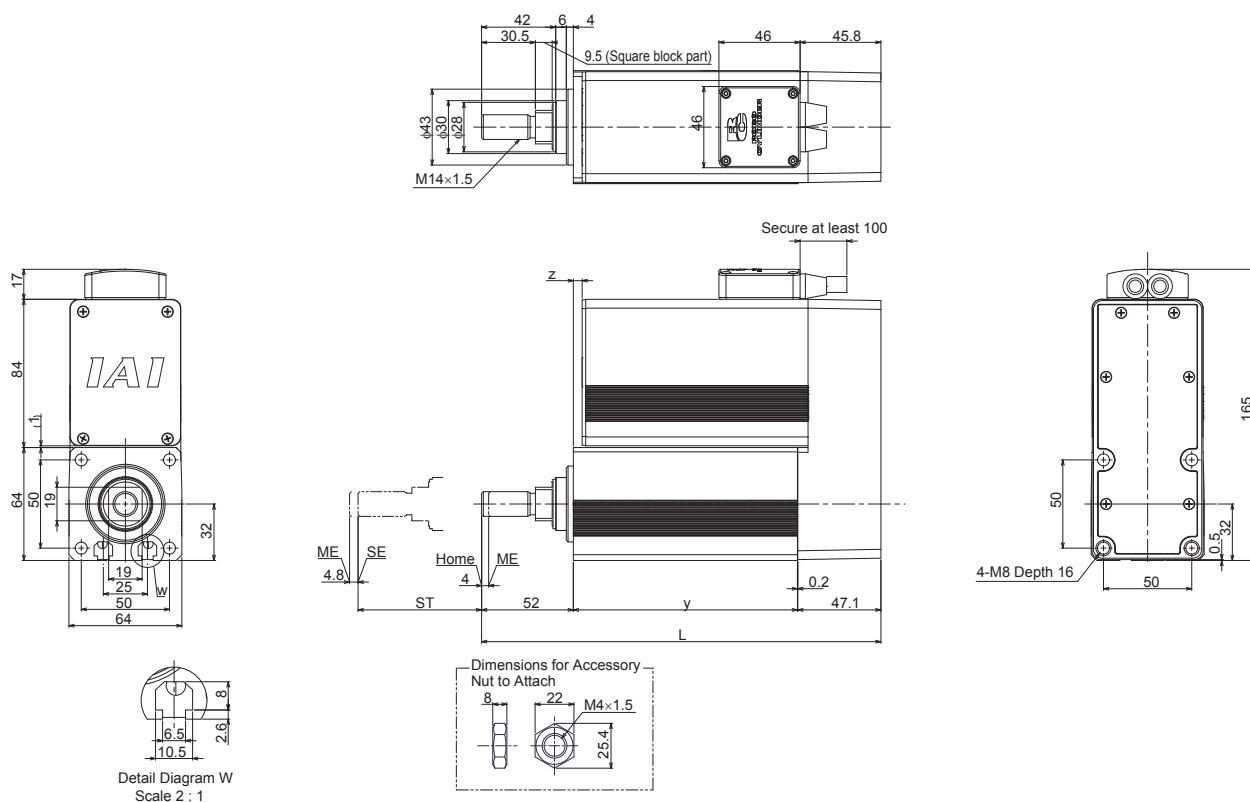


- Dimensions for each Stroke

Stroke		50	100	150	200	250	300
y		104	154	204	254	304	354
L		182.3	232.3	282.3	332.3	382.3	432.3
z		9	59	109	159	209	259
Weight [kg]	w/o Brake	1.7	2.0	2.2	2.5	2.7	2.9
	w/ Brake	1.9	2.1	2.4	2.6	2.9	3.1

13.1.9 RCP2-RA6R

ME : Mechanical End
SE : Stroke End

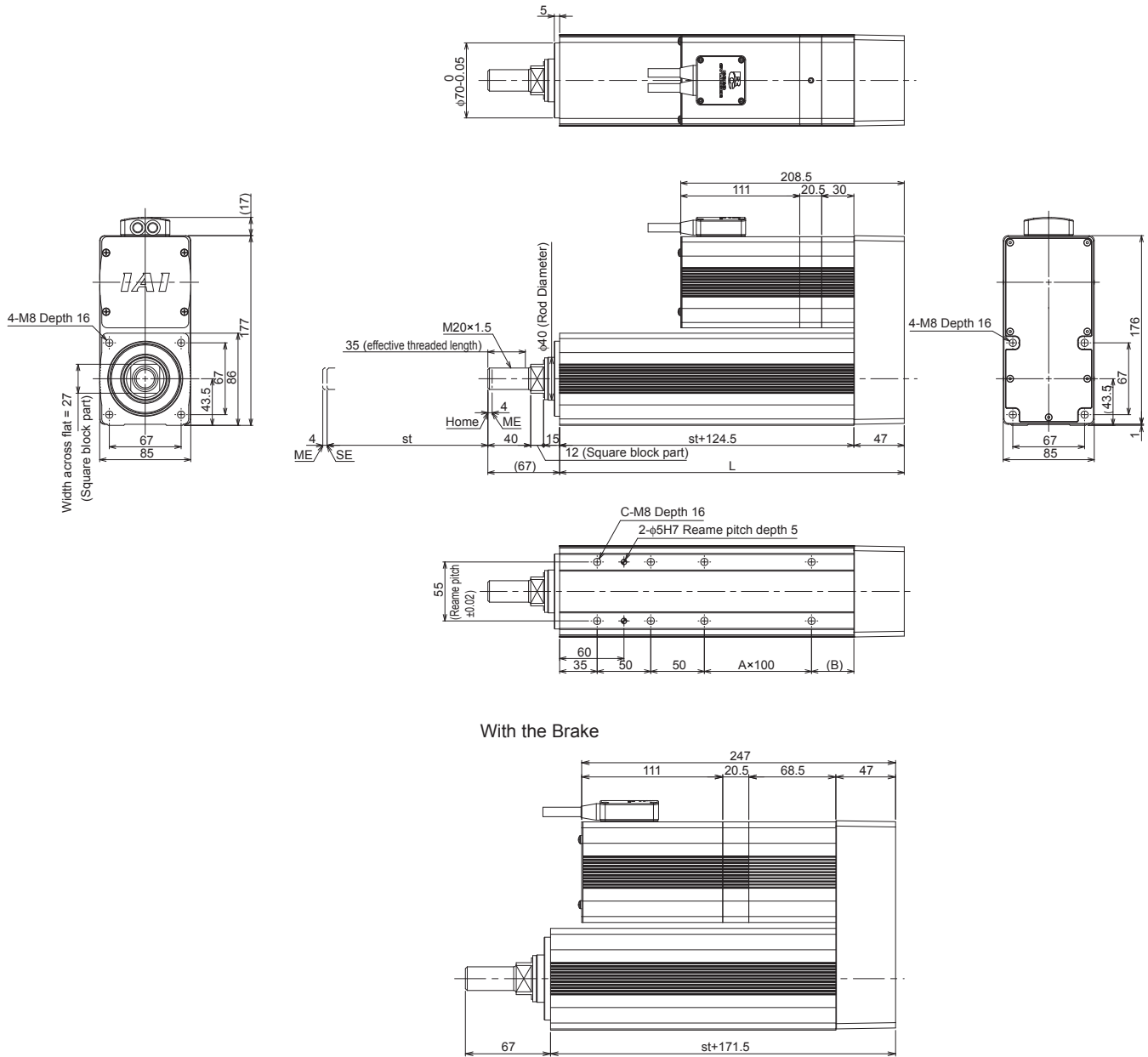


■ Dimensions for each Stroke

Stroke		50	100	150	200	250	300
y		127	177	227	277	327	377
L		226.3	276.3	326.3	376.3	426.3	476.3
z		5	55	105	155	205	255
Weight [kg]	w/o Brake	3.8	4.2	4.7	5.2	5.6	6.1
	w/ Brake	4.1	4.6	5.0	5.5	6.0	6.5

13.1.10 RCP2-RA8R

ME : Mechanical End
SE : Stroke End

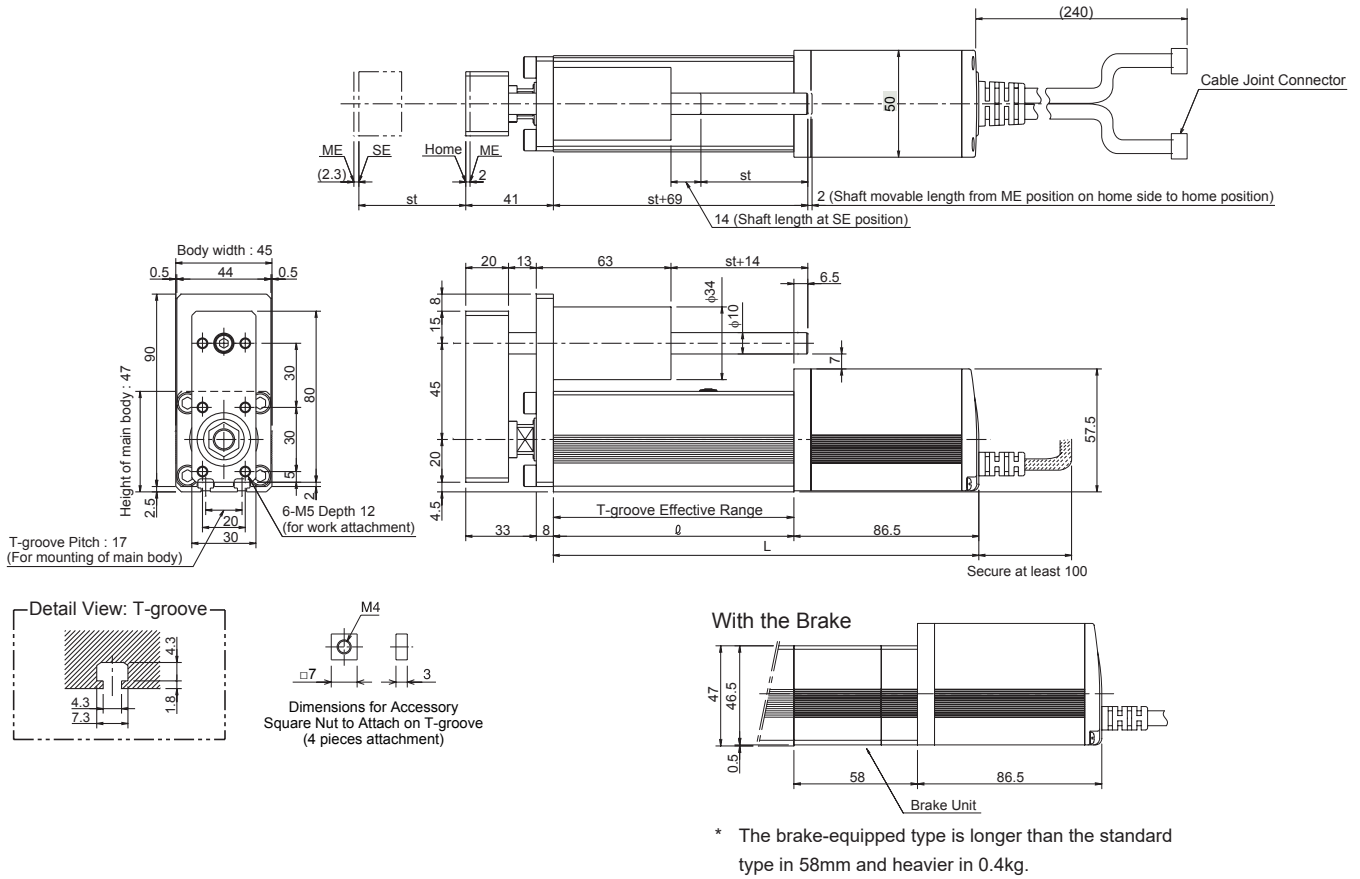


■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
L	221.5	271.5	321.5	371.5	421.5	471.5
A	0	0	1	1	2	2
B	39.5	89.5	39.5	89.5	39.5	89.5
C	6	6	8	8	10	10
D	100	100	200	200	300	300
Weight [kg]	w/o Brake	7.7	8.6	9.4	10.3	11.1
	w/ Brake	8.6	9.5	10.3	11.2	12.9

13.1.11 RCP2-RGS4C

ME : Mechanical End
SE : Stroke End

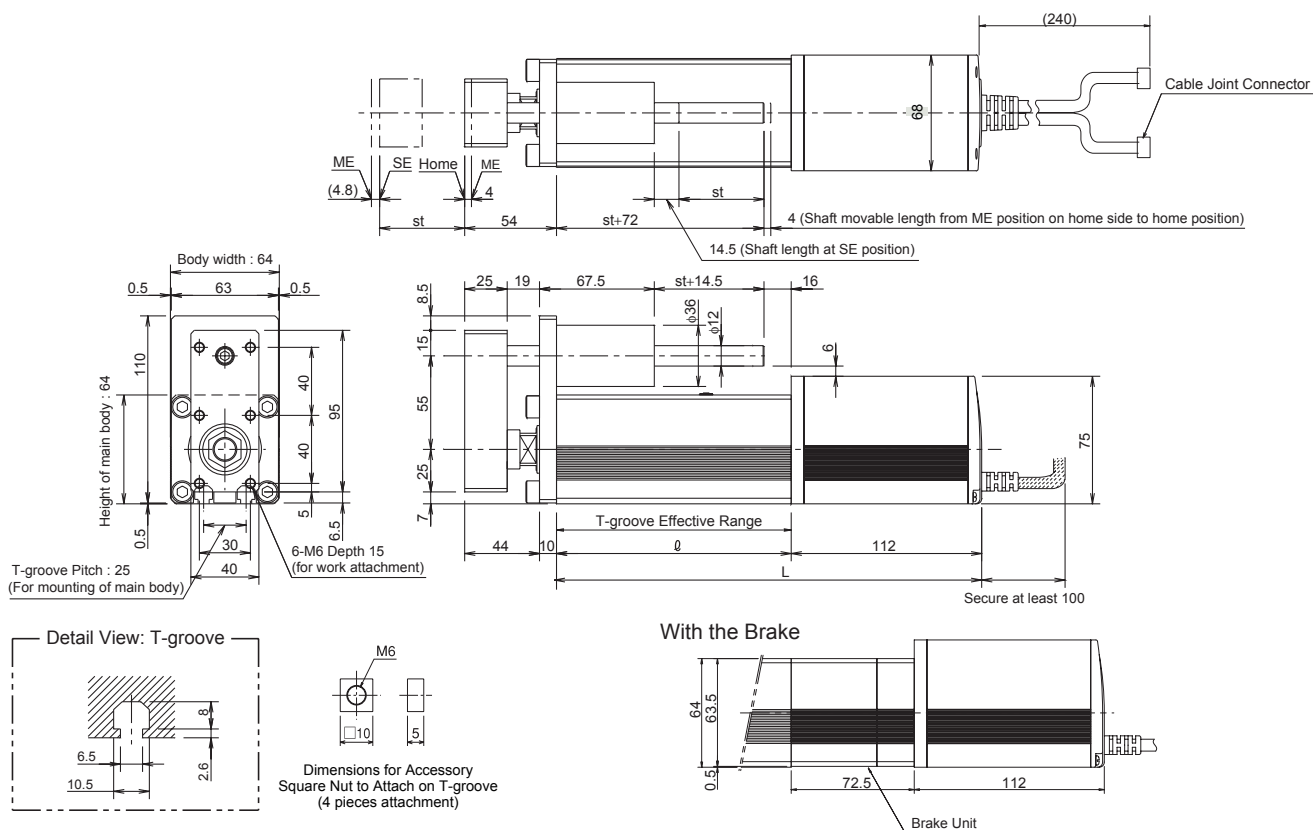


■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
l	112.5	162.5	212.5	262.5	312.5	362.5
L	199	249	299	349	399	449
Weight [kg]	1.8	2.1	2.4	2.7	2.9	3.2

13.1.12 RCP2-RGS6C

ME : Mechanical End
SE : Stroke End



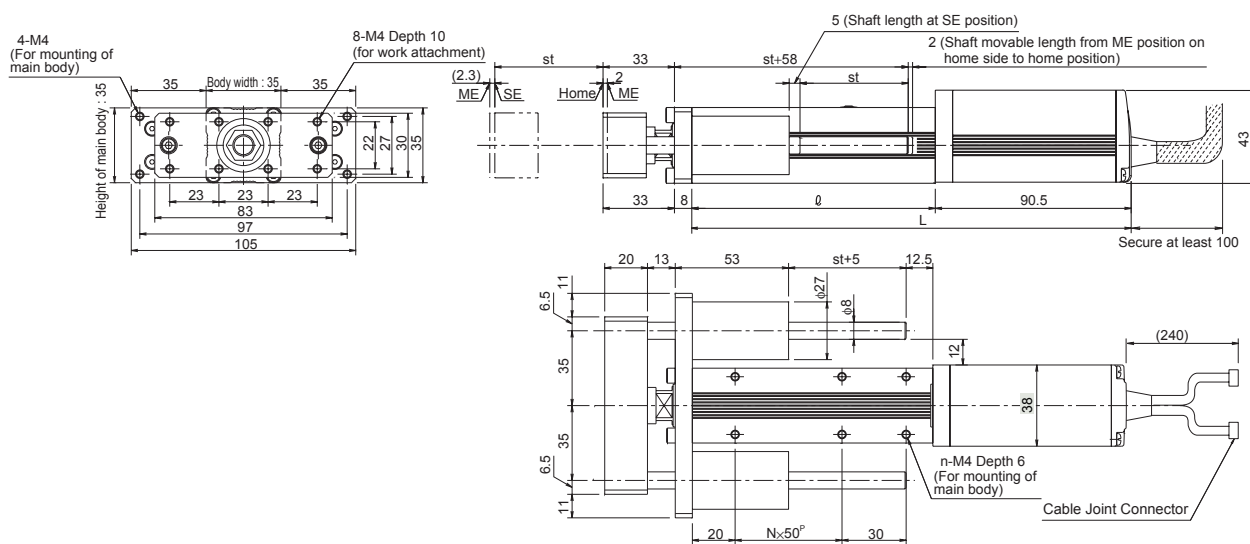
* The brake-equipped type is longer than the standard type in 72.5mm and heavier in 0.9kg.

■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
ℓ	138	188	238	288	338	388
L	250	300	350	400	450	500
Weight [kg]	3.6	4.4	5.0	5.5	6.1	6.6

13.1.13 RCP2-RGD3C

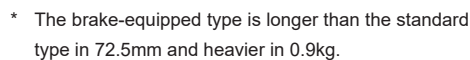
ME : Mechanical End
SE : Stroke End



■ Dimensions for each Stroke

Stroke	50	100	150	200
l	112.5	162.5	212.5	262.5
L	203	253	303	353
N	1	2	3	4
n	6	8	10	12
Weight [kg]	1.1	1.3	1.4	1.6

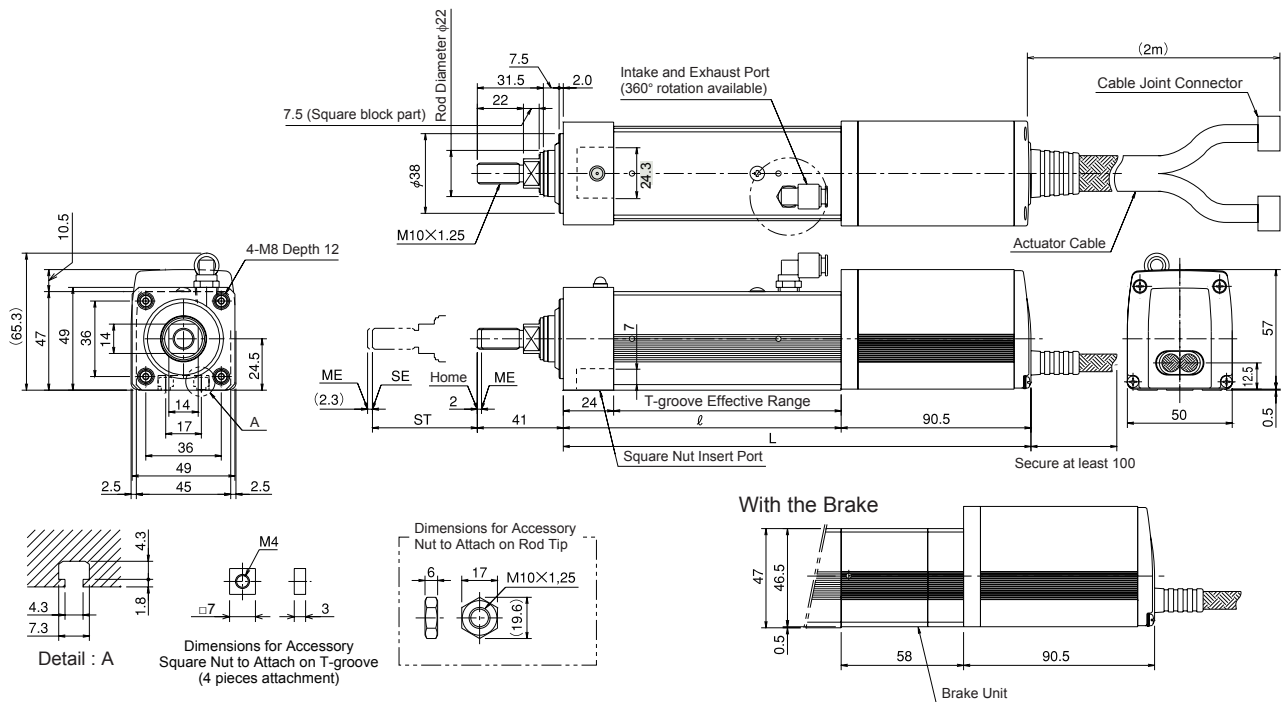
ME : Mechanical End
SE : Stroke End



Stroke	50	100	150	200	250	300
ℓ	138	188	238	288	338	388
L	250	300	350	400	450	500
Weight [kg]	4.4	5.0	5.5	6.1	6.7	7.3

13.1.16 RCP2W-RA4C

ME : Mechanical End
SE : Stroke End



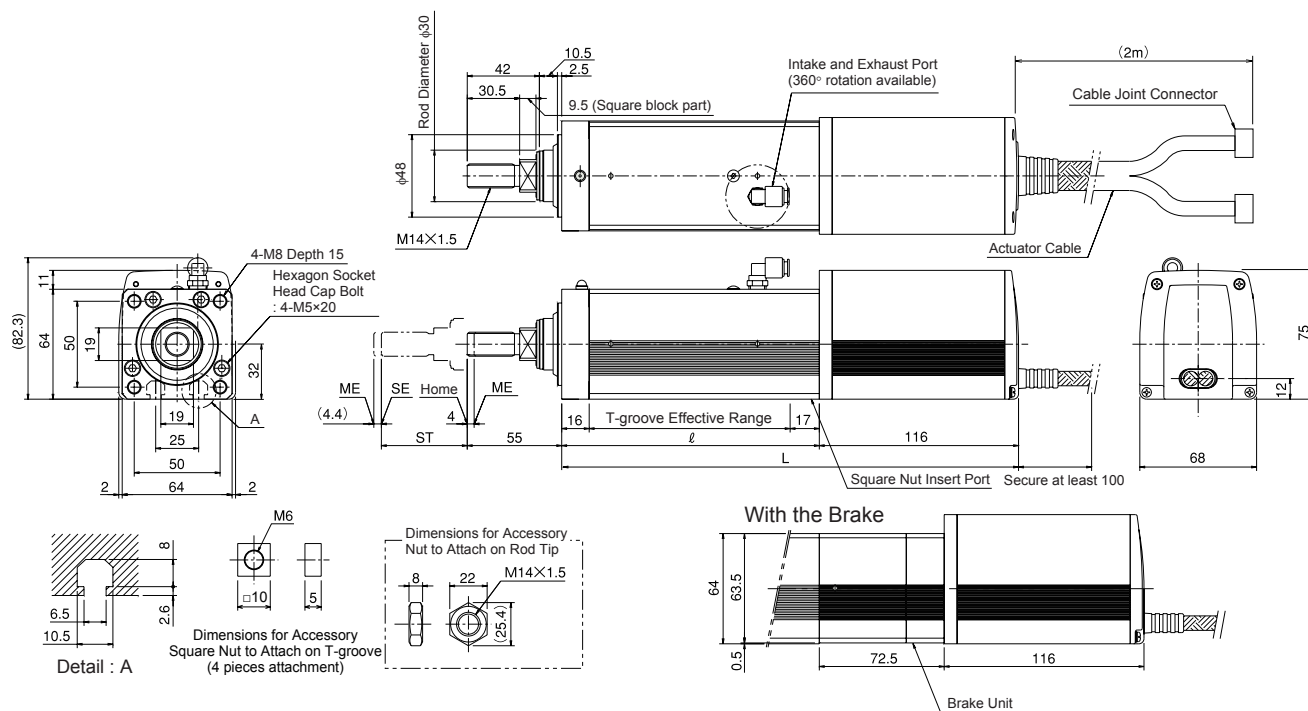
* The brake-equipped type is longer than the standard type in 58mm and heavier in 0.4kg.

■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
ℓ	132.5	182.5	232.5	282.5	332.5	382.5
L	223	273	323	373	423	473
Weight [kg]	1.9	2.1	2.2	2.5	2.9	3.1

13.1.17 RCP2W-RA6C

ME : Mechanical End
SE : Stroke End



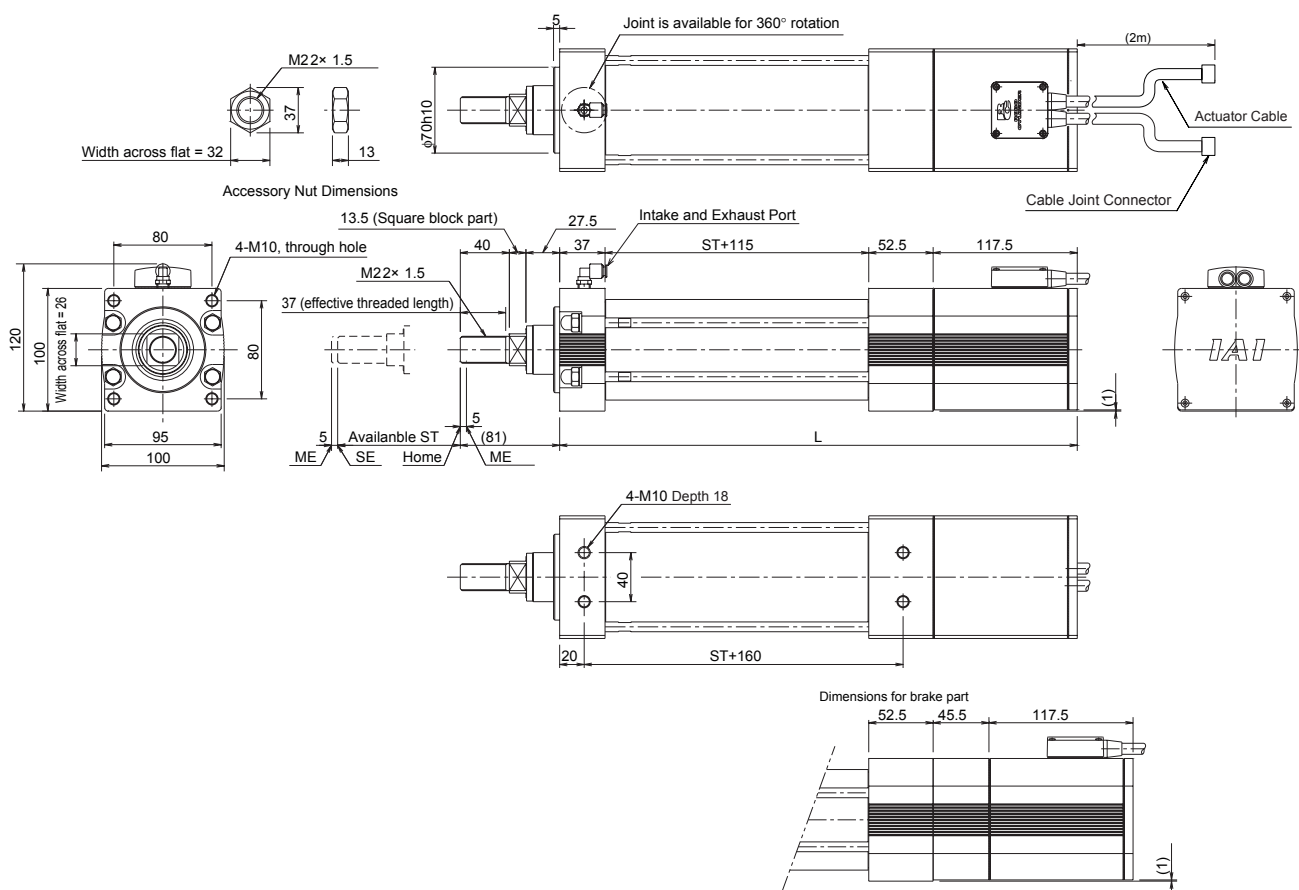
* The brake-equipped type is longer than the standard type in 72.5mm and heavier in 0.9kg.

■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
ℓ	150	200	250	300	350	400
L	266	316	366	416	466	516
Weight [kg]	3.5	4.0	4.5	5.0	5.5	6.0

13.1.18 RCP2W-RA10C

ME : Mechanical End
SE : Stroke End



* The brake-equipped type is longer than the standard type in 45.5mm and heavier in 1.5kg.

■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300
L	372	422	472	522	572	622
Weight [kg]	9	9.5	10	10.5	11	11.5

14. Warranty

14.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after shipment from our factory
- 12 months after delivery to a specified location
- 2500 hours of operation time

14.2 Scope of Warranty

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

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

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

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

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

14.3 Honoring the Warranty

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

14.4 Limited Liability

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

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

- (1) If our product is combined with another product or any system, device, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc. In such a case we will not be liable for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:
 - [1] Medical equipment pertaining to maintenance or management of human life or health
 - [2] Modification or repair performed by a party other than us (unless we have approved such railway facility or aviation facility)
 - [3] Important safety parts of mechanical equipment (such as safety devices)
 - [4] Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact us at the earliest opportunity if our product is to be used in any condition or environment that differs from what is specified in the catalog or operation manual.

14.6 Other Items Excluded from Warranty

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

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

Change History

Revision Date	Revision Description
	First Edition
2010.01	Second Edition
2010.07	Third Edition • “Caution” added to the beginning
2011.04	Fourth Edition • A page for CE Marking addedg
2011.07	Fifth Edition • Contents changed in 5. Transportation in pages 8 • RA8C and RA8R added • Contents changed in 14. Warranty in pages 109 to 110
2011.08	Sixth Edition • RA3R, RA4R and RA6R added
2012.02	Seventh Edition • Contents changed in Safety Guide Caution notes added for when working with two or more persons • “Motor cable CB-RFA-MA□□□” added to 9.2 Cable for PCON and PSEL Controllers • Weight added to 13.1 External Dimensions
2012.02	Eighth Edition • Change made to grease applicable on ball screws for RCP2-RA8C, RA8R, RA10C and RCP2W-RA10C to Multemp PS No. 2 that possesses small low temperature torque
2012.03	Ninth Edition • Contents added and changed in Safety Guide on pages 1 to 7 • Note “Make sure to attach the actuator properly by following this operation manual.” added in Caution in Handling in page 8 • Change made from AQ seal to AQ collar for RCP2-RA10C and RCP2W-RA10C in Pg. 67 • RCP2W-RA4C and RA6C added in the applicable models for the method to supply grease in Pg. 67 • Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care in page 67 and 68

Revision Date	Revision Description
2013.10	Tenth Edition • Contents changed in 12.1.2. Process to replace motor for RA8R.
2013.11	Eleventh Edition • Method to supply grease added for dust proof and drip proof rod type
2014.01	Twelfth Edition • Contents changed in Process to replace motor for RA8C and RA8R type.
2014.02	Thirteenth Edition • Figure for RCA10C Type grease supply inlet added in page 67
2014.08	Fourteenth Edition • Note added for reference of upper limit for times of pressing in page 38
2015.06	Edition 14C • Figure changed for flange bracket RCP2-FL-RA4, RCP2-FL-RA6, RCP2W-FL-RA4, RCP2W-FL-RA6 in page 61 • Figure changed for foot bracket RCP2-FT-RA4, RCP2-FT-RA6 in page 62 • Figure added for foot bracket RCP2W-RA4C, RCP2W-RA6C in page 63
2015.08	Edition 14D • Belts to be used IAI maintenance parts model added in page 72
2016.03	Edition 14E • Note added to ask for cleaning before applying grease on rod slide surface in page 70
2016.04	Edition 14F • The contents about grease supply on rod sliding surface and cleaning are added in page 68
2016.10	Edition 14G • Precautions in Handling Note added stating “Do not attempt to apply any force except for the radial load to actuators equipped with the single guide.”
2016.11	Edition 14H • “Work to Apply Grease on Coupling part” deleted in page 79

Revision Date	Revision Description
2016.12	Edition 14I • RA8C and RA8R to [A] Applicable models added in page 42
2017.02	Edition 14J • Figures added showing directions unacceptable to receive load on single guide in page 9 • Speed reducer added to driving system of RCP2-RA2C in page 33 • Note deleted stating to apply silicon when applying thin head screw Note added stating to apply an adhesive to screw thread for RCP2W dust-proof and splash-proof types in page 72
2017.03	Edition 14L • Precautions in Handling Note added stating not to attempt to apply current exceeding 60% of current limit at positioning stop on controller for RA8C and RA8R in page 8
2018.06	Edition 14M • Pg. 74 Change made to belt manufacturer model code 200S5M300R → 200HP-S5M300
2019.05	Edition 14N • Pg. 21 Correction made 6×6 M4 → 7×7 M4 • Pg. 94,102,105,107 Correction made □6 → □7
2022.11	Edition 14O • 7. Cautions in Operation, External guide mounting added
2024.10	Edition 14P • Pg. 23 1.4 Addition and correction made for controllers applicable for model code • Pg. 72 10.4.1 Grease changed from Multemp LRL 3 to Multemp LRL No.3 • Terms integrated, correction made to description
2025.10	Edition 14Q • Changes due to discontinuation of including the First Step Guide

Revision Date	Revision Description
2026.06	Edition 14R • Terms integrated (cable carrier)



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