



ROBO Cylinder Rod Type

RCA Actuators

RCAW Actuators, Dustproof/Splash-proof Type Operating Manual

===== Eighth Edition =====

Motor Straight Type (Coupling Type)	RA3C,RGS3C,RGD3C,RA4C,RGS4C,RGD4C
Motor Straight Type (Built-in Type)	RA3D,RGS3D,RGD3D,RA4D,RGS4D,RGD4D
Motor Reversing Type	RA3R,RGD3R,RA4R,RGD4R
Motor Straight Type (Coupling Type)	RA3C,RA4C
Motor Straight Type (Built-in Type)	RA3D,RA4D
Motor Reversing Type	RA3R,RA4R

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 Operation Manual is original.
- The product cannot be operated in any way unless expressly specified in this Operation Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Operation Manual is subject to change without notice for the purpose of product improvement.
- If you have any question or comment regarding the content of this manual, please contact the IAI sales office near you.
- Using or copying all or part of this Operation Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

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Safety Guide

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

Safety Precautions for Our Products

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

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

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

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring • Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. • Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. • Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. • When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. • Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. • Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.
		(3) Grounding • The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. • For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm² (AWG20 or equivalent) or more 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). • 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 Operating 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 cover or untightened 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 Operating 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 Operating manual for each model.

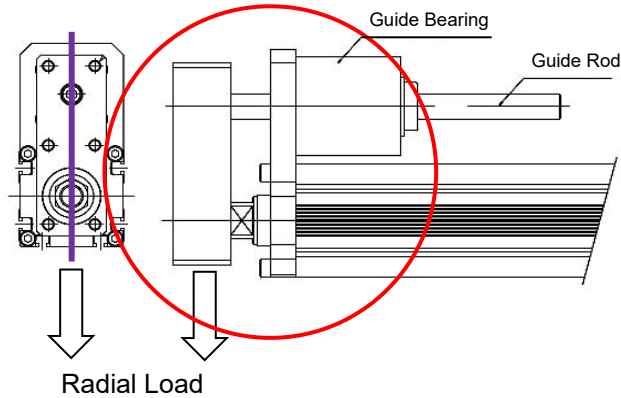
Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could 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

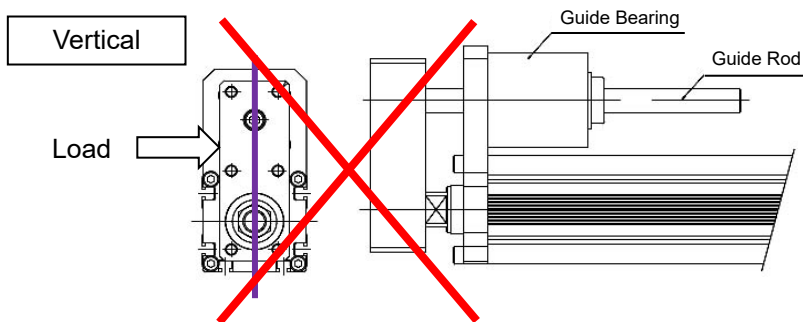
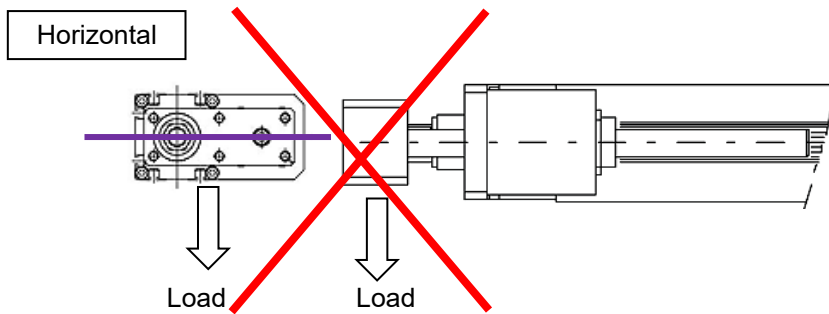
1. Make sure to follow the usage condition, environment and specification range of the product.
In case it is not secured, it may cause a drop in performance or malfunction of the product.
2. Set the allowable load of the move on rod tip within the allowable range.
An operation with the load beyond the allowable load of the move on rod tip may cause an abnormal noise, vibration, malfunction or shortened life. If it is extreme, flaking may occur on the guide.
3. If back and forth operations are performed repeatedly in short distance, it may wear out the film of grease.
Continuous back and forth operation within a distance less than 30mm may cause wear of grease.
As a reference, have approximately 5 cycles of back and forth operation in a distance more than 50mm in every 5,000 to 10,000 cycles to regenerate the oil film. Keep using the actuator with the grease worn out may cause malfunction. If it is extreme, flaking may occur on the guide.
4. Do not apply any rotation torque on the rod.
Doing so may damage the internal component such as the rod stopper, and may result in an operation failure.

- 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.

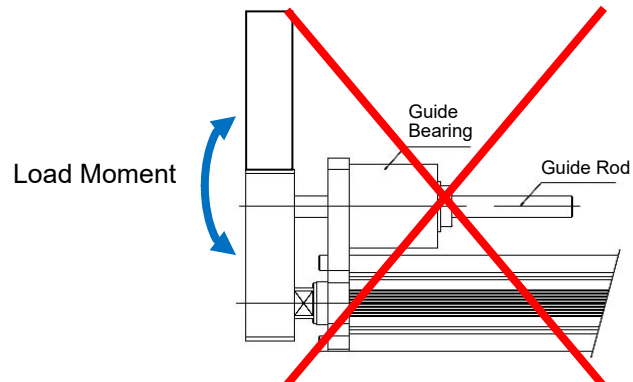
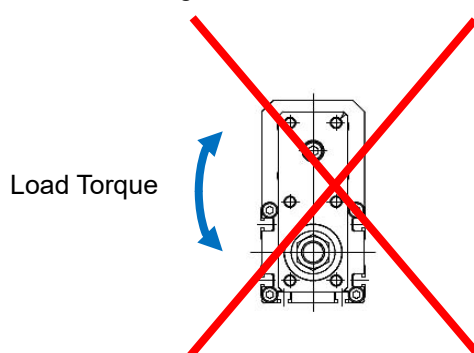
Single guide can receive load only to the vertical direction shown in the figure below (the direction of a line that the rod tip and guide rod tip are joined).



[Direction Unacceptable to Receive Load]



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.



International Standards Compliances

This actuator complies with the following overseas standard.

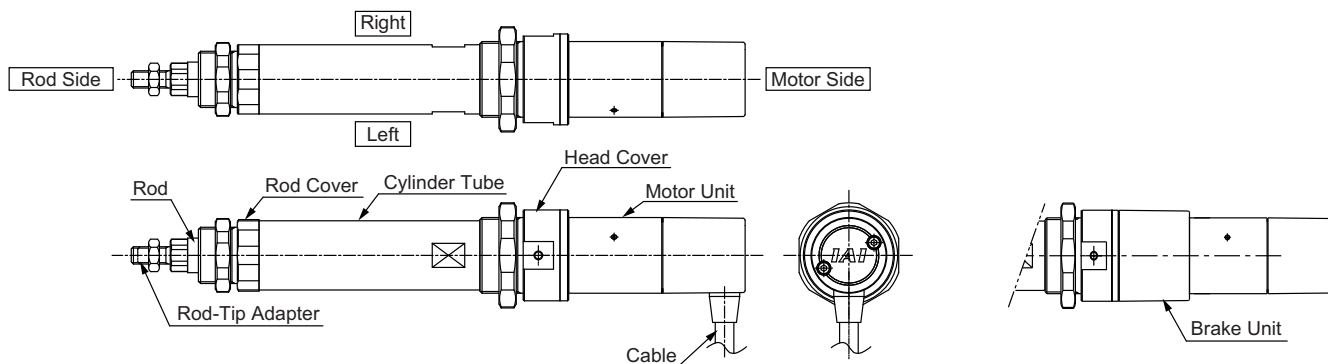
Refer to Overseas Standard Compliance Manual (ME0287) for more detailed information.

RoHS3 Directive	CE Marking
☐	☐

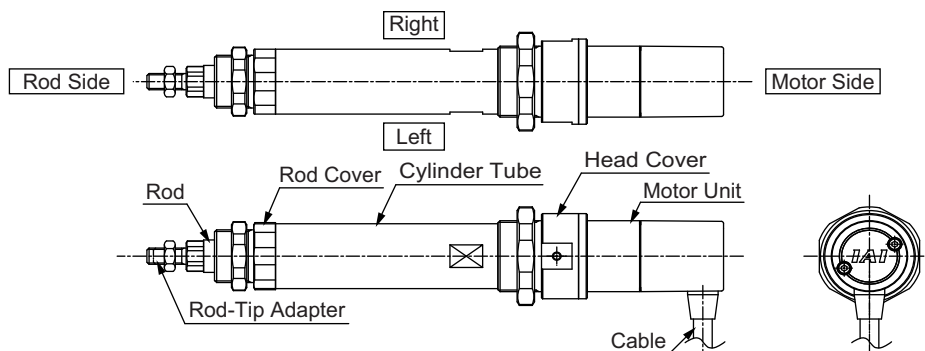
Names of the Parts

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

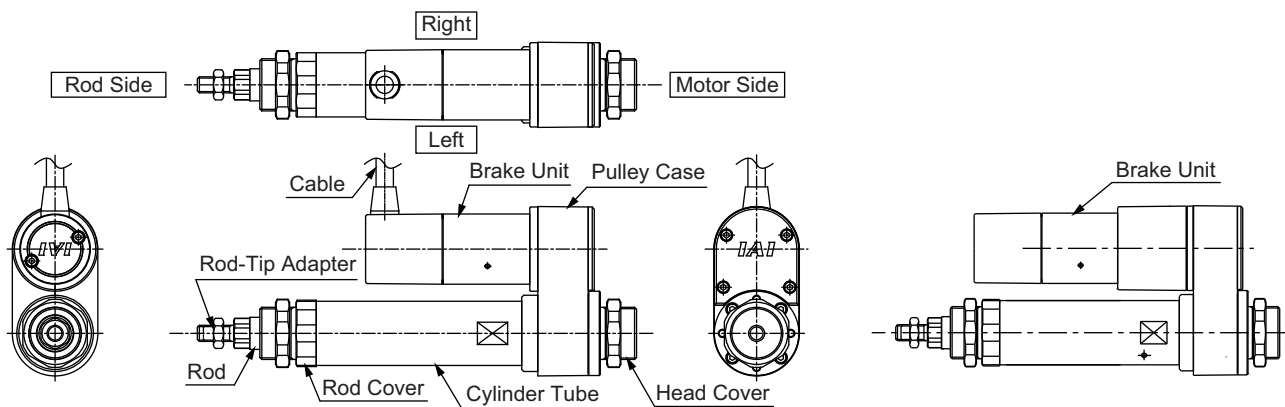
[RA3C, RA4C]



[RA3D, RA4D]

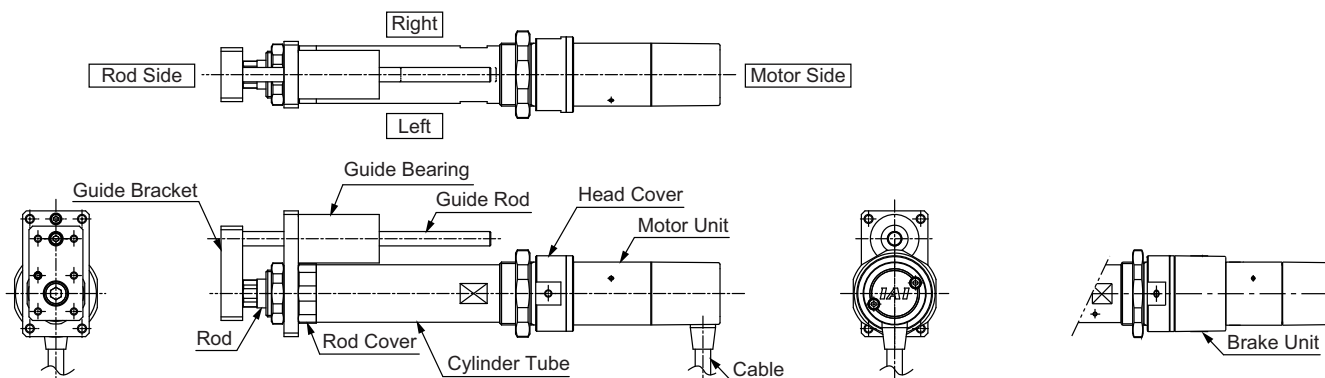


[RA3R, RA4R]



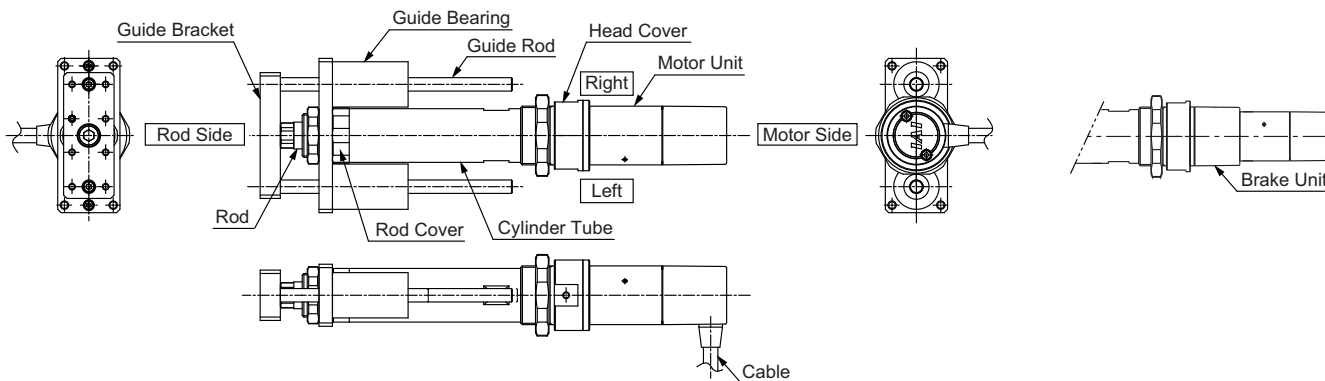
[RGS3C, RGS3D, RGS4C, RGS4D]

RGS3D and RGS4C are non-brake-equipped types.

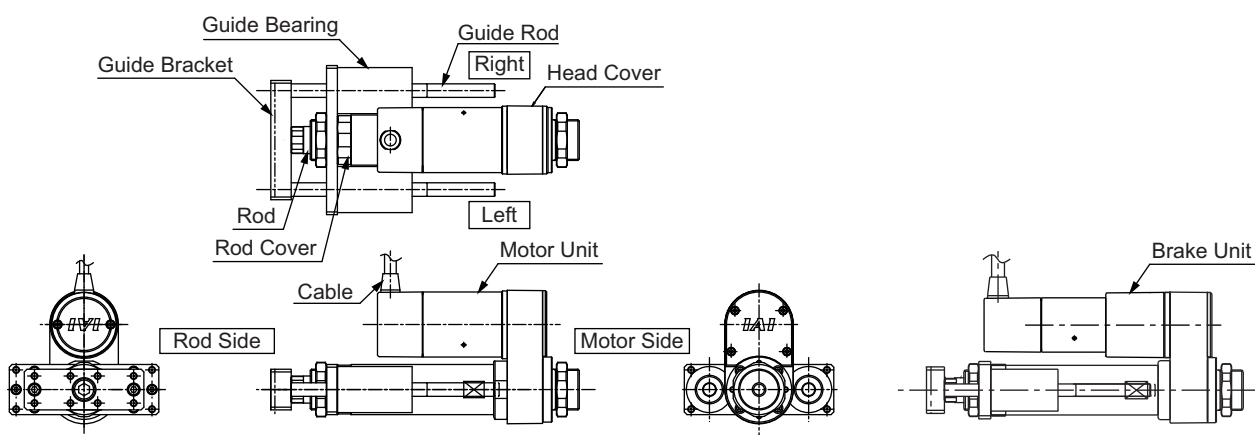


[RGD3C, RGD3D, RGD4C, RGD4D]

RGD3D and RGD4C are non-brake-equipped types.



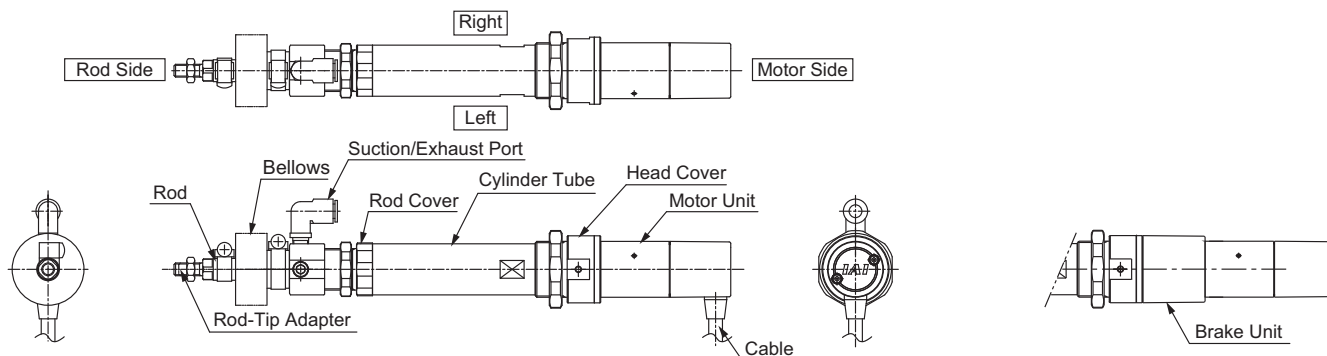
[RGD3R, RGD4R]



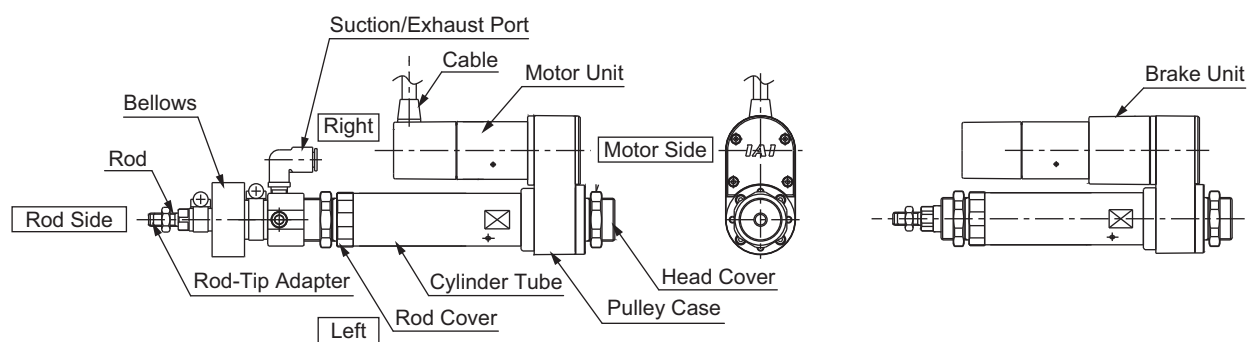
Dust and Splash-Proof Type

[RA3C, RA3D, RA4C, RA4D]

RA3D and RA4D are non-brake-equipped types.



[RA3R, RA4R]



1. Specifications Check

1.1 Checking the Product

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

 **Caution:** Check for the enclosed components referring to the component list. If you find any fault or missing part, contact your local IAI distributor or our company.

1.1.1 Parts

No.	Part Name	Model	Quantity	Remarks
1	Actuator Main Body	Refer to "1.1.3 How to Read the Model Nameplate", "1.1.4 How to Read the Model Number"	1	
Accessories				
2	Motor • Encoder Cable ^{Note1}		1	
3	Nut		Refer to list below	
4	Safety Guide		1	

Model No.	Nut A M26•1.5	Nut B M35•1.5	Nut C M8•1.5	Nut A M30•1.5	Nut B M40•1.5	Nut C M10•1.5
RCA-RA3C	1	1	1			
RCA-RA4C				1	1	1
RCA-RA3D	1	1	1			
RCA-RA4D				1	1	1
RCA-RA3R	2		1			
RCA-RA4R				2		1
RCA-RGS3C	1	1				
RCA-RGS4C				1	1	
RCA-RGS3D	1	1				
RCA-RGS4D				1	1	
RCA-RGD3C	1	1				
RCA-RGD4C				1	1	
RCA-RGD3D	1	1				
RCA-RGD4D				1	1	
RCA-RGD3R	2					
RCA-RGD4R				2		

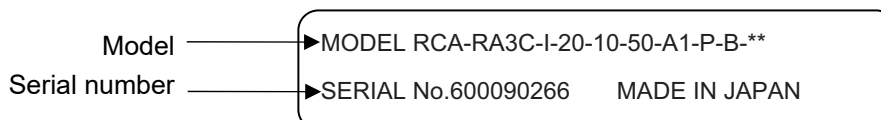
^{Note1} The motor • encoder cables supplied vary depending on the controller used.
[Refer to 1.4, "Motor • Encoder Cables."]

1.1.2 Instruction Manuals related to this product.

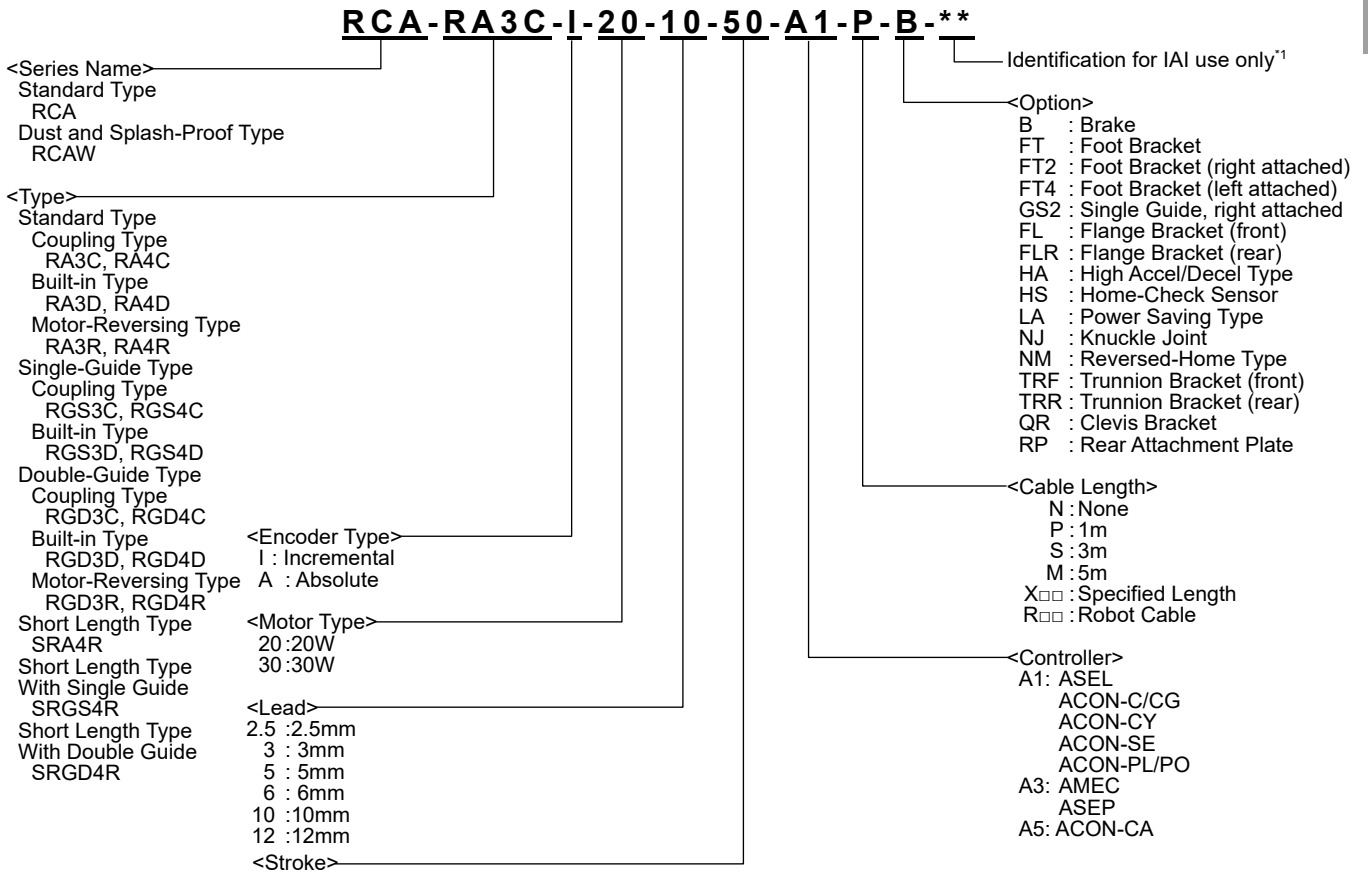
Shown below is a list of the instruction manuals for the controllers related to this product.

No.	Name	Control No.
1	ASEL Controller Operation Manual	ME0165
2	ACON-C/CG Controller Operation Manual	ME0176
3	ACON-CY Controller Operation Manual	ME0167
4	ACON-SE Controller Operation Manual	ME0171
5	ACON-PL/OP Controller Operation Manual	ME0166
6	AMEC Controller Operation Manual	ME0245
7	ASEP/PSEP Controller Operation Manual	ME0216
8	MSEP Controller Operation Manual	ME0299
9	PC software IA-101-X-MX/ IA-101-X-USBMW Operation Manual	ME0154
10	PC software RCM-101MW/RCM-101-USB Operation Manual	ME0155
11	MEC PC Software Operation Manual	ME0248
12	Teaching pendant SEL-T/TD Operation Manual	ME0183
13	Teaching pendant CON-T/TD Operation Manual	ME0178
14	Touch Panel Teaching CON-PT/PD/PG Operation Manual	ME0227
15	Touch Panel Teaching CON-PTA/PDA/PGA Operation Manual	ME0295
16	Touch Panel Teaching SEP-PT Operation Manual	ME0217
17	Simplified Teaching pendant RCM-E Operation Manual	ME0174
18	Data setter RCM-P Operation Manual	ME0175
19	Data setter RCM-PM-01 Operation Manual	ME0182

1.1.3 How to Read the Model Nameplate



1.1.4 How to Read the Model Number



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

1.2 Specification

1.2.1 Speed

Speed limits (Unit: mm/s)

Size	Motor Type	Lead [mm]	Stroke [mm]					
			50	100	150	200	250	300
RA3C RA3D RA3R RGD3C RGD3D RGD3R RGS3C RGS3D	20W	2.5	125					
		5	250					
		10	500					
RA4C RA4D RA4R RGD4C RGD4D RGD4R RGS4C RGS4D	20W	3	150					
		6	300					
		12	600					
RA4C RA4D RA4R RGD4C RGD4D RGD4R RGS4C RGS4D	30W	3	150					
		6	300					
		12	600					

(Note) The speed may not reach the maximum in some ways of the acceleration/deceleration settings.

1.2.2 Maximum Acceleration and Transportable Weight

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

Type	Motor Type	Lead [mm]	Rated Acceleration [G]		Transportable Weight [kg]	Rated Thrust [N]
RA3C	20W	2.5	Horizontal	0.2	18	144.8
			Vertical	0.2	6.5	
		5	Horizontal	1	9	72.4
			Vertical	1	3	
		10	Horizontal	1	4	36.2
			Vertical	1	1.5	
RA3D RA3R	20W	2.5	Horizontal	0.2	18	144.8
			Vertical	0.2	6.5	
		5	Horizontal	0.3	9	72.4
			Vertical	0.3	3	
		10	Horizontal	0.3	4	36.2
			Vertical	0.3	1.5	
RGD3C RGS3C	20W	2.5	Horizontal	0.2	18	144.8
			Vertical	0.2	6.2	
		5	Horizontal	1	9	72.4
			Vertical	1	2.7	
		10	Horizontal	1	4	36.2
			Vertical	1	1.2	
RGD3D RGD3R RGS3D	20W	2.5	Horizontal	0.2	18	144.8
			Vertical	0.2	6.2	
		5	Horizontal	0.3	9	72.4
			Vertical	0.3	2.7	
		10	Horizontal	0.3	4	36.2
			Vertical	0.3	1.2	
RA4C RA4D RA4R	20W	3	Horizontal	0.2	12	75.4
			Vertical	0.2	4	
		6	Horizontal	0.3	6	37.7
			Vertical	0.3	2	
		12	Horizontal	0.3	3	18.9
			Vertical	0.3	1	
RGD4C RGD4D RGD4R RGS4C RGS4D	20W	3	Horizontal	0.2	12	75.4
			Vertical	0.2	3.5	
		6	Horizontal	0.3	6	37.7
			Vertical	0.3	1.5	
		12	Horizontal	0.3	3	18.9
			Vertical	0.3	0.5	

Type	Motor Type	Lead [mm]	Rated Acceleration [G]		Transportable Weight [kg]	Rated Thrust[N]
RA4C	30W	3	Horizontal	0.2	18	113.1
			Vertical	0.2	6.5	
		6	Horizontal	1	9	56.6
			Vertical	1	3	
		12	Horizontal	1	4	28.3
			Vertical	1	1.5	
RA4D RA4R	30W	3	Horizontal	0.2	18	113.1
			Vertical	0.2	6.5	
		6	Horizontal	0.3	9	56.6
			Vertical	0.3	3	
		12	Horizontal	0.3	4	28.3
			Vertical	0.3	1.5	
RGD4C RGS4C	30W	3	Horizontal	0.2	18	113.1
			Vertical	0.2	6	
		6	Horizontal	1	9	56.6
			Vertical	1	2.5	
		12	Horizontal	1	4	28.3
			Vertical	1	1	
RGD4D RGD4R RGS4D	30W	3	Horizontal	0.2	18	113.1
			Vertical	0.2	6	
		6	Horizontal	0.3	9	56.6
			Vertical	0.3	2.5	
		12	Horizontal	0.3	4	28.3
			Vertical	0.3	1	



Caution: Do not set accelerations/decelerations equal to or greater than the respective ratings. Doing so may result in vibration, failure or shorter life.

1.2.3 Driving System • Position Detector

Type	Motor Type	Lead [mm]	No. of Encoder Pulses [P/R]	Drive System	
RA3C RA3D RA3R RGD3C RGD3D RGD3R RGS3C RGS3D	20W	2.5	800	Ball Screw φ8	Rolled C10
		5	800		
		10	800		
RA4C RA4D RA4R RGD4C RGD4D RGD4R RGS4C RGS4D	20W	3	800	Ball Screw φ10	Rolled C10
		6	800		
		12	800		
	30W	3	800		
		6	800		
		12	800		

1.2.4 Positioning Precision

Item	Tolerance
Positioning repeatability	±0.02mm
Backlash	0.1mm or less
Base	Material : Aluminum Anodizing treatment

This is an option already attached when it is shipped out from the factory.
It does not include the consideration of time-dependent change as it is used.

1.2.5 Rod Non-Rotation Accuracy

● Standard

Model Name	Motor Type	Lead [mm]	Rod Diameter	Rod Non-Rotation Accuracy
RA3C	20W	2.5	φ8mm	±1.0°
		5		
		10		
RA3D	20W	2.5	φ8mm	±1.0°
		5		
		10		
RA4C RA4D	20W	3	φ10mm	±1.0°
		6		
		12		
RA4C	30W	3	φ10mm	±1.0°
		6		
		12		
RA4D	30W	3	φ10mm	±1.0°
		6		
		12		

● Motor Reversing

Model Name	Motor Type	Lead [mm]	Rod Diameter	Rod Non-Rotation Accuracy
RA3R	20W	2.5	φ8mm	±1.0°
		5		
		10		
RA4R	20W	3	φ10mm	±1.0°
		6		
		12		
RA4R	30W	3	φ10mm	±1.0°
		6		
		12		

● With single guide

Model Name	Motor Type	Lead [mm]	Rod Diameter	Rod Non-Rotation Accuracy
RGS3C	20W	2.5	φ8mm	±0.05°
		5		
		10		
RGS3D	20W	2.5	φ8mm	±0.05°
		5		
		10		
RGS4C RGS4D	20W	3	φ10mm	±0.05°
		6		
		12		
RGS4C	30W	3	φ10mm	±0.05°
		6		
		12		
RGS4D	30W	3	φ10mm	±0.05°
		6		
		12		

● With double guide

Model Name	Motor Type	Lead [mm]	Rod Diameter	Rod Non-Rotation Accuracy
RGD3C	20W	2.5	φ8mm	±0.05°
		5		
		10		
RGD3D RGD3R	20W	2.5	φ8mm	±0.05°
		5		
		10		
RGD4C RGD4D RGD4R	20W	3	φ10mm	±0.05°
		6		
		12		
RGD4C	30W	3	φ10mm	±0.05°
		6		
		12		
RGD4D RGD4R	30W	3	φ10mm	±0.05°
		6		
		12		

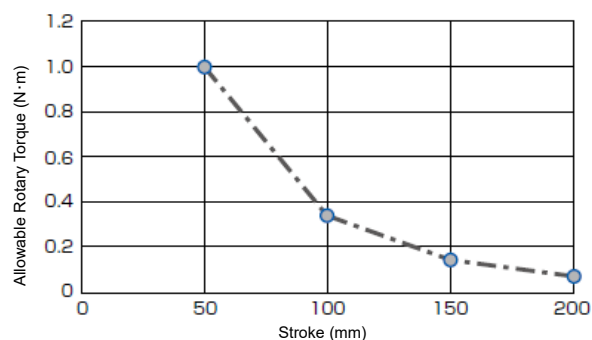
1.2.6 Allowable Running Torque

The allowable torque for each model is as shown below.

Make sure to use the product within the range specified below when applying running torque to the product.

Also, please note that the single guide type is not capable to receive any running torque.

(1) Double guide

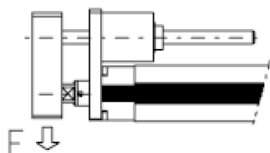


1.2.7 Relation of Allowable Tip Load and Running Life

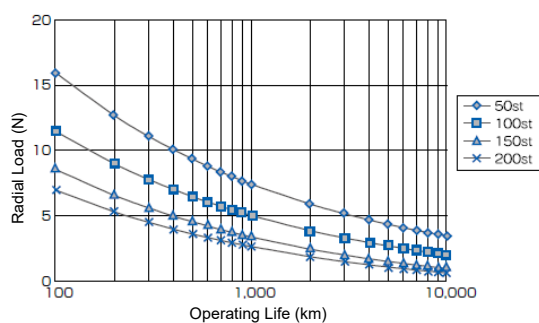
The bigger the load on the tip of the guide gets, the shorter the life becomes.

[1] RG□3□

(1) Single guide RGS3□

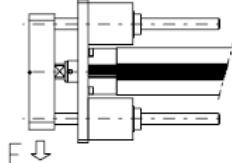


* Single guide type is not capable for any load except for those from the top and bottom.

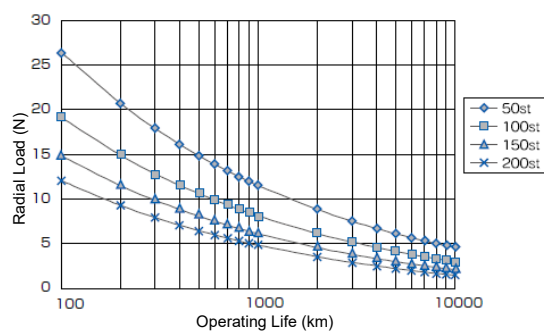
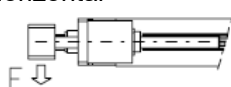


(2) Double guide RGD3□

<Vertical>

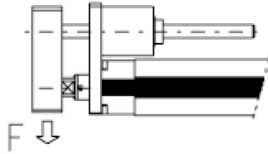


<Horizontal>

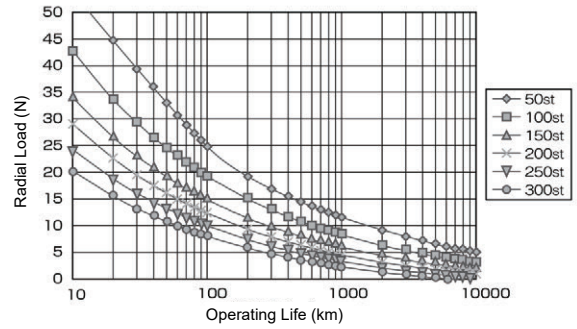


[2] RG□4□

(1) Single guide RGS4□

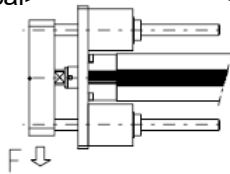


* Single guide type is not capable for any load except for those from the top and bottom.

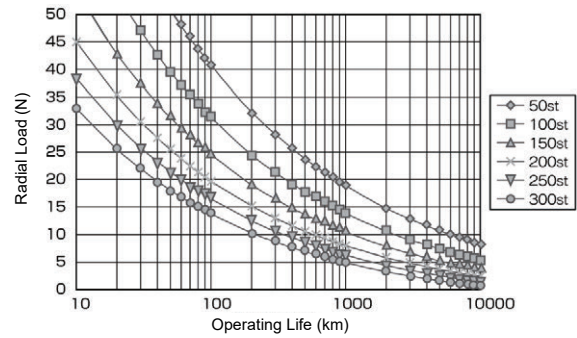
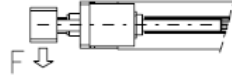


(2) Double guide RGD4□

<Vertical>



<Horizontal>

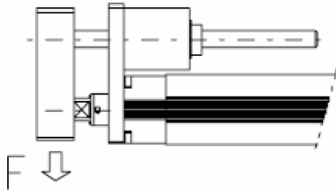


1.2.8 Radial load and Tip Flexure

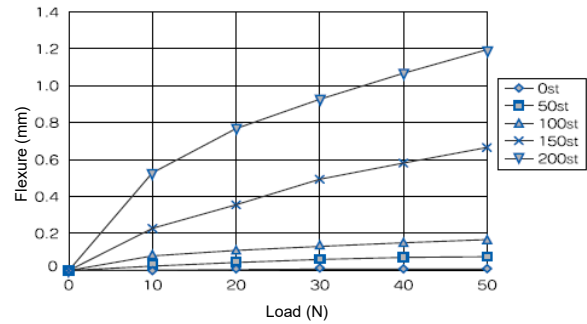
Shown below is the correlation graph of the load applied to the guide tip and the flexure at that time.

[1] RG□3□

(1) Single guide RGS3□



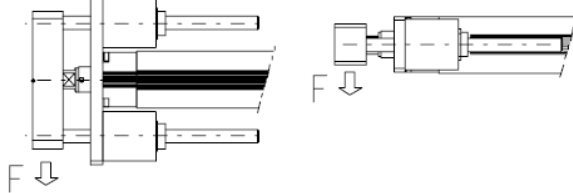
* Single guide type is not capable for any load except for those from the top and bottom.



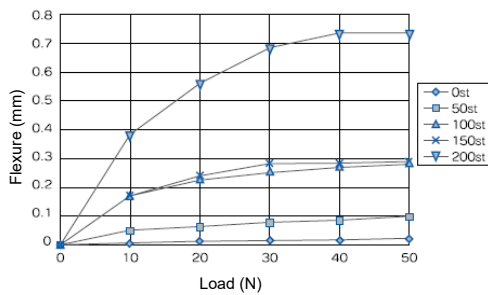
(2) Double guide RGD3□

<Vertical>

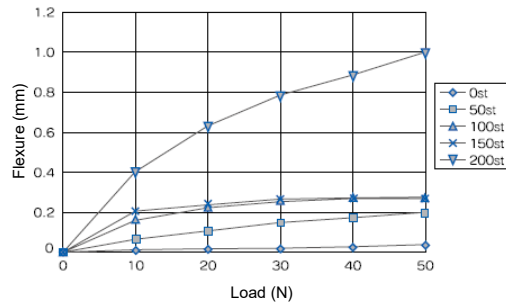
<Horizontal>



Double guide <Vertical> type

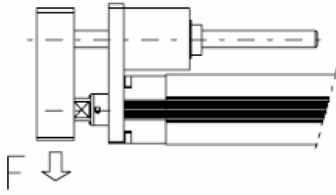


Double guide <Horizontal> type

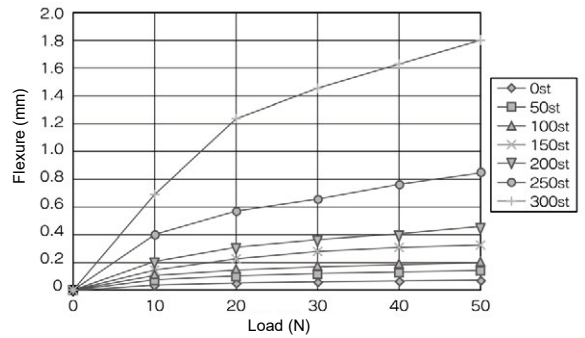


[2] RG□4□

(1) Single guide RGS4□



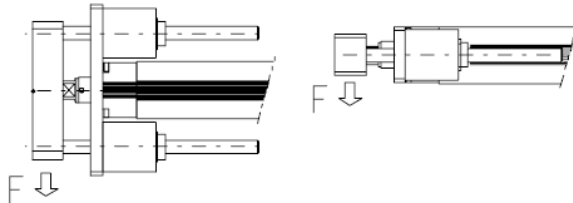
* Single guide type is not capable for any load except for those from the top and bottom.



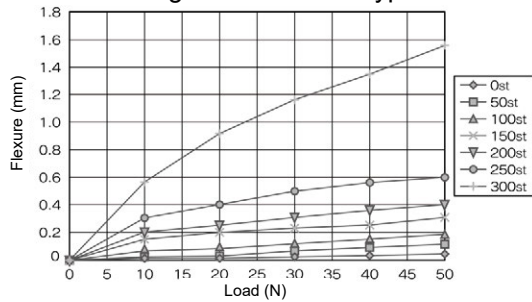
(2) Double guide RGD4□

<Vertical>

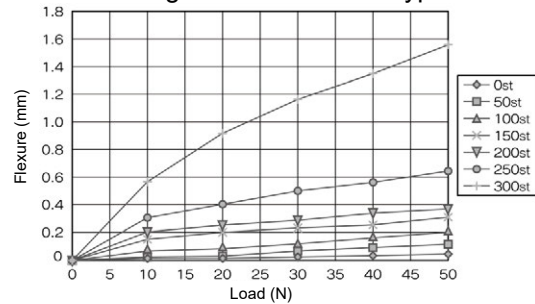
<Horizontal>



Double guide <Vertical> type



Double guide <Horizontal> type



1.2.9 Duty Ratio in Continuous Operation

Perform an operation with the duty ratio below the allowable range.

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



Caution: If the overload error occurs, try either to reduce the duty by extending the stop time or to reduce the acceleration/deceleration speed.

[How to Calculation Duty]

Figure out the load ratio and acceleration/deceleration time ratio, and read the duty ratio from the graph.

If the load ratio is less than 50%, operation with 100% of the duty ratio (continuous operation) is available.

1) Duty ratio LF

The maximum transportable weight at the rated acceleration and the rated acceleration/deceleration speed are described in 1.2 Specifications.

$$\text{Duty ratio:LF} = \frac{M \times \alpha}{M_r \times \alpha_r} \quad [\%]$$

Max. Transportable Weight at Rated Acceleration : M_r [kg]
 Rated Acceleration/Deceleration Speed : α_r [G]
 Transported Weight during Operation : M [kg]
 Acceleration/Deceleration Speed during Operation : α [G]

2) Acceleration/Deceleration Time Ratio t_{od}

Acceleration/Deceleration Time Ratio t_{od} =

$$\frac{\text{Acceleration Time during Operation} + \text{Deceleration Time during Operation}}{\text{Deceleration time}} \quad [\%]$$

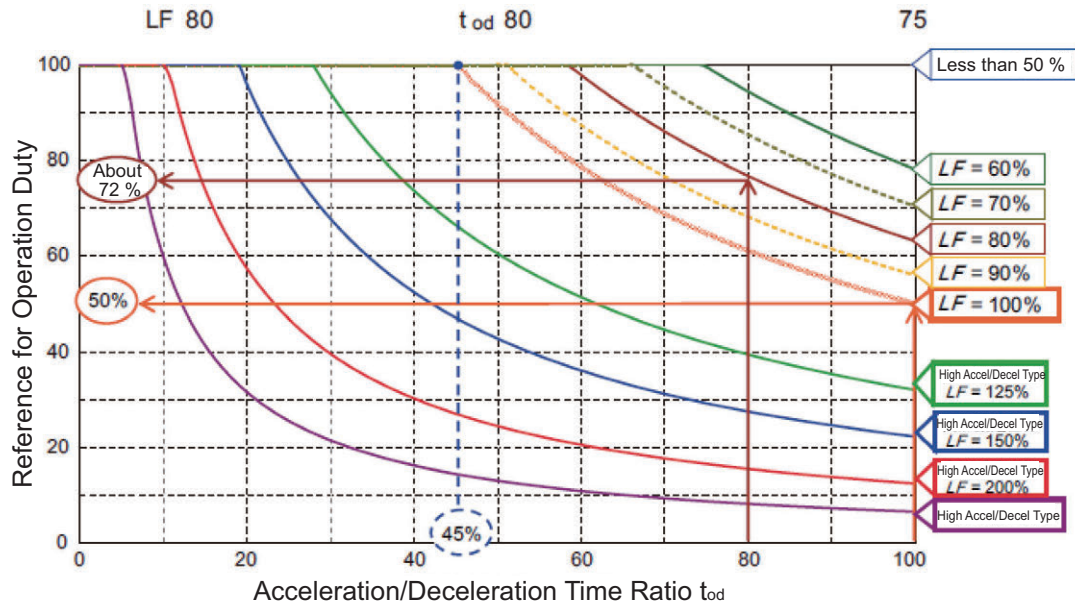
$$\text{Acceleration time} = \frac{\text{Speed during Operation} [\text{mm/s}]}{\text{Acceleration during Operation} [\text{mm/s}^2]} \quad [\text{Sec}]$$

$$\text{Deceleration time} = \frac{\text{Speed during Operation} [\text{mm/s}]}{\text{Deceleration during Operation} [\text{mm/s}^2]} \quad [\text{Sec}]$$

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

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

- 3) From the load ratio LF and the acceleration/deceleration time ratio t_{od} that were used to figure out the duty ratio, read the duty ratio.
 e.g.) When the load ratio $LF = 80\%$ and the acceleration/deceleration time ratio $t_{od} = 80\%$, the reference for the duty is approximately 75%.



1.2.10 Protection class

RCAW-RA3C/RA3D/RA3R/RA4C/RA4D/RA4R = IP54

1.3 Options

1.3.1 Brake Type (Model No.: B)

The brake is a mechanism designed to prevent the rod from dropping on a vertically installed actuator when the power or servo is turned OFF.

Use the brake to prevent the installed load, etc., from being damaged due to the falling rod.

The model code should be expressed with B.

1.3.2 High Acceleration/Deceleration Type (Model No.: HA)

This is an option to upgrade the rated acceleration (0.3G) of the standard type to 1G.

This enables the operation with the transported weight same as at 0.3G even with 1G of the acceleration.

Since the setting of the controller is different from that for the standard type, it is necessary also to have the controller made applicable for the high acceleration/deceleration type when operating with high acceleration/deceleration.

The model code should be expressed with HA.

1.3.3 Home-Position Check Sensor (Model No.: HS)

This is a sensor to monitor the rod to see if it is certainly moved to the home position when a home-return is executed.

* This cannot be used for the home reversed type.

The model code should be expressed with HS.

1.3.4 Power Saving Type (Model No.: LA)

This is an option to reduce the power domain in the controller.

For standard type / high acceleration/deceleration type, if the power saving type is selected, the power consumption can be dropped down to 3.4A at maximum, which the maximum is 5.1A in normal use.

(The maximum value may differ depending on the model. Refer to the power capacity of ACON/ASEL Controller for the detail.)

The model code should be expressed with LA.

1.3.5 Motor Left Reversed, Motor Right Reversed (Model No.: NM)

From the view of the motor side, the type with the motor reversed to the left is ML, and the motor reversed to the right is MR.

The model code should be expressed with NM.

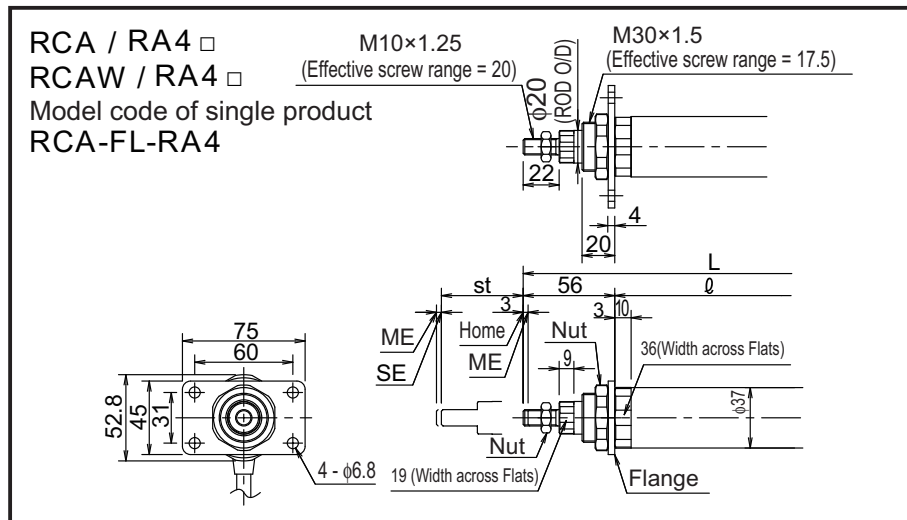
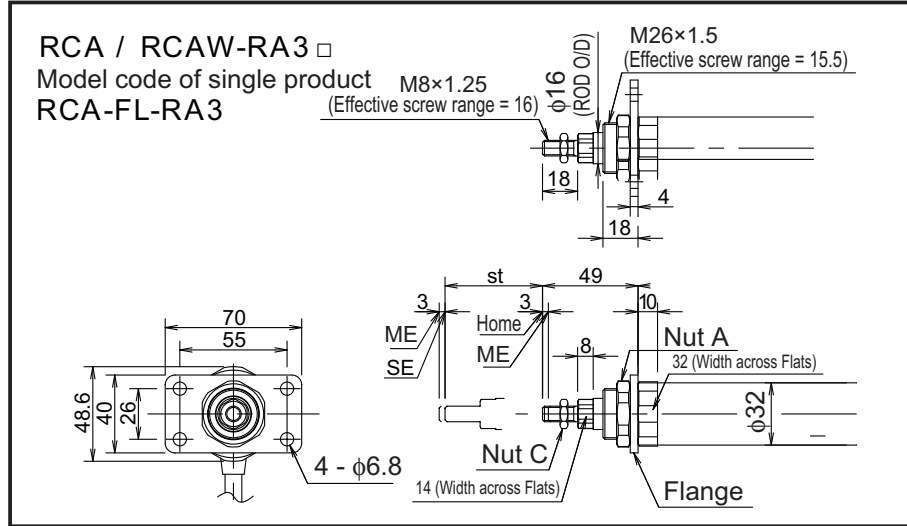
1.3.6 Guide Attachment Directions (Only for Single guide type)

(Model No. : Attached on the right (GS2), attached on the bottom (GS3) and attached on the left (GS4).)

The rod attachment position for the Single Guide type, can be selected from "Attachment on the Right", "Attachment on the Bottom" and "Attachment on the Left".

1.3.7 Front Flange (Model No. : FL)

This metal part is used for fixing the actuator from the actuator body side using the bolts.

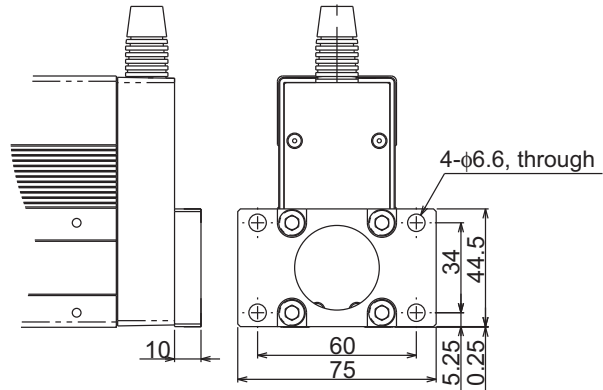


1.3.8 Rear Flange (Model No. : FLR)

This metal fitting is used for fixing the actuator from the actuator rear side.

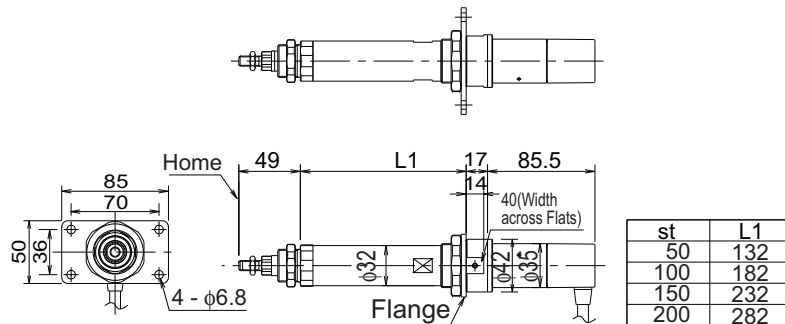
RCA-SRA4 R

Model code of single product RCA-FL-SRA4



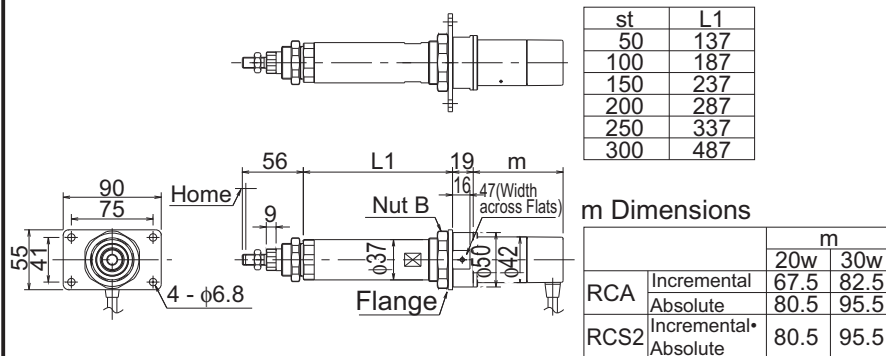
RCA / RCAW-RA3C, RA3D

Model code of single product RCA-FLR-RA3



RCA / RCAW-RA4C, RA4D

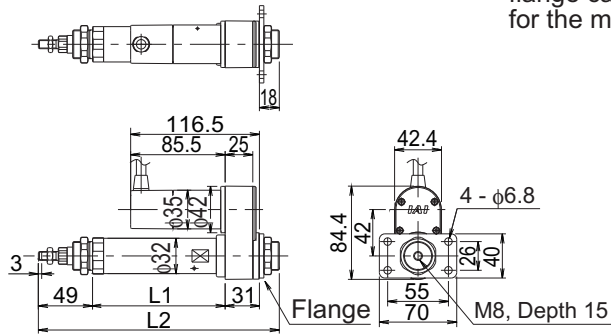
Model code of single product RCA-FLR-RA4



RCA / RCAW-RA3R

Model code of single product RCA-FL-RA3

*The front flange and the rear flange can be used in common for the motor reversing type.

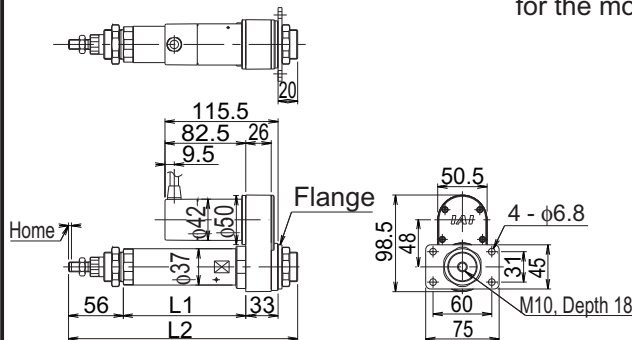


st	L1	L2
50	120	218
100	170	268
150	220	318
200	270	368

RCA / RCAW-RA4R

Model code of single product RCA-FL-RA4

*The front flange and the rear flange can be used in common for the motor reversing type.

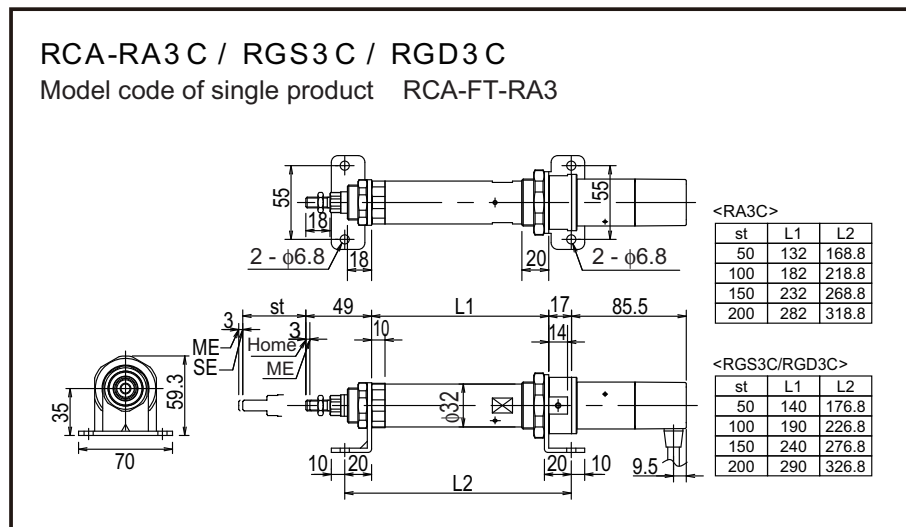
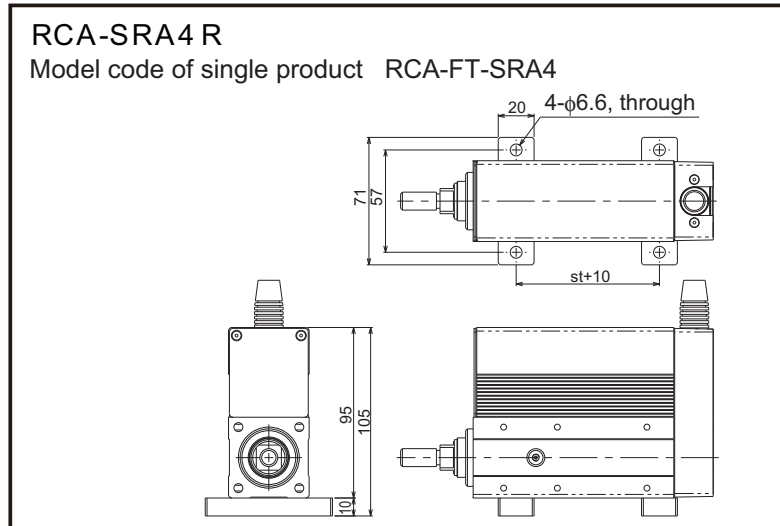


st	L1	L2
50	125	234
100	175	284
150	225	334
200	275	384
250	325	434
300	375	484

1.3.9 Foot (Model No. : FT)

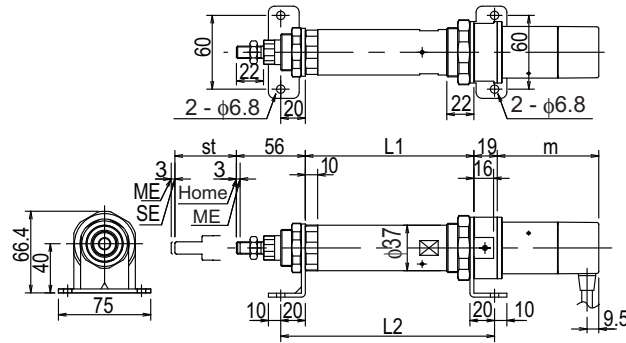
This metal part is used for fixing the actuator from the top side using the bolts.

* Refer to the attachment pitch size in the drawing for each actuator, for the attachment pitch between the foot metal parts.



RCA -RA4 C / RGS4 C / RGD4 C

Model code of single product RCA-FT-RA4



<RA4C>

st	L1	L2
50	137	173.8
100	187	223.8
150	237	273.8
200	287	323.8
250	337	373.8
300	487	423.8

<RGS4C/RGD4C>

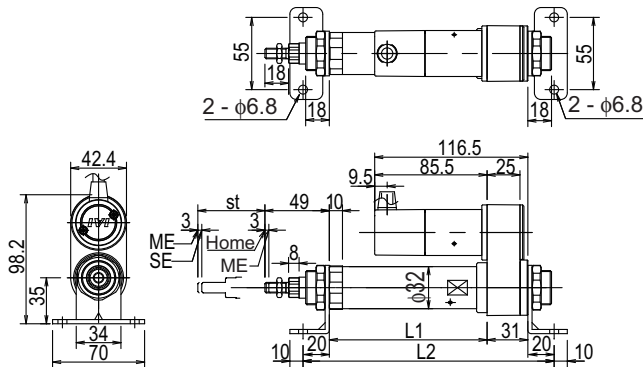
st	L1	L2
50	145	181.8
100	195	231.8
150	245	281.8
200	295	331.8
250	345	381.8
300	495	431.8

m Dimensions

		m	
		20w	30w
RCA	Incremental	67.5	82.5
	Absolute	80.5	95.5
RCS2	Incremental	80.5	95.5
	Absolute	80.5	95.5

RCA / RA3 R / RGS3 R / RGD3 R

Model code of single product RCA-FT-RA3R



<RA3R>

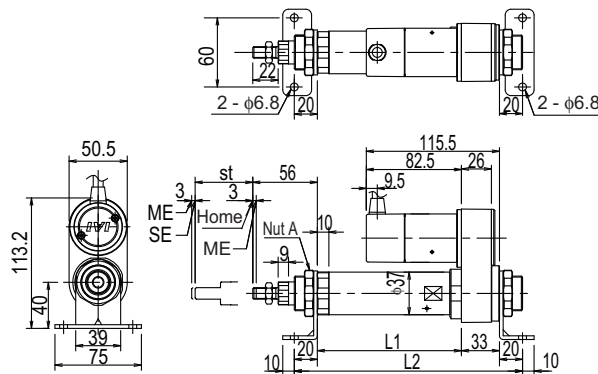
st	L1	L2
50	120	191
100	170	241
150	220	291
200	270	341

<RGS3R/RGD3R>

st	L1	L2
50	128	199
100	178	249
150	228	299
200	278	349

RCA -RA4 R / RGS4 R / RGD4 R

Model code of single product RCA-FT-RA4R



<RA4R>

st	L1	L2
50	125	198
100	175	248
150	225	298
200	275	348
250	325	398
300	375	448

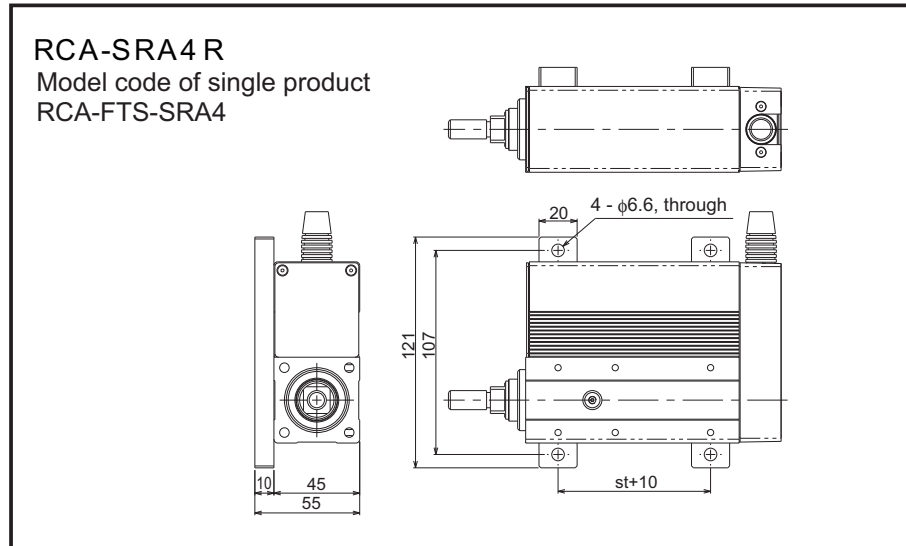
<RGS4R/RGD4R>

st	L1	L2
50	133	206
100	183	256
150	233	306
200	283	356
250	333	406
300	383	456

1.3.10 Foot (Attached on the Right Side/Left Side)

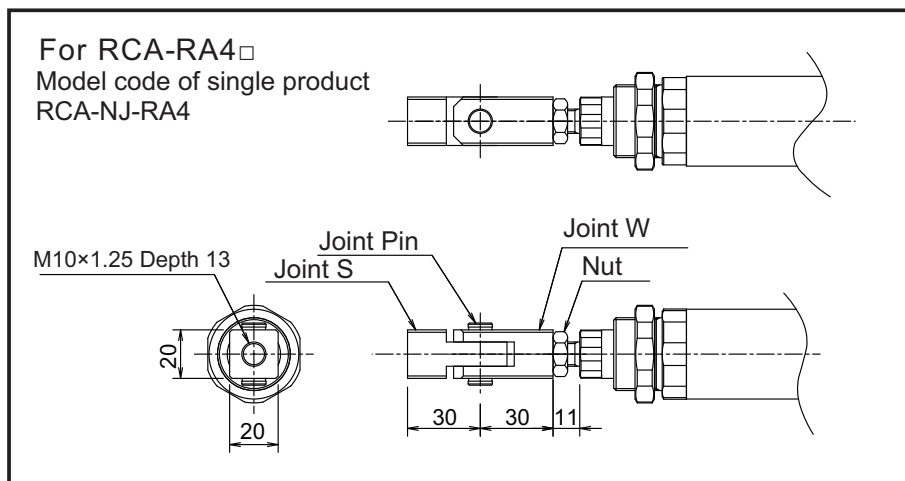
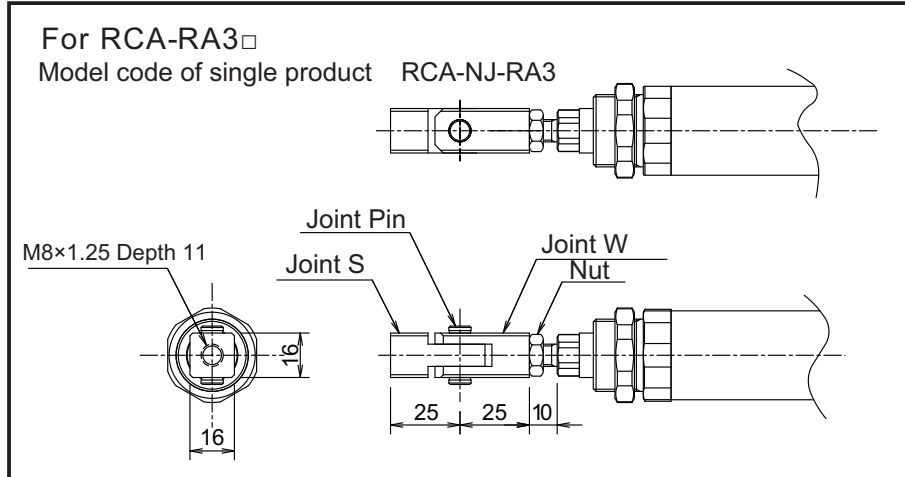
(Model No.: FT2 (Attached on the Right Side), FT4 (Attached on the Left Side))

This metal part is used for fixing the actuator from the top side using the bolts. For RCA-SRA4R, the actuator can be attached also to the side.



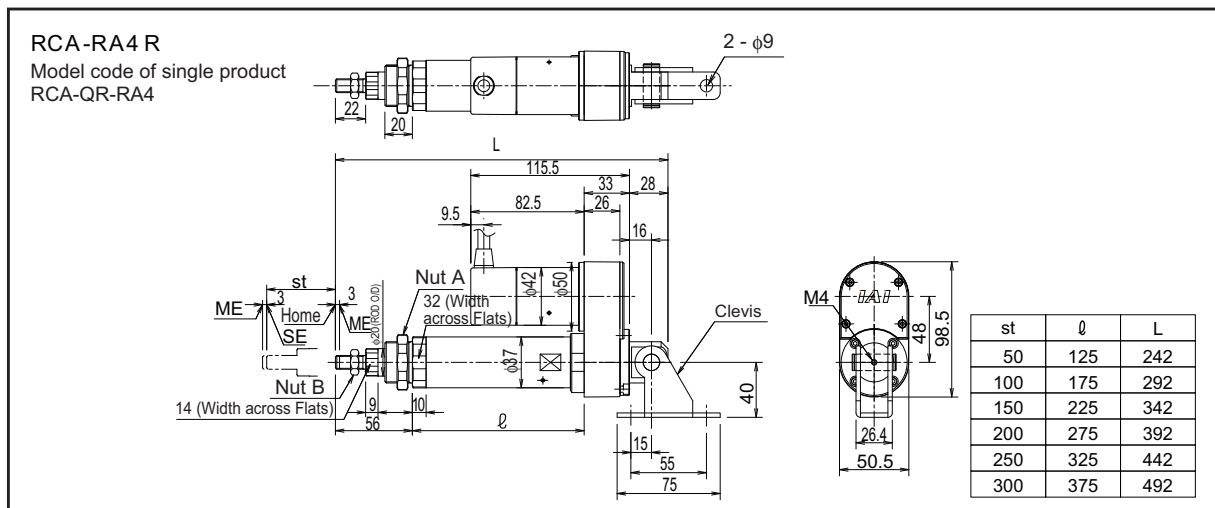
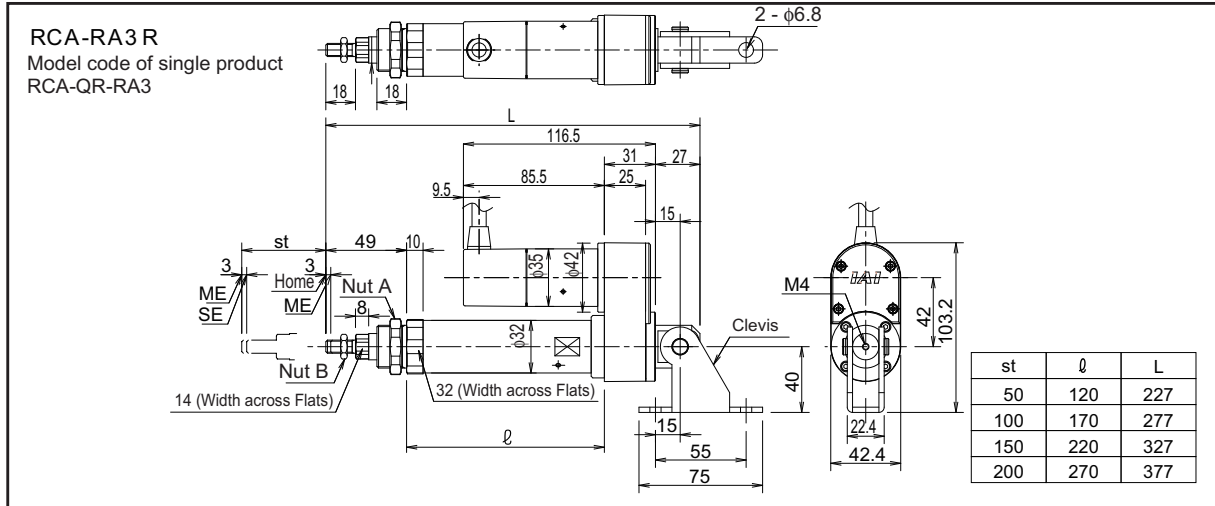
1.3.11 Knuckle Joint (Model No. : NJ)

This metal part is used to give some degree of freedom (rotation) in the movement at the rod end of the actuator when Clevis or trunnion part is used.



1.3.12 Clevis (Model No. : QR)

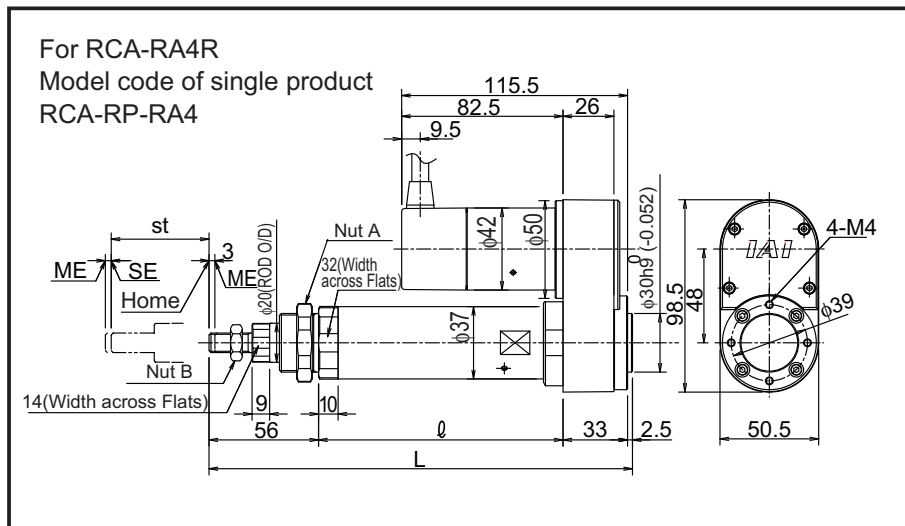
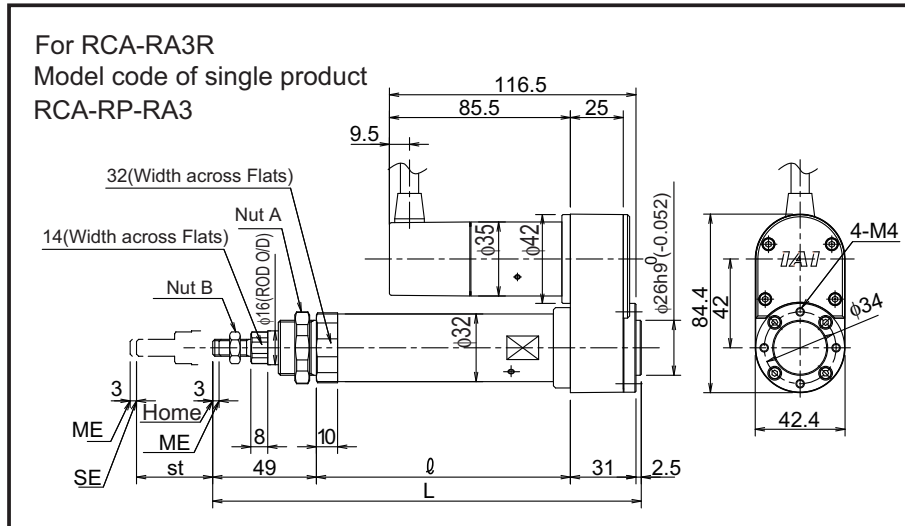
This bracket is used to make the cylinder follow up when the movement of an object attached on the tip of the rod is different from the direction of rod movement. Attach on the rod.



Caution: Attach the external guide so that any load is not given to the rod other than in the forward direction, when the Clevis bracket is attached and rod is moved.

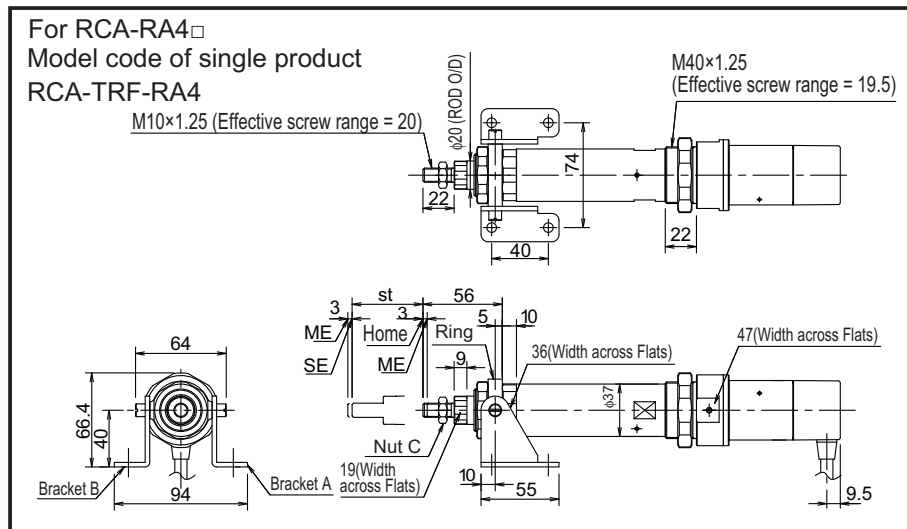
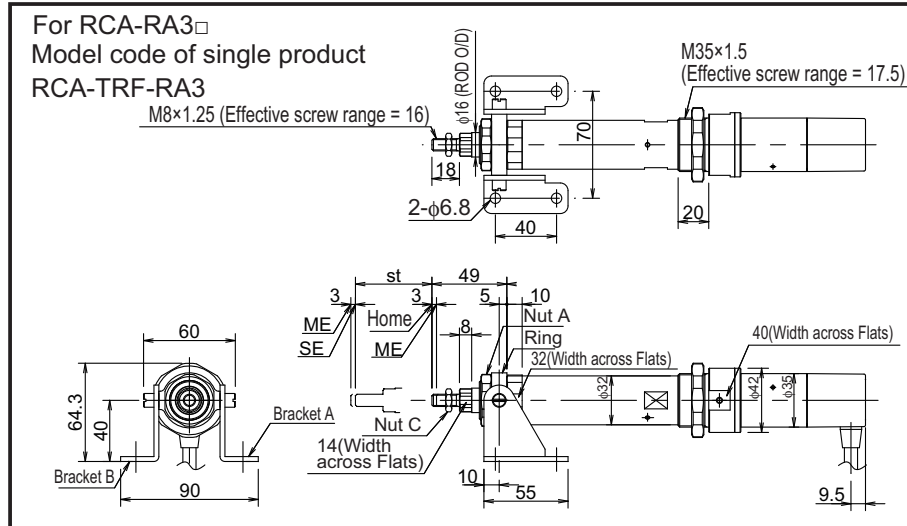
1.3.13 Rear Attachment Plate (Model No. : RP)

This plate is used to fix the rear side of the motor reversing rod type (RA3R/RA4R) onto the system.



1.3.14 Front Trunnion (Model No. : TRF)

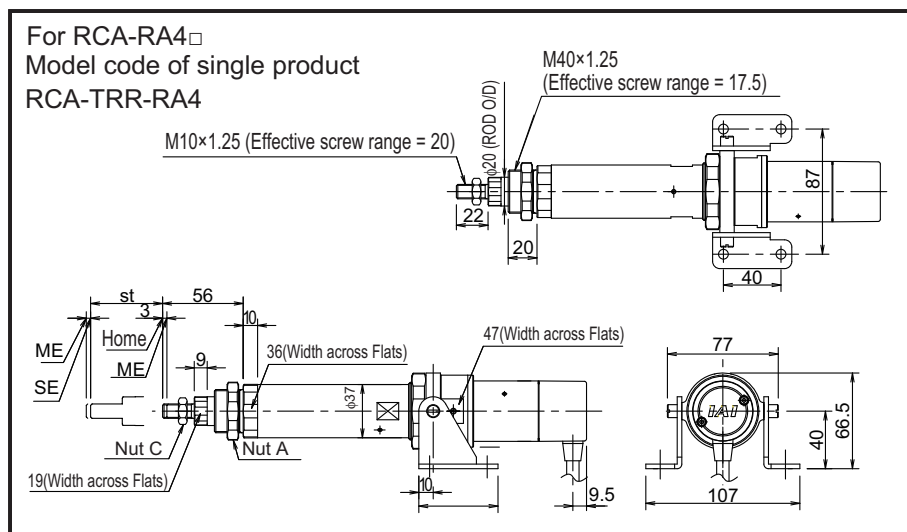
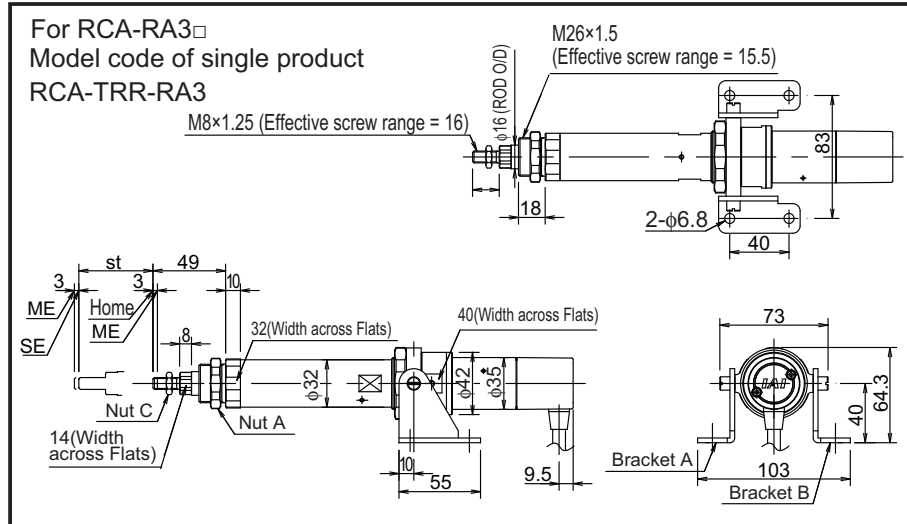
This bracket is used to make the cylinder follow up when the movement of an object attached on the tip of the rod is different from the direction of rod movement. Attach on the rod.



Caution: Use the guide equipped type or attach the external guide so that any load is given to the rod other than in the forward direction, when the trunnion is attached and the rod is moved.

1.3.15 Rear Trunnion (Model No. : TRR)

This bracket is used to make the cylinder follow up when the movement of an object attached on the tip of the rod is different from the direction of rod movement. Attach on the rod.

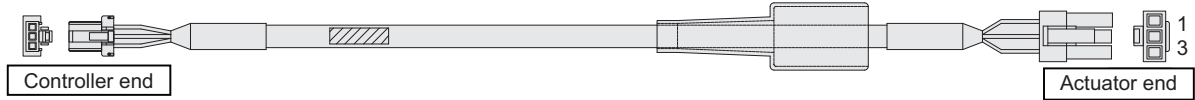


Caution: Use the guide equipped type or attach the external guide so that any load is given to the rod other than in the forward direction, when the trunnion is attached and the rod is moved.

1.4 Motor • Encoder Cables

1.4.1 Motor cable

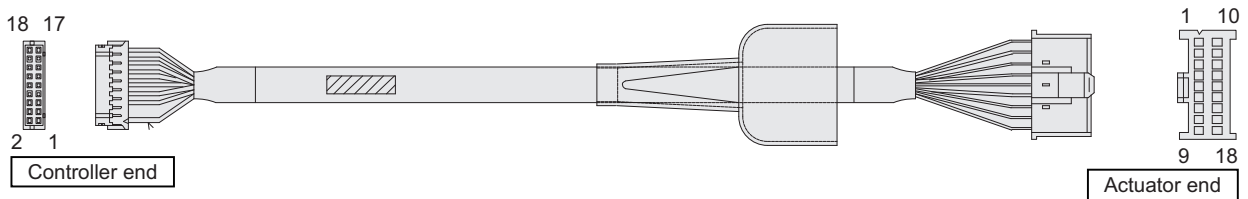
CB-ACS-MA □□□

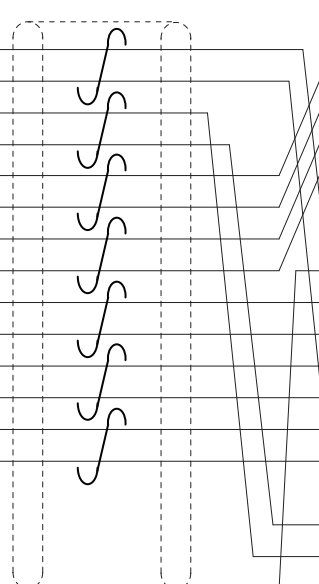


Width	Cable Color	Signal Name	Pin No.	Pin No.	Signal Name	Cable Color	Width
AWG22 (crimped)	Red	U	1	1	U	Red	AWG22 (crimped)
	White	V	2	2	V	White	
	Black	W	3	3	W	Black	

1.4.2 Encoder cable/robot encoder cable

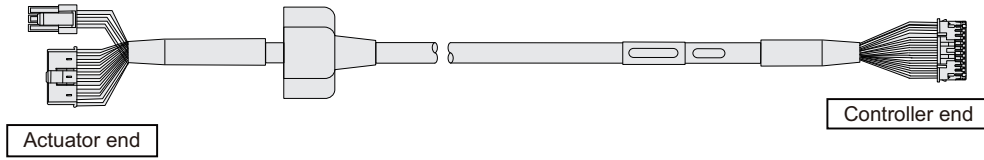
CB-ACS-PA □□□/CB-ACS-PA □□□-RB



Width	Cable Color	Signal Name	Pin No.		Pin No.	Signal Name		Cable Color	Width
						For ABZ	For Serial		
AWG26 (crimped)	White/purple	LS +	18		1	A +	-	White/blue	AWG26 (crimped)
	White/gray	LS -	17		2	A -	-	White/yellow	
	Yellow	BK +	16		3	B +	-	White/red	
	Blue	BK -	15		4	B -	-	White/black	
	White/blue	A +	14		5	-	-	-	
	White/yellow	A -	13		6	-	-	-	
	White/red	B +	12		7	LS +	LS +	White/purple	
	White/black	B -	11		8	-	-	-	
	Orange	SD/Z +	10		9	FG	FG	Drain	
	Green	SD/Z -	9		10	Z +	SD +	Orange	
	Purple	BAT +	8		11	Z -	SD -	Green	
	Gray	BAT -	7		12	-	BAT +	Purple	
	Red	VCC	6		13	/PS	BAT -	Gray	
	Black	GND	5		14	VCC	VCC	Red	
	-	-	4		15	GND	GND	Black	
	-	-	3		16	LS -	LS -	White/gray	
	-	-	2		17	BK -	BK -	Blue	
	Drain	FG	1		18	BK +	BK +	Yellow	

1.4.3 Motor/Encoder Integrated Robot Cable for ACON-CA/AMEC/ASEP

CB-ASEP2-MPA □□□



Width	Cable Color	Signal Name	Pin No.	Pin No.	Signal Name	Cable Color	Width
AWG22 (crimped)	Red	U	1	1	U	Red	AWG22 (crimped)
	Yellow	V	2	2	V	Yellow	
		NC		3	NC		
		NC		4	NC		
AWG25 (crimped)	Black	W	3	5	W	Black	AWG25 (crimped)
		NC		6	NC		
	Orange	BK+	18	7	BK+	Orange	
	Gray	BK-	17	8	BK-	Gray	
	Black	LS+	7	9	LS+	Black	
	Brown	LS-	16	10	LS-	Brown	
	White	A+	1	11	A+	White	
	Yellow	A-	2	12	A-	Yellow	
	Red	B+	3	13	B+	Red	
	Green	B-	4	14	B-	Green	
	Black	Z+/SD+	10	15	Z+/SD+	Black	
	Brown	Z-/SD-	11	16	Z-/SD-	Brown	
	White	VCC	14	17	VCC	White	
	Yellow	GND	15	19	GND	Yellow	
AWG22	Red	VPS/BAT-	13	18	VPS/BAT-	Red	AWG22
	Green	Spare	6	20	Spare	Green	
		NC	5	21	BAT+	White	
		NC	8	22	NC		
	White	BAT+	12	23	NC		
		FG	9	24	FG		

2. Installation

2.1 Transportation

[1] Handling of Robot

Unless otherwise specified, the actuators are packaged individually.

(1) Handling the Packed Unit

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

(2) Handling the Actuator After Unpacking

- Do not attempt to carry the actuator with holding a cable or move it by pulling a cable.
- Hold either the base part or the bracket part when transporting the actuator main body.
- Do not hit or drop the actuator during transportation.
- Do not carry an actuator by motor unit and a cable or attempt to move it by pulling the cable.

[2] Handling in Assembled Condition

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

(1) How to Handle in Package

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

(2) How to Handle after Unpackaged

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

[3] Handling in Condition of being assembled in Machinery Equipment (System)

This is some caution notes for when transporting the actuator being assembled in the machinery equipment (system).

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

2.2 Installation and Storage • Preservation Environment

[1] Installation Environment

The actuator should be installed in a location other than those specified below.

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

Also provide sufficient work space required for maintenance inspection.

- Where the actuator receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 0 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds 85% RH
- The product will possess water-proof performance of the protection structure of IP65 if air purge is conducted.
- Where the actuator receives direct sunlight
- Where the actuator is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of powder dust, salt or iron (at level exceeding what is normally expected in an assembly plant)
- Where the actuator is subject to splashed water, oil (including oil mist or cutting fluid) or chemical solutions
- Where the actuator receives impact or vibration

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

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

[2] Storage • Preservation Environment

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

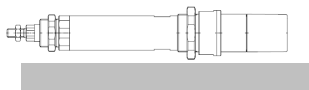
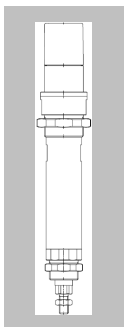
2.3 How to Installation

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

2.3.1 General Rules on Installation

Follow the information below when installing the actuator, as a rule.
Do pay attention to these items (except with custom-order models).

○: Available × : Not available

Horizontally Oriented Mount	Vertical Mount
	
○	○

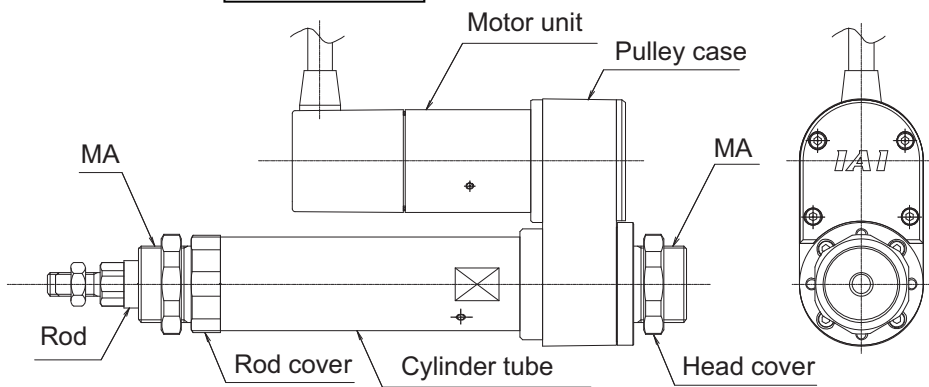
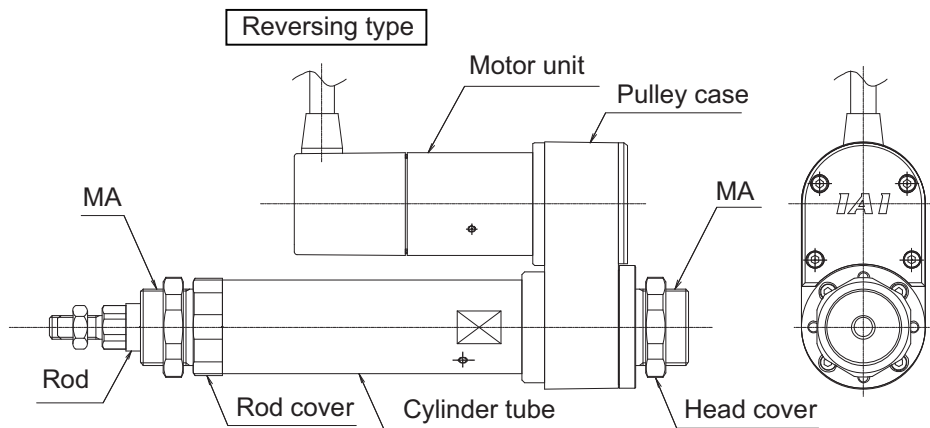
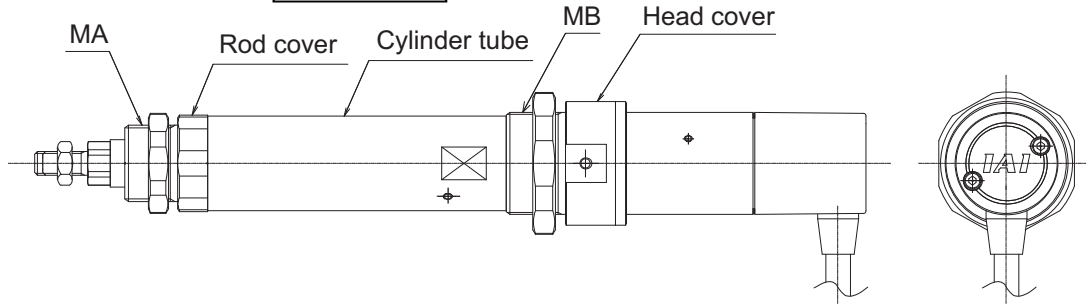
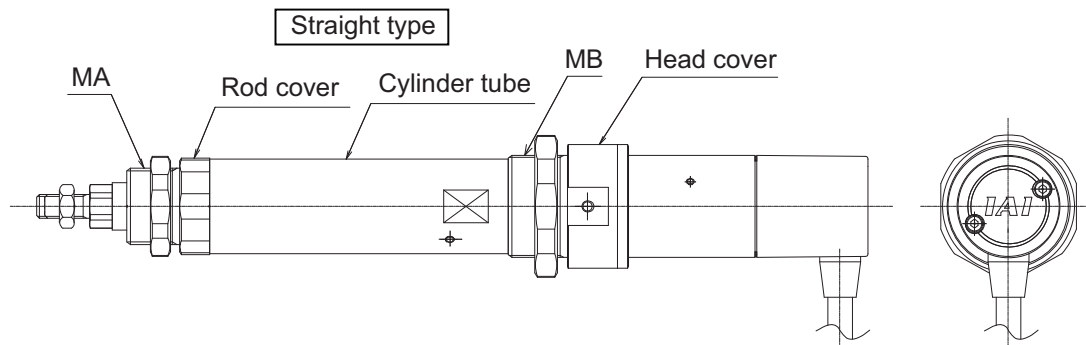


Caution: When the unit is installed vertically oriented, attempt to put the motor up unless there is a special reason. Putting the motor on the lower side would not cause a problem in an ordinary operation. However, it may rarely cause a problem, when it is not operated for a long period, depending on the surrounding environment (especially high temperature), caused by the grease being separated and the base oil flowing into the motor unit.

2.3.2 Installation

- (1) Using screws on the rod or head side
Install the actuator using screws set on the rod or head side of the actuator.

● Applicable models: All models

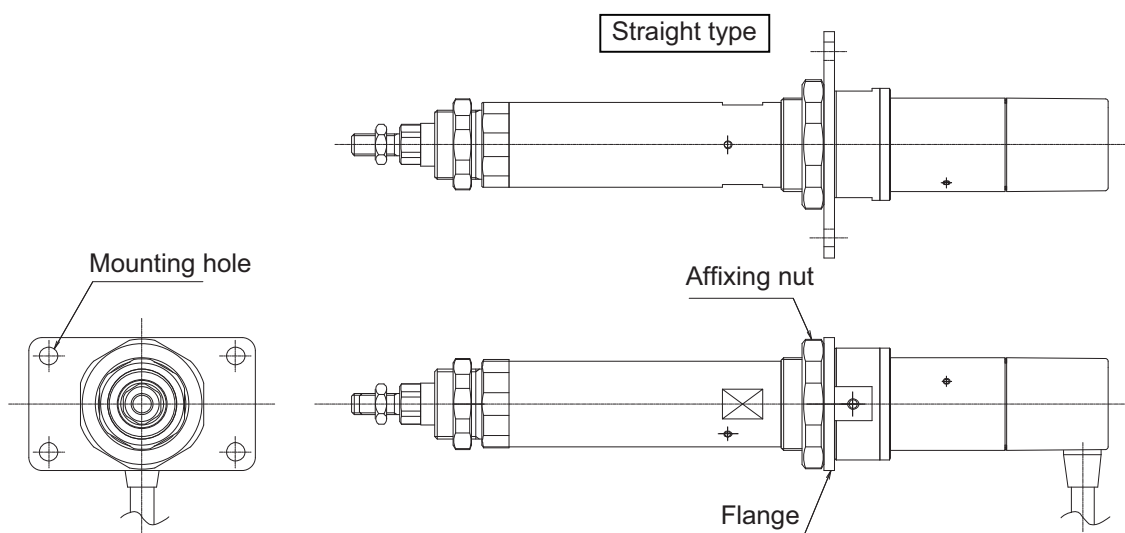
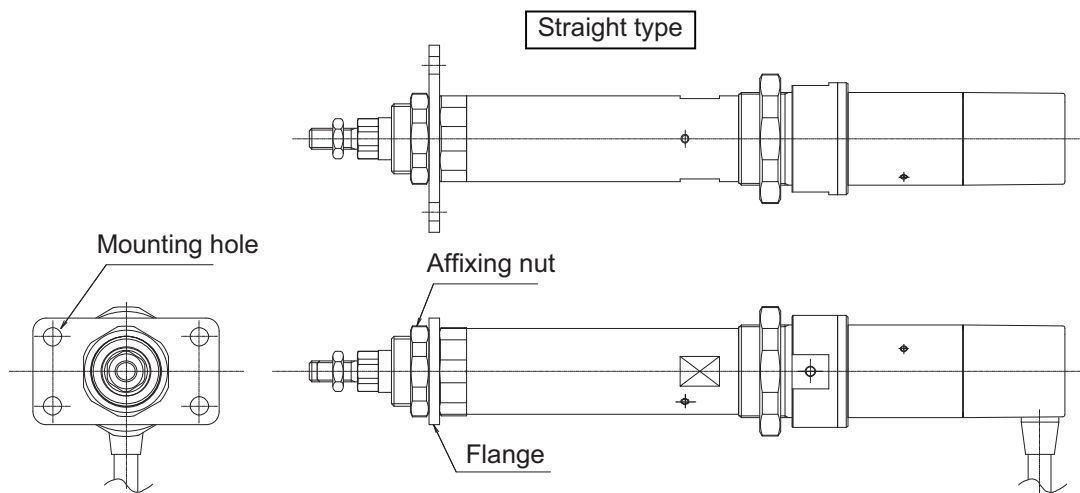


Type	MA	MB
RA3 type	M26×1.5	M35×1.5
RA4 type	M30×1.5	M40×1.5

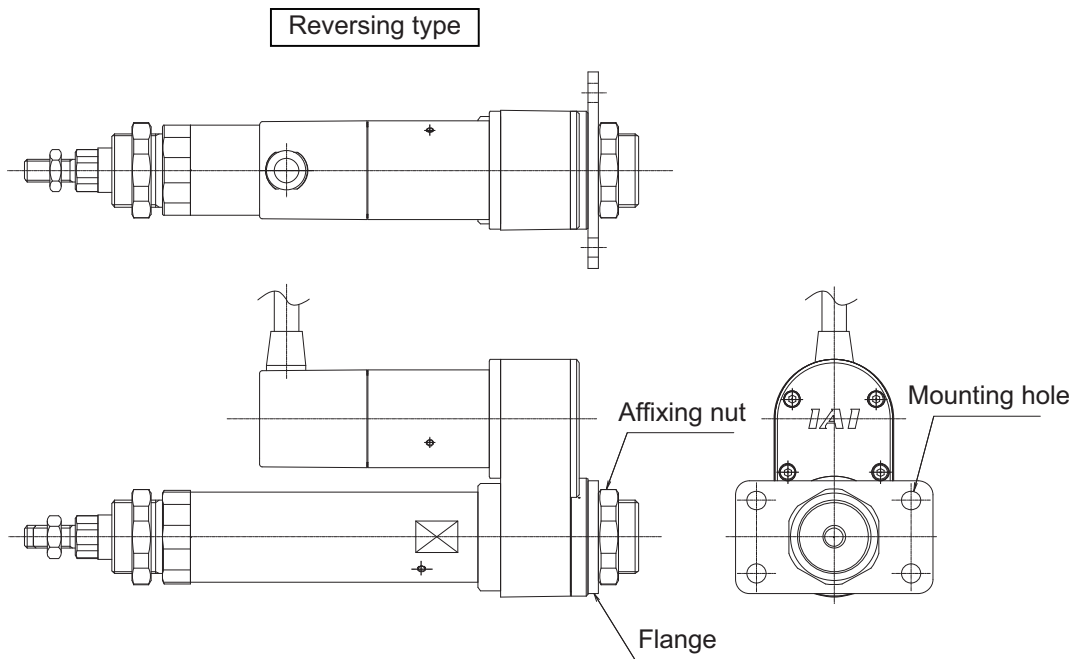
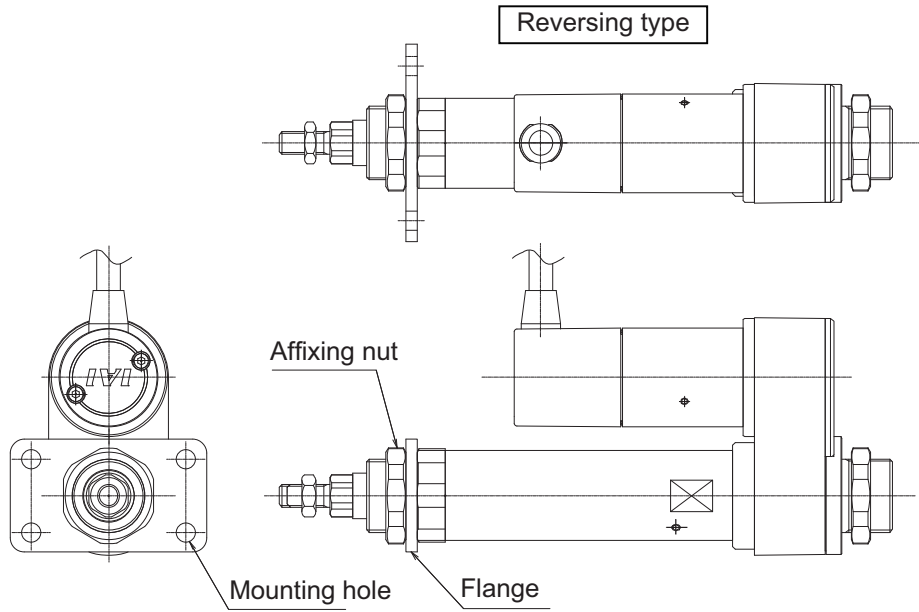
(2) Using screws on a flange (optional)

An optional flange is available for installing the actuator. Use this flange, if necessary.

- Applicable models: All models



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

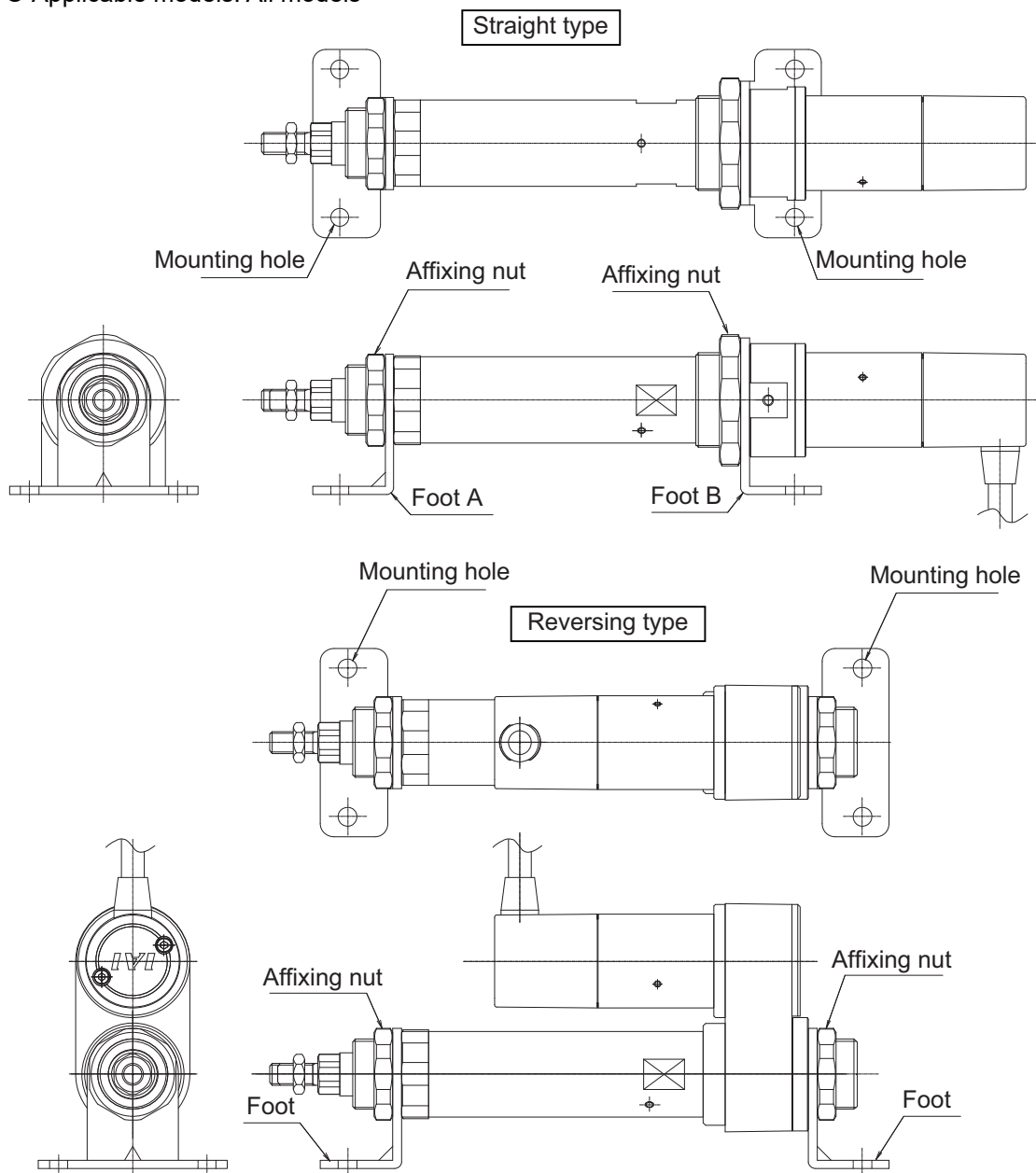


	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

(3) Using screws on feet (optional)

Optional feet are available for installing the actuator. Use these feet, if necessary.

- Applicable models: All models



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

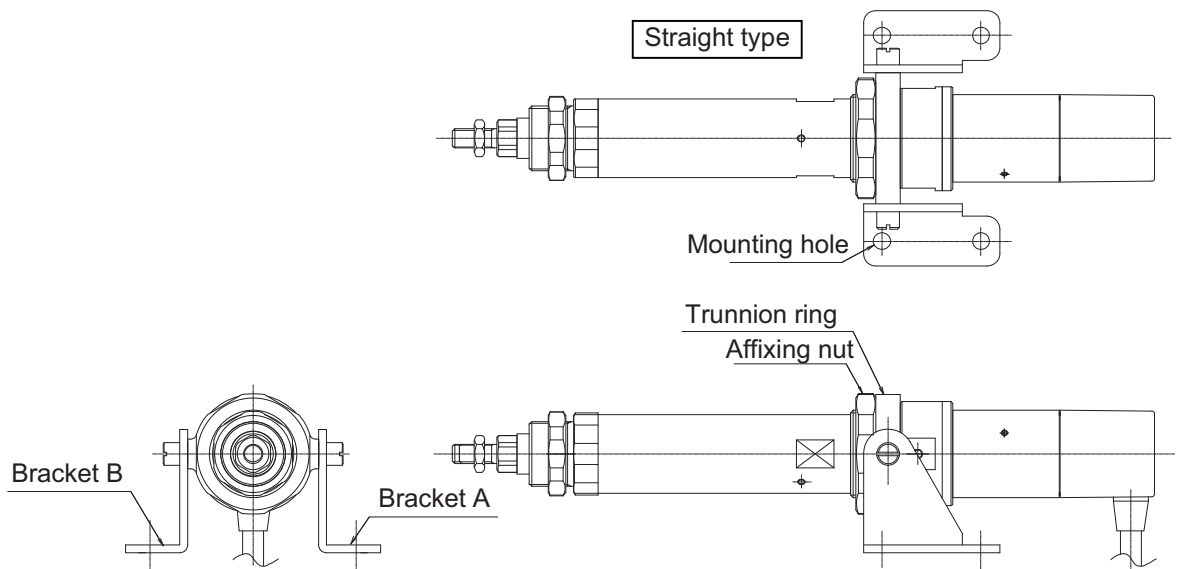
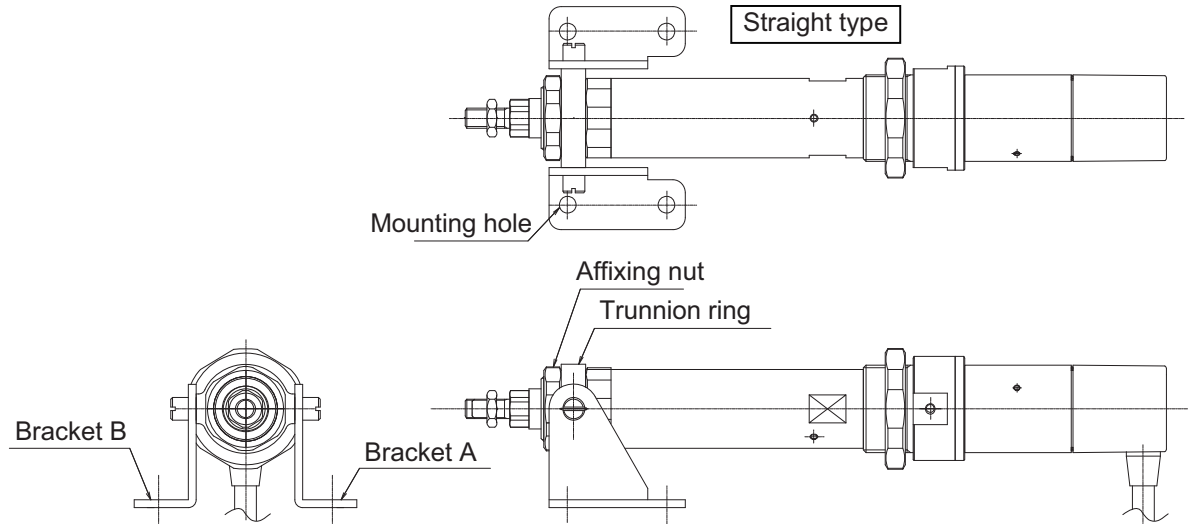


Caution: Affix the actuator using two feet (optional), one in the front and the other in the back. If affixed using only one foot in the front or back, the actuator may be negatively affected due to insufficient rigidity.

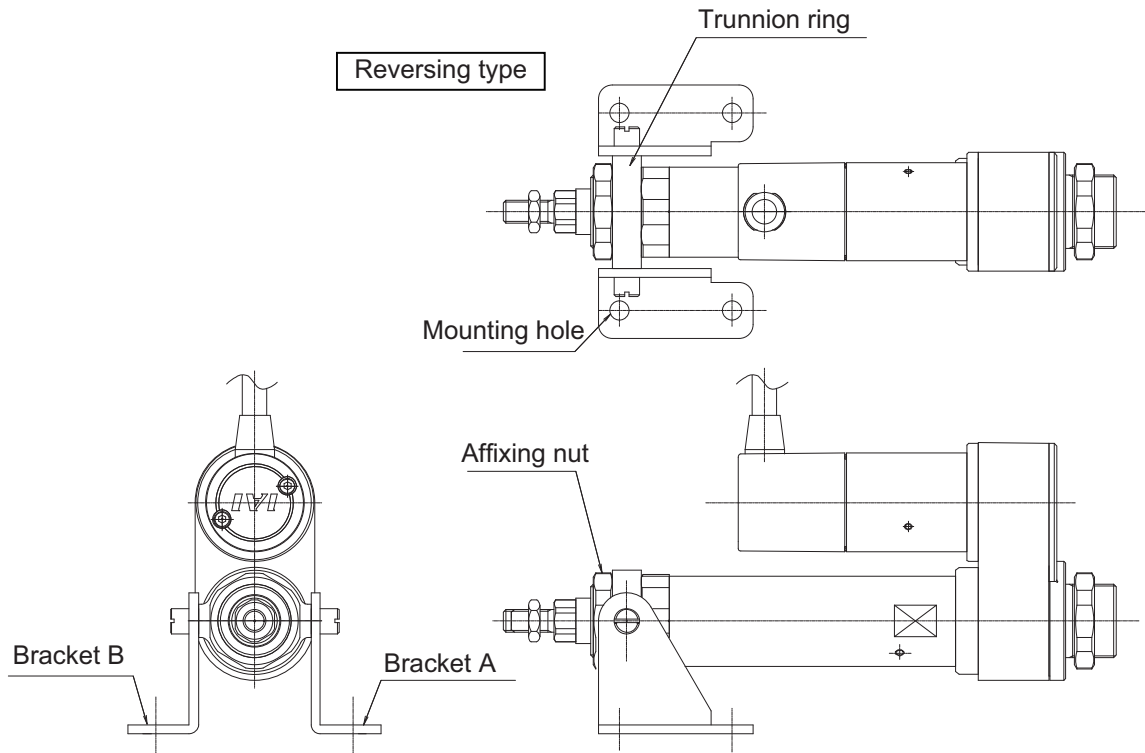
(4) Using screws on a trunnion (optional)

An optional trunnion is available for installing the actuator. Use this trunnion, if necessary.

- Applicable models: RA3C, RA3D, RA4C, RA4D



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

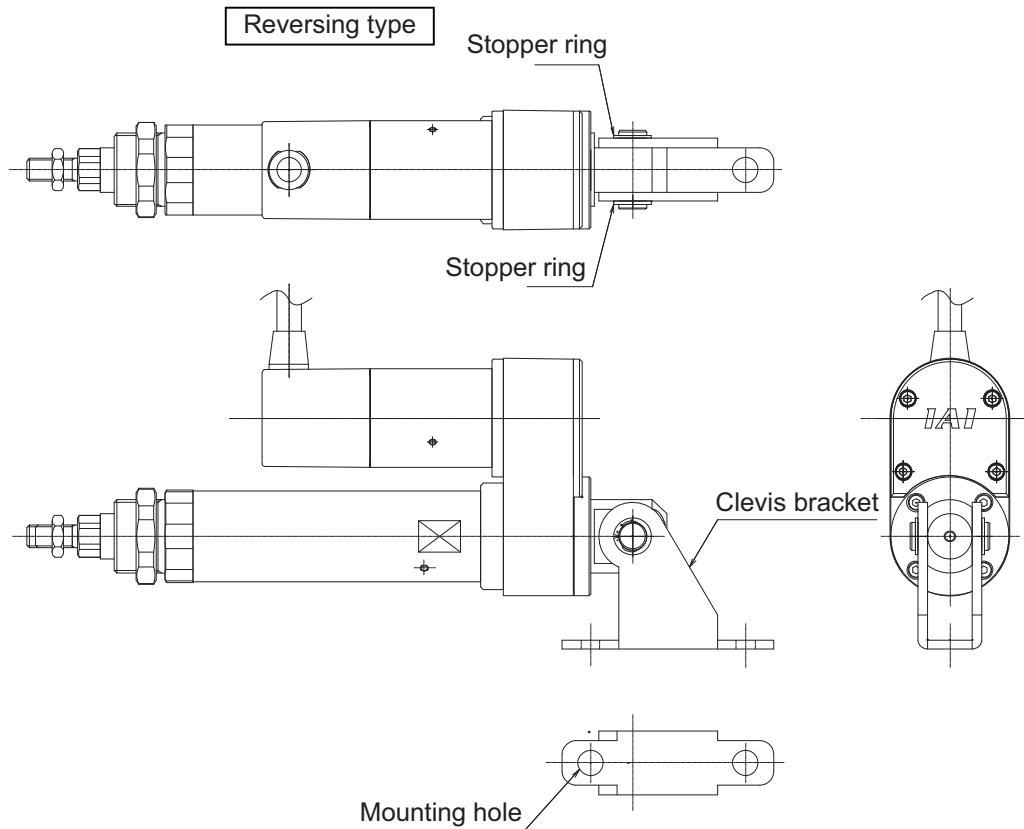


- Caution:**
- When the optional Clevis, Trunnion or commercially available free joint is attached and the actuator is installed horizontally, take the greatest care because the weight of the actuator is given to the rod. Otherwise, the bush might be worn out earlier or inside mechanism might be damaged. Add the guide mechanism, etc., so that the weight of the actuator is not given to the rod.
 - For the load given to the optional Clevis or Trunnion fulcrum shaft, only the radial load is allowed. In the case of the conditions that the backlash is not allowed or thrust load is given, the user should design the bearing structure.
 - The optional Clevis or Trunnion has the structure that the bearing selects the fulcrum shaft. Apply grease onto the fulcrum shaft.

(5) Using screws on a clevis (optional)

An optional clevis is available for installing the actuator. Use this clevis, if necessary.

- Applicable models: Motor reversing type RCA-RA3R, RCA-RA4R



	Mating material is steel	Mating material is aluminum
Screw size	M8	M8
Tightening torque	30 N•m	12 N•m

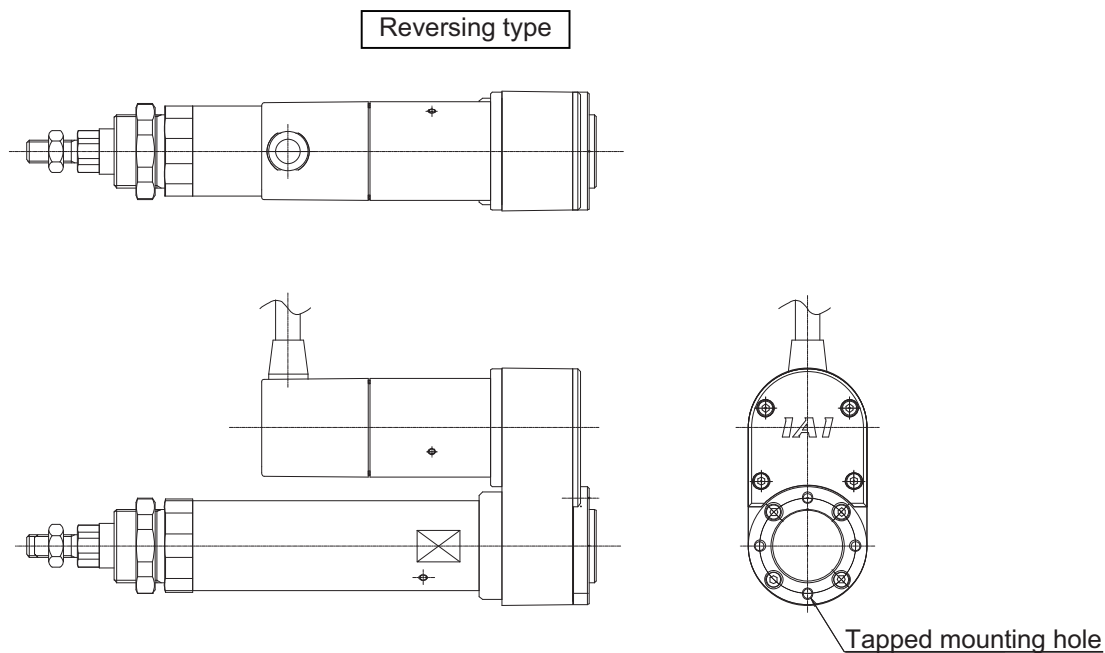


- Caution:**
- When the optional Clevis, Trunnion or commercially available free joint is attached and the actuator is installed horizontally, take the greatest care because the weight of the actuator is given to the rod. Otherwise, the bush might be worn out earlier or inside mechanism might be damaged. Add the guide mechanism, etc., so that the weight of the actuator is not given to the rod.
 - For the load given to the optional Clevis or Trunnion fulcrum shaft, only the radial load is allowed. In the case of the conditions that the backlash is not allowed or thrust load is given, the user should design the bearing structure.
 - The optional Clevis or Trunnion has the structure that the bearing selects the fulcrum shaft. Apply grease onto the fulcrum shaft.

(6) Using screws on a rear mounting bracket (optional)

An optional rear mounting bracket is available for installing the actuator. Use this rear mounting bracket, if necessary.

- Applicable models: Motor reversing type RCA-RA3R, RCA-RA4R

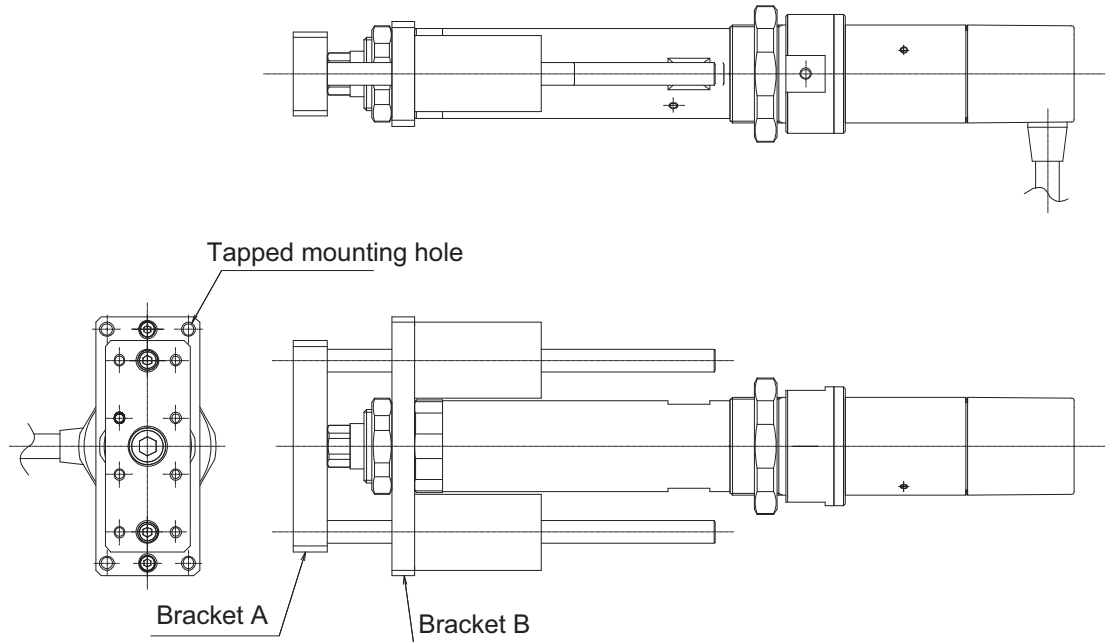


Type	Tapped hole diameter	Tapped depth	Tightening torque
RA3 type	M4	6 mm	1.8 N•m
RA4 type	M4	7 mm	1.8 N•m

(7) Double-guide type

Use the tapped holes in the bracket for installing an actuator of the double-guide type.

- Applicable models: Double-guide type RGD3, RGD4

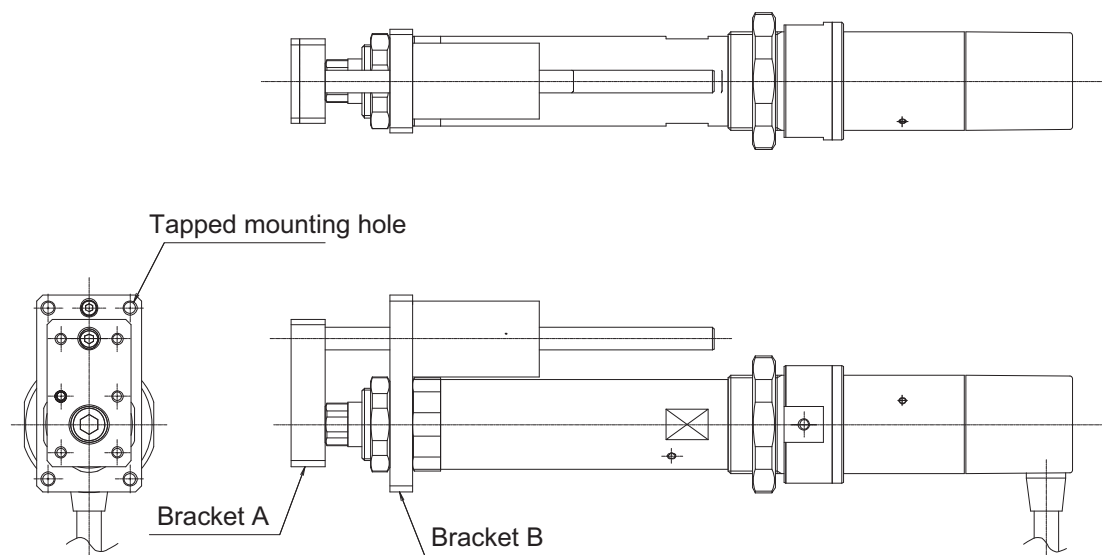


Type	Tapped hole diameter	Tapped depth	Tightening torque
RA3 type	M5	8 mm	3.4 N•m
RA4 type	M5	8 mm	3.4 N•m

(8) Single-guide type

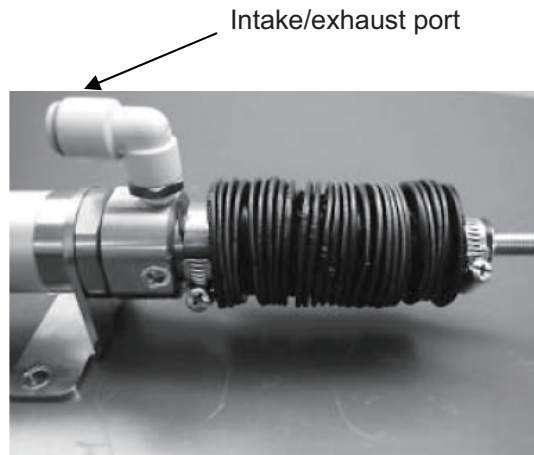
Use the tapped holes in the bracket for installing an actuator of the single-guide type.

- Applicable models: Double-guide type RGD3, RGD4



Type	Tapped hole diameter	Tapped depth	Tightening torque
RA3 type	M5	8 mm	3.4 N•m
RA4 type	M5	8 mm	3.4 N•m

2.3.3 Connecting the Air Tube of the RCAW Dustproof/Splash-proof Type



Install the air tube (outer diameter: 10 mm, inner diameter: 6.5 mm) on the intake/exhaust port and guide the air tube to a location where the external environment assures the tube will not come in contact with water.

(Applicable tube)

Shown below is a representative model of air tube that can be installed on the RCAW:

- TU1065: Polyurethane tube (Manufacturer: SMC)

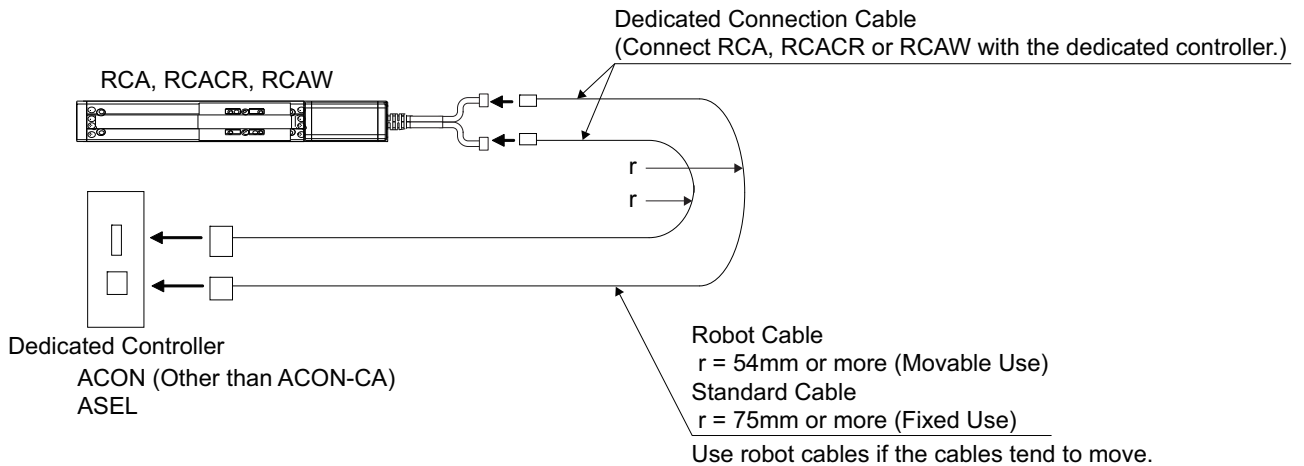


Caution: The air tube should not be more than 3 m long.

3. Connecting with Controller

For the controller, only the dedicated controller manufactured by our company can be used. Usage of an undedicated controller may cause accidents such as burnout, ignition or heat generation. For the connection between the actuator and controller, use the attached dedicated connection cable.

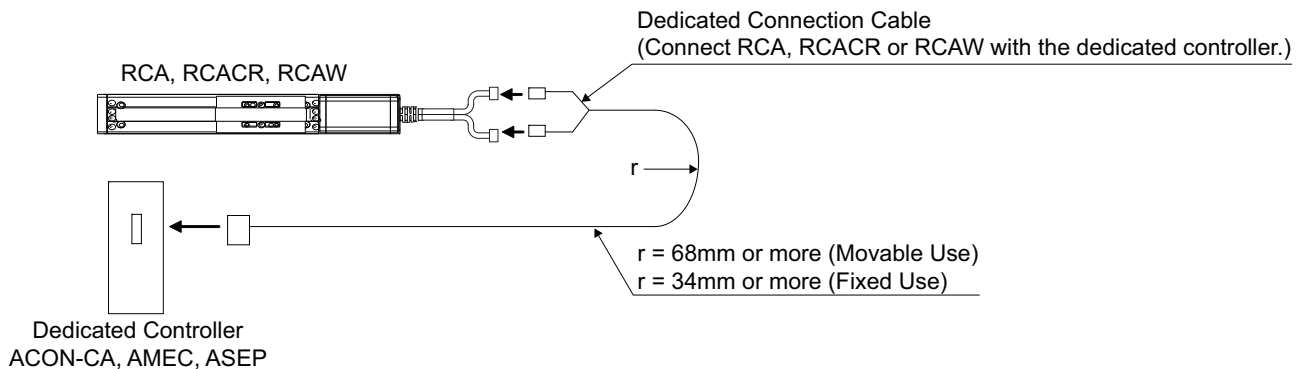
[Connection to the ACON (Other than ACON-CA), ASEL controller]



Dedicated Connection Cable

- Motor Cable (Robot Cable) CB-RCP2-MA***
 - Encoder Cable CB-RCP2-PB***/Encoder Cable Robot Cable CB-RCP2-PB***-RB
- *** shows the cable length. The max. length should be 20m.
Example) 080=8m

[Connection to the ACON-CA, AMEC, ASEP controller]



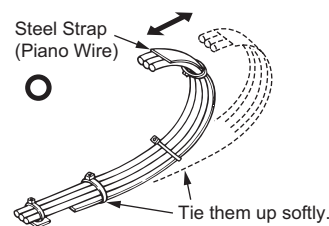
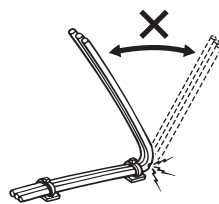
Dedicated Connection Cable

- Motor Encoder Cable (Robot Cable) CB-ASEP2-MPA***
- *** shows the cable length. The max. length should be 20m.
Example) 080=8m

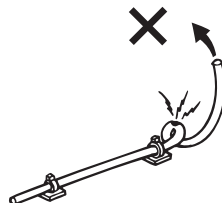


Warning: For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure,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

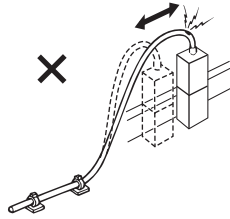
- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with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



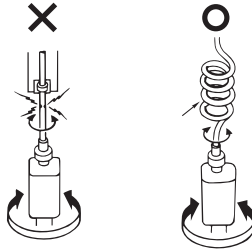
- Do not let the cable bend, kink or twist.



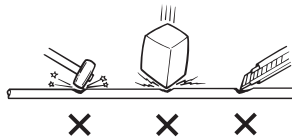
- Do not pull the cable with a strong force.



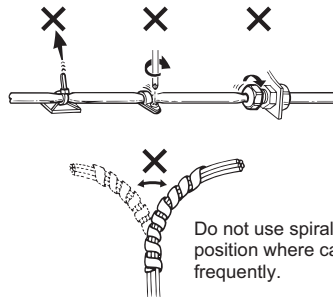
- Pay attention not to concentrate the twisting force to one point on a cable.



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

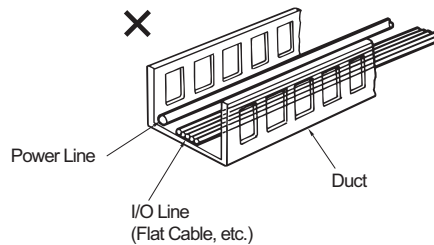


- When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.



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

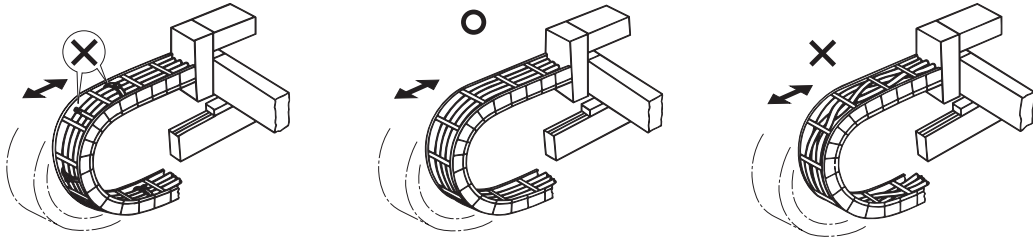
- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



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.



4. Maintenance

4.1 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 ^{*1}
Start of operation	○	
After 1 month of operation	○	
After 3 months of operation	○	
Every 3 months thereafter	○	○ (Sliding surface of the rod) ^{*1}
After 3 years of operation, or upon reaching 5,000 km in traveled distance	○	○ (Sliding surface of the rod) ^{*1}
Every year thereafter	○	

^{*1} Apply grease to the sliding surface of the rod at the startup check if grease has been consumed, or every three months.

For the RCAW dustproof/splash-proof type, apply grease when the bellows is changed.

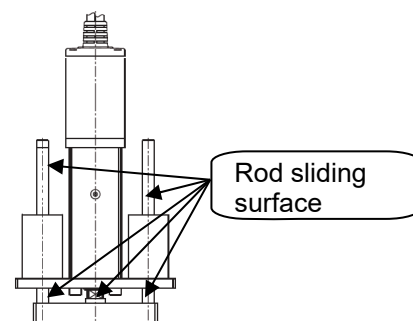
First, wipe off the old grease and then supply new grease.

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.

4.2 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



4.3 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.

4.4 Applying Grease to the Sliding Surface of the Rod

(1) Applicable grease

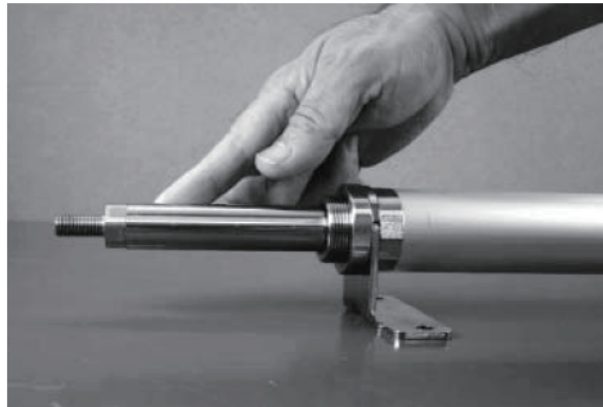
KyodoYushi	MultempLRL3
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Warning: Never use any fluorine-based grease.
It will cause a chemical reaction when mixed with a lithium-based grease and may cause damage to the actuator.

(2) How to apply grease

Wipe off the old grease, and then supply new grease evenly on the whole area of the rod sliding surface.



Caution: 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.

4.5 Reduction Belt [Motor Reversing Type]

4.5.1 Inspecting the Belt

Remove the pulley cover and visually inspect the belt.

Durability of the reduction belt is affected significantly by the operating condition, and there is no standard guideline as to when the belt should be replaced.

Generally, the belt is designed to withstand several millions of flexing loads.

As a practical guideline, replace the reduction belt when any of the conditions listed below is observed:

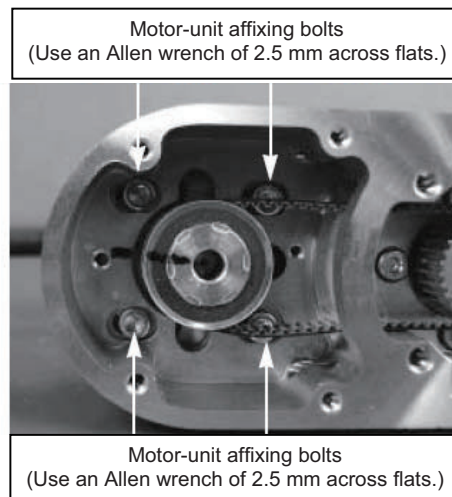
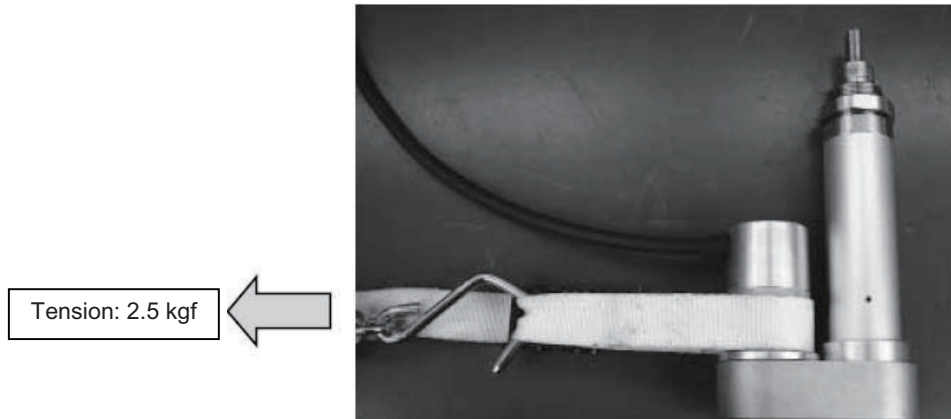
- The teeth and end faces of the belt have worn significantly.
- The belt has swollen due to deposits of oil, etc.
- Cracks and other damages are found on the teeth or back of the belt.
- The belt has broken.

4.5.2 Applicable Belt

Model	IAI Maintenance Parts Model	Supplier Model
RA3R/RGD3R	TB-RCA-RA3R	60S2M124R Rubber clean type (Bando Chemical Industries) 6 mm wide
RA4R/RGD4R	TB-RCA-RA4R	60S2M152R Rubber clean type (Bando Chemical Industries) 6 mm wide

4.5.3 Adjusting the Belt Tension

Remove the pulley case cover and loosen the four motor-unit affixing bolts.
Pass a looped string (or long zip tie) around the motor unit, and pull the string to the specified tension using a tension gauge. In this condition, uniformly tighten the motor-unit affixing bolts.
[Recommended tightening torque of adjustment bolts]
162 N•cm (16.5 kgf•cm)



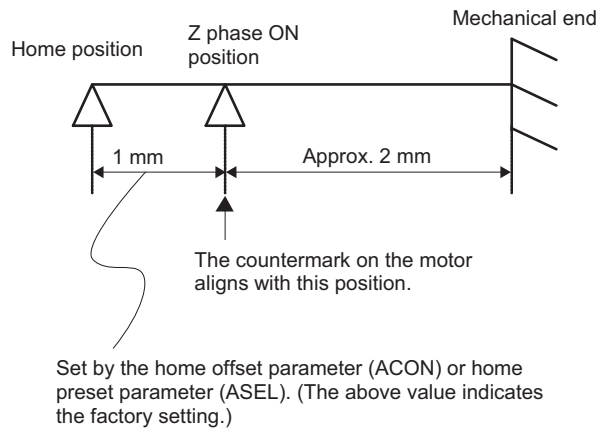
4.5.4 Replacing the Belt of the Motor Reversing Type: RA3R/RA4R Types

[Items Required for Replacement]

- Replacement belt
RA3R·····60S2M124R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide
RA4R·····60S2M152R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide
- Allen wrenches
- Tension gauge (capable of tensioning to 7 kgf or greater)
- Strong string, looped (or long zip tie)
- Scale
- Oil-based marker pen
- PC or teaching pendant

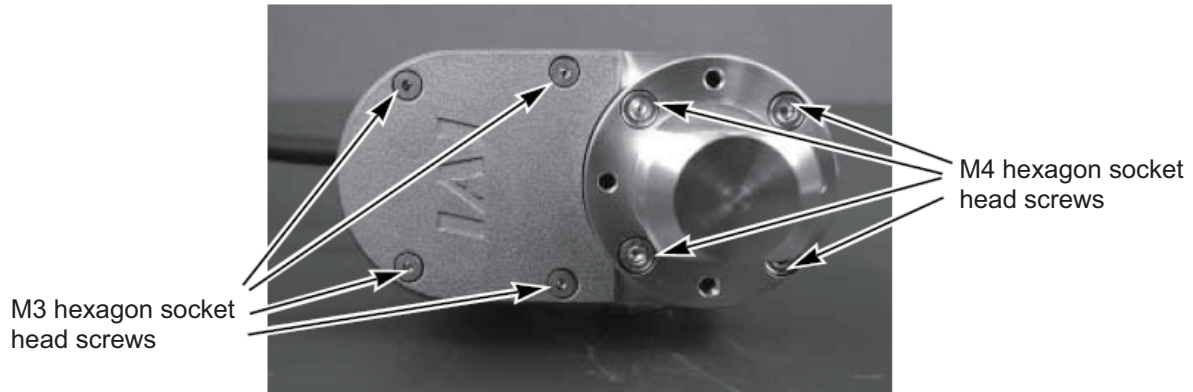
[Overview of Replacement]

- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, loosen the motor-unit affixing bolts and replace the belt.
- 2) Restore the home position.
Affix the rod at a position 2 mm from the mechanical end on the home side, pass the belt, and adjust the belt to the specified tension.
- 3) Perform homing using a PC or teaching pendant and check for deviation from the initial home position.
If there is a deviation, adjust the home offset if you are using an ACON controller. If you are using an ASEL controller, adjust the home preset.



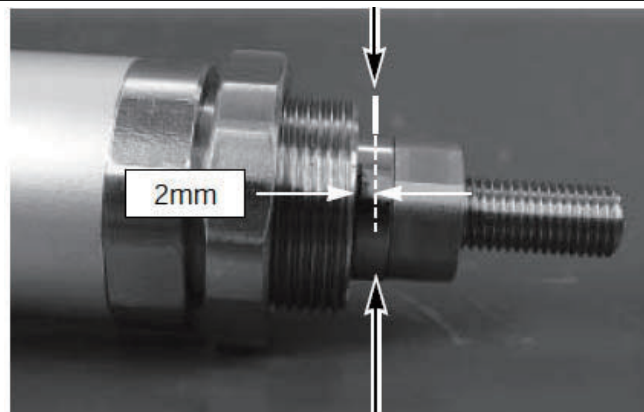
[Procedure]

- 1) Remove the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.



- 2) Move the rod to a position where Z phase turns on (home position). This corresponds to a position where the rod projects 2 mm from the mechanical end. Apply countermarks in this position.

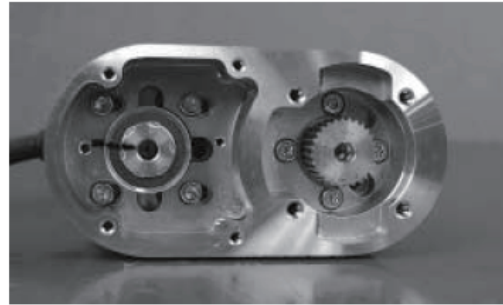
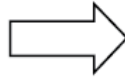
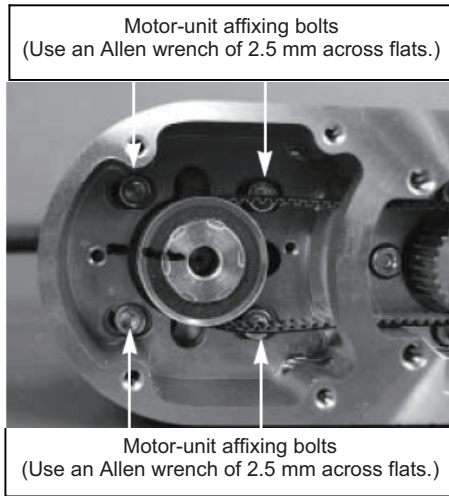
Cause the rod to project 2 mm from the mechanical end.



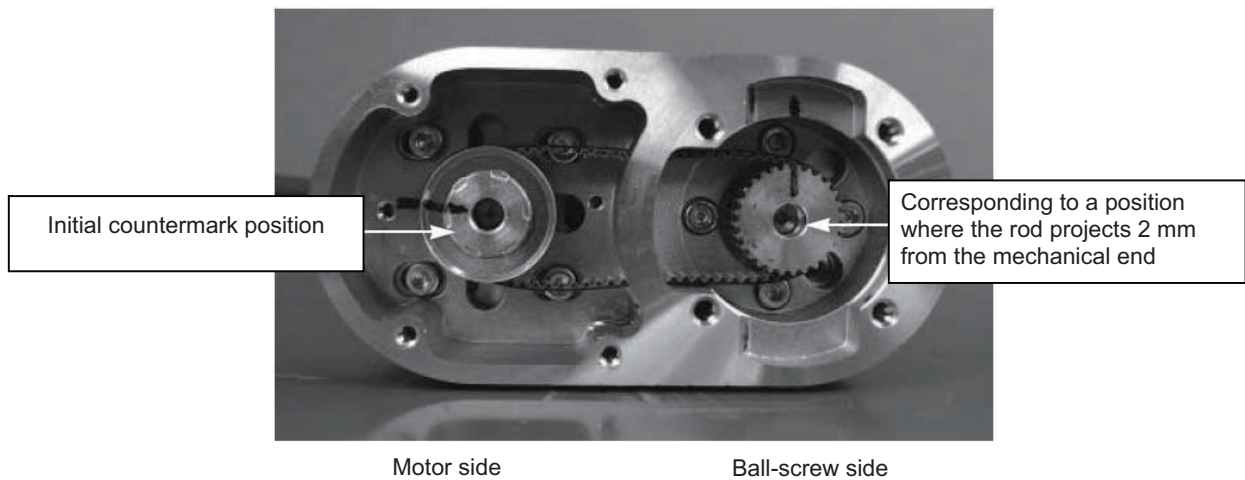
Apply countermarks once the rod has projected 2 mm from the mechanical end.

Warning: If the actuator is installed vertically, move it after turning on the controller power and forcibly releasing the brake. At this time, beware of danger as the actuator may drop suddenly. Always provide a support to brace the actuator hand to prevent sudden drop, so as not to pinch fingers or damage the load.

- 3) Loosen the motor-unit affixing bolts using an Allen wrench of 2.5 mm across flats. Slide the motor, and loosen and remove the belt.



- 4) Check the following points before restoring the home position:
- The motor side should be aligned with the initial countermark. If the position is offset, adjust it to achieve proper alignment.
 - The ball-screw side should be at a position where the rod projects 2 mm from the mechanical end. After the check, attach a new belt while holding the pulleys on both sides in position.



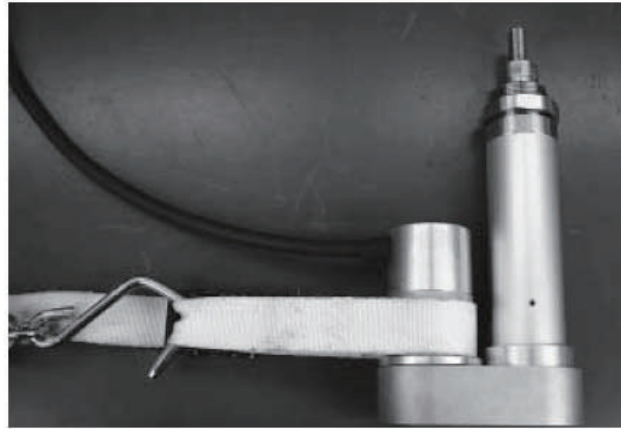
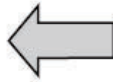
5) Adjust the belt tension.

Pass a looped strong string (or long zip tie) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.

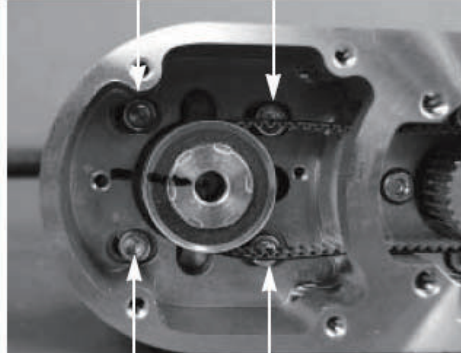
[Recommended tightening torque for adjustment bolts]

162 N•cm (16.5 kgf•cm)

Tension: 2.5 kgf

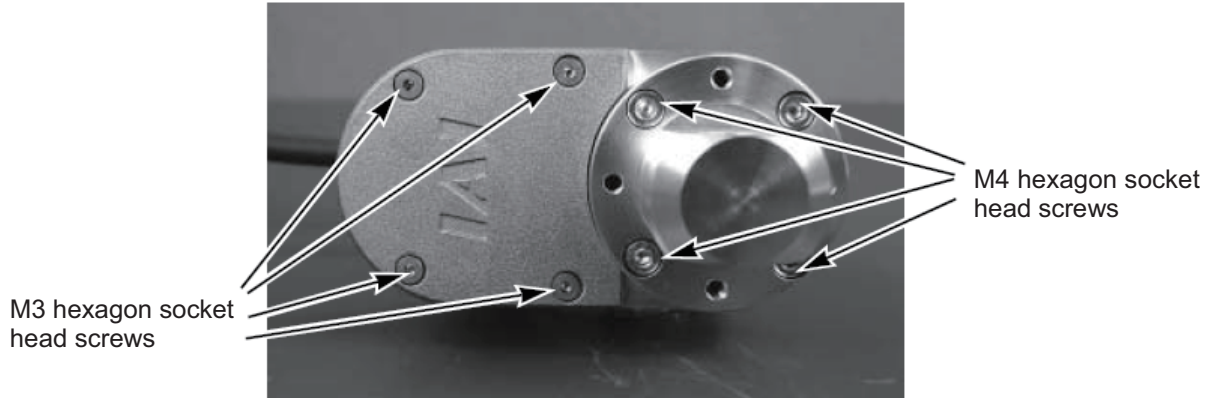


Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)



Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)

- 6) Install the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.



- 7) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed.) Check for deviation from the initial home position.
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an ACON controller.
If you are using an ASEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

4.6 Replacing the Motor

4.6.1 Replacing the Motor of the Motor Straight Type (Coupling Type): RA3C/RA4C Types

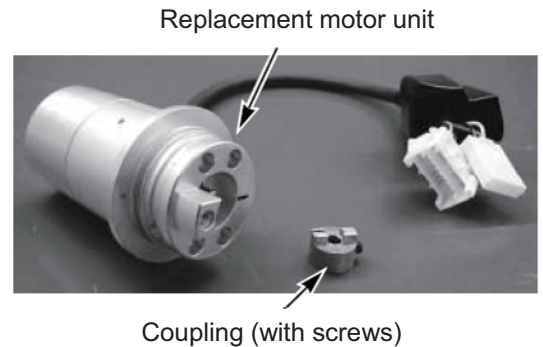
[Items Required for Replacement]

- Replacement motor unit
- Coupling (with screws)
- Allen wrenches
- Scale
- Oil-based marker pen
- Grease

Idemitsu Kosan

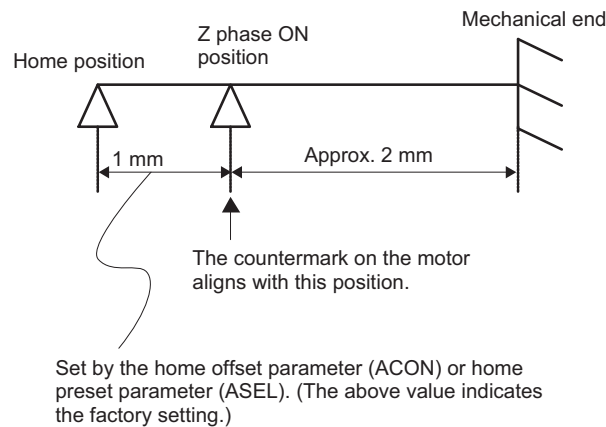
Daphne Grease MP No.2

- PC or teaching pendant



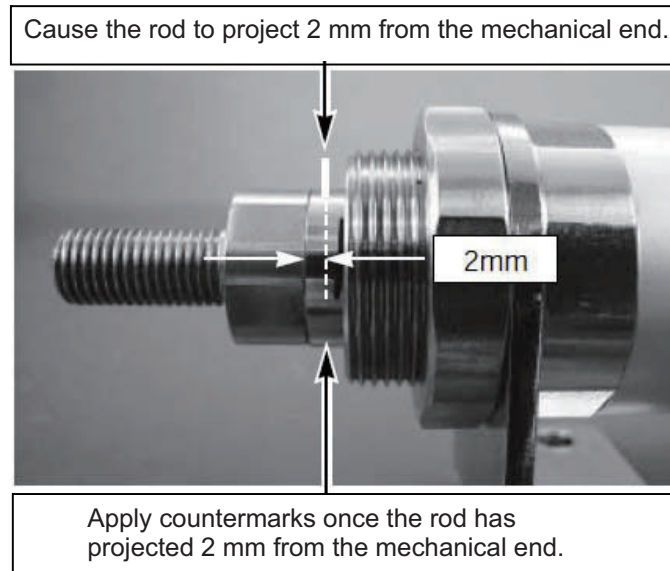
[Overview of Replacement]

- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, replace the motor.
- 2) Perform homing using a PC or teaching pendant and check for deviation from the initial home position. If there is a deviation, adjust the home offset if you are using an ACON controller. If you are using an ASEL controller, adjust the home preset.



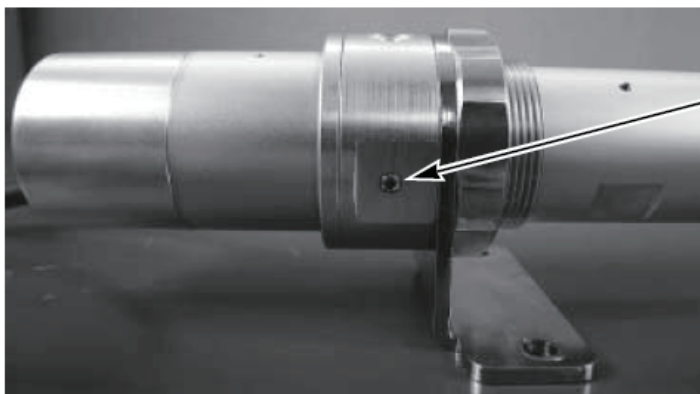
[Procedure]

- 1) Move the rod to a position where Z phase turns on (home position).
This corresponds to a position where the rod projects 2 mm from the mechanical end.
Apply countermarks in this position.



⚠ Warning: If the actuator is installed vertically, move it after turning on the controller power and forcibly releasing the brake. At this time, beware of danger as the actuator may drop suddenly.
Always provide a support to brace the actuator hand to prevent sudden drop, so as not to pinch fingers or damage the load.

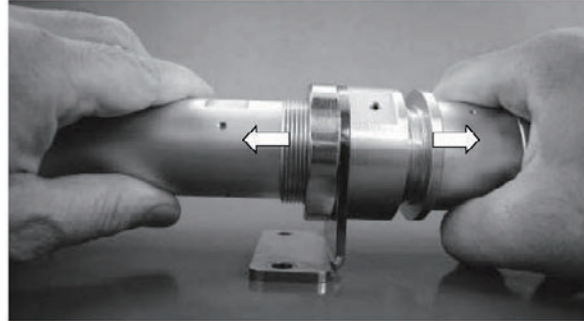
- 2) Using an Allen wrench of 2 mm across flats, remove the two motor-unit affixing bolts on the right and left.



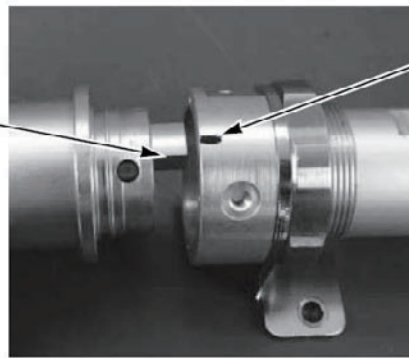
2 affixing bolts on the motor-end cap (right and left) (hexagon socket head setscrews)

3) Pull out the motor unit.

Before pulling out the motor unit, apply a countermark on the cylinder tube at a position corresponding to the tab on the motor unit, so that the motor unit and cylinder can be aligned in the correct position later on.

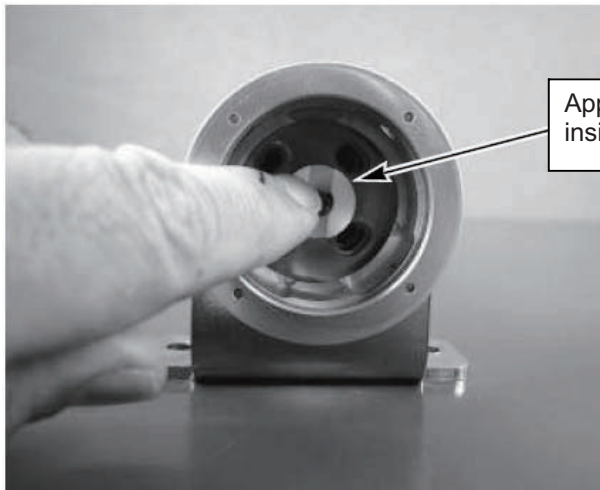


Tab on the motor unit



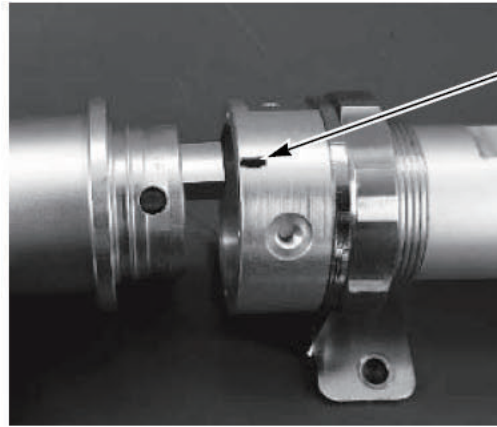
Apply a countermark at a position corresponding to the tab on the motor unit.

4) Apply grease on the actuator coupling.

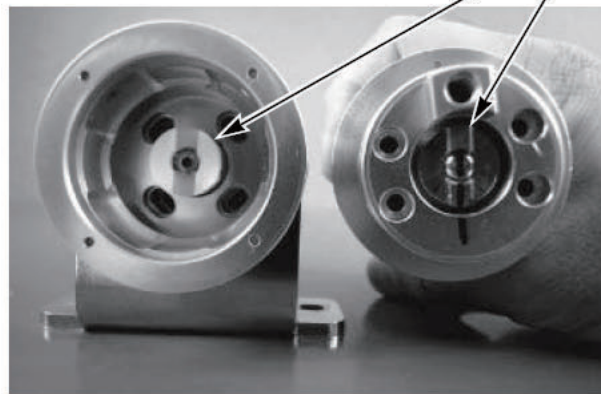


Apply grease on the inside of the coupling.

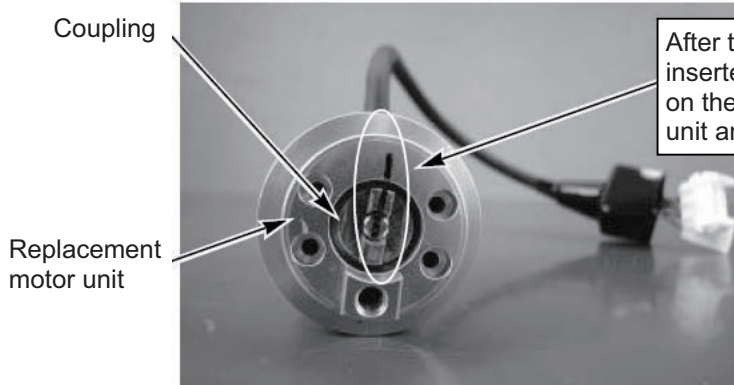
- 5) Align the tab on the replacement motor unit with the countermark on the cylinder.
With the motor unit and cylinder aligned properly, insert the coupling into the replacement motor unit by aligning the orientation of this coupling with that of the actuator coupling (adjusted to a position corresponding to a rod projection of 2 mm from the mechanical end). Apply countermarks to identify the current motor position (phase Z position) and coupling.



Align the tab on the replacement motor unit with the countermark on the cylinder.

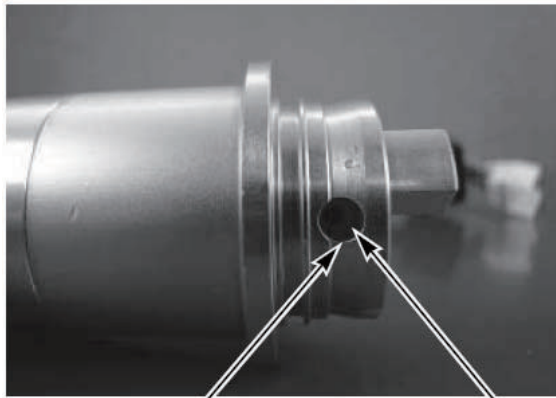


Position the couplings.

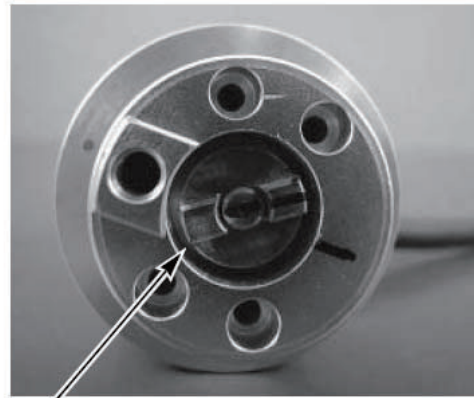


After the coupling has been inserted, apply countermarks on the replacement motor unit and coupling.

- 6) Turn the coupling and motor shaft simultaneously until a setscrew on the coupling is seen through the hole.
Thereafter, tighten the hexagon socket head setscrew using an Allen wrench of 2 mm across flats. Similarly, turn the coupling and motor shaft simultaneously until the other screw is seen through the hole, and tighten the setscrew.

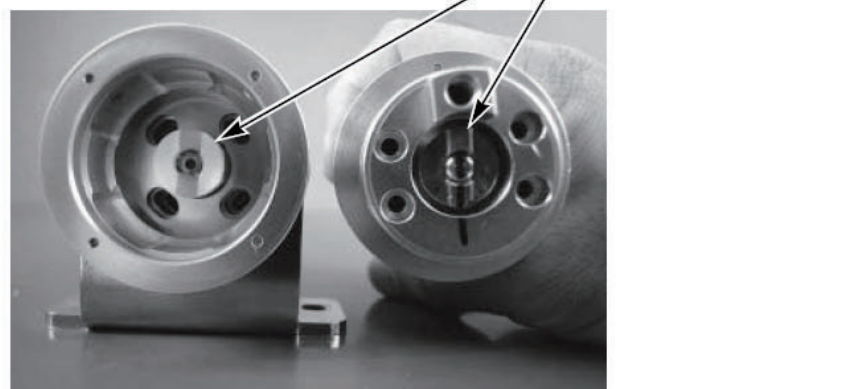
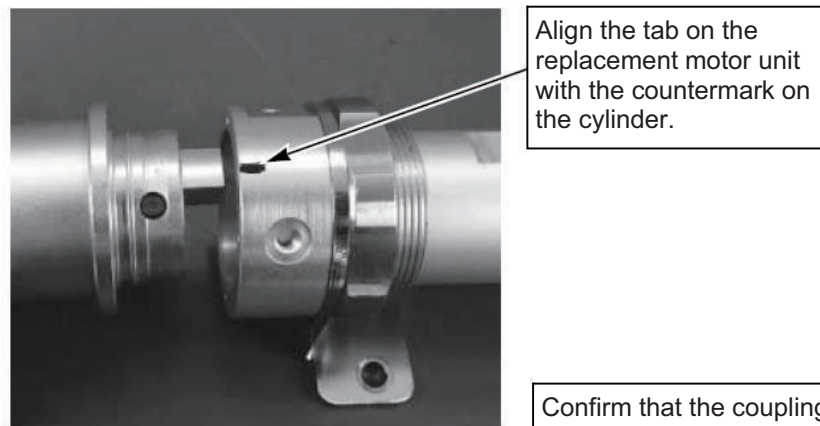
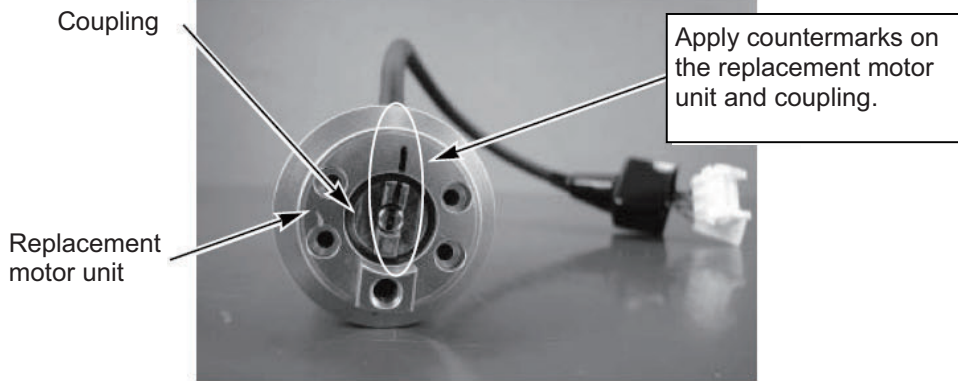


Coupling
setscrew hole

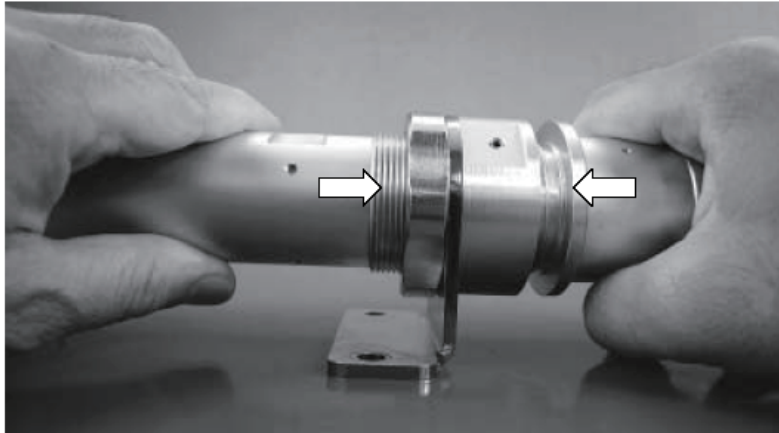


Turn the coupling and motor shaft simultaneously until a setscrew on the coupling is seen through the hole. Thereafter, tighten the hexagon socket head setscrew using an Allen wrench of 2 mm across flats.

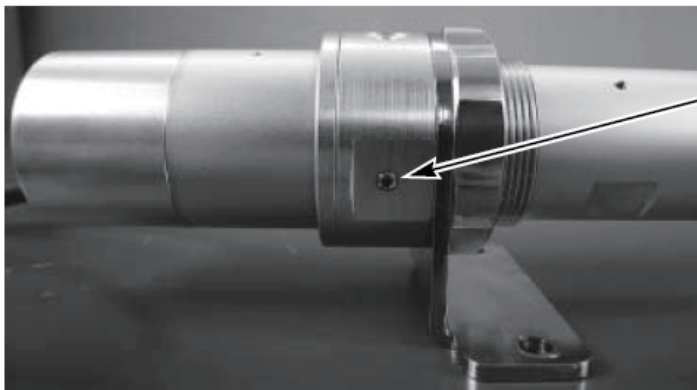
- 7) Return the coupling in the replacement motor unit to the initial motor position (Z phase position). Align the tab on the replacement motor unit with the countermark on the cylinder. With the motor unit and cylinder positioned this way, confirm that the orientation of the actuator coupling (adjusted to a position corresponding to a rod projection of 2 mm from the mechanical end) corresponds to the position of the coupling in the replacement motor unit.



- 8) Carefully insert the replacement motor unit into the cylinder by ensuring that the couplings do not lose their alignment.



- 9) Using an Allen wrench of 2 mm across flats, tighten the two motor-unit affixing bolts on the right and left.



2 affixing bolts on the motor-end cap (right and left) (hexagon socket head setscrews)

- 10) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed). Check for deviation from the initial home position.
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an ACON controller. If you are using an ASEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

4.6.2 Replacing the Motor of the Motor Reversing Type: RA3R/RA4R Types

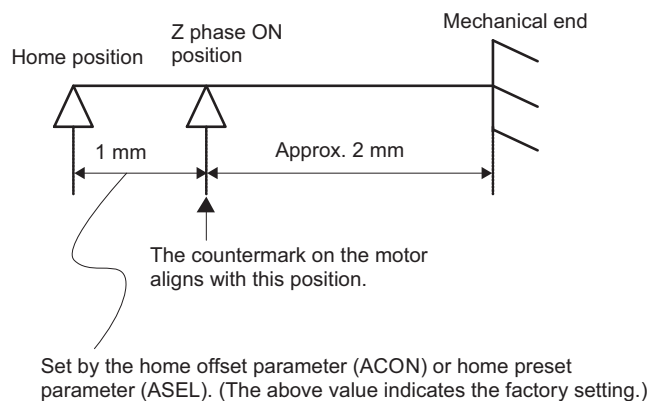
[Items Required for Replacement]

- Replacement motor unit
- Tension gauge (capable of tensioning to 7 kgf or greater)
- Strong string, looped (or long zip tie)
- Scale
- PC or teaching pendant
- Allen wrenches
- Oil-based marker pen



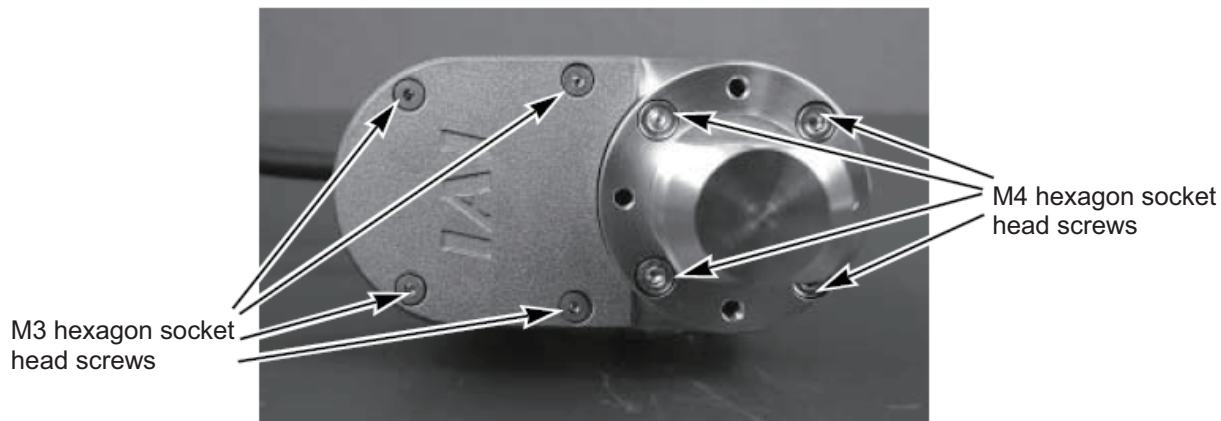
[Overview of Replacement]

- 1) Loosen the motor-unit affixing bolts to remove the belt, and replace the motor.
- 2) Restore the home position.
Affix the rod at a position 2 mm from the mechanical end on the home side, pass the belt, and adjust the belt to the specified tension.
- 3) Perform homing using a PC or teaching pendant and check for deviation from the initial home position.
If there is a deviation, adjust the home offset if you are using an ACON controller. If you are using an ASEL controller, adjust the home preset.



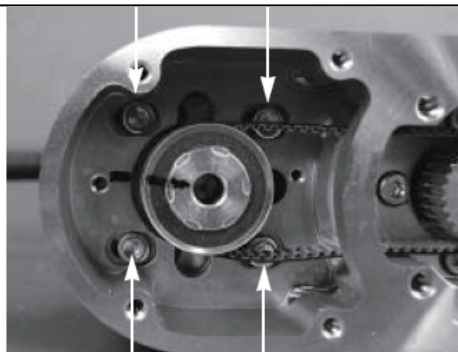
[Procedure]

- 1) Remove the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.

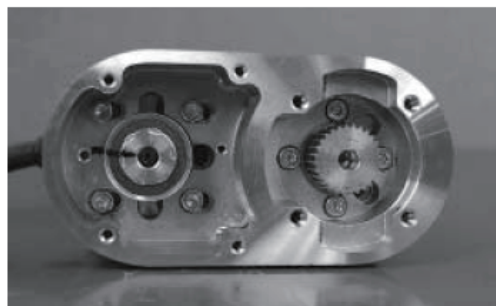
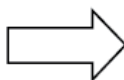


- 2) Loosen the motor-unit affixing bolts using an Allen wrench of 2.5 mm across flats. Slide the motor, and loosen and remove the belt. After the belt has been removed, remove the motor-unit affixing bolts.

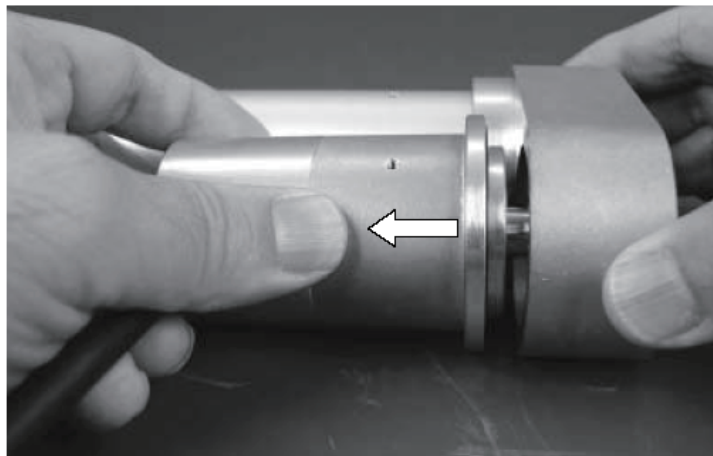
Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)



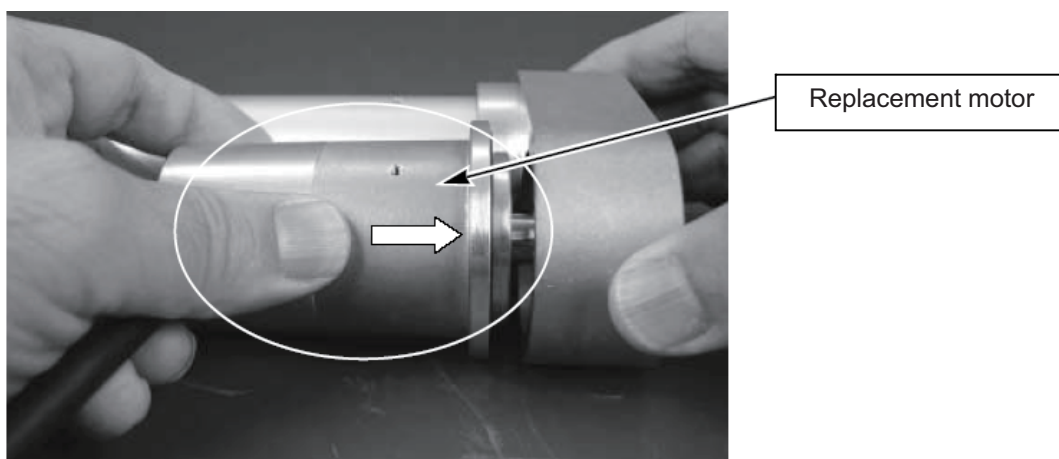
Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)



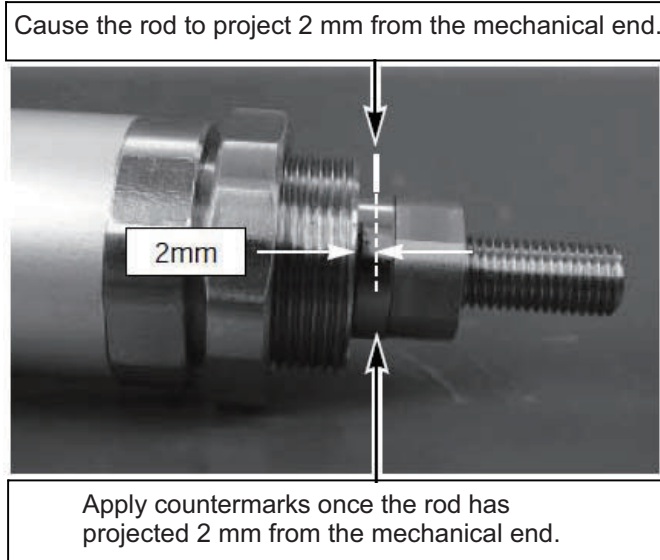
- 3) Take out the motor.



- 4) Install the replacement motor. Loosely tighten the motor-unit affixing bolts.

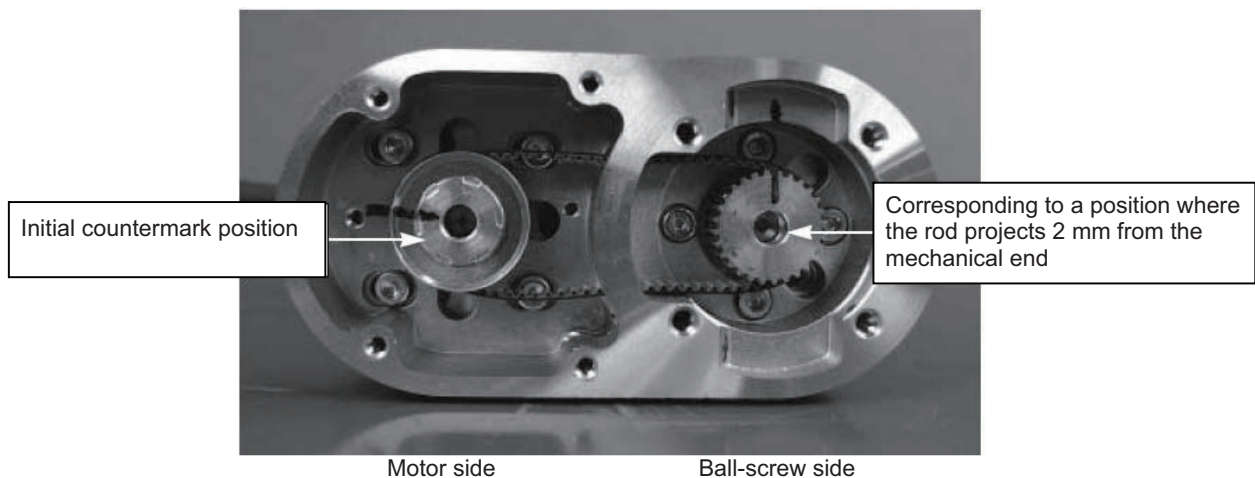


- 5) Move the rod to a position where Z phase turns on (home position). This corresponds to a position where the rod projects 2 mm from the mechanical end. Apply countermarks in this position.



Warning: If the actuator is installed vertically, move it after turning on the controller power and forcibly releasing the brake. At this time, beware of danger as the actuator may drop suddenly. Always provide a support to brace the actuator hand to prevent sudden drop, so as not to pinch fingers or damage the load.

- 6) Check the following points before restoring the home position:
- The motor side should be aligned with the initial countermark. If the position is offset, adjust it to achieve proper alignment.
 - The ball-screw side should be at a position where the rod projects 2 mm from the mechanical end. After the check, attach a new belt while holding the pulleys on both sides in position.



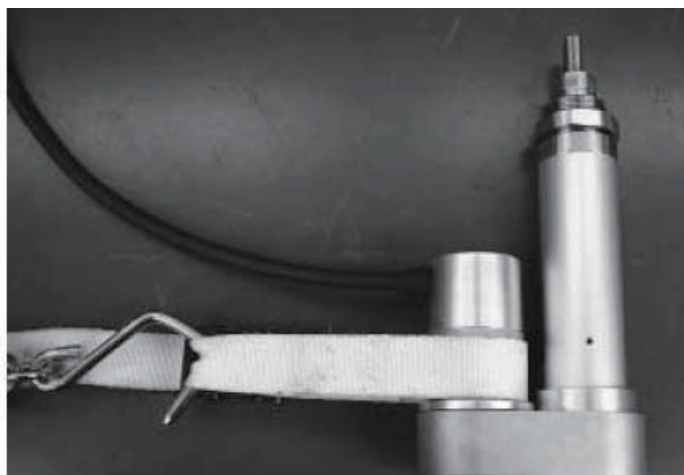
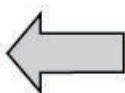
7) Adjust the belt tension.

Pass a looped strong string (or long zip tie) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.

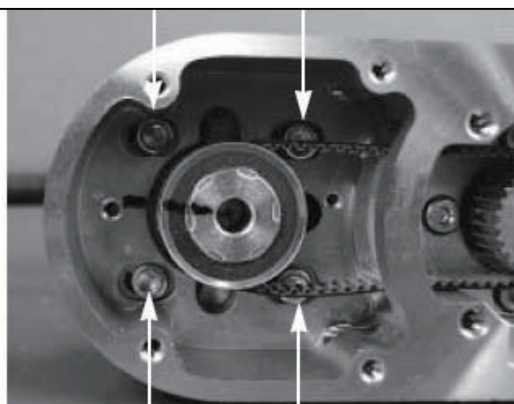
[Recommended tightening torque for adjustment bolts]

162 N•cm (16.5 kgf•cm)

Tension: 2.5 kgf

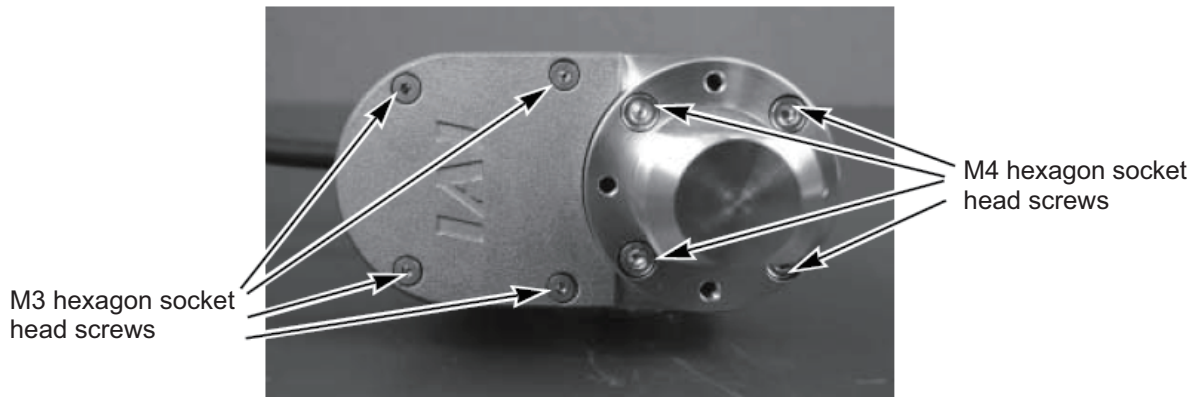


Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)



Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)

- 8) Remove the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.



- 9) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed.) Check for deviation from the initial home position. If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an ACON controller. If you are using an ASEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

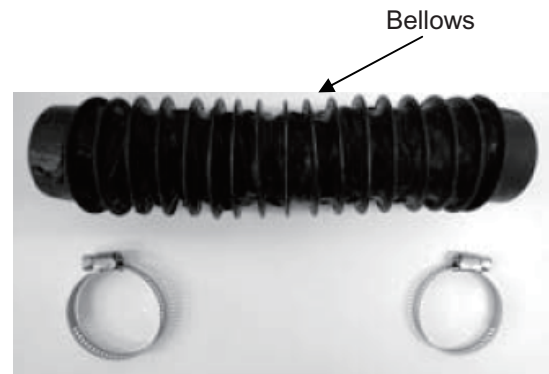
4.7 Replacing the Bellows of the RCAW Dustproof/Splash-proof Type

[Items Required for Replacement]

- Replacement bellows unit
: RA3·····JB-RA3- (stroke)
: RA4·····JB-RA4- (stroke)
- Slotted screwdriver
- Torque driver
- Grease

Kyodo Yushi

Multemp LRL3



[Procedure]

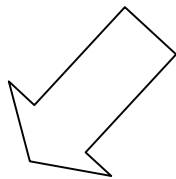
- 1) Loosen the front and rear metal fittings affixing the bellows and remove the bellows.



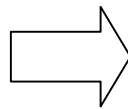
Loosening of front metal fitting



Loosening of rear metal fitting

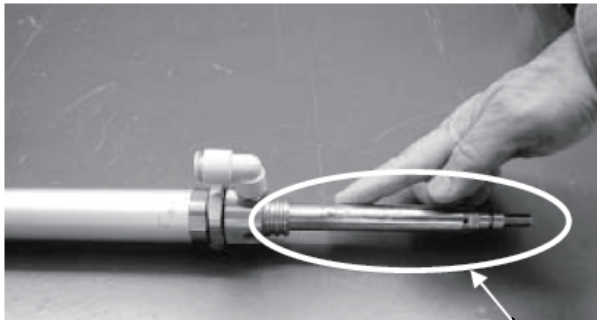


Removal of bellows



Bellows has been removed

- 2) Apply grease evenly over the entire cylinder surface.



Apply grease evenly over the entire surface.

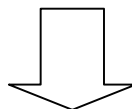
- 3) Install a metal fitting on the bellows.



Bellows



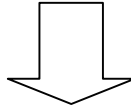
Install a metal fitting on the bellows.



- 4) Install the replacement (new) bellows and tighten the screws of the front and rear metal fittings affixing the bellows. Tighten the screws to the specified torque using a torque driver.



Installation of bellows



Tightening of rear metal fitting

Tightening torque: 0.35N•m



Tightening of front metal fitting

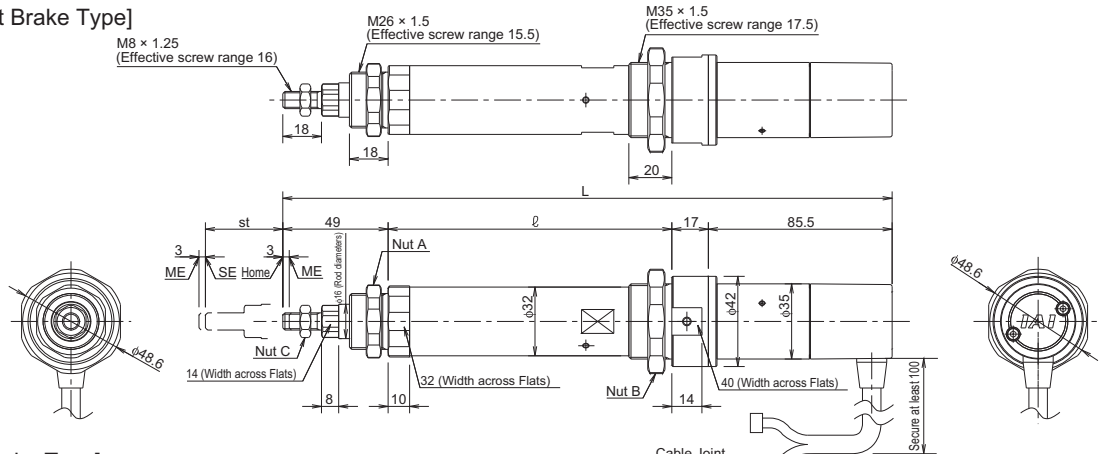
Tightening torque: 0.35N•m

5. Appendix

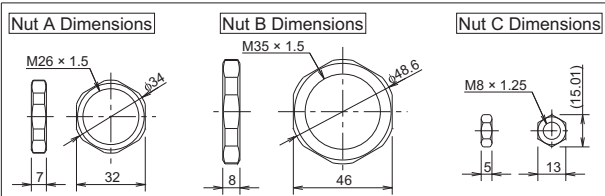
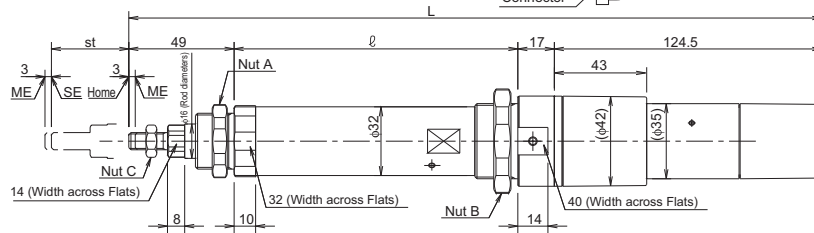
5.1 RCA-RA3C

ME: Mechanical End SE: Stroke End

[Without Brake Type]



[With Brake Type]



Caution
Do not apply any external force to the rod from the directions other than the rod operating directions.
The force in the vertical or rotational direction of the rod may damage the stopper.

■ Dimensions and Weight by Stroke

RCA-RA3C (Without brake)

Stroke	50	100	150	200
L	283.5	333.5	383.5	433.5
ℓ	132	182	232	282
Weight [kg]	0.7	0.8	0.9	1.0

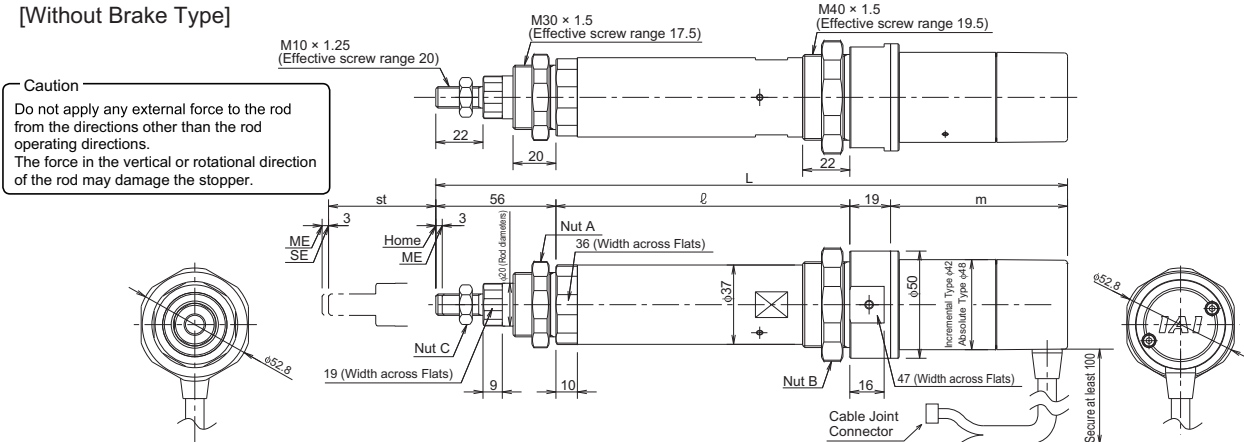
RCA-RA3C (With brake)

Stroke	50	100	150	200
L	322.5	372.5	422.5	472.5
ℓ	132	182	232	282
Weight [kg]	0.9	1.0	1.1	1.2

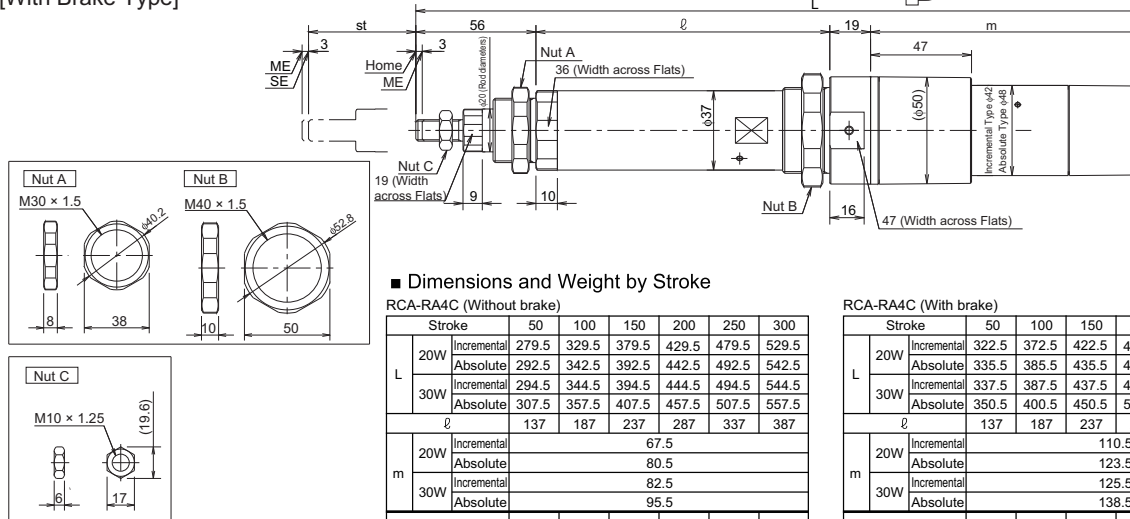
5.2 RCA-RA4C

ME: Mechanical End SE: Stroke End

[Without Brake Type]



[With Brake Type]



■ Dimensions and Weight by Stroke

RCA-RA4C (Without brake)

Stroke		50	100	150	200	250	300
L	20W	Incremental	279.5	329.5	379.5	429.5	479.5
		Absolute	292.5	342.5	392.5	442.5	492.5
	30W	Incremental	294.5	344.5	394.5	444.5	494.5
		Absolute	307.5	357.5	407.5	457.5	507.5
	Weight [kg]		1.1	1.2	1.4	1.5	1.7
			1.2	1.4	1.5	1.7	1.8

RCA-RA4C (With brake)

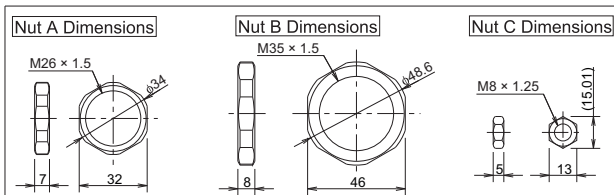
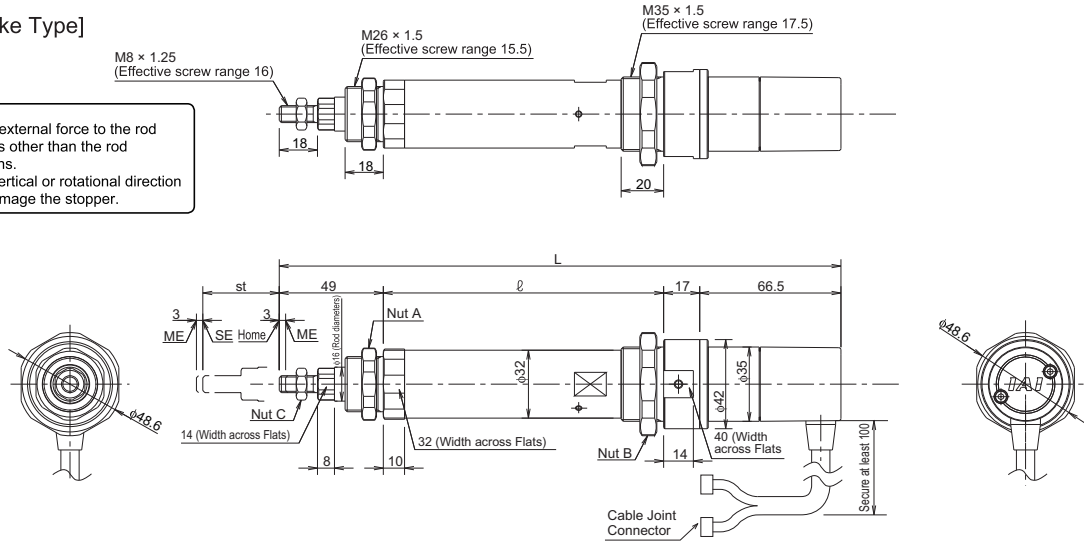
Stroke		50	100	150	200	250	300
L	20W	Incremental	322.5	372.5	422.5	472.5	522.5
		Absolute	335.5	385.5	435.5	485.5	535.5
	30W	Incremental	337.5	387.5	437.5	487.5	537.5
		Absolute	350.5	400.5	450.5	500.5	550.5
	Weight [kg]		1.3	1.4	1.6	1.7	1.9
			1.4	1.6	1.7	1.9	2.0

5.3 RCA-RA3D

ME: Mechanical End SE: Stroke End

[Without Brake Type]

Caution
Do not apply any external force to the rod from the directions other than the rod operating directions.
The force in the vertical or rotational direction of the rod may damage the stopper.



■ Dimensions and Weight by Stroke

RCA-RA3D (Without brake)

Stroke	50	100	150	200
L	264.5	314.5	364.5	414.5
ℓ	132	182	232	282
Weight [kg]	0.7	0.8	0.9	1.0

RCA-RA3D type is no brake-equipped type.

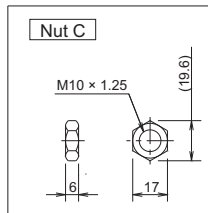
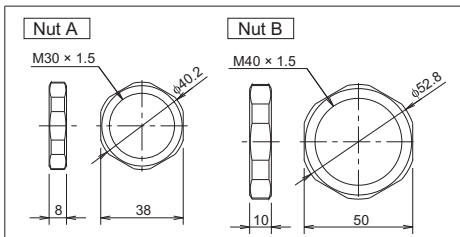
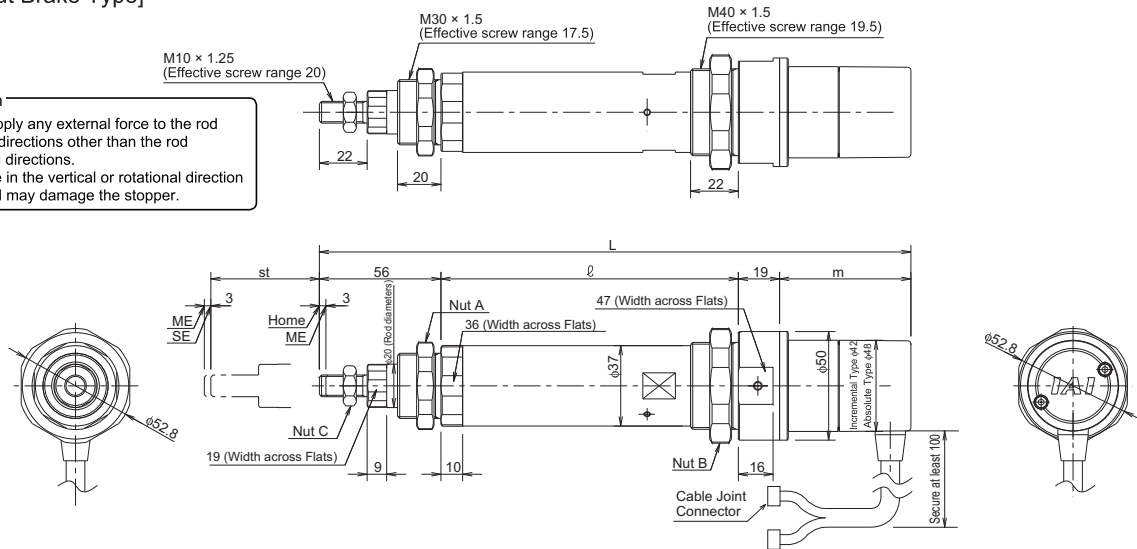
5.4 RCA-RA4D

ME: Mechanical End SE: Stroke End

[Without Brake Type]

Caution

Do not apply any external force to the rod from the directions other than the rod operating directions.
The force in the vertical or rotational direction of the rod may damage the stopper.



■ Dimensions and Weight by Stroke

RCA-RA4D (Without brake)

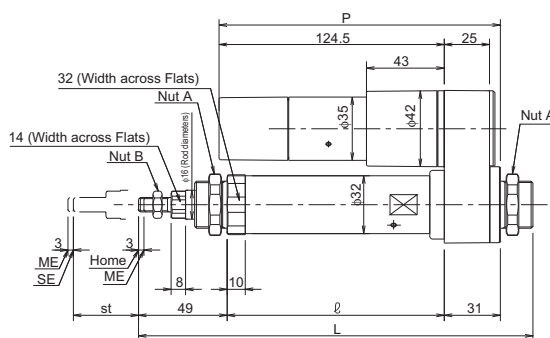
Stroke		50	100	150	200	250	300
L	20W Incremental	257.5	307.5	357.5	407.5	457.5	507.5
	20W Absolute	270.5	320.5	370.5	420.5	470.5	520.5
	30W Incremental	272.5	322.5	372.5	422.5	472.5	522.5
	30W Absolute	285.5	335.5	385.5	435.5	485.5	535.5
m	ϕ Incremental	137	187	237	287	337	387
	20W Absolute	45.5					
	30W Absolute	58.5					
	Weight [kg]	1.0	1.2	1.3	1.5	1.6	1.8

RCA-RA4D type is no breake-equipped type.

ME: Mechanical End SE: Stroke End

- Caution

Do not apply any external force to the rod from the directions other than the rod operating directions.
The force in the vertical or rotational direction of the rod may damage the stopper.



RCA-RA3R (Without brake)

Stroke	50	100	150	200
L	218	268	318	368
ℓ	120	170	220	270
P	116.5			
Weight [kg]	0.8	0.9	1.0	1.1

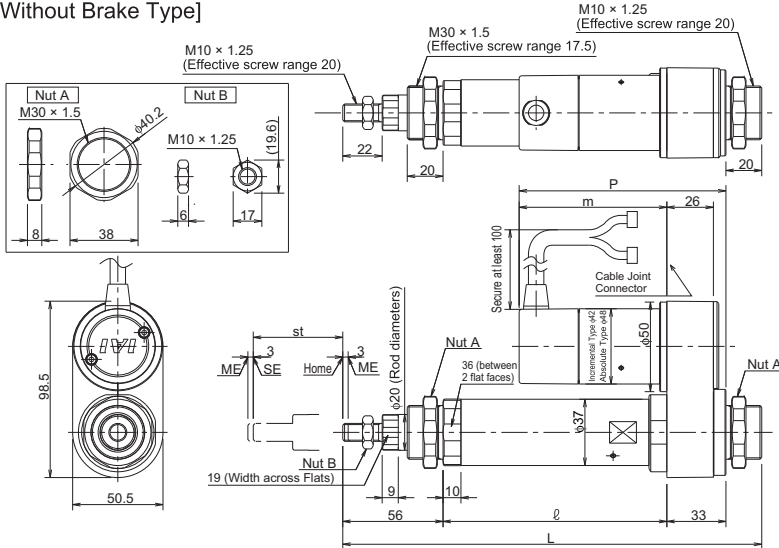
RCA-RA3R (With brake)

Stroke	50	100	150	200
L	218	268	318	368
ℓ	120	170	220	270
P	155.5			
Weight [kg]	1.0	1.1	1.2	1.3

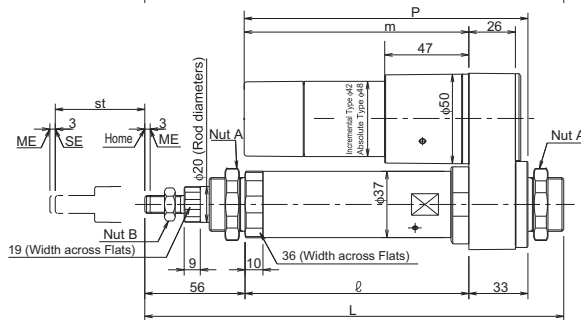
5.6 RCA-RA4R

ME: Mechanical End SE: Stroke End

[Without Brake Type]



[With Brake Type]



■ Dimensions and Weight by Stroke

RCA-RA4R (Without brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
	30W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
	ℓ		125	175	225	275	325	375
	m	20W	Incremental	67.5				
Absolute			80.5					
30W		Incremental	82.5					
		Absolute	95.5					
P	20W	Incremental	100.5					
		Absolute	113.5					
	30W	Incremental	115.5					
		Absolute	128.5					
Weight [kg]		1.2	1.4	1.5	1.7	1.8	2.0	

Caution
Do not apply any external force to the rod from the directions other than the rod operating directions. The force in the vertical or rotational direction of the rod may damage the stopper.

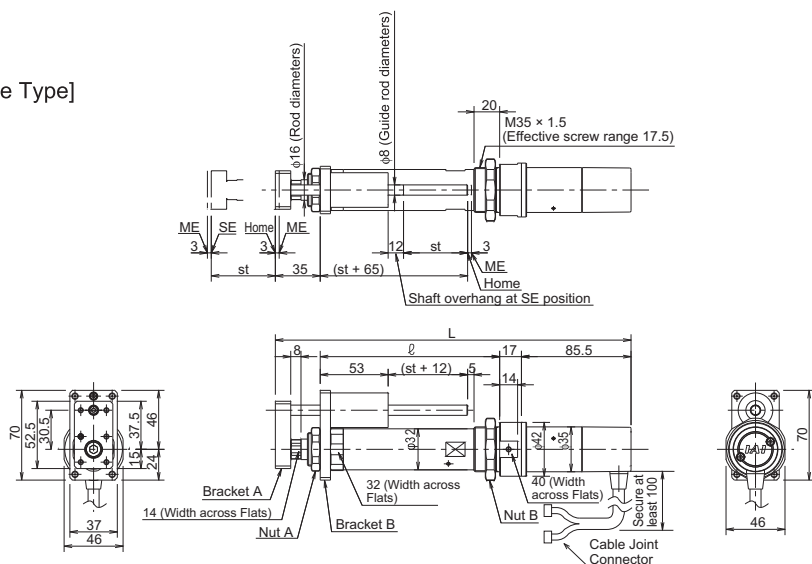
RCA-RA4R (With brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
	30W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
ℓ		125	175	225	275	325	375	
m	20W	Incremental	110.5					
		Absolute	123.5					
	30W	Incremental	125.5					
		Absolute	138.5					
P	20W	Incremental	143.5					
		Absolute	156.5					
	30W	Incremental	158.5					
		Absolute	171.5					
Weight [kg]		1.4	1.6	1.7	1.9	2.0	2.2	

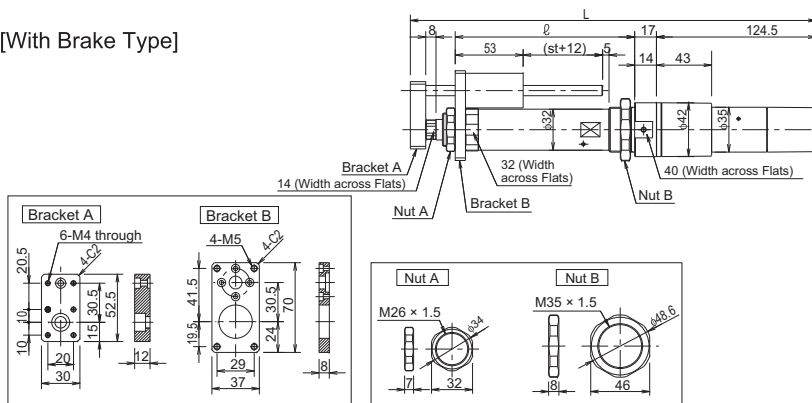
5.7 RCA-RGS3C

ME: Mechanical End SE: Stroke End

[Without Brake Type]



[With Brake Type]



■ Dimensions and Weight by Stroke

RCA-RGS3C (Without brake)

Stroke	50	100	150	200
L	277.5	327.5	377.5	427.5
ℓ	140	190	240	290
Weight [kg]	0.9	1.1	1.2	1.3

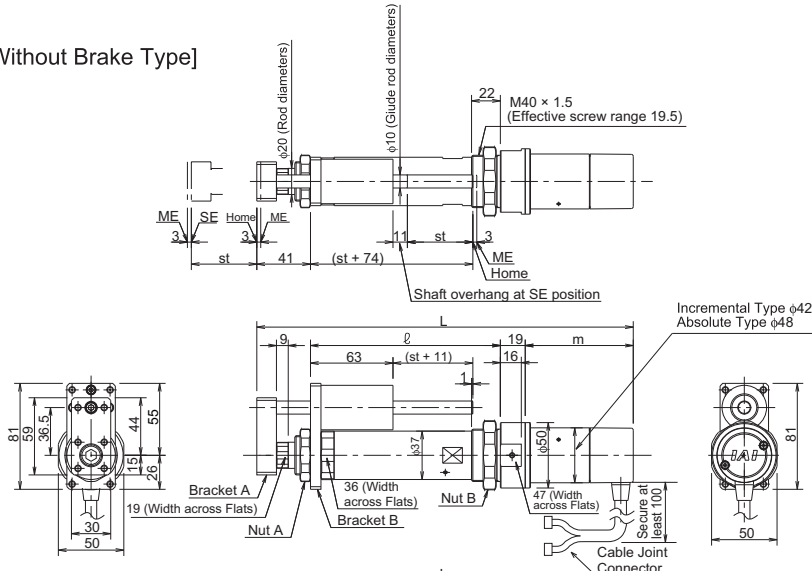
RCA-RGS3C (With brake)

Stroke	50	100	150	200
L	316.5	366.5	416.5	466.5
ℓ	140	190	240	290
Weight [kg]	1.1	1.3	1.4	1.5

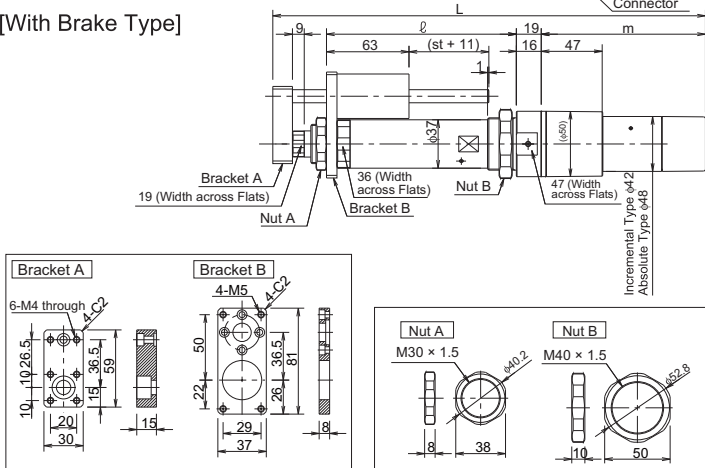
5.8 RCA-RGS4C

ME: Mechanical End SE: Stroke End

[Without Brake Type]



[With Brake Type]



■ Dimensions and Weight by Stroke

RCA-RGS4C (Without brake)

		Stroke	50	100	150	200	250	300
L	20W	Incremental	272.5	322.5	372.5	422.5	472.5	522.5
		Absolute	285.5	335.5	385.5	435.5	485.5	535.5
	30W	Incremental	287.5	337.5	387.5	437.5	487.5	537.5
		Absolute	300.5	350.5	400.5	450.5	500.5	550.5
ℓ			145	195	245	295	345	395
m	20W	Incremental	67.5					
		Absolute	80.5					
	30W	Incremental	82.5					
		Absolute	95.5					
Weight [kg]			1.5	1.6	1.8	2.0	2.2	2.4

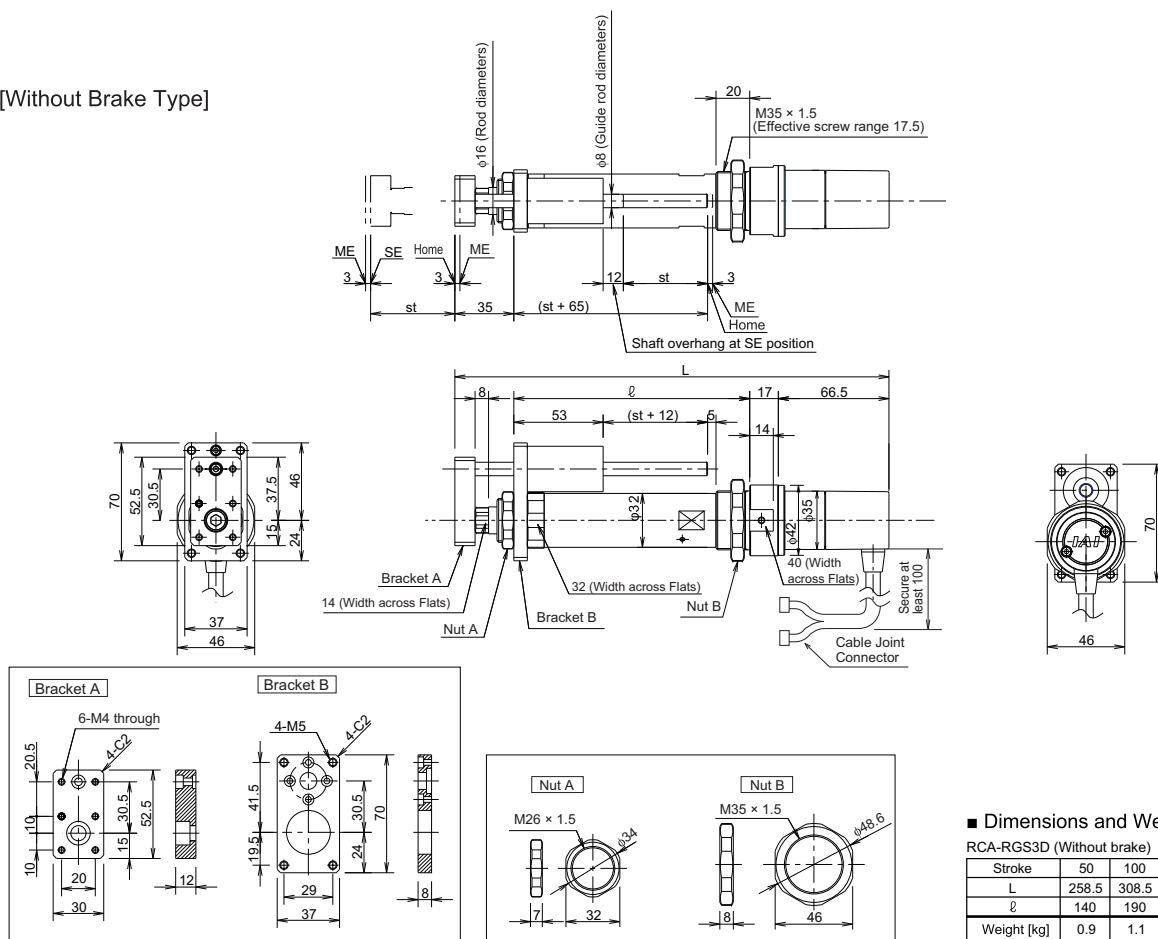
RCA-RGS4C (With brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	315.5	365.5	415.5	465.5	515.5	565.5
		Absolute	328.5	378.5	428.5	478.5	528.5	578.5
	30W	Incremental	330.5	380.5	430.5	480.5	530.5	580.5
		Absolute	343.5	393.5	443.5	493.5	543.5	593.5
ℓ		145	195	245	295	345	395	
m	20W	Incremental	110.5					
		Absolute	123.5					
	30W	Incremental	125.5					
		Absolute	138.5					
Weight [kg]		1.7	1.8	2.0	2.2	2.4	2.6	

5.9 RCA-RGS3D

ME: Mechanical End SE: Stroke End

[Without Brake Type]

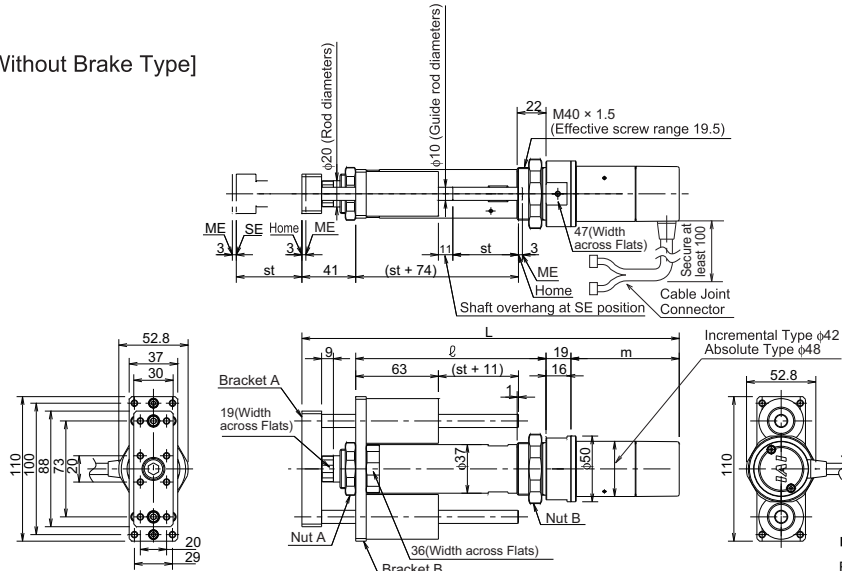


RCA-RGS3D type is no breake-equipped type.

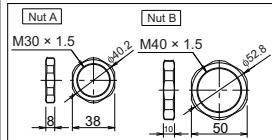
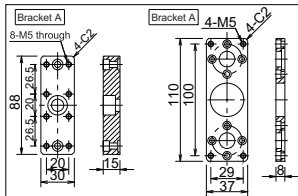
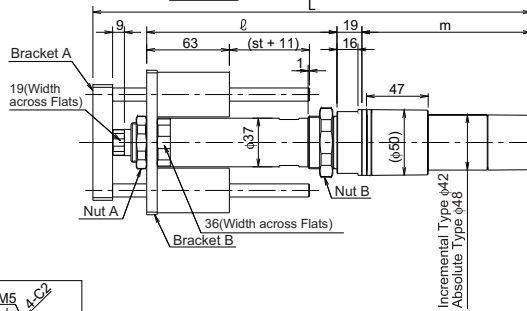
5.12 RCA-RGD4C

ME: Mechanical End SE: Stroke End

[Without Brake Type]



[With Brake Type]



■ Dimensions and Weight by Stroke

RCA-RGD4C (Without brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	272.5	322.5	372.5	422.5	472.5	522.5
		Absolute	285.5	335.5	385.5	435.5	485.5	535.5
	30W	Incremental	287.5	337.5	387.5	437.5	487.5	537.5
		Absolute	300.5	350.5	400.5	450.5	500.5	550.5
ℓ		145	195	245	295	345	395	
m	20W	Incremental	67.5					
		Absolute	80.5					
	30W	Incremental	82.5					
		Absolute	95.5					
Weight [kg]		1.8	2.0	2.2	2.4	2.6	2.8	

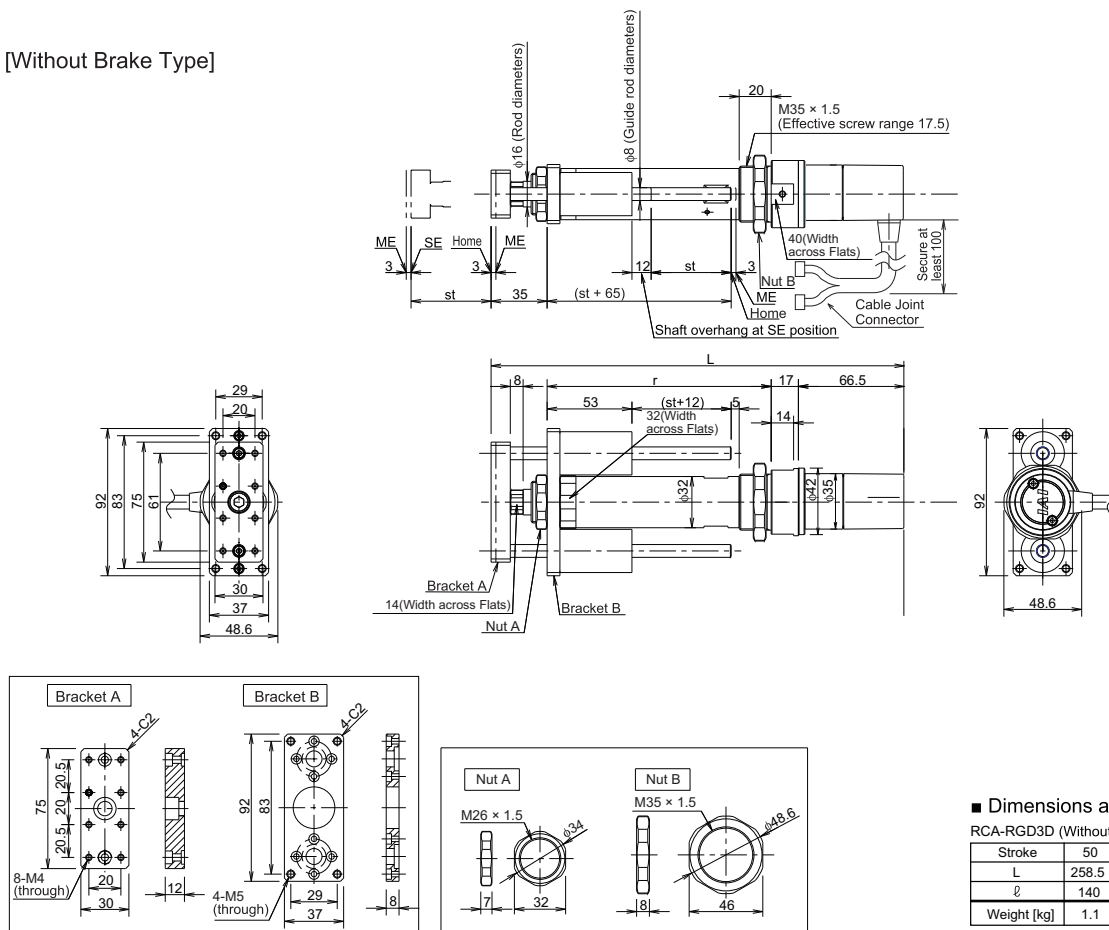
RCA-RGD4C (With brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	315.5	365.5	415.5	465.5	515.5	565.5
		Absolute	328.5	378.5	428.5	478.5	528.5	578.5
	30W	Incremental	330.5	380.5	430.5	480.5	530.5	580.5
		Absolute	343.5	393.5	443.5	493.5	543.5	593.5
Ø		145	195	245	295	345	395	
m	20W	Incremental	110.5					
		Absolute	123.5					
	30W	Incremental	125.5					
		Absolute	138.5					
Weight [kg]		2.0	2.2	2.4	2.6	2.8	3.0	

5.13 RCA-RGD3D

ME: Mechanical End SE: Stroke End

[Without Brake Type]

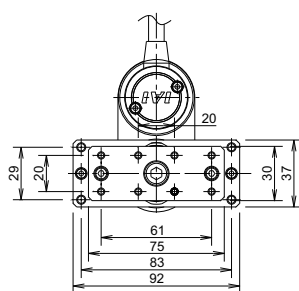
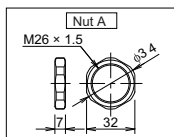


RCA-RGD3D type is no breake-equipped type.

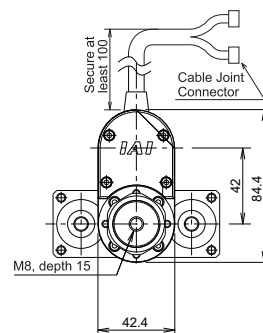
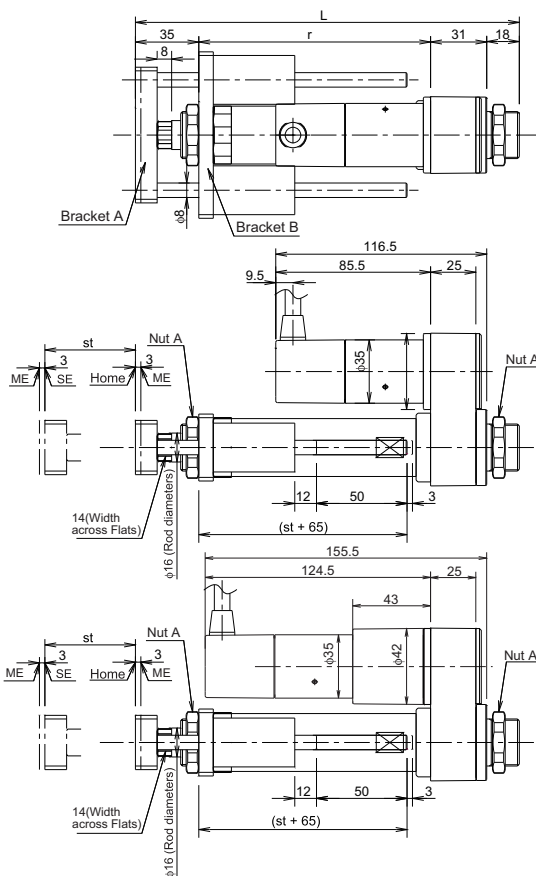
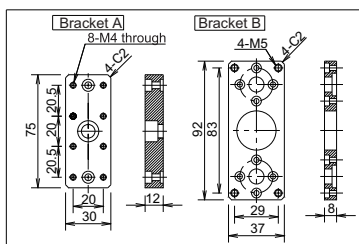
5.15 RCA-RGD3R

ME: Mechanical End SE: Stroke End

[Without Brake Type]



[With Brake Type]



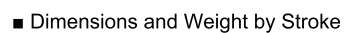
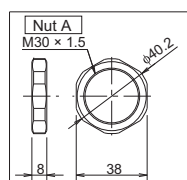
■ Dimensions and Weight by Stroke

Stroke	50	100	150	200
L	212	262	312	362
ℓ	128	178	228	278
Weight [kg]	1.2	1.3	1.5	1.6

RCA-RGD3R (With brake)

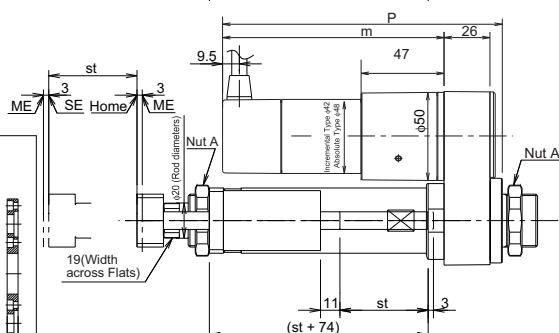
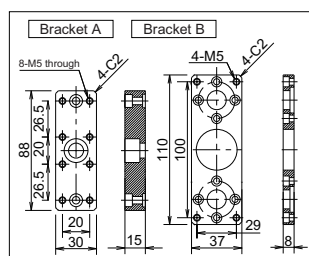
Stroke	50	100	150	200
L	212	262	312	362
<i>l</i>	128	178	228	278
Weight [kg]	1.4	1.5	1.7	1.8

ME: Mechanical End SE: Stroke End



RCA-RGD4R (Without brake)

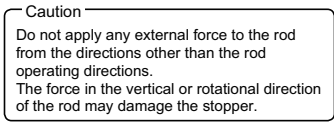
ICM-RGB-DK (without brake)								
Stroke			50	100	150	200	250	300
L	20W	Incremental	227	277	327	377	427	477
		Absolute	227	277	327	377	427	477
	30W	Incremental	227	277	327	377	427	477
		Absolute	227	277	327	377	427	477
ℓ			133	183	233	283	333	383
m	20W	Incremental	67.5					
		Absolute	80.5					
	30W	Incremental	82.5					
		Absolute	95.5					
P	20W	Incremental	100.5					
		Absolute	113.5					
	30W	Incremental	115.5					
		Absolute	128.5					
Weight [kg]			1.9	2.2	2.3	2.6	2.7	3.0



RCA-RGD4R (With brake)

		LOAD (kg) (with brake)						
Stroke		50	100	150	200	250	300	
L	20W	Incremental	227	277	327	377	427	477
		Absolute	227	277	327	377	427	477
	30W	Incremental	227	277	327	377	427	477
		Absolute	227	277	327	377	427	477
ℓ		133	183	233	283	333	383	
m	20W	Incremental	110.5					
		Absolute	123.5					
	30W	Incremental	125.5					
		Absolute	138.5					
P	20W	Incremental	143.5					
		Absolute	156.5					
	30W	Incremental	158.5					
		Absolute	171.5					
Weight [kg]		2.1	2.4	2.5	2.8	2.9	3.2	

ME: Mechanical End SE: Stroke End



■ Dimensions and Weight by Stroke

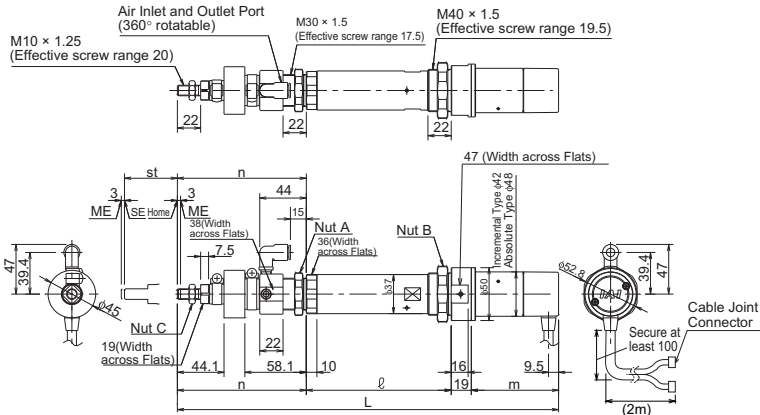
RCAW-RA3C/RA3D/RA3R (Without brake)					
Stroke		50	100	150	200
L	RA3C	348.9	408.9	468.9	528.9
	RA3D	329.9	389.9	449.9	509.9
	RA3R	283.4	343.4	403.4	463.4
ℓ	RA3C	132	182	232	282
	RA3D	132	182	232	282
	RA3R	120	170	220	270
m	RA3C	85.5			
	RA3D	66.5			
	RA3R	85.5			
n	RA3C	114.4	124.4	134.4	144.4
	RA3D	114.4	124.4	134.4	144.4
	RA3R	114.4	124.4	134.4	144.4
Weight [kg]	RA3C	1.0	1.1	1.2	1.3
	RA3D	1.0	1.1	1.2	1.3
	RA3R	1.1	1.2	1.3	1.4

RCAW-RA3C/RA3D/RA3R (With brake)

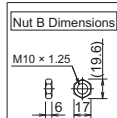
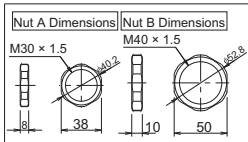
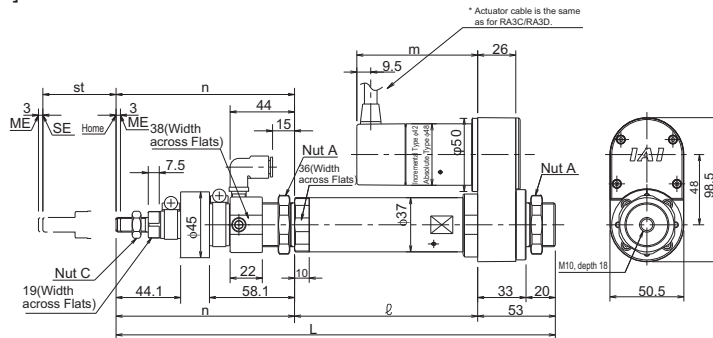
Stroke		50	100	150	200
L	RA3C	387.9	447.9	507.9	567.9
	RA3D	There is no brake-equipped type.			
	RA3R	283.4	343.4	403.4	463.4
ℓ	RA3C	132	182	232	282
	RA3D	There is no brake-equipped type.			
	RA3R	120	170	220	270
m	RA3C	124.5			
	RA3D	There is no brake-equipped type.			
	RA3R	124.5			
n	RA3C	114.4	124.4	134.4	144.4
	RA3D	There is no brake-equipped type.			
	RA3R	114.4	124.4	134.4	144.4
Weight [kg]	RA3C	1.2	1.3	1.4	1.5
	RA3D	1.2	1.3	1.4	1.5
	RA3R	1.3	1.4	1.5	1.6

5.18 RCAW-RA4C/RA4D/RA4R

[RA4C/RA4D]



[RA4R]



Caution
Do not apply any external force to the rod from the directions other than the rod operating directions.
The force in the vertical or rotational direction of the rod may damage the stopper.

■ Dimensions and Weight by Stroke

RCAW-RA4C/RA4D/RA4R (Without brake)

	Stroke			50	100	150	200	250	300
L	RA4C	20W	Incremental	345.4	405.4	465.4	525.4	586.4	647.4
			Absolute	358.4	418.4	478.4	538.4	599.4	660.4
	30W		Incremental	360.4	420.4	480.4	540.4	601.4	662.4
			Absolute	373.4	433.4	493.4	553.4	614.4	675.4
	RA4D	20W	Incremental	323.4	383.4	443.4	503.4	564.4	625.4
			Absolute	336.4	396.4	456.4	516.4	577.4	638.4
	30W		Incremental	338.4	398.4	458.4	518.4	579.4	640.4
			Absolute	351.4	411.4	471.4	531.4	592.4	653.4
	RA4R	20W	Incremental	299.9	359.9	419.9	479.9	540.9	601.9
			Absolute	299.9	359.9	419.9	479.9	540.9	601.9
	30W		Incremental	299.9	359.9	419.9	479.9	540.9	601.9
			Absolute	299.9	359.9	419.9	479.9	540.9	601.9
ℓ	RA4C	20W		137	187	237	287	337	387
		30W	Common to Incremental	137	187	237	287	337	387
	RA4D	20W		137	187	237	287	337	387
		30W	Absolute	137	187	237	287	337	387
	RA4R	20W		125	175	225	275	325	375
		30W	125	175	225	275	325	375	
m	RA4C	20W	Incremental	67.5					
			Absolute	80.5					
	30W		Incremental	82.5					
			Absolute	95.5					
	RA4D	20W	Incremental	45.5					
			Absolute	58.5					
	30W		Incremental	60.5					
			Absolute	73.5					
	RA4R	20W	Incremental	67.5					
			Absolute	80.5					
	30W		Incremental	82.5					
			Absolute	95.5					
n	RA4C	20W	Common to Incremental Absolute	121.9	131.9	141.9	151.9	162.9	173.9
		30W		121.9	131.9	141.9	151.9	162.9	173.9
	RA4D	20W		121.9	131.9	141.9	151.9	162.9	173.9
		30W		121.9	131.9	141.9	151.9	162.9	173.9
	RA4R	20W		121.9	131.9	141.9	151.9	162.9	173.9
		30W		121.9	131.9	141.9	151.9	162.9	173.9
Weight [kg]	RA4C	20W/30W	1.4	1.5	1.7	1.8	2.0	2.1	
	RA4D	20W/30W	1.3	1.5	1.6	1.8	1.9	2.1	
	RA4R	20W/30W	1.5	1.7	1.8	2.0	2.1	2.3	

* The total length of RA4C Type is extended to 43mm if it is equipped with a brake. Although the motor part is extended to 43mm also for RA4R Type, since it is the reversed type, the total length does not change. Also, the weight increases in 0.2kg for all the models.

6. Life

The product life is estimated as 5000km (reference) under the condition that it is operated with maximum transportable weight, maximum acceleration and deceleration.

7. Warranty

7.1 Warranty Period

One of the following periods, whichever is shorter:

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

7.2 Scope of the Warranty

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

- (1) The breakdown or 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.

7.3 Honoring the Warranty

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

7.4 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.

7.5 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] A mechanism or mechanical equipment intended to move or transport people (such as a vehicle, 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.

7.6 Other Items Excluded from Warranty

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

- [1] Guidance for 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	Description of Revision
April 2011	Fifth edition A page for CE Marking added
March 2012	Sixth edition CAUTION deleted Pg. 1 to 7 Contents added and changed in Safety Guide Pg. 8 Caution in Handling added Pg. 10, 11 Contents changed in 3. Warranty Pg. 38 Warning notes added such as in case the grease got into your eye, Pg. 64 to 81 immediately go to see the doctor for an appropriate care. External Dimensions added
September 2012	Seventh edition Revised overall Contents added in Motor reversing type
October 2012	Edition 7B Note corrected
November 2012	Eighth edition Pg. 54 Connecting the Air Tube of the RCAW Dustproof Splash-proof Type is added to 2.3.3.
December 2014	Edition 8C Pg. 15 P5: ACON-CA added in applicable controllers Pg. 19 No. of Encoder Pulses 200 → 800 Pg. 39, 55 Cable changed to CB-ASEP2-MPA□□□
August 2015	Edition 8D Pg. 58 Change made in caution note for connection to controller Pg. 61 Applicable Belt IAI maintenance parts model added
April 2016	Edition 8E Pg. 59, 60 The contents about grease supply on rod sliding surface and cleaning are added
October 2016	Edition 8F Precautions Note added stating "Do not attempt to apply any force except for the radial load to actuators equipped with the single guide."
January 2017	Edition 8G Pg. 39 Correction made to combinations of twisted pairs Actuator Side 14-pin and 15-pin, 6-pin and 13-pin are pair Controller Side 17-pin and 19-pin, 18-pin and 20-pin are pair
February 2017	Edition 8H Pg. 9 Figures added showing directions unacceptable to receive load on single guide
September 2017	Edition 8I Pg. 25 Running Life graph of RGS4 and RGD4 are added Pg. 27 Tip Flexure graph of RGS4 and RGD4 are added

Revision Date	Description of Revision
May 2018	Edition 8J Pg. 86 Change made from Phillips screwdriver to slotted screwdriver Pg. 88 Change made for tightening torque from 2N·m to 0.35N·m
May 2021	Edition 8K Pg. 73 Grease changed from Daphne Eponex Grease No. 2 to Daphne Grease MP No. 2
June 2026	Edition 8L Changes due to discontinuation of including the Instruction Manual DVD Changes due to discontinuation of including the First Step Guide Terms integrated (cable carrier)



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