



# ROBO Cylinder RCP3 Actuator Table Type Operating Manual

Seventh Edition

Motor straight types	[Slim small ROBO cylinders] TA3C, TA4C
	TA5C, TA6C, TA7C
Motor side mounted types	[Slim small ROBO cylinders] TA3R, TA4R
	TA5R, TA6R, TA7R

***IAI America, Inc.***



## **Please Read Before Use**

Thank you for purchasing our product.

This Operation Manual explains the handling methods, structure and maintenance of this product, among others, providing the information you need to know 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.

The CD or DVD that comes with the product contains operation manuals for IAI products.

When using the product, refer to the necessary portions of the applicable operation manual by printing them out or displaying them on a PC.

After reading the Operation Manual, keep it in a convenient place so that whoever is handling this product can reference 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.

## **CE Marking**

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

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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	<ul style="list-style-type: none"><li>• 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.<ol style="list-style-type: none"><li>1) Medical equipment used to maintain, control or otherwise affect human life or physical health.</li><li>2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)</li><li>3) Important safety parts of machinery (Safety device, etc.)</li></ol></li><li>• Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product.</li><li>• Do not use it in any of the following environments.<ol style="list-style-type: none"><li>1) Location where there is any inflammable gas, inflammable object or explosive</li><li>2) Place with potential exposure to radiation</li><li>3) Location with the ambient temperature or relative humidity exceeding the specification range</li><li>4) Location where radiant heat is added from direct sunlight or other large heat source</li><li>5) Location where condensation occurs due to abrupt temperature changes</li><li>6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)</li><li>7) Location exposed to significant amount of dust, salt or iron powder</li><li>8) Location subject to direct vibration or impact</li></ol></li><li>• 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.</li></ul>

No.	Operation Description	Description
2	Transportation	<ul style="list-style-type: none"> <li>• When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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 operation manual for each model.</li> <li>• Do not step or sit on the package.</li> <li>• Do not put any heavy thing that can deform the package, on it.</li> <li>• When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work.</li> <li>• When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit.</li> <li>• Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength.</li> <li>• Do not get on the load that is hung on a crane.</li> <li>• Do not leave a load hung up with a crane.</li> <li>• Do not stand under the load that is hung up with a crane.</li> </ul>
3	Storage and Preservation	<ul style="list-style-type: none"> <li>• The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.</li> <li>• Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.</li> </ul>
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• When using the product in any of the places specified below, provide a sufficient shield.             <ol style="list-style-type: none"> <li>1) Location where electric noise is generated</li> <li>2) Location where high electrical or magnetic field is present</li> <li>3) Location with the mains or power lines passing nearby</li> <li>4) Location where the product may come in contact with water, oil or chemical droplets</li> </ol> </li> </ul>



No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> <li>● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool.</li> <li>● 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.</li> <li>● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error.</li> <li>● 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.</li> <li>● 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.</li> <li>● 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.</li> </ul>
		<p>(3) Grounding</p> <ul style="list-style-type: none"> <li>● 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.</li> <li>● 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 <math>0.5\text{mm}^2</math> (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).</li> <li>● Perform Class D Grounding (former Class 3 Grounding with ground resistance <math>100\Omega</math> or below).</li> </ul>





No.	Operation Description	Description
4	Installation and Start	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• Take the measure so that the work part is not dropped in power failure or emergency stop.</li> <li>• Wear protection gloves, goggle or safety shoes, as necessary, to secure safety.</li> <li>• 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.</li> <li>• 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.</li> </ul>
5	Teaching	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• Place a sign "Under Operation" at the position easy to see.</li> <li>• 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.</li> </ul> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>

No.	Operation Description	Description
6	Trial Operation	<ul style="list-style-type: none"> <li>• 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.</li> <li>• After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>
7	Automatic Operation	<ul style="list-style-type: none"> <li>• Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence.</li> <li>• Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication.</li> <li>• Make sure to operate automatic operation start from outside of the safety protection fence.</li> <li>• 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.</li> <li>• 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.</li> </ul>

No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• When the work is to be performed inside the safety protection fence, basically turn OFF the power switch.</li> <li>• 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.</li> <li>• 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.</li> <li>• Place a sign "Under Operation" at the position easy to see.</li> <li>• For the grease for the guide or ball screw, use appropriate grease according to the Operation Manual for each model.</li> <li>• Do not perform the dielectric strength test. Failure to do so may result in a damage to the product.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul> <p>Use in incomplete condition may cause damage to the product or an injury.</p> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
9	Modification and Dismantle	<ul style="list-style-type: none"> <li>• Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.</li> </ul>
10	Disposal	<ul style="list-style-type: none"> <li>• When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste.</li> <li>• When removing the actuator for disposal, pay attention to drop of components when detaching screws.</li> <li>• Do not put the product in a fire when disposing of it.</li> </ul> <p>The product may burst or generate toxic gases.</p>
11	Other	<ul style="list-style-type: none"> <li>• 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.</li> <li>• See Overseas Specifications Compliance Manual to check whether complies if necessary.</li> <li>• For the handling of actuators and controllers, follow the dedicated operation manual of each unit to ensure the safety.</li> </ul>

## Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the Operation 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

## Handling Precautions

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

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

### 2. Handling a Single Actuator

Please adhere to the following when handling a single actuator.

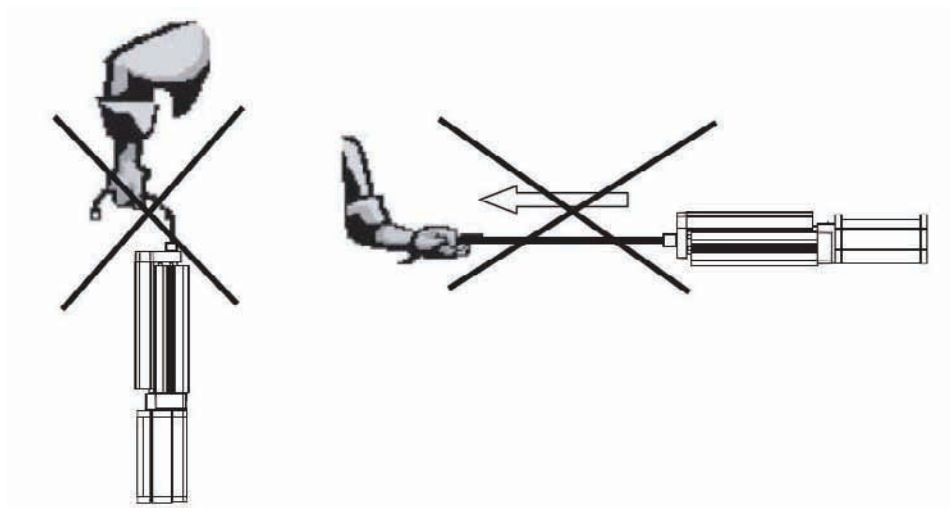
#### 2.1 Handling the Packed Unit

Unless otherwise specified, single-axis actuators are shipped in individual packaging. Please handle packages carefully during transport to ensure that product is not damaged by bumping or dropping.

- Never attempt to move heavy packages by yourself.
- Always set packages down on a level surface.
- Never climb on top of packages.
- Never place heavy objects or objects where the load is concentrated in one place on top of packages, as this may cause deformation.

#### 2.2 Handling the Actuator After Unpacking

Do not carry an actuator by a cable or attempt to move it by pulling the cable.



When unpacking the actuator and handling it thereafter, always hold it by the base.

- Be careful not to bump the actuator into anything when moving it.
- Do not attempt to force any part of the actuator.

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

### **3. Moving the actuator back and forth over a short distance may cause the oil film of grease to break.**

If the actuator is moved back and forth continuously over a short distance of 30 mm or less, the oil film of grease may break. As a rough guide, after every 5,000 to 10,000 cycles move the actuator five cycles or so over a distance of 50 mm or more, to restore the oil film.

### **4. Turn ON the servo when the slider, rod, etc., is positioned away from the mechanical end.**

If the servo is turned ON when the slider, rod, etc., is positioned near the mechanical end, pole phase detection may not be performed correctly and a pole non-confirmation error or excited-phase detection error may occur. Perform the pole phase detection with the slider, rod, etc. positioned away from the mechanical end.

## **5. Handling the Actuator Assembly**

When transporting the actuator with its axes already assembled, take note of the following items.

### **5.1 Shipping from IAI Already Assembled**

After assembly at IAI, your machine undergoes a shipping inspection, is packed in a crate with skids, and finally shipped.

If any of the combined actuators is a slider, the slider is securely fastened in place to prevent unexpected movement during shipping. Combined units have the ends of their actuators fastened so as to prevent them from moving significantly due to external vibration.

- The crate is not designed to withstand dropping or collision. Please handle it carefully. It is also not built to have items stacked on it, so please avoid placing heavy objects on top of the crate.
- When lifting the package using belts or the like, be sure to pass the belts around the reinforcement frames under the skids. The same applies for lifting the package with a forklift; please ensure that the forks are placed under the skids.
- When setting the package down, do not let the package receive an impact upon contacting the floor.

### **5.2 Handling After Unpacking**

Please adhere to the following instructions when handling the assembled unit, whether it was shipped pre-assembled at IAI or assembled on your site.

- Secure the slider so that it does not move unexpectedly during transport.
- If the end of the actuator is protruding, fasten it down properly so that it does not move significantly due to external vibration. When transporting the assembly without the ends of the actuators fastened, do not subject the assembly to an impact of 0.3 G or more.
- When using belts or the like to lift an assembly consisting of an actuator and peripheral equipment, make sure the belts are not passed around the actuator itself or otherwise do not touch the actuator.
- Make sure the belts support the actuator load by its base by using appropriate cushioning materials.
- Lift the end of the Y-axis with a separate belt, ensuring that the assembly remains level. At this time, also make sure the load is not placed on the screw cover.
- Make sure the load is not placed on the brackets, covers, or connector box.  
Also make sure the cables are not pinched or deformed excessively.

## **6. Handling after Assembly with Peripheral Equipment**

When the machine assembled at IAI is transported as an assembly, also follow the handling precautions in 2.2, “Handling after Unpacking.”



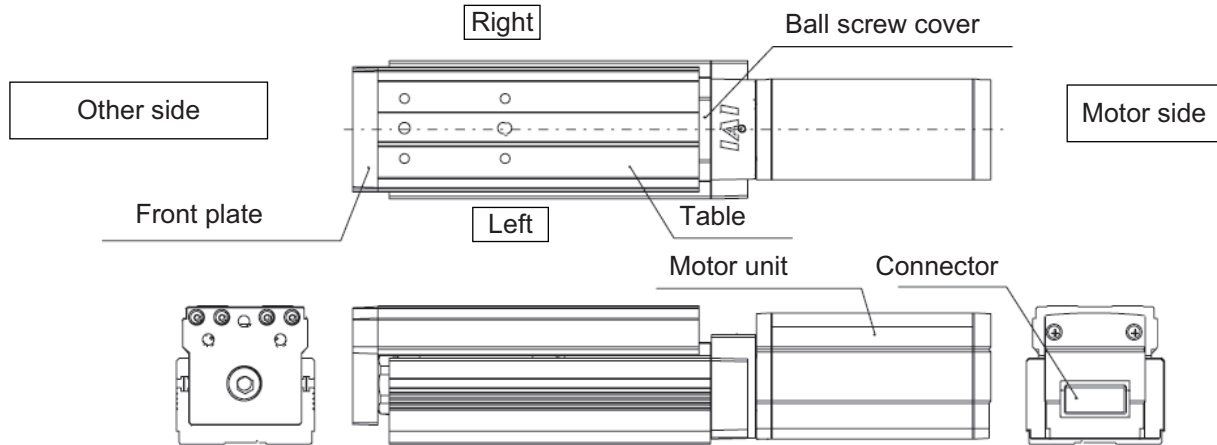
## 1. Part Names

The names of the actuator parts are indicated below.

In this manual, the left and right directions are indicated by viewing the horizontally placed actuator from the motor in a top view.

Front refers to the side opposite the motor.

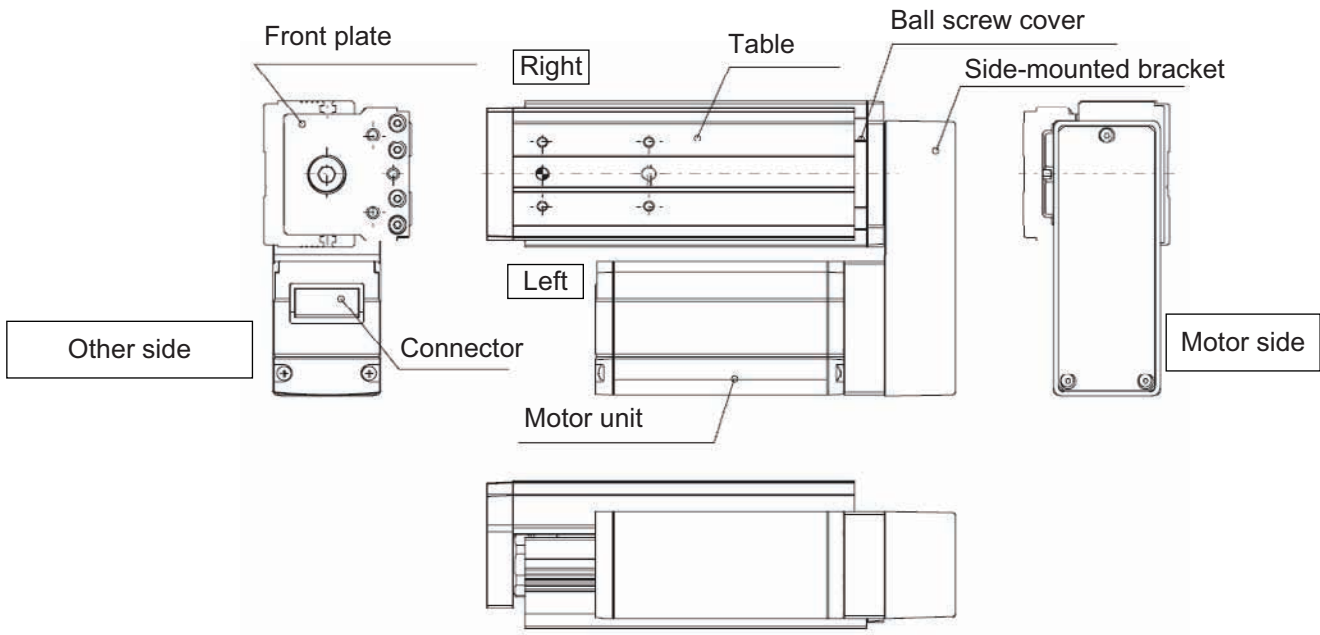
- “Motor coupling types” : RCP3-TA3C/TA4C/TA5C/TA6C/TA7C



\* Refer to 2, “External Dimensions” for details.

\* The connector positions shown in the above figure are when the cable exit direction has not been changed.

- “Motor side mounted types” : RCP3-TA3R/TA4R/TA5R/TA6R/TA7R



\* Refer to 2, “External Dimensions” for details.

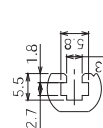
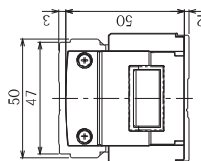
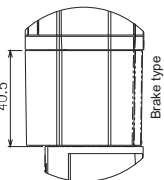
**Note:** On table types, a gap is created between the table and motor unit when the table is away from the home position. Be careful not to pinch your hand in this gap.

## 2.1 RCP3-TA3C

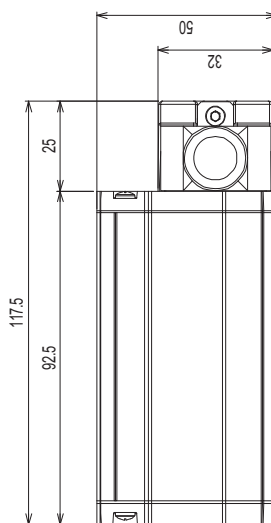
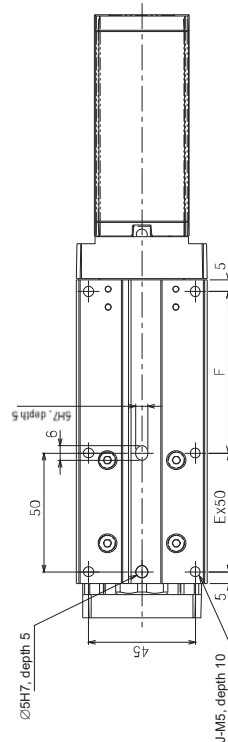
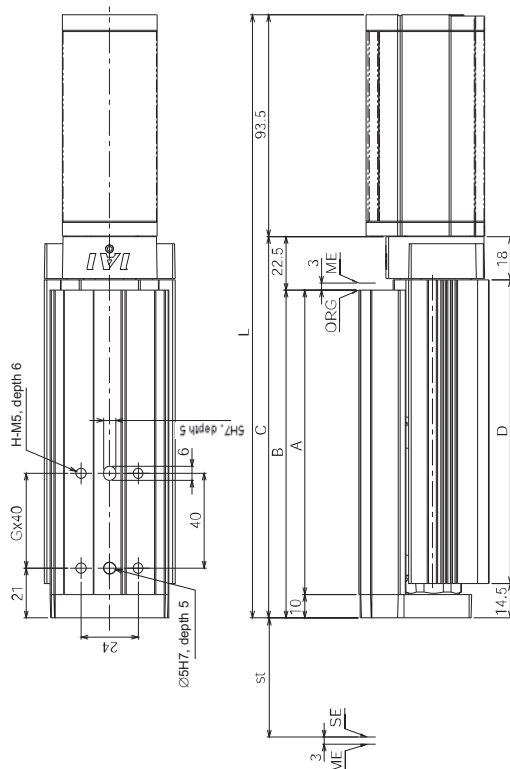
ST	L		A	B	C	D	E	F	G	H	J	Weight [kg]	
	without brake	with brake										without brake	with brake
20	224	262	87.5	95.5	121.5	91	1	28.5	1	4	6	0.5	0.6
30	234	272	89.5	105.5	131.5	101	1	38.5	1	4	6	0.5	0.6
40	244	282	107.5	115.5	141.5	111	1	48.5	1	4	6	0.5	0.6
50	254	292	117.5	125.5	151.5	121	1	58.5	1	4	6	0.6	0.7
60	264	302	127.5	135.5	161.5	131	2	18.5	2	6	8	0.6	0.7
70	274	312	137.5	145.5	171.5	141	2	28.5	2	6	8	0.6	0.7
80	284	322	147.5	155.5	181.5	151	2	38.5	2	6	8	0.6	0.7
90	294	332	157.5	165.5	191.5	161	2	48.5	2	6	8	0.7	0.8
100	304	342	167.5	175.5	201.5	171	2	58.5	2	6	8	0.7	0.8



Technical drawing of the front view of a mechanical part. The drawing shows a rectangular block with a central circular feature. Dimensions are provided in millimeters: overall width is 55, overall height is 53, and a central vertical slot is 29 wide. On the left side, there are four circular features (holes) with a diameter of 3-M6, spaced 10 units apart. The distance from the top edge to the first hole is 6.5, and the distance between the first and second hole is 14. The distance from the bottom edge to the last hole is 29. The central circular feature has a diameter of 34. The distance from the right edge to the center of the central feature is 24. The distance from the right edge to the center of the first hole is 15. The distance from the right edge to the center of the last hole is 34. The distance from the right edge to the center of the central feature is 24. The distance from the right edge to the center of the first hole is 15. The distance from the right edge to the center of the last hole is 34.



Detail view of T-groove (2: 1)



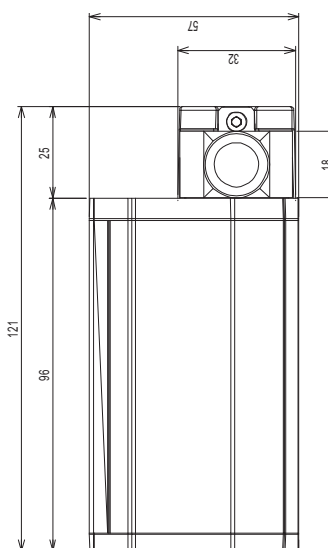
(Side view of the motor when the cable exit direction has been changed (optional))

ST	L		A	B	C	D	E	F	G	H	J	Weight [kg]	
	without brake	with brake										without brake	with brake
25	259	269.5	103	113	135.5	103	1	43	1	4	6	1.2	1.5
50	254	294.5	128	138	160.5	128	1	68	1	4	6	1.4	1.7
75	279	319.5	153	163	185.5	153	2	43	2	6	8	1.5	1.8
100	294	344.5	178	188	210.5	178	2	68	2	6	8	1.7	2



[illegible]

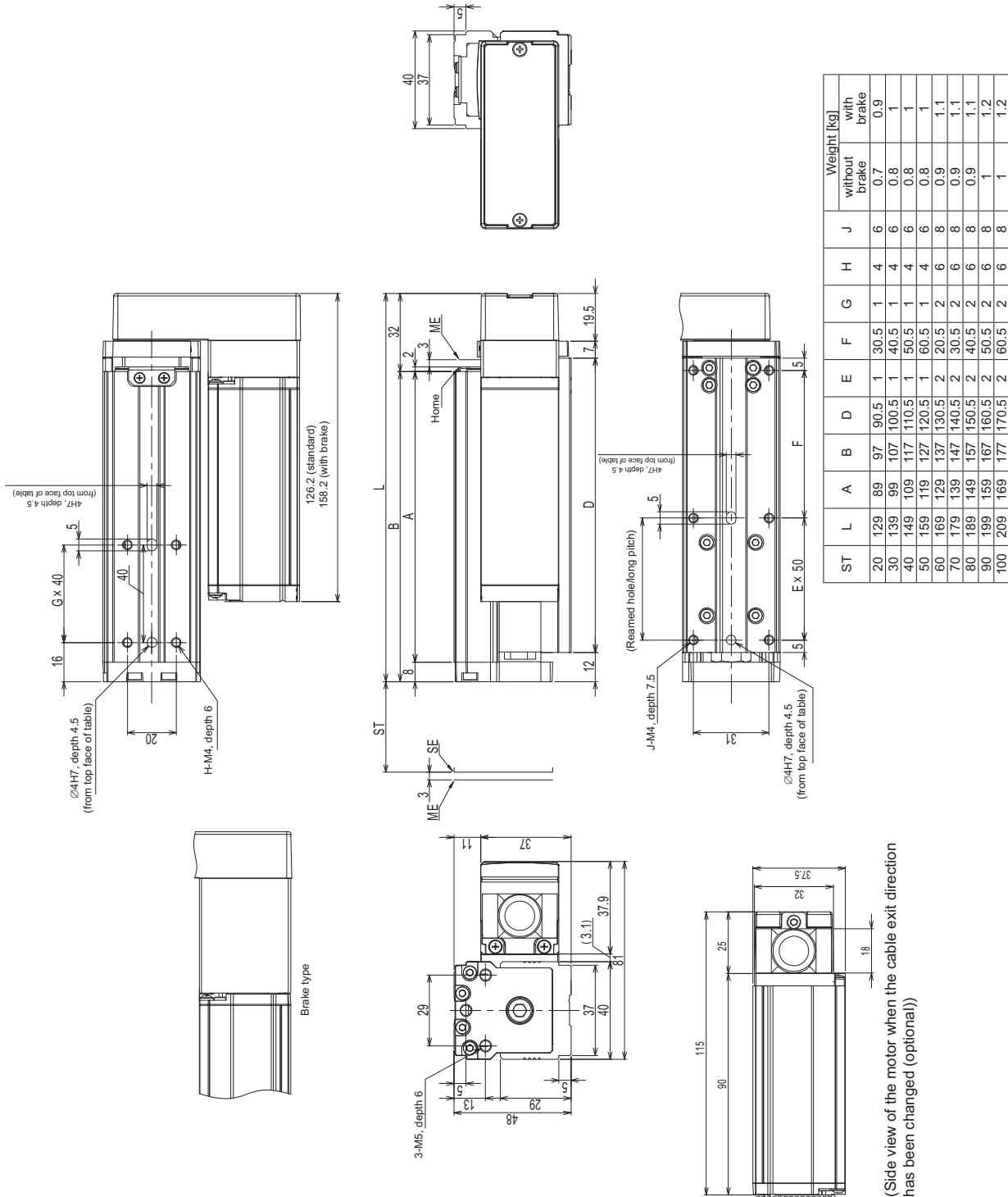
ST	L		A	B	C	D	E	F	G	H	J	Weight [kg]	
	without brake	with brake										without brake	with brake
25	246.5	286	118	133	149.5	110.5	1	50.5	1	4	6	2.1	2.5
50	271.5	311	143	158	174.5	135.5	1	75.5	1	4	6	2.3	2.7
75	296.5	336	168	183	199.5	160.5	2	50.5	2	6	8	2.5	2.9
100	321.5	361	193	208	224.5	185.5	2	75.5	2	6	8	2.8	3.2
125	346.5	386	218	233	249.5	210.5	3	50.5	3	8	10	3	3.4
150	371.5	411	243	258	274.5	235.5	3	75.5	3	8	10	3.2	3.6
175	396.5	436	268	283	299.5	260.5	4	50.5	4	10	12	3.4	3.8
200	421.5	461	293	308	324.5	285.5	4	75.5	4	10	12	3.6	4



(Side view of the motor when the cable exit direction has been changed (optional))

ST	L	A	B	D	E	F	G	H	J	Weight [kg]	
										without brake	with brake
20	126.5	87.5	95.5	91	1	28.5	1	4	6	0.5	0.6
30	136.5	97.5	105.5	101	1	38.5	1	4	6	0.6	0.7
40	146.5	107.5	115.5	111	1	48.5	1	4	6	0.6	0.7
50	156.5	117.5	125.5	121	1	58.5	1	4	6	0.6	0.7
60	166.5	127.5	135.5	131	2	18.5	2	6	8	0.6	0.7
70	176.5	137.5	145.5	141	2	28.5	2	6	8	0.7	0.8
80	186.5	147.5	155.5	151	2	38.5	2	6	8	0.7	0.8
90	196.5	157.5	165.5	161	2	48.5	2	6	8	0.7	0.8
100	206.5	167.5	175.5	171	2	58.5	2	6	8	0.7	0.8

## 2.7 RCP3-TA4R Side Mounted to the Left (Right)





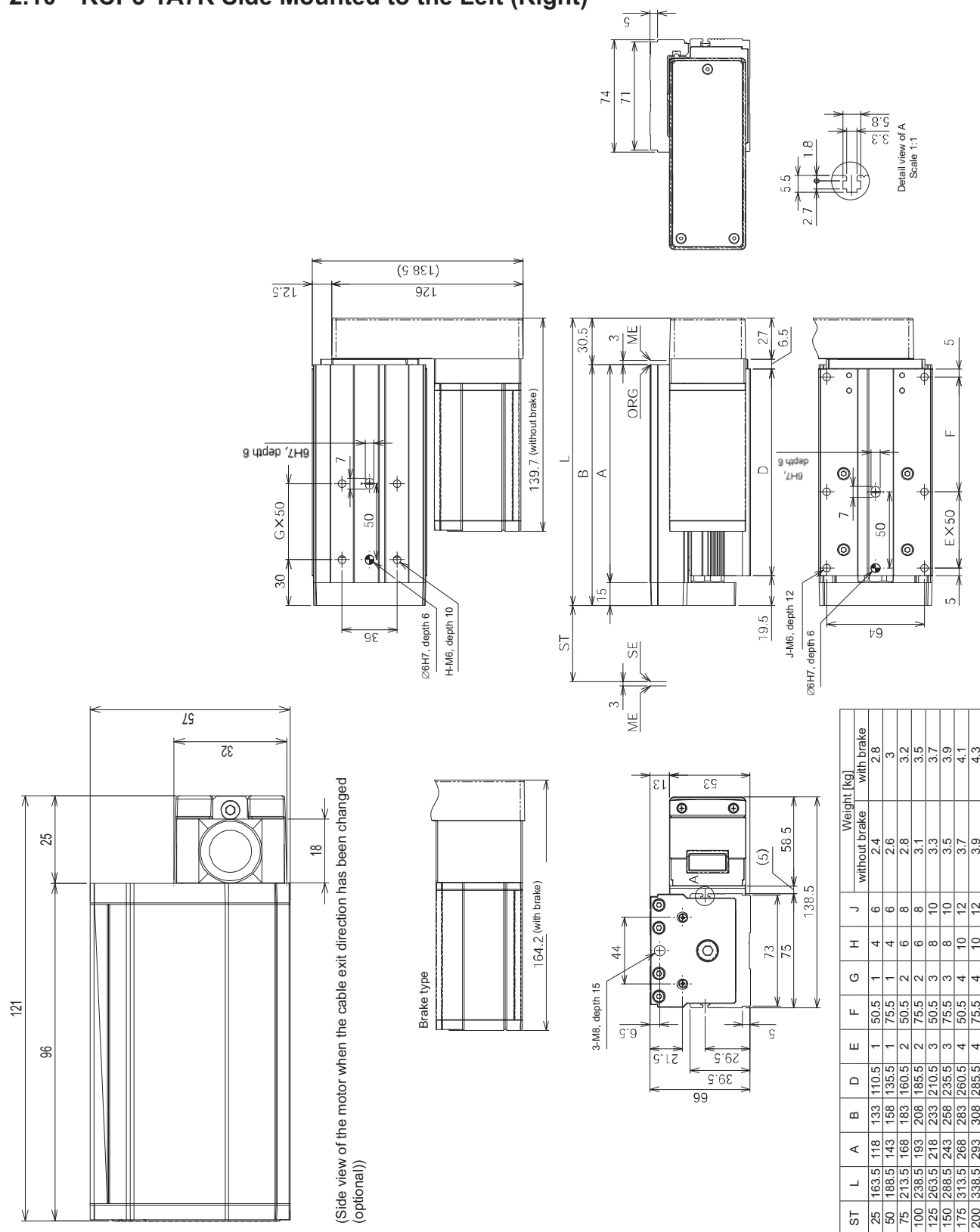
(\*) On ST-25 models with brake, the motor unit projects from the tip of the table (at the home position).

Technical drawing of the ST-25 motor showing side and front views with dimensions. The side view shows a motor with a cable exit direction that can be changed. The front view shows the motor with dimensions for the frame, terminal box, and mounting feet. A table of dimensions is provided below the drawing.

ST	L	A	B	D	E	F	G	H	J	Weight [kg]
25	161.5	108	121	110.5	1	50.5	1	4	6	without brake 2.1
50	186.5	133	146	135.5	1	75.5	1	4	6	with brake 2.5
75	211.5	158	171	160.5	1	100.5	1	4	6	2.3
100	236.5	183	196	185.5	2	125.5	2	6	8	2.7
125	261.5	208	221	210.5	2	150.5	2	6	8	2.9
150	286.5	233	246	235.5	3	175.5	3	8	10	3.1
					3	200.5	3	8	10	3.3
					3	225.5	3	8	10	3.5

(\*) On ST-25 models with brake, the motor unit projects from the tip of the table (at the home position).

### 2.10 RCP3-TA7R Side Mounted to the Left (Right)



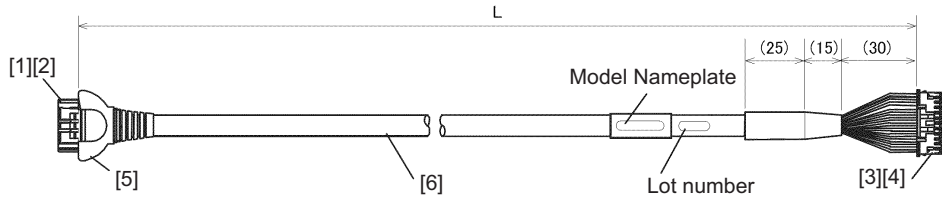
(\*) On ST-25 models with brake, the motor unit projects from the end of the table (at the home position).

## 3. Cable Drawings

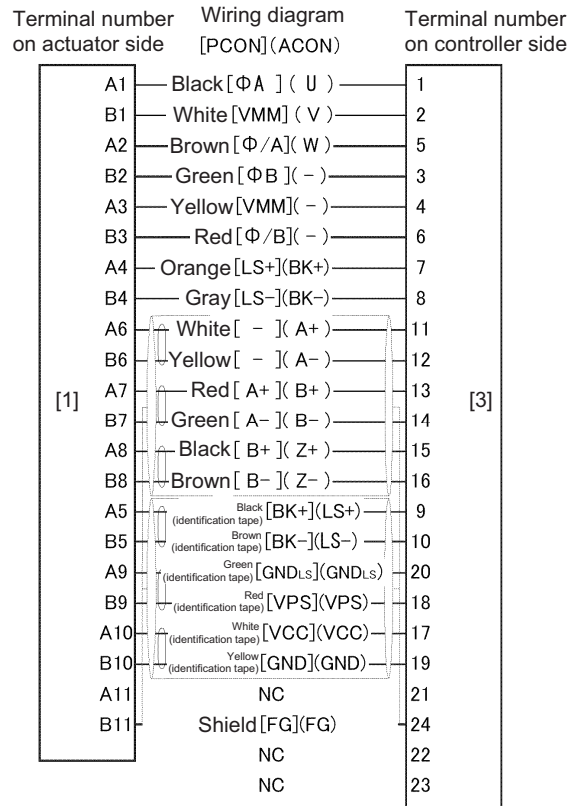
### 3.1 PSEP Controller Cables

Integrated motor/encoder cable  
(CB-APSEP-MPA\*\*\*)

\*\*\* indicates the cable length (L). Up to 10 m can be specified.  
Example) 080 = 8 m



No.	Item	Model number	Manufacturer
1	Housing	D-1100D 1-1827863-1 (black, 2.0-mm pitch, 22 poles)	AMP
2	Contact	D-1 1827570-2 (AWG 22 to 18, 1.08 to 1.6Ø)	
3	Housing	PADP-24V-1-S (white, 2.0-mm pitch, 24 poles)	JST
4	Contact	SPND-001T-C0.5 (AWG 26 to 22, 1.0 to 1.5Ø)	
5	Coupler cover	TMS-4ZB008	TATSUTA ELECTRIC WIRE & CABLE
6	ZUL2854-OHFRPCVVSW	25AWG x 6P + 25AWG x 2C + 22AWG x 6C, TS08V0350	TATSUTA ELECTRIC WIRE & CABLE





## 4. Options

### 4.1 Brake Type

The brake is a mechanism designed to prevent the slider 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 table.

### 4.2 Reversed-home Specification

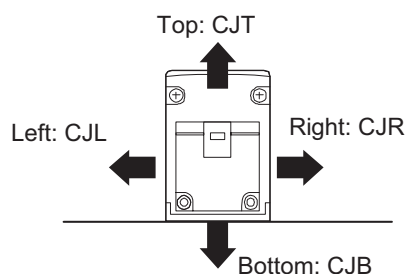
The standard home position is on the motor side. However, you can specify an option to reverse the home direction if it is desirable due to the layout of the system, etc.

(Note) Since the home position is adjusted at the factory before shipment, you must return your actuator to IAI for adjustment if you wish to change the home direction after the delivery of your actuator.

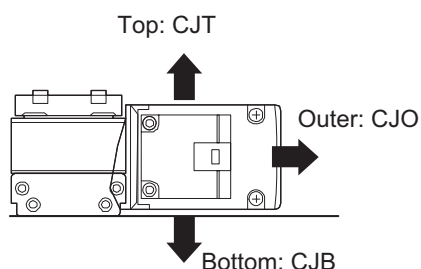
### 4.3 Changing the Cable Exit Direction

By changing the cable exit direction, the cable can be exited from a different direction.

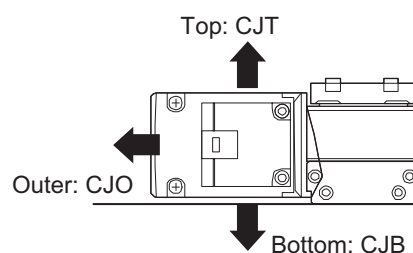
The direction can be changed to one of five options including top (model number: CJT), right (model number: CJR), left (model number: CJL), bottom (model number: CJB), outer (model number: CJO).



Straight type



Motor side mounted type  
Side mounted direction: Left (ML)



Motor side mounted type  
Side mounted direction: Right (MR)

## 5. Checking after Unpacking

After unpacking, check the product condition and the included items.

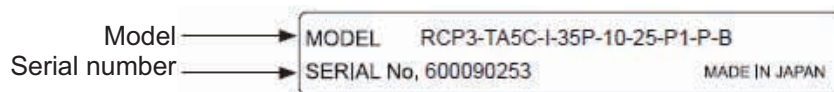
### 5.1 Included Items

No.	Item	Remarks
1	Actuator	Refer to 5.3, "How to Read Model Nameplate" and 5.4, "How to Read Model Number."
Accessories		
2	RCP3 integrated motor/encoder cable	CB-APSEP-MPA□□□: PSEP type CB-PCS-MPA□□□: PCON, PSEL type
3	First Step Guide	
4	Operating Manual (CD/DVD)	
5	Safety Guide	

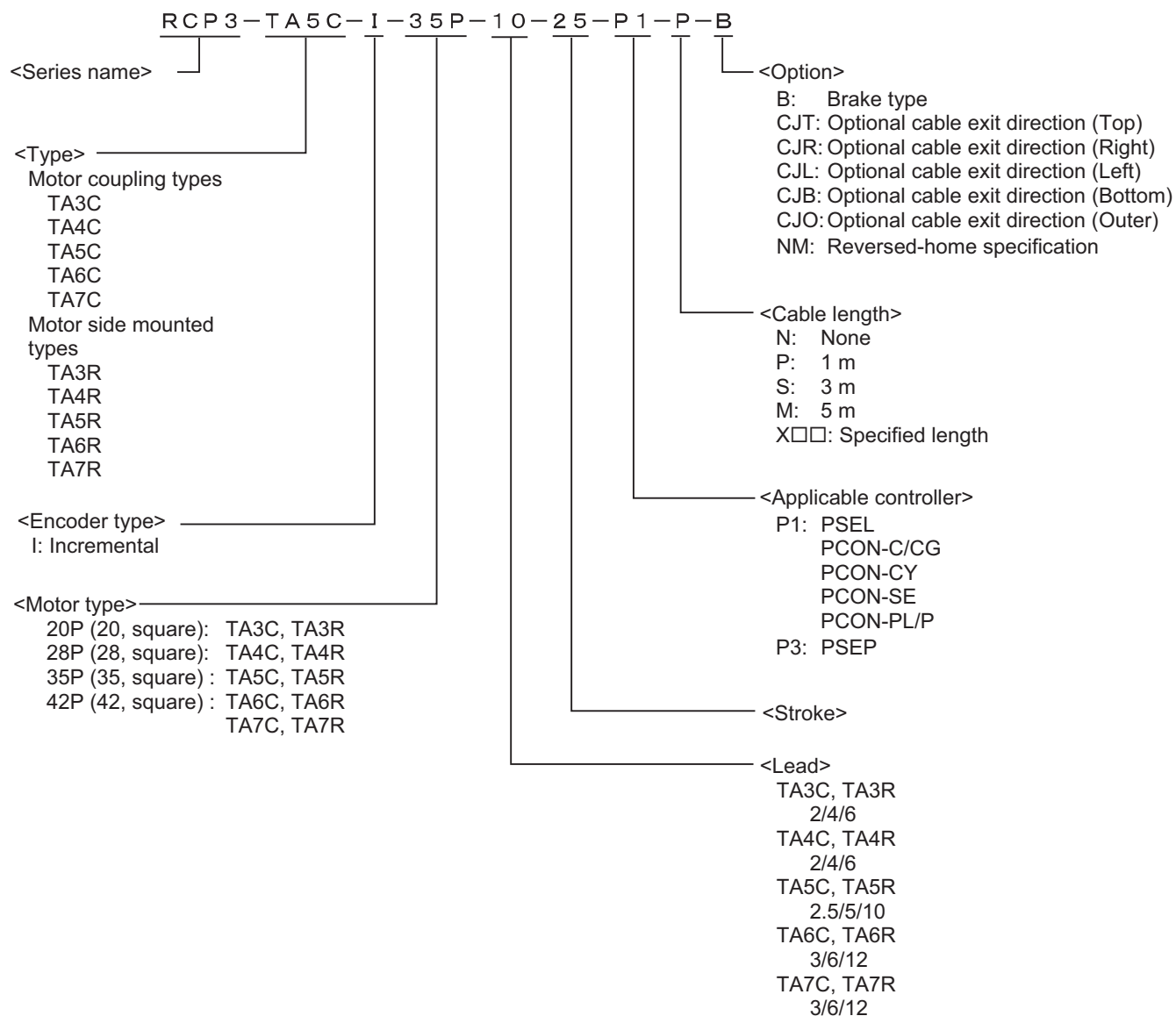
### 5.2 Operation Manuals Relating to This Product

No.	Name	Control No.
1	Operation Manual for PSEL Controller	ME0172
2	Operation Manual for PCON-C/CG/CF Controller	ME0170
3	Operation Manual for PCON-CY Controller	ME0156
4	Operation Manual for PCON-SE Controller	ME0163
5	Operation Manual for PCON-PL/PO Controller	ME0164
6	Operation Manual for ASEP/PSEP Controller	ME0216
7	Operation Manual for PC Software RCM-101MW/RCM-101-USB	ME0155
8	Operation Manual for Teaching Pendant CON-T/TG	ME0178
9	Operation Manual for Dedicated PSEP/ASEP Touch Panel SET-PT	ME0217
10	Operation Manual for Simple Teaching Pendant RCM-E	ME0174
11	Operation Manual for Data Setter RCM-P	ME0175
12	Operation Manual for Touch Panel Display RCM-PM-01	ME0182

### 5.3 How to Read Model Nameplate



## 5.4 How to Read Model Number





## 6. Specifications

Item		Unit	TA3			TA4			TA5			TA6			TA7		
Lead		mm	2	4	6	2	4	6	2.5	5	10	3	6	12	3	6	12
Maximum speed	Horizontal	mm/sec	100	200	300	100	200	300	125	250	465	150	300	560	150	300	600
	Vertical	mm/sec	67	133	200	100	200	300	125	250	400	150	300	500	150	300	580
Maximum payload capacity	Horizontal	kg	2	105	0.8	3	2	1	6	4	2	8	6	4	10	8	6
	Vertical	kg	1	0.7	0.4	1.5	1	0.5	3	1.5	1	4	2	1	4	2	1
Maximum push force		N	28	14	9	44	22	15	194	101	51	258	157	78	258	157	78
Stroke		mm	20 to 100 (10)			20 to 100 (10)			25 to 100 (in 25 steps)			25 to 150 (in 25 steps)			25 to 200 (in 25 steps)		
Load moment		N•m (kgf•cm)	Ma: 3.2 (0.33)			4.2 (0.43)			Ma: 6.57 (0.67)			Ma: 7.26 (0.74)			Ma: 9.91 (1.01)		
			Mb: 4.6 (0.47)			6.0 (0.61)			Mb: 9.32 (0.95)			Mb: 10.30 (1.05)			Mb: 14.13 (1.44)		
			Mc: 5.1 (0.52)			8.2 (0.84)			Mc: 14.32 (1.46)			Mc: 18.25 (1.86)			Mc: 28.65 (2.92)		
			5,000 km service life														
Positioning repeatability		± mm	0.02														

\*) Maximum speed may not be reached on all strokes.

\*) Maximum load depends on operating conditions.

## 7. Selection Conditions

### 7.1 Selection Method

Select an appropriate model by following the procedure below:

#### [1] Usage conditions

Verify usage conditions for items [1] through [6].

[1] Load installation orientation (horizontal, upright, vertical)

[2] Stroke L (mm)




[3] Maximum speed V (mm/s)

[4] Acceleration a (G)

[5] Payload capacity W (kg)

[6] Overhang T (mm)    T: Distance from end of table surface to load center of gravity

Installation orientation    Figure 1

Horizontal	Upright	Vertical
		

## [2] Stroke, maximum speed, acceleration

Determine which models you can use based on [2] stroke, [3] maximum speed, and [4] acceleration.

**Table 1** \* Maximum speed based on acceleration of 0.3 G (0.2 G for lead 2.5 or 3 or TA5, 6, 7 for vertical usage).

Installation orientation	Model	Lead (mm)	Acceleration (G)	Max speed (mm/s)	Longest stroke (mm)
Horizontal	TA3	2	0.2	100	100
		4	0.3	200	
		6	0.3	300	
	TA4	2	0.2	100	100
		4	0.3	200	
		6	0.3	300	
	TA5	2.5	0.2	125	100
		5	0.3	250	
		10	0.3	465	
	TA6	3	0.2	150	150
		6	0.3	300	
		12	0.3	560	
	TA7	3	0.2	150	200
		6	0.3	300	
		12	0.3	600	
Vertical	TA3	2	0.2	67	100
		4	0.3	133	
		6	0.3	200	
	TA4	2	0.2	100	100
		4	0.3	200	
		6	0.3	300	
	TA5C	2.5	0.2	125	100
		5	0.2	250	
		10	0.2	400	
	TA6C	3	0.2	150	150
		6	0.2	300	
		12	0.2	500	
	TA7C	3	0.2	150	200
		6	0.2	300	
		12	0.2	580	

How to decide: [2] Desired stroke ≤ model stroke

[3] Desired speed ≤ maximum speed for selected stroke

[4] Desired acceleration ≤ 0.3 G (0.2 G for lead 2, 2.5, 3 or TA5, 6, 7 for vertical usage)

## [3] Maximum speed, payload capacity

Determine which models you can use based on [3] maximum speed and [5] payload capacity.

- Pulse motor (RCP3) (Graph 1)

How to decide: You can use any model that has a [3] maximum speed and [4] payload capacity that exceeds your usage range.

## [4] Moment

Determine which models you can use based on the moment as determined by the [2] moment, [4] acceleration, [5] payload capacity, and [6] overhang.

- Static moment (M1) calculation

Static moment equation

$M1 = W \times L \times 9.8/1000$  (Nm); L (mm): Distance from the operation point to load center of gravity

Stroke consideration:  $L = T + Hn + \text{stroke}$  (Patterns A and B)

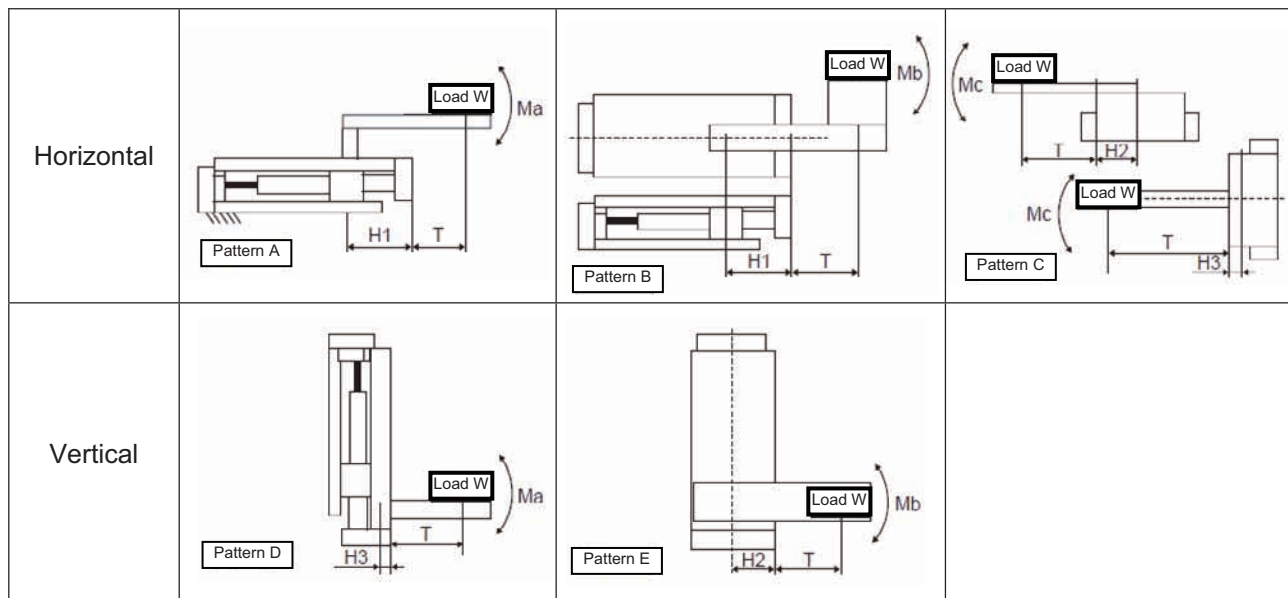
No stroke consideration:  $L = T + Hn$  (Patterns C, D, and E)

Use Figure 2 and Table 2 to choose an Hn measurement based on the installation orientation of the load.

**Table 2: Hn measurement (distance from the operation point to end of table)**

	TA3	TA4	TA5	TA6	TA7
H1 (mm)	28.5	30	49	54.5	61.5
H2 (mm)	16	20	25	30	37
H3 (mm)	10.5	11.5	13.5	15.5	17.5

**Static Moment Figure 2**



- Dynamic moment (M2) calculation

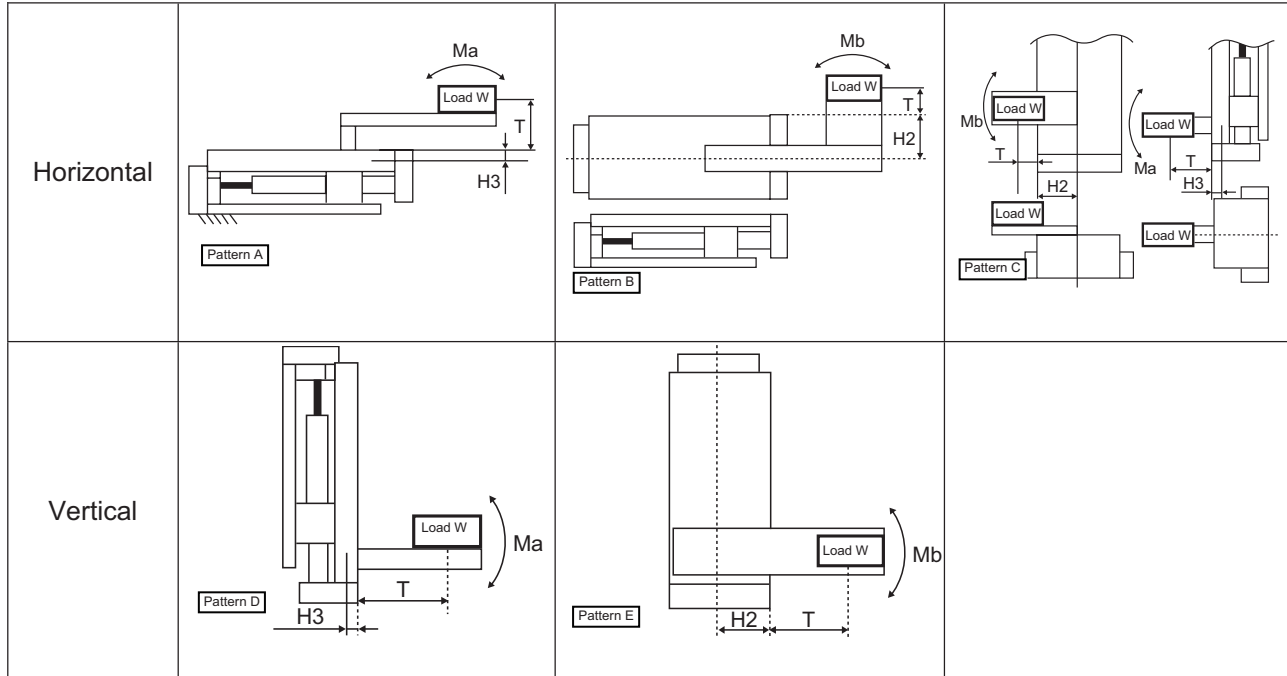
Dynamic moment equation

$$M2 = W \times L \times a \times 9.8/1000 \text{ (Nm)}$$

$$L = T + Hn$$

From Figure 3 and Table 2, select the Hn measurement based on the installation orientation of the work part.

**Dynamic moment Figure 3**



- Generated moment (M) calculation

Generated moment equation

$$M = M1 + M2 \text{ (Nm)}$$

\* Pattern C has different directions for the static moment and the dynamic moment, so set whichever is larger as M.

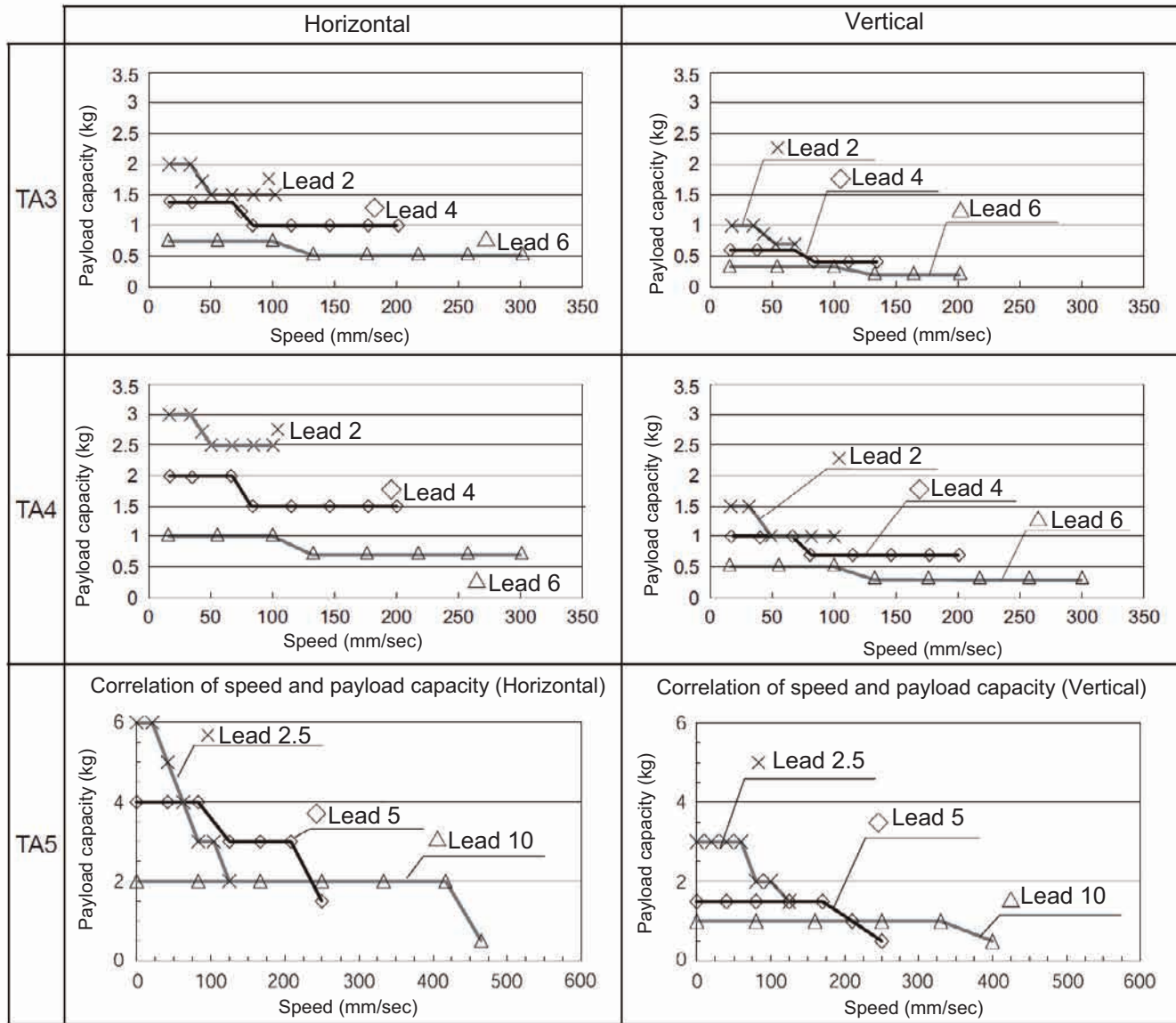
From Table 3, select an allowable moment based on the generated moment calculated above.

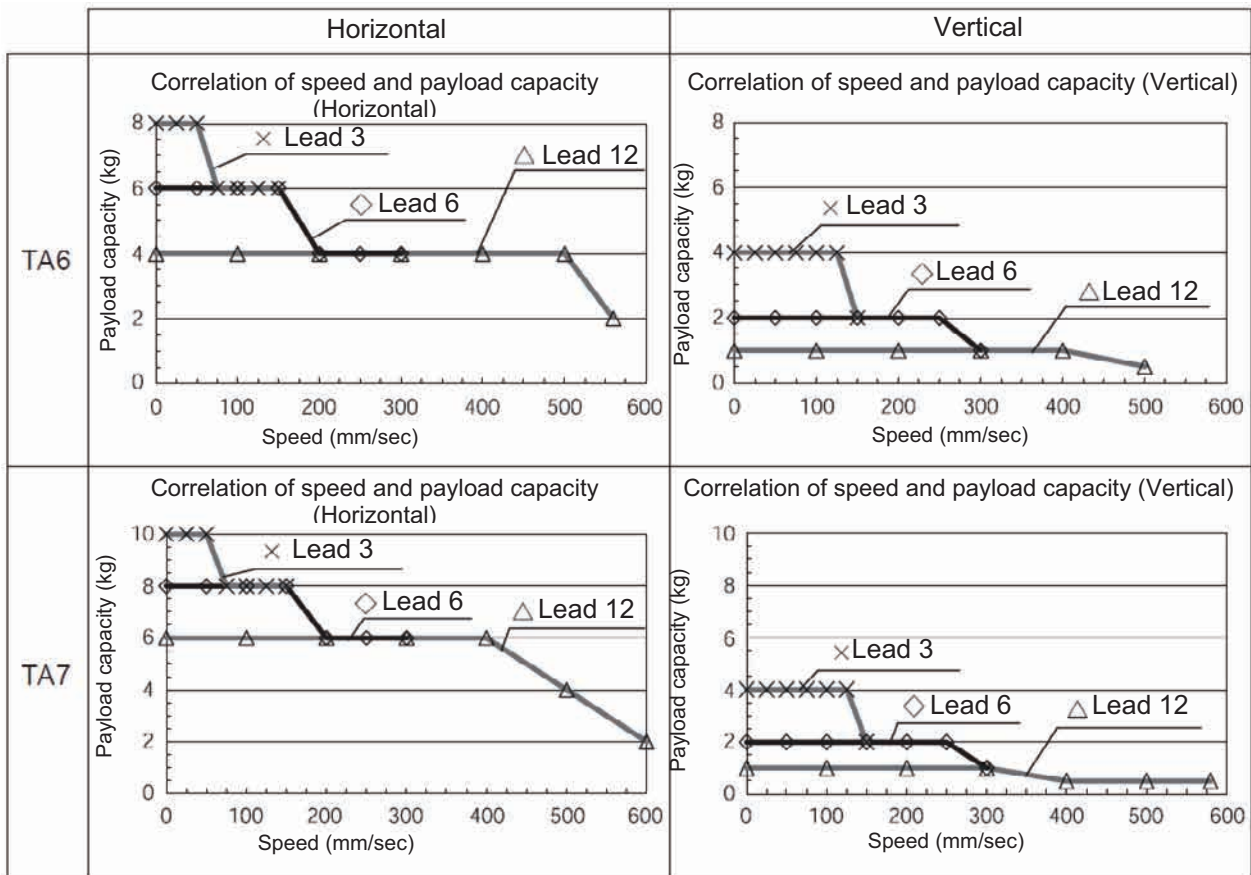
**Table 3: Allowable moments**

	TA3	TA4	TA5	TA6	TA7
Allowable moment: Ma (Nm)	3.2	4.2	6.57	7.26	9.91
Allowable moment: Mb (Nm)	4.6	6.0	9.32	10.30	14.13
Allowable moment: Mc (Nm)	5.1	8.2	14.32	18.25	28.65

How to decide: You can use any model for which the generated moment (M) < allowable moment for all three of Ma, Mb, Mc.

Graph 1 Pulse motor: RCP3





## 7.2 Selection Method for Push & Hold Operation

### [1] Usage conditions

Check the use conditions of [1] and [2].

[1] Push force F (N)

[2] Overhang T (mm): Distance from the end face of the table to the load application point.

\* For push & hold operations, movement speed is set at 20 mm/s.

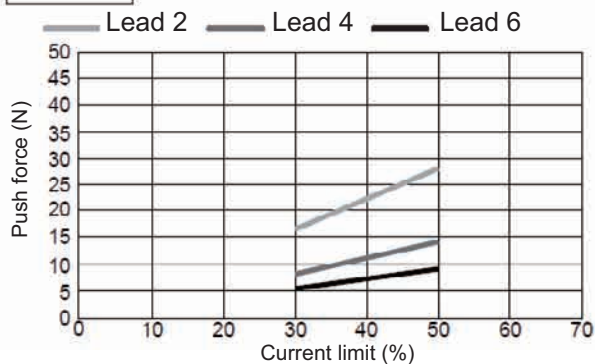
### [2] Push force

Determine which models you can choose based on the push force. The range of current-limiting values is 30% to 50%.

Current Limit (%)	RCP3 TA3			RCP3 TA4			RCP3 TA5			RCP3 TA6, TA7		
	Push force Lead 2 (N)	Push force Lead 4 (N)	Push force Lead 6 (N)	Push force Lead 2 (N)	Push force Lead 4 (N)	Push force Lead 6 (N)	Push force Lead 2.5 (N)	Push force Lead 5 (N)	Push force Lead 10 (N)	Push force Lead 3 (N)	Push force Lead 6 (N)	Push force Lead 12 (N)
30	16.8	8.4	5.4	26.4	13.2	9	82	41	21	113	57	28
40	22.4	11.2	7.2	35.2	17.6	12	109	55	27	151	76	38
50	28	14	9	44	22	15	136	68	34	189	95	47

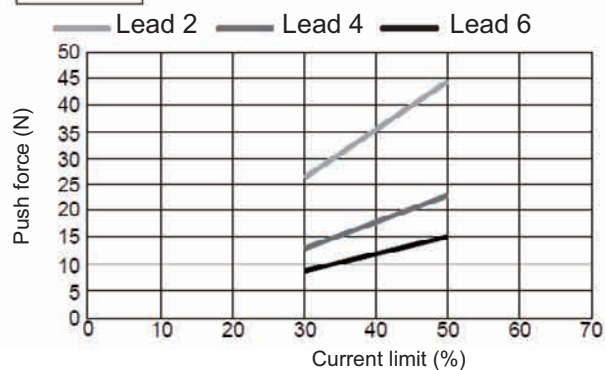
Graph 2

Push force RCP3-TA3



Graph 3

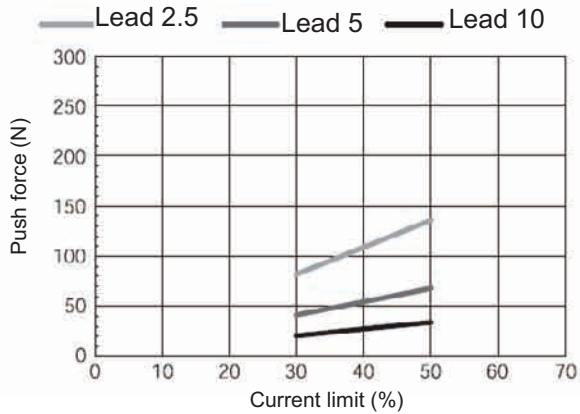
Push force RCP3-TA4





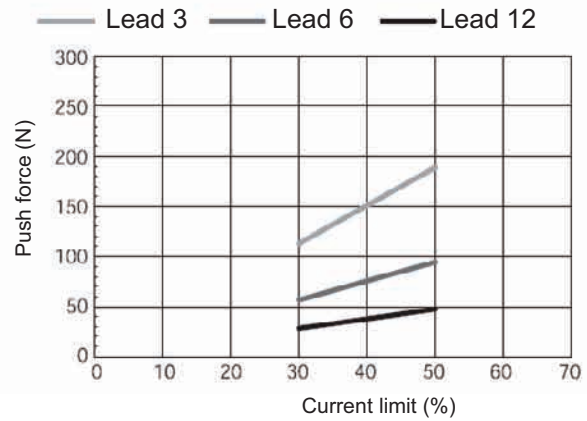
Graph 4

Push force RCP3-TA5



Graph 5

Push force RCP3-TA6, TA7



How to decide: If the push force [1] is within the use range shown in Graph 4 or 5, that model can be selected.

## [3] Moments

Check the selectable models based on the moments determined by the push force [1] and overhang [2].

Fig. 1

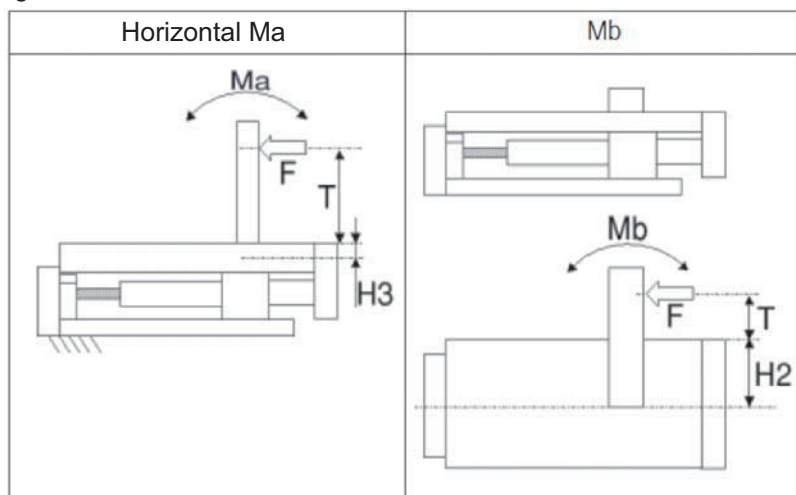


Table 1. Allowable moments

	TA3	TA4	TA5	TA6	TA7
Allowable moment: $M_a$ (Nm)	3.2	4.2	6.57	7.26	9.91
Allowable moment: $M_b$ (Nm)	4.6	6.0	9.32	10.30	14.13

Table 2.  $H_n$  dimensions ( $H_n$ : Distance from the point of application to the end face of the table)

	TA3	TA4	TA5	TA6	TA7
$H1$ (mm)	28.5	30	49	54.5	61.5
$H2$ (mm)	16	20	25	30	37
$H3$ (mm)	10.5	11.5	13.5	15.5	17.5

Calculation formula for generated moment  $M$

$$M = F \times L / 1000 \text{ (Nm)}$$

$L = (T + H_n)$   $L$  (mm): Distance from the point of application to the load application point

$H_n$  (mm): Distance from the point of application to the end face of the table

Using Fig. 1 and Table 2, select an appropriate dimension of  $H_n$  due to the load application point receiving the push force and calculate the value of  $L$ .

How to decide: "Generated moment ( $M$ ) < 0.8 x Allowable moment ( $M_a, M_b$ )" should be satisfied.

\* The generated moment must not exceed 80% of the allowable moment.

A given model can be used if it satisfies all conditions.

## 8. Installation Environment and Storage Environment

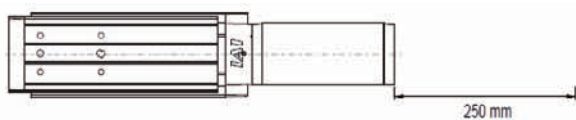
### 8.1 Installation Environment

Install the actuator in an environment meeting the following conditions:

- Not exposed to direct sunlight
- The machine does not receive radiated heat from large heat sources such as heat treatment furnaces.
- Ambient temperature of 0 to 40°C
- Humidity of 85% or below, non-condensing
- Not subject to corrosive or flammable gases
- Is a normal environment for assembly work where there is not much dust.
- Not subject to oil mist or cutting fluid
- Not subject to impact or vibration
- Not subject to significant electromagnetic waves, ultraviolet light or radiation
- This product is not designed to provide chemical resistance.

In general, the environment shall be one where the operator can work without wearing protective gears.

Open space required for maintenance inspection



### 8.2 Storage Environment

The storage environment should conform to the installation environment. Particularly when the actuator is stored for a long period of time, give consideration to prevent bedewing.

Unless specified, the actuator is shipped without any drying agent placed in the package. If the actuator is stored in an environment subject to bedewing, implement anti-bedewing measures over the entire package or directly on the actuator after unpacking.

The maximum storage temperature is 60°C for a short period. If the storage period exceeds 1 month, make sure the storage temperature does not exceed 50°C.

## 9. Installation

The actuator mounting surface should be machined or otherwise processed to a smooth surface of equivalent precision.

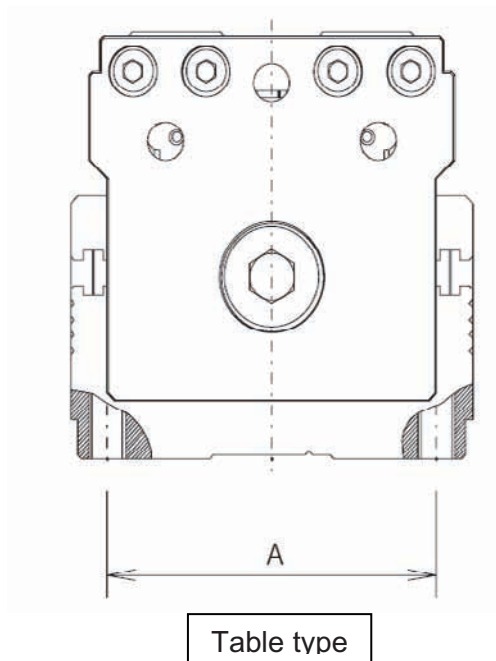
The platform should have a structure stiff enough to install the unit so it would not generate vibration or other abnormality.

### 9.1 Installation of Actuator

This actuator contains installation tap holes which allow it to be secured from the rear.

(Note that tap hole size depends on model. Please see diagrams below and package dimensions.)


The actuator also contains reamed holes for use with positioning pins.



Model	Hole size and maximum threading depth	Applicable bolt	Tightening torque		A (mm)	Reamed hole (mm)
			Bolt bearing surface is steel	Bolt bearing surface is aluminum		
TA3	M3, depth 5	M3	1.54 N•m (0.16 kgf•m)	0.83 N•m (0.085 kgf•m)	28	Ø3H7, depth 3.5
TA4	M4, depth 7.5	M4	3.59 N•m (0.37 kgf•m)	1.76 N•m (0.18 kgf•m)	31	Ø4H7, depth 4.5
TA5	M5, depth 10	M5	7.27 N•m (0.74 kgf•m)	3.42 N•m (0.35 kgf•m)	45	Ø5H7, depth 5
TA6	M5, depth 10	M5	7.27 N•m (0.74 kgf•m)	3.42 N•m (0.35 kgf•m)	55	Ø5H7, depth 5
TA7	M6, depth 12	M6	12.34 N•m (1.26 kgf•m)	5.36 N•m (0.55 kgf•m)	64	Ø6H7, depth 6

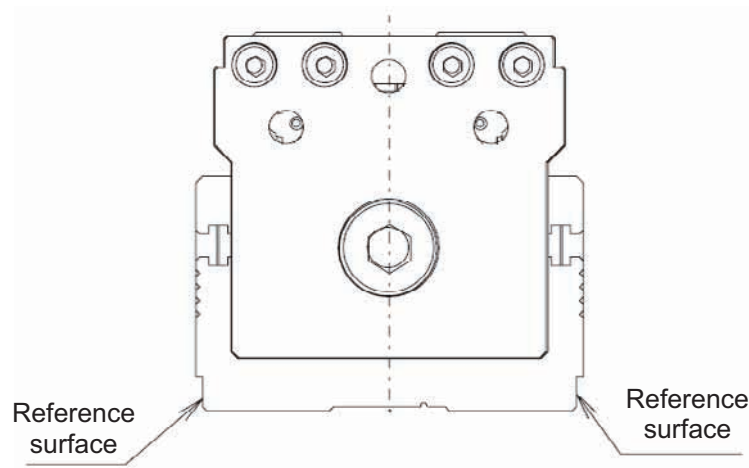
## Tightening screws

- For the male threads for installing the base, use hexagonal socket head bolts.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- The length of thread engagement should be 1.8 times more than the nominal diameter, and pay attention not to stick the screw out inside the actuator.

 **Caution:** *Exercise caution when selecting the bolt length. Use of bolts of inappropriate lengths may cause damage to tapped holes, insufficient mounting strength of the actuator and/or interference with driving parts, resulting in lower precision or unexpected accidents.*

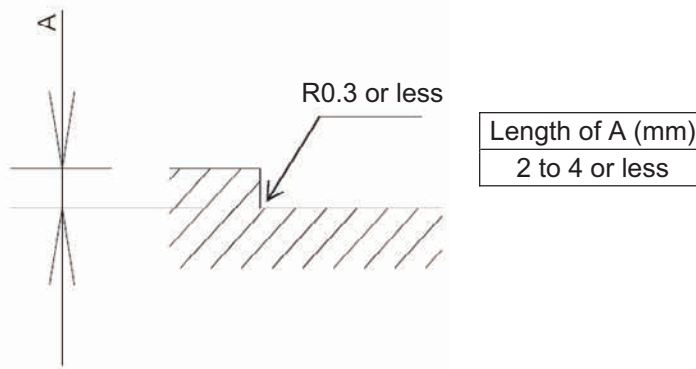
## 9.2 Mounting Surface

- Mount on a strong, rigid structure to prevent vibration.
  - The actuator mounting surface should be machined or otherwise processed to a smooth surface of equivalent precision, within  $\pm 0.05$  mm/m.
  - Provide adequate space around the device to allow for future maintenance.
  - On actuators, the side and bottom faces of the base provide reference surfaces for slider travel.
- When it is necessary that the slider or table move in a highly precise fashion, please ensure that the device is installed at the direction that is based on the position of these surfaces.



**Caution:** Because the side and bottom faces of the base provide reference surfaces for slider travel as shown in the above diagram, conduct installation based on the position of this side when precision is required.

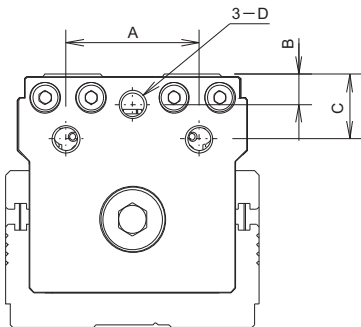
Follow the diagram below when installing the device using the reference surface.



## 9.3 Installation of the Load

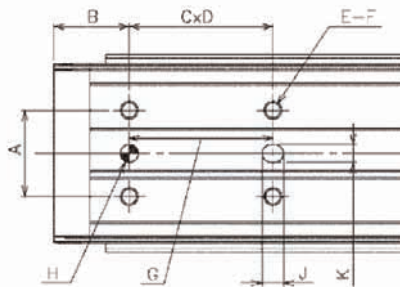
- On table types, tapped holes are provided in the front plate, so affix the load using these holes.
- Tapped holes and reamed holes are also provided in the top face of the table, so you can affix the load using these holes, as well.
- Two reamed holes are found in the top face of the table. If higher repeatability is required after installation/removal, use these reamed holes. When the squareness, etc., must be fine-tuned, use one reamed hole to make adjustment.
- The load is affixed in the same manner as the actuator is installed.  
The mounting screws and tightening torque are the same as those used when installing the actuator. (Refer to 9.1.)
- Refer to the table below for the screw-in depths.
- If the screws are screwed in by more than the applicable value shown in the table, they will contact the internal parts and damage the actuator.

**⚠ Caution:** Never use mounting screws whose length is equal to or greater than depth D in the table. The tapped holes provided in the front plate are through holes. If mounting screws whose length is equal to or greater than depth D in the table are used, these screws will project out of the front plate in a condition where the table is stored, and consequently contact the actuator. If the screws, already contacting the actuator, are screwed in further, the front panel may become flared and damaged or the mounting screws may pierce through the actuator.



Model	A	B	C	D
TA3	24	5	10	M4, depth 6
TA4	29	5	13	M5, depth 6
TA5	29	6.5	14	M6, depth 10
TA6	35	7	18	M6, depth 13
TA7	44	6.5	21.5	M8, depth 15

Surface of the table



Model	A	B	D	F	G	H	J	K
TA3	16	12	40	M3, depth 5	40	Ø3H7, depth 3.5	4	3H7, depth 3.5
TA4	20	16	40	M4, depth 6	40	Ø4H7, depth 4.5	5	4H7, depth 4.5
TA5	24	21	40	M5, depth 6	40	Ø5H7, depth 5	6	5H7, depth 5
TA6	30	27	50	M5, depth 8	50	Ø5H7, depth 5	6	5H7, depth 5
TA7	36	30	50	M6, depth 10	50	Ø6H7, depth 5	7	6hH, depth 6

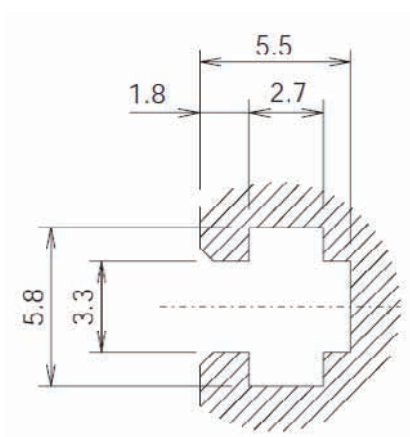
For C and E, refer to the external dimension drawing because these dimensions vary depending on the stroke. H and K represent depths from the top surface of the table.

## 9.4 T Grooves

The main unit surface side of TA5C, 6C, 7C, 5R, 6R and TR types contains T grooves (M3 size) for attaching external devices.

These grooves are to be used for whatever needs may arise, such as installing sensors, fastening wiring, etc. T groove measurements are shown below.

- A use of square nut is recommended for the T grooves, but a hex nut can also be used.
- Pay careful attention to the length so that the edge of the bolt won't contact the base of T grooves during installation.





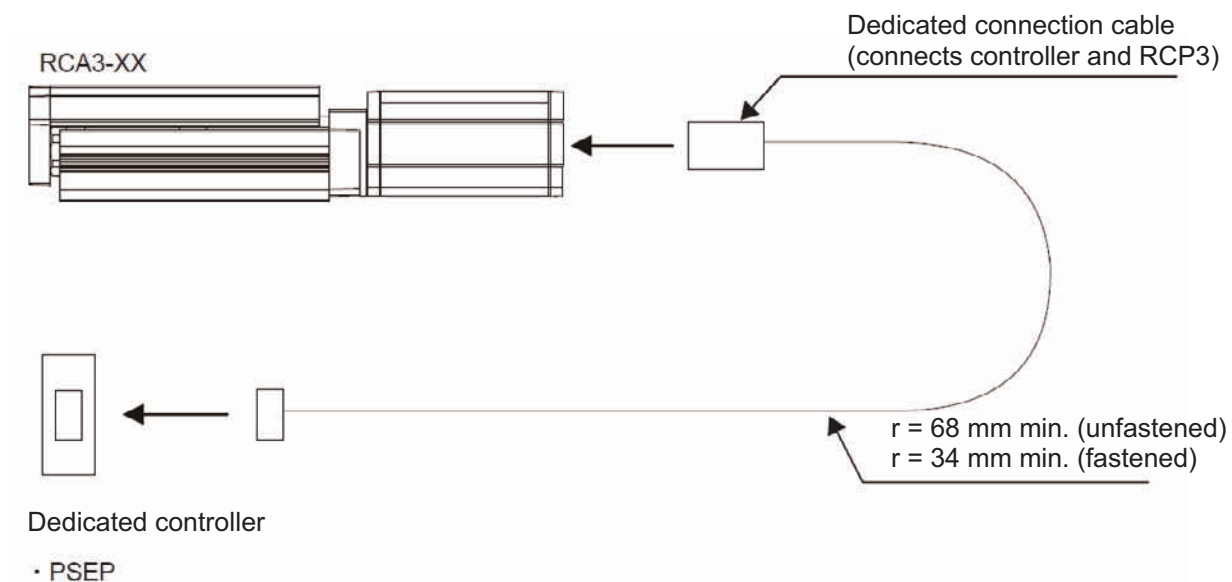
## 10. Connecting with Controller

Both for the controller itself and for the connection cable between the controller and actuator (RCP3), use a dedicated IAI controller and dedicated connection cable.

This section explains the wiring method for a single axis.

- If the dedicated connection cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Do not cut and reconnect the dedicated connection cable for extension or shorten the cable.
- Do not pull on the dedicated connection cable or bend it forcibly.

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

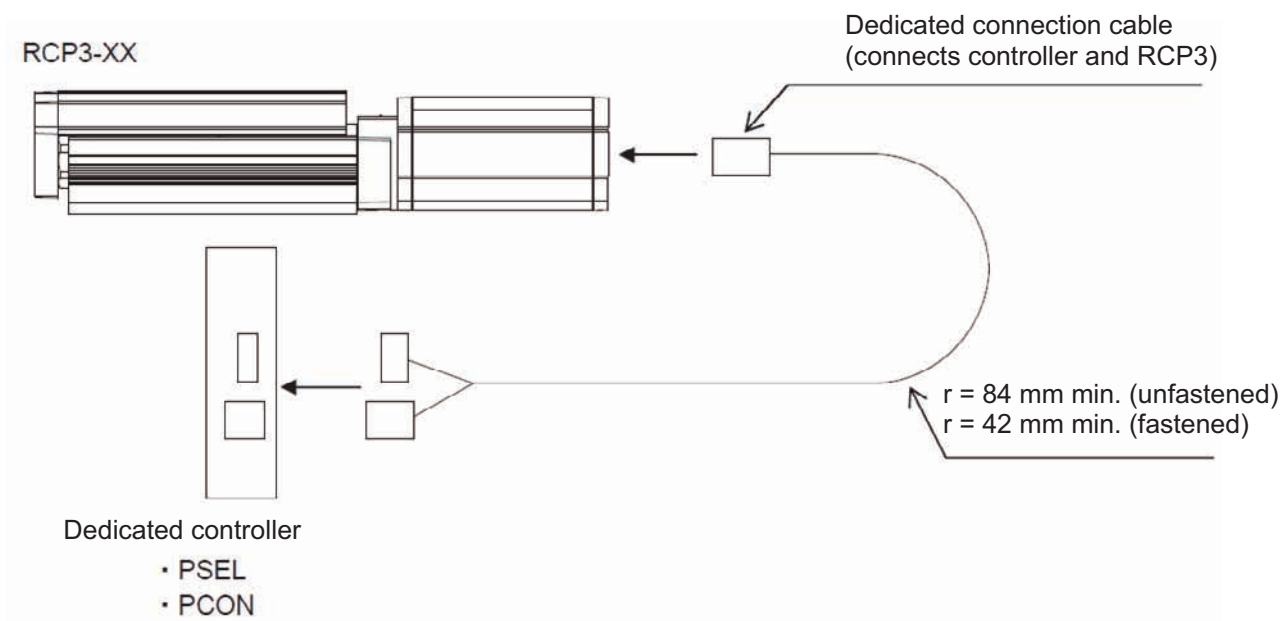


Dedicated connection cable

- Pulse motor cable: CB-APSEP-MPA\*\*\*

\* \*\*\* indicates the cable length (L). Up to 10 m can be specified.

Example) 080 = 8 m



Dedicated connection cable

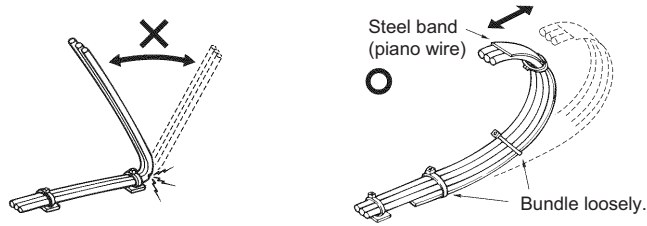
- Pulse motor cable: CB-PCS-MPA\*\*\*

\* \*\*\* indicates the cable length (L). Up to 10 m can be specified.

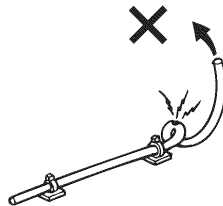
Example) 080 = 8 m

When building an application system using the actuator and controller, incorrect wiring or connection of each cable may cause broken wire, poor contact or other unexpected problem. The prohibited items relating to cable wiring are explained below.

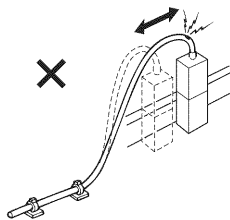
- Do not cut and reconnect the cable to extend or shorten the cable.
- If the cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Prevent the cable from bending at the same point.



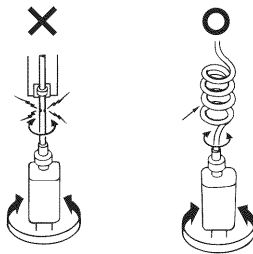
- Do not let the cable bend, kink or twist.



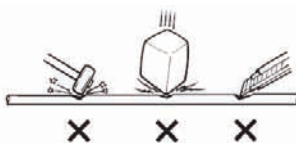
- Do not pull the cable with a strong force.



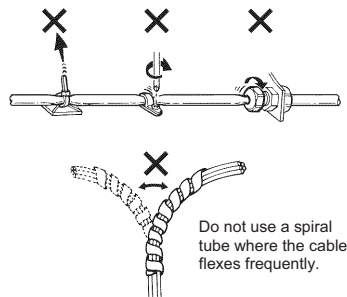
- Do not let the cable receive a turning force at a single point.



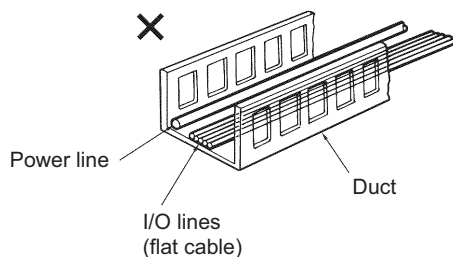
- Do not pinch, drop a heavy object onto or cut the cable.



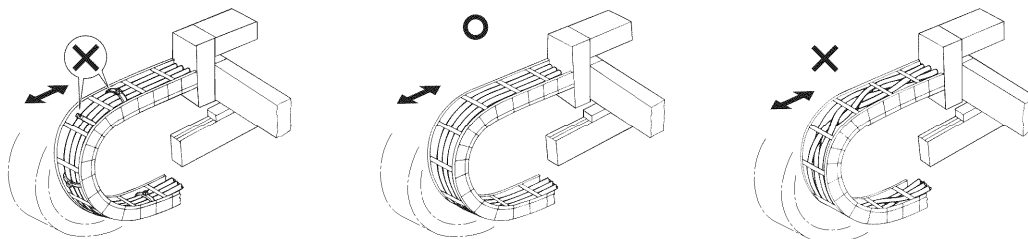
- When fixing the cable, provide a moderate slack and do not tension it too tight.



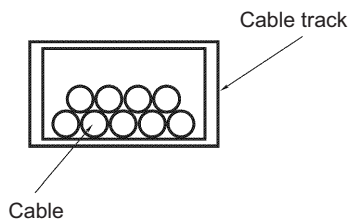
- Separate the I/O and communication lines from the power and drive lines. Do not wire them in the same duct.



- Pay attention to the following points when using a cable track.
- Do not let the cable get tangled or kinked in a cable track or flexible tube. When bundling the cable, keep a certain degree of flexibility (so that the cable will not become too taut when bent).



- Do not cause the cables to occupy more than 60% of the space in the cable track.



## Warning

- Always turn off the controller power before connecting/disconnecting cables. If cables are connected/disconnected while the power is still supplied, the actuator may malfunction and a serious injury or equipment damage may occur.
- Loose connectors may cause the actuator to malfunction and create a dangerous situation. Be sure to confirm that all connectors are securely connected.

## 11. Notes on Operation

### 11.1 Placing a Load on the Actuator

- Do not exceed the load ratings given in the specification table below.  
In particular, be careful not to exceed the load moment, overhang load length and maximum payload capacity for the table.  
(See diagram below.)

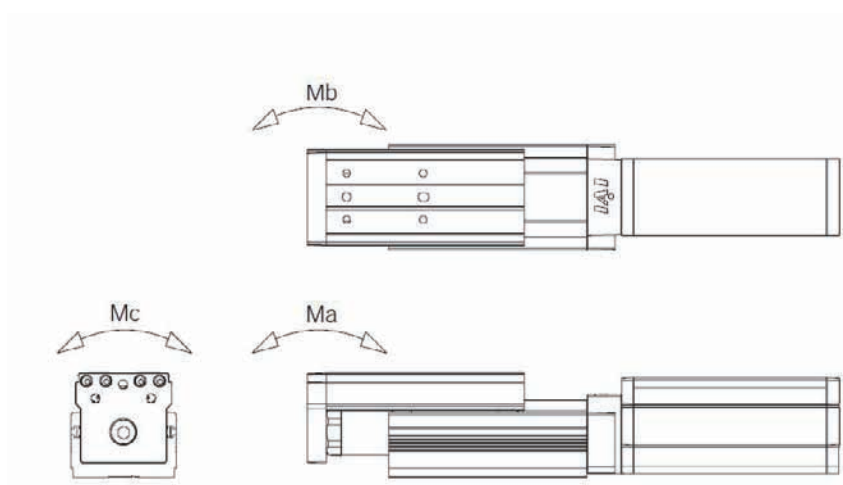
- Dynamic allowable moments Unit: N•mm (kgf•mm)

	$M_a$	$M_b$	$M_c$
TA3	3.2 (0.33)	4.6 (0.47)	5.1 (0.52)
TA4	4.2 (0.43)	6.0 (0.61)	8.2 (0.84)
TA5	6.57 (0.67)	9.32 (0.95)	14.32 (1.46)
TA6	7.26 (0.74)	10.3 (1.05)	18.25 (1.86)
TA7	9.91 (1.01)	14.13 (1.44)	28.65 (2.92)

- Static allowable moments Unit: N•mm (kgf•mm)

	$M_a$	$M_b$	$M_c$
TA5	25.5 (2.60)	36.5 (3.72)	56.1 (5.72)
TA6	29.4 (3.00)	42.0 (4.29)	74.1 (7.56)
TA7	42.6 (4.35)	60.8 (6.20)	123.2 (12.57)

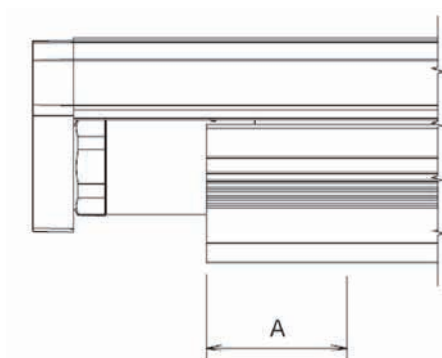
On table types, be careful not to let the load applied to the front plate exceed the  $M_a$  moment.  
When calculating the load moments, refer to 11.1.1, "Positioning the guide to calculate the load moment" shown below.



## 11.1.1 Positioning the Guide to Calculate the Load Moment

When calculating load moments, consider the position of action shown below.  
Exercise caution because the overhang length varies depending on the stroke.

[Table type]



Application position of Ma moment

Model	TA3	TA4	TA5	TA6	TA7
A (mm)	28.5	30.0	34.5	37	42

**⚠ Caution:** Application of an excessive load moment may produce unwanted results such as a shorter life of the guide. Also note that using the actuator with an overhang load exceeding the allowable limit may generate vibration or negatively affect the life of the guide.

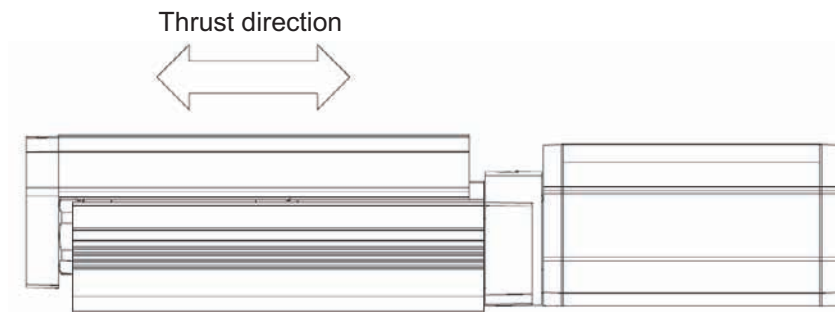
## 11.1.2 Thrust Direction External Force

Exercise caution not to apply in thrust directions any external force or impact load exceeding the allowable value. Subjecting the actuator to levels of external force or mechanical shock above the allowable capacity may damage or destroy internal components.

Allowable external forces in thrust directions

Unit: N (kgf)

TA5	160 (16.3)
TA6	220 (22.4)
TA7	220 (22.4)



Follow the caution below when moving the slider.

[Low-lead type]

Sometimes the slider may not move even when a force is applied externally. In this case, do not move the slider forcibly and move the slider through jog operation using the PC software or teaching pendant.

**⚠ Caution:** When the slider does not move, do not move the slider forcibly. Doing so will exert an undue force and the nut may break or otherwise the actuator may be damaged.

## 11.2 Adjusting the Home Position

The actuator home position can be adjusted by changing parameter <sup>\*1</sup>. In order to make adjustments, please do the following.

- [1] Verify the home position by performing a home return operation.
- [2] Move the actuator to the desired position, verify the distance between the old and new positions, and adjust the parameter accordingly. The parameter can be set to a positive value in the direction of movement. (It cannot be set to a negative value.)
- [3] Increasing the offset amount restricts the movement range by the amount of the increase. If you set an offset greater than 1 mm, please reset the stroke soft limit.

\*1 PCON controller: No. 22, home return offset distance  
PSEL controller: Parameter No. 12 for each axis, home preset value  
PSEP controller: No. 16, home return preset value

## 11.3 Changing the Home Position Direction

To change the home position direction after delivery, it is necessary to change the movement direction parameter. Please contact with IAI if you need to do this.



### Warning:

The encoder plays an important role in the detection of position and home signals, and its phase is adjusted precisely. Never touch the encoder to change the home position.



## 12. Maintenance Inspection

### 12.1 Inspection Items and Schedule

Follow the maintenance inspection schedule below.

It is assumed that the equipment is operating 8 hours per day.

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

	External visual inspection	Internal inspection	Greasing
Start of work inspection	○		
1-month inspection	○		
6-month inspection	○	○	
12-month inspection	○	○	○
Every 6 months thereafter	○		
Every 12 months thereafter	○	○	○

### 12.2 External Visual Inspection

An external visual inspection should check the following things.

Main unit	Loose actuator mounting bolts, other loose items, buildup
Cables	Scratches, proper connections
Overall	Irregular noise, vibration

- If the actuator is installed vertically, certain conditions may cause grease to drip from the guide. Please ensure that proper cleaning is performed and grease is replenished.

### 12.3 Cleaning

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

## 12.4 Internal Inspections

Turn off the power.

Remove the ball screw cover and inspect visually.

On motor side mounted types, remove the side-mounted bracket and inspect visually.

An internal inspection should check the following things.

Main unit	Loose actuator mounting bolts, other loose items
Guide section	Lubrication, buildup
Belt (side mounted types)	Belt wear and damage

Visually inspect the interior of the equipment. Check whether dust or other foreign matter has gotten inside and check the lubrication state.

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

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

The procedure to check the interior is shown below. Refer to 12.7 for inspection and adjustment of the belt.

[1] Move the table to the counter-home side.

[2] Remove the ball screw cover.

[3] Check the interior.

[4] When the checks are completed, reassemble the parts by following the same procedure in reverse.

## 12.5 Internal Cleaning

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

## 12.6 Greasing Guides

### 12.6.1 Applicable Greases for Guide

The grease initially used is lithium-based grease.  
IAI uses the following grease in our plant.

Idemitsu Kosan	Daphne Eponex Grease No. 2
----------------	----------------------------

Other companies also sell similar types of grease. For details, give the above grease name to the manufacturer you want to purchase from and ask what corresponding product they have available.  
Here are some examples of similar products.

Showa Shell Oil	Albania Grease No. 2
Mobil Oil	Mobilax 2

#### **Warning:**

Never use fluorine-based grease. Mixing fluorine-based grease with lithium-based grease not only reduces the performance of the grease, it may even cause damage to the actuator.

### 12.6.2 Applicable Greases for Ball Screw

The grease initially used is lithium-based grease.  
IAI uses the following grease in our plant. (Excludes SA3C type)

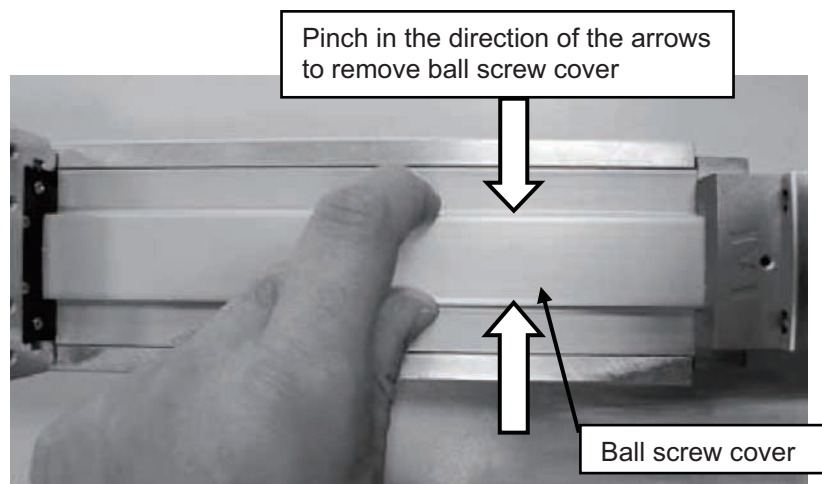
TA5C, TA6C, TA7C TA5R, TA6R, TA7R	Kyodo Yushi	Multitemp LRL 3
TA3C, TA4C TA3R, TA4R	Idemitsu Kosan	Daphne Eponex Grease No. 2

#### **Warning:**

Never use fluorine-based grease. Mixing fluorine-based grease with lithium-based grease not only reduces the performance of the grease, it may even cause damage to the actuator.

## 12.6.3 How to Apply Grease

Pull out the table as much as possible and remove the ball screw cover.



- (1) For the guide section, apply the grease by moving the slider back and forth and spreading it out, either by pushing a scraper between the table and base or by lubricating with a grease injector. Grease the guides on both sides. When complete, wipe away any excess grease.

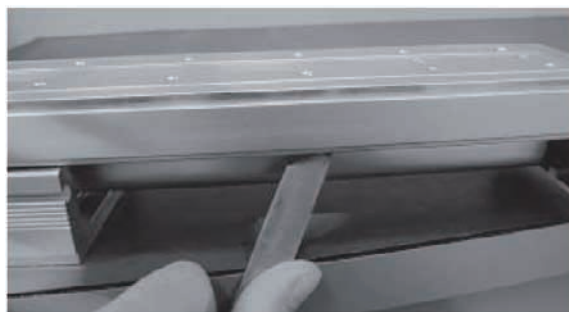


Table Type

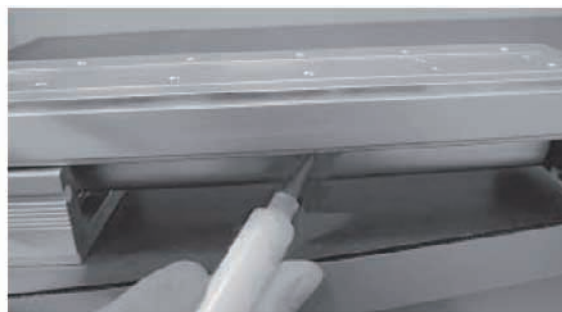


Table Type

- (2) To grease ball screws, first clean, then put some grease on your finger and apply while moving the table back and forth.  
When finished, wipe off excess grease.



For the table type, put the ball screw cover back on.

- Note:
- 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.
  - When moving the table back and forth by hand, be certain never to apply force in excess of the thrust direction external force capacity (see 11.1.2). (If the slider will not move, operate it using a jog function.)

## 12.7 Belt

### 12.7.1 Inspection of Belt

Visually inspect the belt after removing the pulley cover.

Although the durability of the belt is affected significantly by the operating conditions, generally the belt has a flex life of several million times.

As a reference of when the belt should be actually replaced, replace the belt if any of the following conditions is observed:

- Significant wear of the teeth or end face of the belt
- Swelling of the belt due to attached oil, etc.
- Cracking or other damage to the belt teeth or back
- Breaking of the belt

### 12.7.2 Applicable Belt

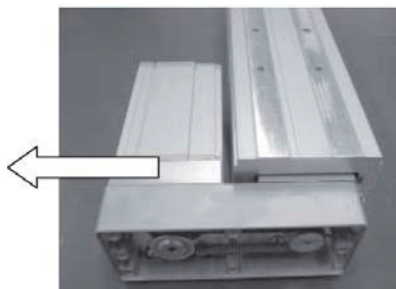
Manufacturer: Bando Chemical Industries, Ltd.

Belt model number (type)	Model
40S2M116R, 4-mm wide (clean rubber type)	TA3R
40S2M138R, 4-mm wide (clean rubber type)	TA4R
60S2M168R, 6-mm wide (clean rubber type)	TA5R
60S2M198R, 6-mm wide (clean rubber type)	TA6R
60S2M198R, 6-mm wide (clean rubber type)	TA7R

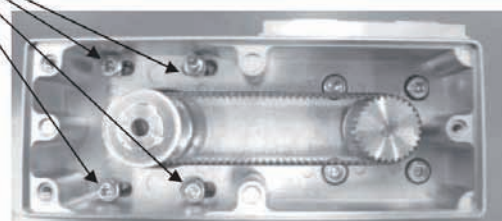
### 12.7.3 Adjustment of Belt Tension

Remove the pulley cover, loosen the tension adjustment bolts (4 locations), and move the motor to the left as shown below to tension the belt. After the adjustment is finished, tighten the tension adjustment bolts.

Tension  
TA3R/TA4R:  $1.5 \pm 0.1$  kgf  
TA5R/6R/7R:  $2.5 \pm 0.1$  kgf



Tension adjustment bolt		
Model	Nominal thread size	Tightening torque
TA3R/TA4R	M2.6	0.46 N•m (0.047 kgf•m)
TA5R	M3	0.83 N•m (0.085 kgf•m)
TA6R/TA7R	M4	1.76 N•m (0.18 kgf•m)



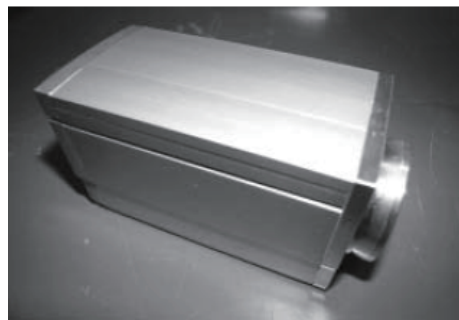
## 12.8 Motor Replacement (Pulse Motor: RCP3)

\* Refer to 12.9 for side mounted types.

[Items required for replacing the stainless sheet]

- Replacement motor unit

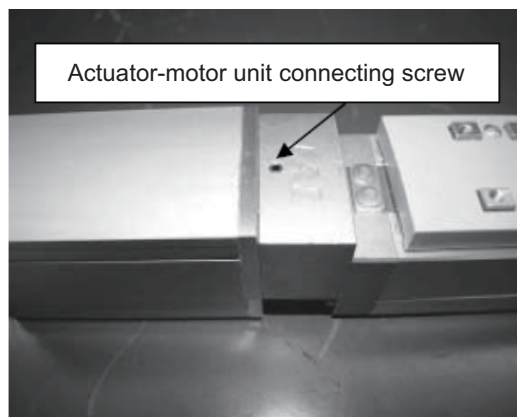
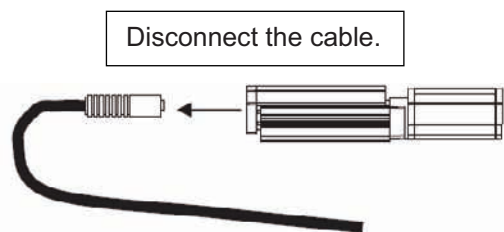
Axis type			Model number	
			Without Brake	With Brake
RCP3 (black encoder cable connector)	Table type	TA3C	RCP3-MU0A	RCP3-MU0A-B
		TA4C	RCP3-MU1A	RCP3-MU1A-B
		TA5C	RCP3-MU2A	RCP3-MU2A-B
		TA6C	RCP3-MU3A	RCP3-MU3A-B
		TA7C		



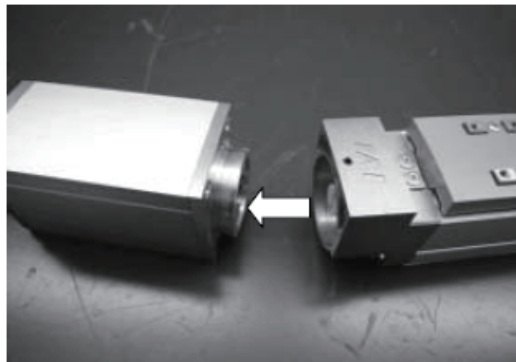
- Hex wrench set

[Procedure]

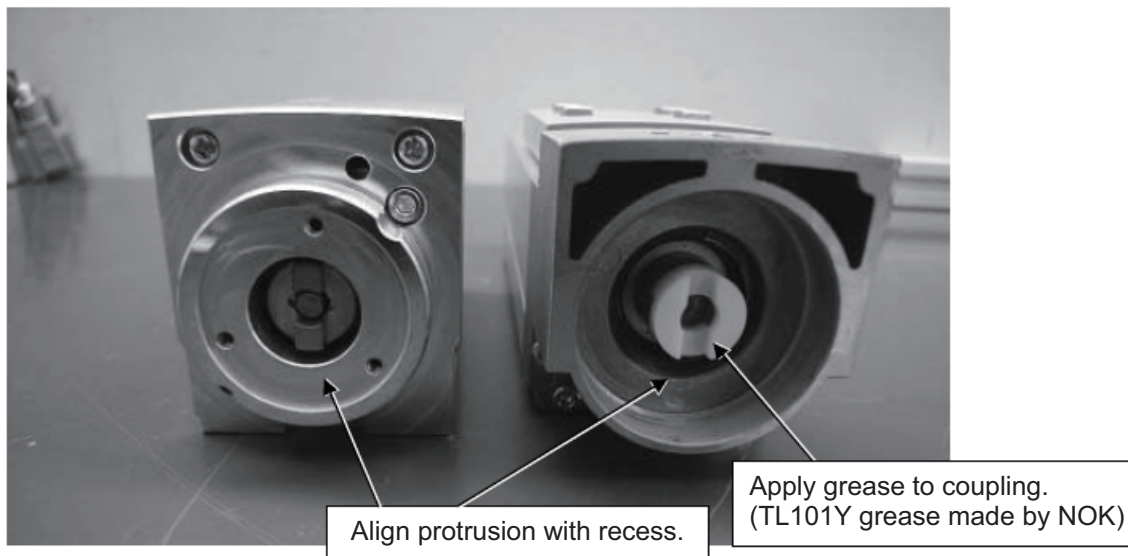
- [1] Disconnect the cable from the motor unit, then use a 2 mm hex wrench to remove the screw which holds together the actuator unit and the motor unit.



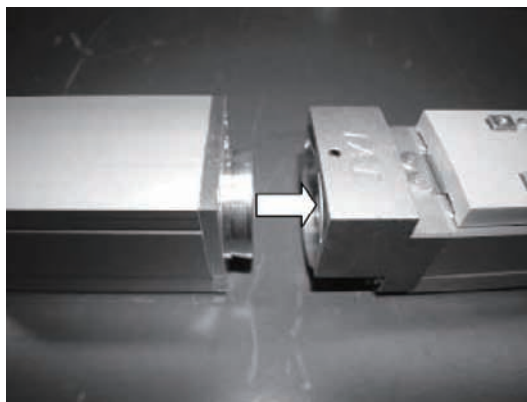
- [2] Detach the motor unit.



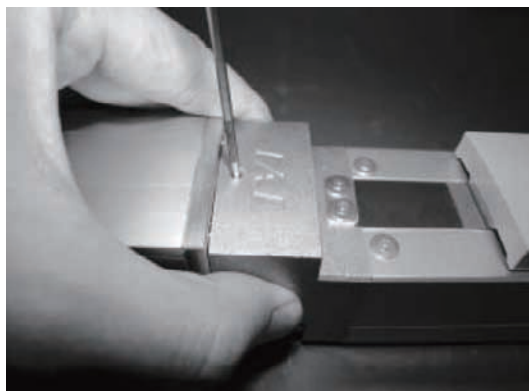
[3] Align the actuator side and replacement motor unit side projection section and the slit orientation.



[4] Install the replacement motor by fitting the protrusion of one unit in the recess of the other.



[5] Use a 2 mm hex wrench to remove the screw fastening the motor unit and the actuator.





## 12.9 Replacement of Belt and Motor for Motor Side Mounted Types (Pulse Motor: RCP3)

[Items required for replacing the stainless sheet]

- Replacement motor unit for side mounted type

Axis Type			Model number	
			Without brake	With brake
RCP3 (black encoder cable connector)	Table type	TA3R	RCP3-MU0B	RCP3-MU0B-B
		TA4R	RCP3-MU1B	RCP3-MU1B-B
		TA5R	RCP3-MU2B	RCP3-MU2B-B
		TA6R	RCP3-MU3B	RCP3-MU3B-B
		TA7R		



- Belt

Manufacturer: Bando Chemical Industries, Ltd.

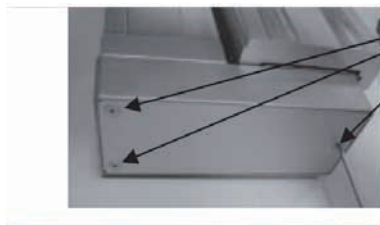
Belt model number (type)	Model
40S2M116R, 4-mm wide (clean rubber type)	TA3R
40S2M138R, 4-mm wide (clean rubber type)	TA4R
60S2M168R, 6-mm wide (clean rubber type)	TA5R
60S2M198R, 6-mm wide (clean rubber type)	TA6R
60S2M198R, 6-mm wide (clean rubber type)	TA7R

- Tension gauge
- Hex wrench set

[Procedure]

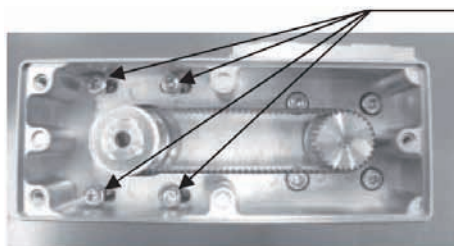
[1] Remove the pulley cover.

Remove the mounting screws (2 pcs on the TA3R/TA4R, or 3 pcs on all other models).



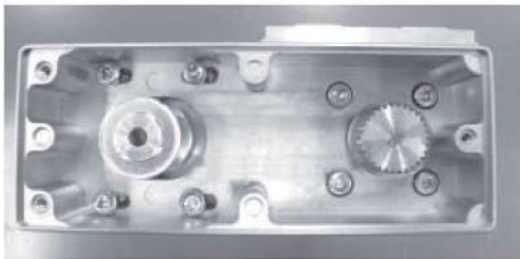
Mounting screw		
Model	Nominal thread size	Applicable hex wrench
TA3R/TA4R/ TA5R	M2.5	1.5 mm across flats
TA6R/TA7R	M3	2.5 mm across flats

[2] Loosen the tension adjustment bolts (4 locations) and slack the belt.

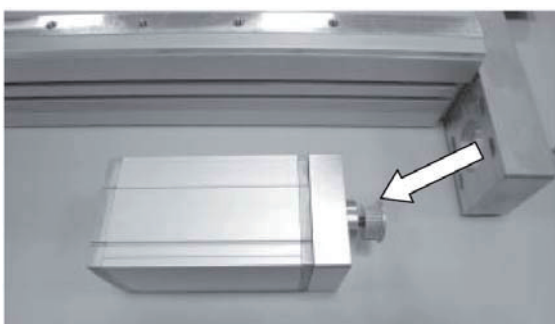


Tension adjustment bolt		
Model	Nominal thread size	Applicable hex wrench
TA3R/TA4R	M2.6	2 mm across flats
TA5R	M3	2.5 mm across flats
TA6R/TA7R	M4	3 mm across flats

[3] Remove the belt from the pulleys. When replacing the belt, proceed to step [6].



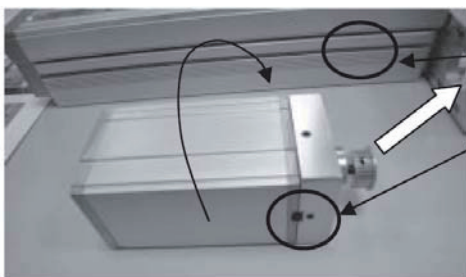
[4] Remove the tension adjustment bolts and pull out the motor unit.



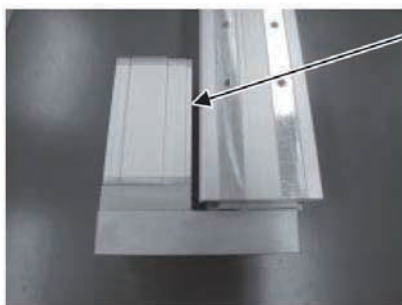
[5] Install the replacement motor unit.

As shown below, install the motor unit by making sure the specified surface of the motor unit faces the base of the actuator.

Loosely secure the motor unit using the tension adjustment bolts.

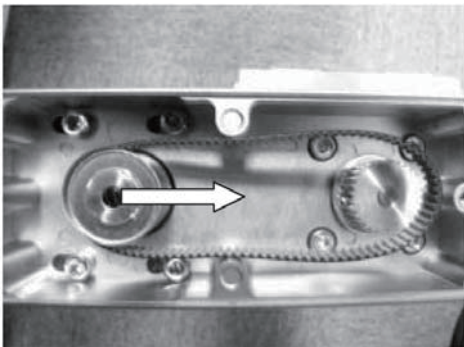


Install the motor unit by making sure  
the base surface of the actuator faces  
the motor unit surface with two holes.

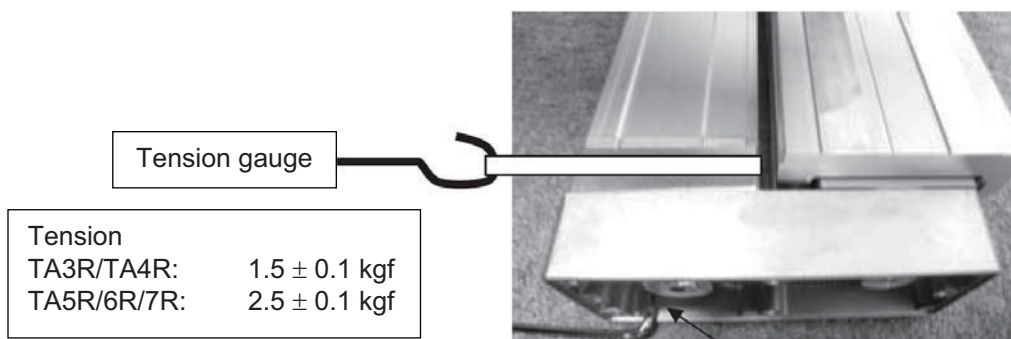


The surface with no gaps must face  
the motor unit surface with two holes.

- [6] Move the motor unit in the direction of the arrow shown below, and then install the belt.  
When replacing the belt, install the replacement belt.



- [7] Pass around the base of the motor unit a strong string (or long tie band) that has been looped into a ring, and pull the ring with a tension gauge. After confirming the specified tension, tighten the tension adjustment bolts uniformly.



Tension adjustment bolt		
Model	Nominal thread size	Tightening torque
TA3R/TA4R	M2.6	0.46 N•m (0.047 kgf•m)
TA5R	M3	0.83 N•m (0.085 kgf•m)
TA6R/TA7R	M4	1.76 N•m (0.18 kgf•m)

- [8] Install the pulley cover.



Mounting screws (2 pcs on the TA3R/TA4R or 3 pcs on all other models).

## 13. Warranty

### 13.1 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
- 2500 hours of operation time

### 13.2 Scope of Warranty

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

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

### 13.3 Honoring the Warranty

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

### 13.4 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.

### 13.5 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.

### 13.6 Other Items Excluded from Warranty

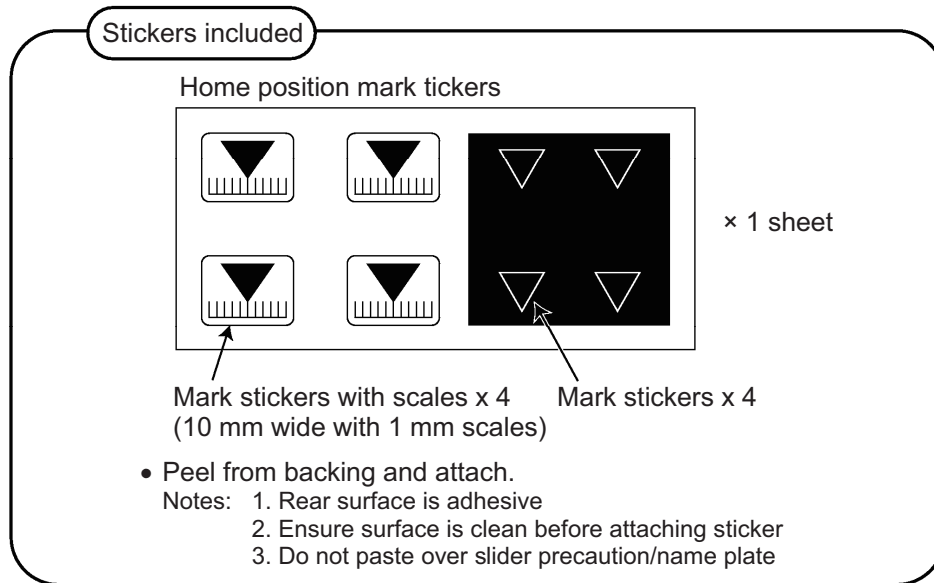
The price of the product delivered to you does not include expenses associated with programming, the dispatch of engineers, etc. Accordingly, a separate fee will be charged in the following cases even during the warranty period:

- [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

## Appendix

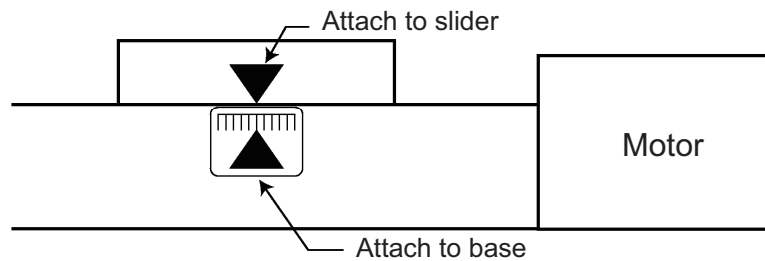
### Using the Home Position Marks

- ◆ As necessary, affix these marks to the product to mark the home position of the actuator.



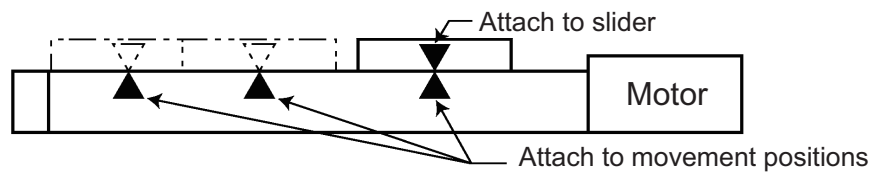
#### Example

[1] To mark the home position



- Attach both stickers when actuator is stopped in home position

[2] To show different movement positions



## Change History

Revision date	Description of revision
April 2009	First Edition
December 2009	Second Edition <ul style="list-style-type: none"> <li>• Added a top view of table in 9.3, "Installing the Load."</li> <li>• Added allowable static moments for TA5, TA6 and TA7 in 11.1, "Loads Applied to the Actuator."</li> <li>• "Changing the Cable Exit Direction" (Added the details of the option.)</li> </ul>
July 2010	Third Edition <ul style="list-style-type: none"> <li>• Added "Notes" after "Before Use."</li> </ul>
January 2011	Fourth Edition <ul style="list-style-type: none"> <li>• Changed the D dimensions of TA3 and TA4 in 9.3, "Installing the Load."</li> <li>• Added notes.</li> </ul>
May 2011	Fifth Edition <ul style="list-style-type: none"> <li>• A page for CE Marking added</li> </ul>
March 2012	Sixth Edition <ul style="list-style-type: none"> <li>• Contents changed in Safety Guide</li> <li>• Caution notes added for when working with two or more persons</li> <li>• Page 38 Note added to tell platform should have a structure with enough stiffness</li> <li>• Page 39 Note changed to 1.8 times more of the nominal diameter for the length of thread engagement on aluminum</li> <li>• Page 62 to 63 Contents changed in 13. Warranty</li> </ul>
March 2012	Seventh Edition <ul style="list-style-type: none"> <li>• Page 1 to 7 Contents added and changed in Safety Guide</li> <li>• Page 8 Note "Make sure to attach the actuator properly by following this operation manual." added in Caution in Handling</li> <li>• Page 9 "CAUTION" added to "Handling Precautions"</li> <li>• Page 12 to 21 Weight added to external drawings</li> <li>• Page 55 Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care.</li> </ul>









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