ROBO CYLINDER

Technical Information/ Support & Networks

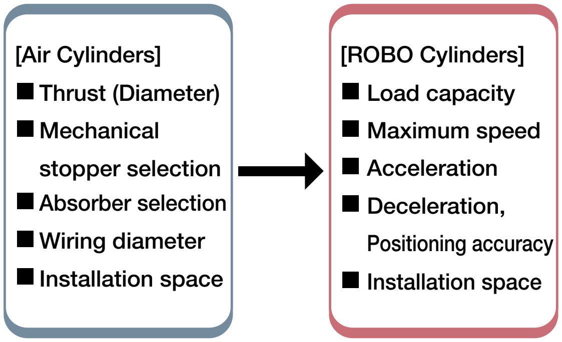
Considerations when Switching from Air Cylinders

Air Cylinder and ROBO Cylinder

Air cylinders are devices used to push and grasp objects by means of supplying and releasing compressed air. Air cylinders are used widely in all industries, mainly for transfer equipment, assembly systems, various automation systems, etc.
Air cylinders generally have diameters of between 4mm and 320mm, and their lengths (strokes) can also be set in fine steps. There are several tens to hundreds of thousands of different air cylinder products, which makes it easy to select optimal models for a variety of applications. However, since product lines are overly complex, many with identical specs, it can be difficult to select the best model for your specifications.
For this reason, there are many cases where air cylinders are selected largely out of past experience and familiarity.
ROBO Cylinders are easy-to-use electric cylinders offering a variety of functions not achievable with air cylinders. The ROBO Cylinder product family makes it easy for you to select the model that best suits the needs of your application. However, the controls and configuration possibilities of ROBO Cylinders are completely different from air cylinders.
This section explains some of the key points to consider when switching from air cylinders to ROBO Cylinders.

Overview of Switching

The following explains the differences in the basic items to be checked when selecting ROBO Cylinders and air cylinders. Since both are linear motion actuators, there are some common matters that must be taken into consideration. However, the different configurations and controls described above result in different designations for adjustments and check items between the two. A comparison of these various items is shown at right.



The above diagram shows that the two have different mechanical viewpoints to consider.

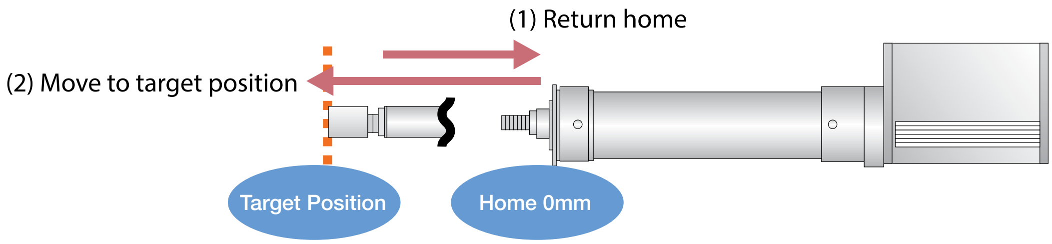
Installation Space

ROBO Cylinders are driven by a motor. Compared with air cylinders, simply from a size perspective, the ROBO Cylinder requires more attention paid to space requirements for installation.

Home Return

Unlike air cylinders, ROBO Cylinder operation is based on a "coordinates" concept. A home return operation is necessary at the beginning of operation because operations are controlled in movement quantities that are always referenced against a home point (0 point).
Specifically, in the case of incremental specifications, bear in mind that a pushing operation to the actuator stroke end will be performed as the initial operation when the power is turned ON.

- Incremental Specification: Return home operation after power is turned ON
- Absolute Specification : Absolute reset operation during initialization



Critical Rotating Speed

The ball screw inevitably deflects due to bending and its own deadweight. The ROBO Cylinder operates at high speeds causing the ball screw to rotate faster, and as the rotations increase the screw deflection also increases until the rotating axis is ultimately damaged.Hazardous rotational speeds that may damage the rotary axis are referred to as "critical speeds", "whirling speeds" or "whipping speeds".
Ball screw type ROBO Cylinders operate linearly as the ball screw is rotated with the end of the ball screw supported by a bearing. Although the maximum speed is specified for each ROBO Cylinder in accordance with the actuator type, some models with certain strokes have their maximum speed set in consideration of the aforementioned critical rotating speeds.

General Purpose (Types, Modes, Parameters)

ROBO Cylinders offer the "air-cylinder specification (or air cylinder mode)" that allows the ROBO Cylinder to be used just like an air cylinder. When using these, it is possible to operate the actuator by simple ON/OFF control by an external signal in exactly the same way as an air cylinder. This type or mode may be sufficient in the case of a simple swap-out, but a variety of types and parameters have been introduced for customers who desire higher value-added uses.
Feel free to contact our Customer Center
(Toll free for Western U.S. 800-736-1712, Central U.S. 800-944-0333, and Eastern U.S. 888-354-9470) to discuss features to match your use conditions and needs when the equipment is actually installed.

Maintenance

The key maintenance points of air cylinders and ROBO Cylinders are compared.
Air cylinders require periodic maintenance performed according to the frequency and conditions of use.Although air cylinders offer a certain level of flexibility in that minor damage or malfunction can be ignored by means of increasing the source air pressure and moving the cylinder with a greater force, ignoring maintenance will inevitably shorten the service life of the air cylinder.
On the other hand, ROBO Cylinders have a more complex structure and use a greater number of parts and are therefore seen as requiring cumbersome maintenance work. This is wrong. ROBO Cylinders are clearly easier to use and offer longer life than air cylinders. Of course, ROBO Cylinders also require lubrication of sliding parts just as air cylinders do. However, ROBO Cylinders are equipped with a lubrication unit (AQ Seal) for ball screw and the sliding parts of the guides. This ensures a long maintenance-free period (5,000 km of traveled distance, or three years). After 5,000km or travel or 3 years, greasing every 6 months to 1 year as instructed in the Operating Manual will vastly prolong the service life of the product.
In addition, absolute type controllers are currently equipped with a position retention battery. Since this is a consumable part, it must be periodically replaced (for periods that vary with the product).

[Primary Maintenance Tasks]

[Air Cylinders]
- Lubricating sliding parts
- Replacing gasket
- Draining
- Replacing absorber

[ROBO Cylinders]
- Lubricating ball screw and guide (after AQ seals have worn out)
- Replacing battery (absolute encoder types only)

Operation

Air cylinders are generally operated with the use of a direction control valve to determine the direction of reciprocating motion, as well as a flow control valve (speed controller) to determine the speed. Immediately after their system is started up, many users operate the air cylinder at low speed by restricting the flow control valve.
The same procedure is also recommended for ROBO Cylinders after the system is started up. With ROBO Cylinders, "speed setting" replaces the flow control valve. Operate your ROBO Cylinder at speeds where safety is ensured, and then change to the desired speed after safety is confirmed.

Service life and Moment

One of the main factors related to an actuator's service life is the "load rating".
There are two types of load rating: A static load is the weight of a load that leaves a small amount of indentation when the load is applied. A dynamic load is the weight of a load that maintains a constant survival probability of the guide when the load is applied while moving a constant distant.
Guide manufacturers rate dynamic load values to maintain a 90% survival rate at a travel distance of 50km. However, when taking account the speed of movement and work rate, the actual travel distance needs to be 5,000 to 10,000km.
While the life of a guide is sufficiently long for radial loads, it is actually the moment load that is offset from the guide center that is most problematic to its service life.
The service life for IAI actuators as documented in this catalog shows the allowable dynamic moment based on a 5,000 or 10,000km service life.

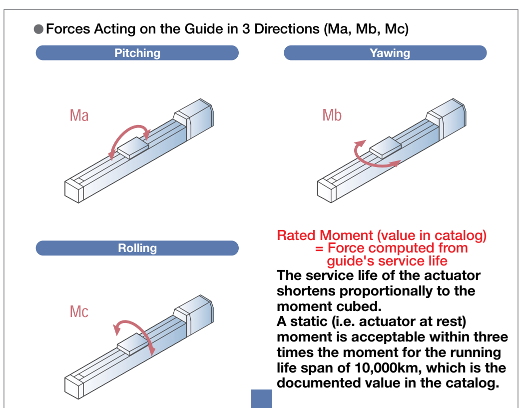
IAI uses the following equation calculate the service life:
(for 10,000km service life)

$$L_{10}=\left(\frac{M_S}{P}\right)^3 \cdot 10{,}000\text{km}$$

L_{10} : Service life (90% survival Probability
M_S : Allowable Dynamic Moment in IAI Catalog
P : Moment used
* Fw (Load coefficient) at 1.2

Allowable Dynamic Moment

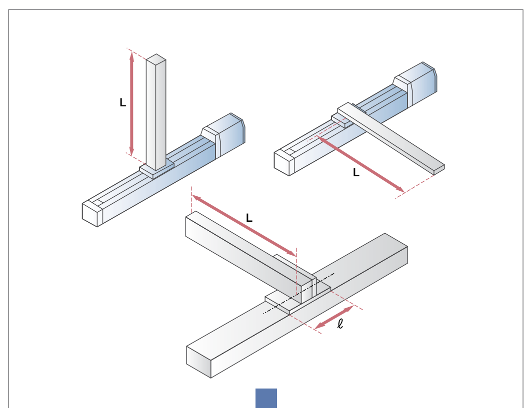
The allowable dynamic moment is the maximum offset load exerted on the slider, calculated from the guide service life.
The direction in which force is exerted on the guide is categorized into 3 directions - Ma (pitch), Mb (yaw), Mc (roll) - the tolerance for each of which are set for each actuator.
Applying a moment exceeding the allowable value will reduce the service life of the actuator. Use an auxiliary guide when working within or in excess of these tolerances.



The allowable dynamic moment is calculated from the service life of the guide.

Overhang load length

An overhang load length is specified for a slider-type actuator to indicate the length of overhang (offset) from the actuator.
When the length of an object mounted to the slider actuator exceeds this length, it will generate vibration and increase the settling time. So, pay attention to the allowable overhang length as well as the allowable dynamic moment.



The allowable overhang load length is determined by the slider length.

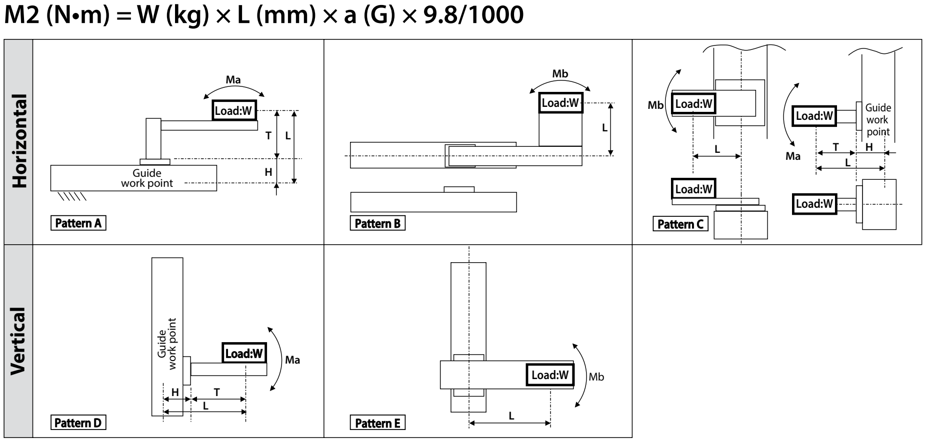
An overhang that exceeds the allowable overhang length will generate vibration and increase settling time.

L/ℓ = 5 or less
* Between 3 to 4 for a camera-equipped measuring machine.

● For example:
L/ℓ =1.2 Mechanical machine
L/ℓ = 3 Measuring machine
L/ℓ = 5 Robot

How to calculate allowable dynamic moment

M2 (N•m) = W (kg) × L (mm) × a (G) × 9.8/1000



W : Load
L : Distance from the work point to the center of gravity of the payload (L=T+H)
T : Distance from the top surface of the slider to the center of gravity of the payload
H : Distance from the guide work point to the top surface of the slider
a : Specified acceleration

Allowable Dynamic Moment and Allowable Static Moment

There are two types of moments that can be applied to the the guide: the allowable dynamic moment and the allowable static moment.
The allowable dynamic moment is calculated from the travel life (when flaking occurs) when moved with the moment load applied.
In contrast, the static moment is calculated from the load that causes permanent deformation to the steel ball or its rolling surface (i.e. rated static moment), taking into account the rigidity and deformity of the base.

[Allowable Dynamic Moment]

IAI's catalog contains the allowable dynamic moments based on a load coefficient of 1.2 and 10,000km or 5,000km.
This value is different from the so-called basic rated dynamic moment, which is based on a 50km travel life.
To calculate the basic rated dynamic moment for a 50km travel life, use the following equation.

$$M_{50}=f_w \times M_s \div \left(\frac{50}{S}\right)^{\frac{1}{3}}$$ ······ Equation 1

M_s : Allowable dynamic moment at an assumed travel distance (catalog value)
S : IAI catalog assumed travel life (5,000km or 10,000km)
f_w : Load coefficient (=1.2)
M_{50}: Basic rated dynamic moment (50km travel life)

The allowable dynamic moments mentioned in the catalog (10,000km or 5,000km life) are based on a load coefficient fw=1.2. To calculate the service life of a guide with a different load coefficient, use Table 1 below to determine the load coefficient that matches your requirements.

Table 1: Load Coefficients

Operation and Load Requirements	Load Coefficient fw
Slow operation with light vibration/shock (1,500mm/s or less, 0.3G or less)	1.0~1.5
Moderate vibration/shock, abrupt braking and accelerating (2,500mm/s or less, 1.0G or less)	1.5~2.0
Operation with abrupt acceleration/deceleration with heavy vibration/shock (2,500mm/s or faster, 1.0G or faster)	2.0~3.5

$$L_{10}=\left(\frac{M_S}{P}\cdot\frac{1.2}{f_W}\right)^3 \times S$$ ······ Equation 2

L_{10}: Service life (90% Survival Probability)
M_S: Allowable dynamic moment in IAI Catalog (5,000km or 10,000km)
P : Moment used ($\leq M_S$)
S : IAI catalog assumed travel life (5,000km or 10,000km)
f_W : Load coefficient (from Table 1)

[Allowable Static Moment]

The maximum moment that can be applied to a slider at rest.
These values are calculated by taking the basic rated static moment of the slider and multiplying with the safety rate that takes into consideration any effects from the rigidity and deformity of the base.
Therefore, if a moment load is applied to the slider at rest, keep the moment within this allowable static moment.
However, use caution to avoid adding any unexpected shock load from any inertia that reacts on the load.

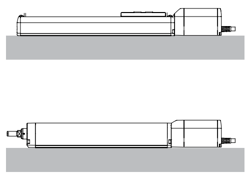
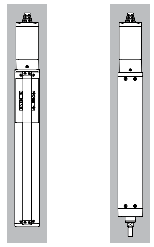
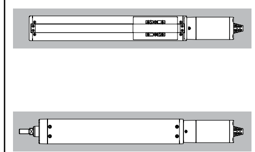
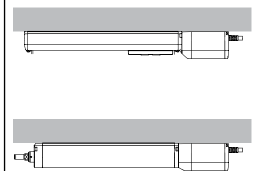
[Basic Rated Static Moment]

The basic rated static moment is the moment value at which the sum of the permanent deformation at the center of contact between the rolling body (steel ball) and the rolling surface (rail) is 0.0001 times the diameter of the rolling body.
These values are simply calculated strictly from the permanent deformation done to the steel ball and its rolling surface.
However, the actual moment value is restricted by the rigidity and deformation of the base. Hence, the allowable static moment the actual moment that can be applied statically, taking into account those factors.

Installation Orientations of Actuators

Some ROBO Cylinder models cannot be installed in certain orientations or require caution if they are to assume certain orientations. Check the table below to understand the limitations on installation orientation applicable to each model.

○: Permitted / △: Must be inspected daily / X: Prohibited

		Installation orientations			
					
Series	**Type**	**Horizontal, flat**	**Vertical (*1)**	**Sideways**	**Ceiling mount**
ERC3	Slider type	○	○	○	○
	Rod type	○	○	○	○
ERC3D	Slider type	○	○	△(*2)	△(*2)
ERC2/ERC	Slider type	○	○	○	○
	Rod type	○	○	○	○
RCP4	Slider type	○	○	△(*2)	△(*2)
	Rod type	○	○	○	○
RCP3	SA2A□/SA2B□	○	X	X	X
	SA3□	○	○	○	△(※2)
	SA4□/SA5□/ SA6□	○	○	△(*2)	△(*2)
	Table type	○	○	○	○
RCP2	Slider type	○	○	△ (*2)	△(*2)
	Belt type	○	X	X	○ (*3)
	Rod type	○	○	○	○
RCA2	Slider type	○	○	△(*2)	△(*2)
	Table type	○	○	○	○
RCA	Slider type	○	○	△(*2)	△(*2)
	Rod type	○	○	○	○
	Arm type	×	○	X	X
RCS3	SA8C/SA8R	○	○	△(*4)	△(*4)
	SS8C/SS8R	○	○	△ (*2)	△(*2)
RCS2	Slider type	○	○	△(*2)	△(*2)
	Rod type	○	○	○	○
	Arm type	×	○	X	X
ERC3CR	Slider type	○	○	△(*2)	△(*2)
RCP4CR	Slider type	○	○	△(*2)	△(*2)
RCP2CR	Slider type	○	○	△(*2)	△(*2)
RCACR	Slider type	○	○	△(*2)	△(*2)
	SA5D/SA6D	○	△(*5)	△(*5)	△(*5)
RCS3CR	Slider type	○	○	△(*2)	△(*2)
RCS2CR	Slider type	○	○	△ (*2)	△(*2)
RCP4W	Slider type	○	X	○(*6)	○(*6)
	Rod type	○	○	○	○
RCP2W	SA16C	○	X	X	X
	RA4C/RA6C	○	○	○	○
RCAW/ RCS2W	RA3C/RA4C	○	○	○	○

Refer to the facing page for the notes.

Notes on Installation Orientations

(*1) If the actuator is installed vertically, the motor should come to the top if at all possible.
If the actuator is installed with the motor at the bottom, you shouldn't expect any problem during normal operation, but if the actuator is not operated for an extended period of time, grease may separate and base oil may flow into the motor unit, thereby causing malfunctions on rare occasions.

(*2) The actuator can be installed sideways or mounted on the ceiling, but the stainless steel sheet may slacken or shift. If the actuator is used continuously with its stainless steel sheet slacked or shifted, the stainless steel sheet may fracture or cause other malfunction. Inspect the actuator daily and if the stainless steel sheet is found slacked or shifted, adjust the stainless steel sheet.

(*3) If a belt-type actuator is mounted on the ceiling, the belt cover may deflect and contact the work part on the slider. If you are using the SA6 or SA6U type with a stroke of 500 or longer, or SA7 or SA7U type with a stroke of 600 or longer, keep a distance of at least 5 mm between the seating surface of the slider and the work part.

(*4) If a RCS3-SA8C/SA8R actuator is installed sideways or mounted on the ceiling, the screw cover may deflect and contact the work part on the slider. Keep an appropriate distance between the seating surface of the slider and the work part by referring to the table below.

Stroke	Distance between the seating surface of the slider and the work part
400mm or more, but less than 800mm	5mm or more
800mm or more, but less than 1100mm	7mm or more
1100mm or more (Must be custom-ordered.)	10mm or more

(*5) RCACR-SA5D/SA6D actuators are not structured to have the stainless steel sheet absorbed to the side covers, so if any of these actuators is installed other than in horizontal and flat orientation
(= installed vertically, sideways or mounted on the ceiling), the cleanliness level of Class 10 may not be met.

(*6) You need the optional mounting bracket to install any slider type RCP4W actuator either sideways or mounted on the ceiling. Be sure to use the optional bracket, because if the actuator is installed this way using the standard mounting bracket, splash-proof performance cannot be assured.

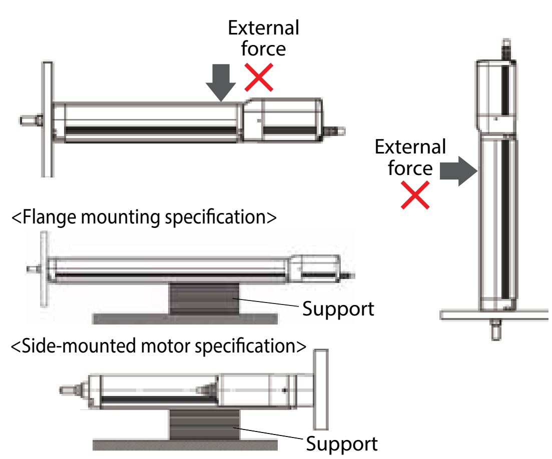
Refer to Appendix-9 and 10 for information on how to install the actuator with the optional bracket.

< Notes on Installing the Rod Type >

When installing the actuator using its front housing or with a flange (optional), make sure no external force applies to the actuator body. (External forces may cause the actuator to malfunction or damage its parts.)

If the actuator body receives any external force or the actuator is combined with a Cartesian robot, etc., secure the actuator body using the mounting holes provided at the base of the actuator.

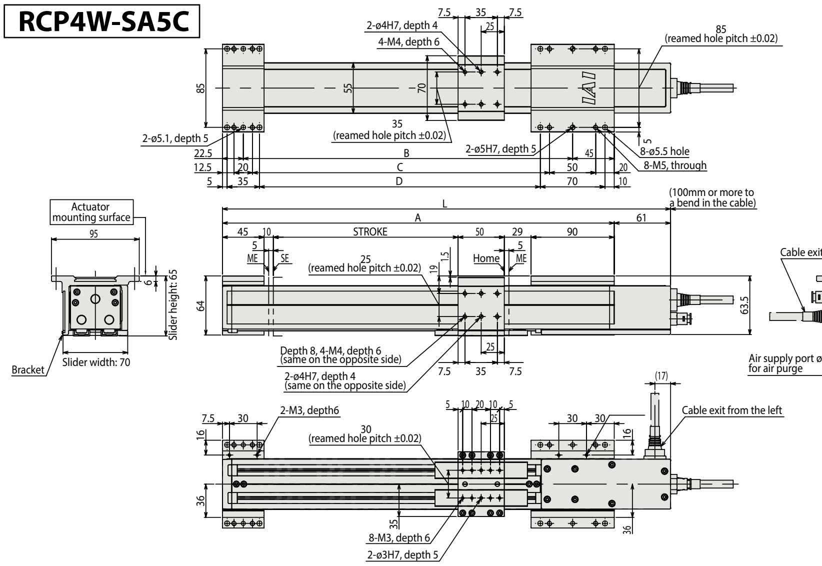
Even if the actuator body does not receive any external force, provide a support base to support the actuator body, as shown to the right, if the actuator is installed horizontally using a flange or when the actuator is of the side-mounted motor specification and secured using the mounting hole provided in the dedicated bracket.

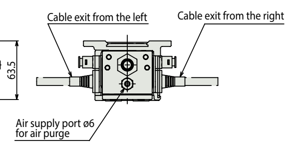


RCP4W Dimensions of the Ceiling Mount Specification

The dimensions shown assume that the ceiling mount option (code: HFL/HFR) is selected.

RCP4W-SA5C



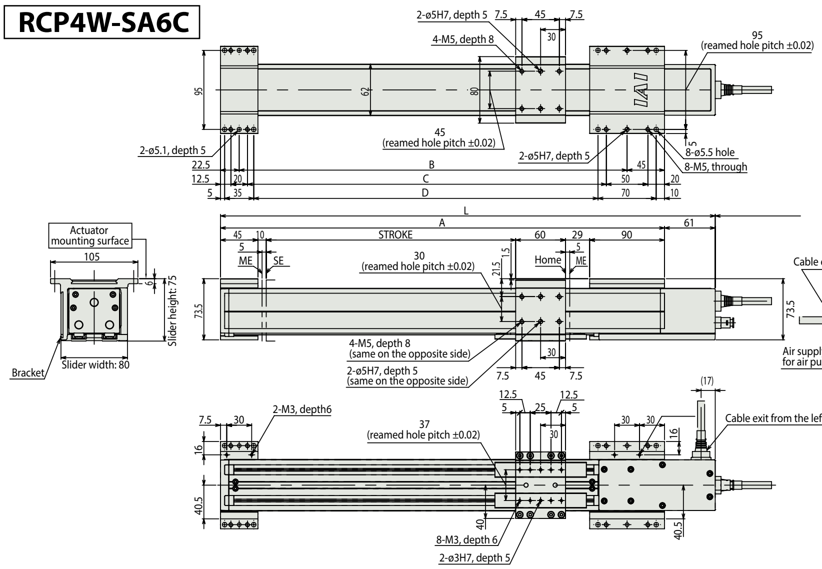


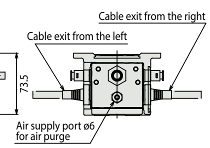
* The bracket is mounted on the right (code: HFR) in this drawing. When the bracket is mounted on the left (code: HFL), the positions of the mounting holes remain the same and the bracket on the side simply moves to the left.

■ Dimensions and Mass by Stroke

Stroke	100	150	200	250	300	350	400	450	500
L	385	435	485	535	585	635	685	735	785
A	324	374	424	474	524	574	624	674	724
B	256.5	306.5	356.5	406.5	456.5	506.5	556.5	606.5	656.5
C	221.5	271.5	321.5	371.5	421.5	471.5	521.5	571.5	621.5
D	204	254	304	354	404	454	504	554	604
Weight (kg)	2.8	2.9	3.1	3.2	3.4	3.5	3.7	3.8	4.0

RCP4W-SA6C





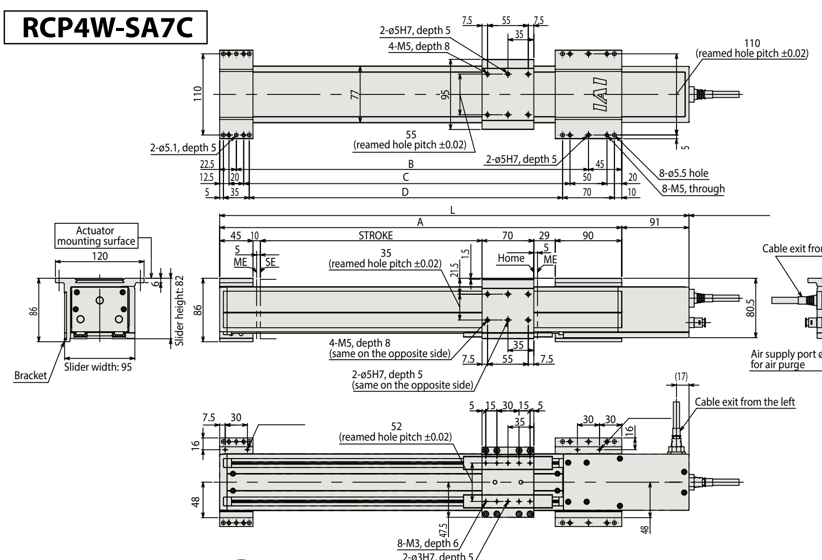
* The bracket is mounted on the right (code: HFR) in this drawing. When the bracket is mounted on the left (code: HFL), the positions of the mounting holes remain the same and the bracket on the side simply moves to the left.

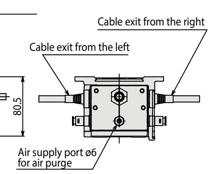
■ Dimensions and Mass by Stroke

Stroke	100	150	200	250	300	350
L	395	445	495	545	595	645
A	334	384	434	484	534	584
B	266.5	316.5	366.5	416.5	466.5	516.5
C	231.5	281.5	331.5	381.5	431.5	481.5
D	214	264	314	364	414	464
Weight (kg)	3.9	4.1	4.3	4.5	4.7	4.9

Stroke	400	450	500	550	600
L	695	745	795	845	895
A	634	684	734	784	834
B	566.5	616.5	666.5	716.5	766.5
C	531.5	581.5	631.5	681.5	731.5
D	514	564	614	664	714
Weight (kg)	5.1	5.3	5.5	5.8	6.0

RCP4W-SA7C





* The bracket is mounted on the right (code: HFR) in this drawing. When the bracket is mounted on the left (code: HFL), the positions of the mounting holes remain the same and the bracket on the side simply moves to the left.

■ Dimensions and Mass by Stroke

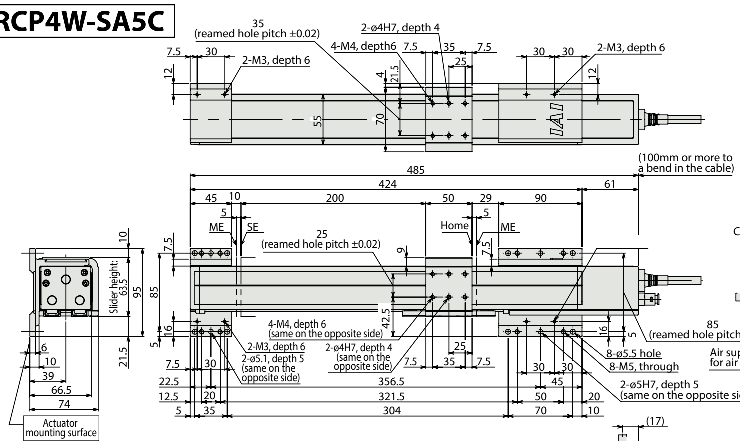
Stroke	100	150	200	250	300	350	400
L	435	485	535	585	635	685	735
A	344	394	444	494	544	594	644
B	276.5	326.5	376.5	426.5	476.5	526.5	576.5
C	241.5	291.5	341.5	391.5	441.5	491.5	541.5
D	224	274	324	374	424	474	524
Weight (kg)	5.9	6.2	6.5	6.8	7.1	7.4	7.6

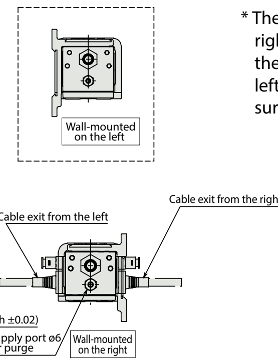
Stroke	450	500	550	600	650	700
L	785	835	885	935	985	1035
A	694	744	794	844	894	944
B	626.5	676.5	726.5	776.5	826.5	876.5
C	591.5	641.5	691.5	741.5	791.5	841.5
D	574	624	674	724	774	824
Weight(kg)	7.9	8.2	8.5	8.8	9.0	9.3

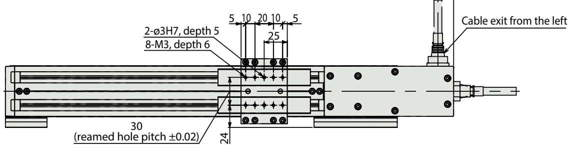
RCP4W Dimensions of the Wall Mount Specification

The dimensions shown assume that the wall mount option (code: TFR/TFL) is selected.

RCP4W-SA5C





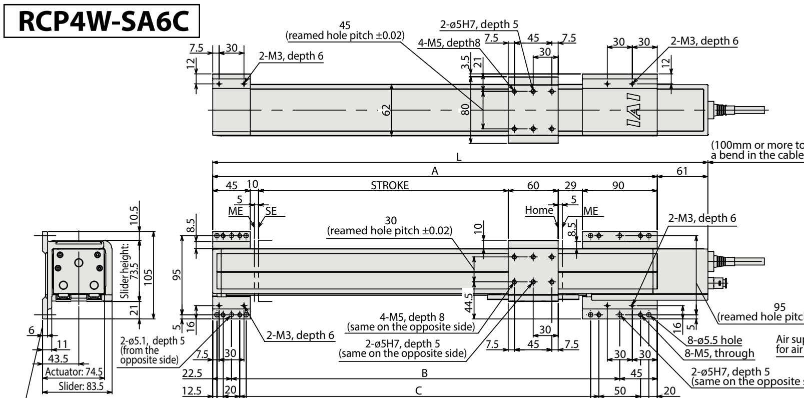


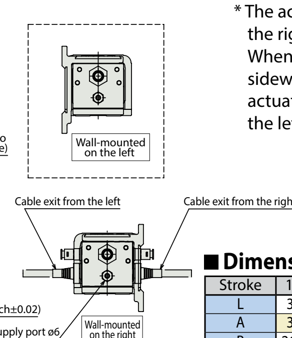
* The actuator is mounted sideways on the right (code: TFR) in this drawing. When the actuator is mounted sideways on the left (code: TFL), the actuator mounting surface comes to the left side.

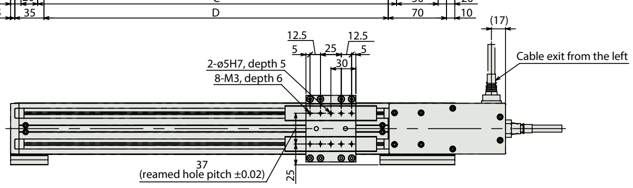
■ Dimensions and Mass by Stroke

Stroke	100	150	200	250	300	350	400	450	500
L	385	435	485	535	585	635	685	735	785
A	324	374	424	474	524	574	624	674	724
B	256.5	306.5	356.5	406.5	456.5	506.5	556.5	606.5	656.5
C	221.5	271.5	321.5	371.5	421.5	471.5	521.5	571.5	621.5
D	204	254	304	354	404	454	504	554	604
Weight (kg)	2.8	2.9	3.1	3.2	3.4	3.5	3.7	3.8	4.0

RCP4W-SA6C







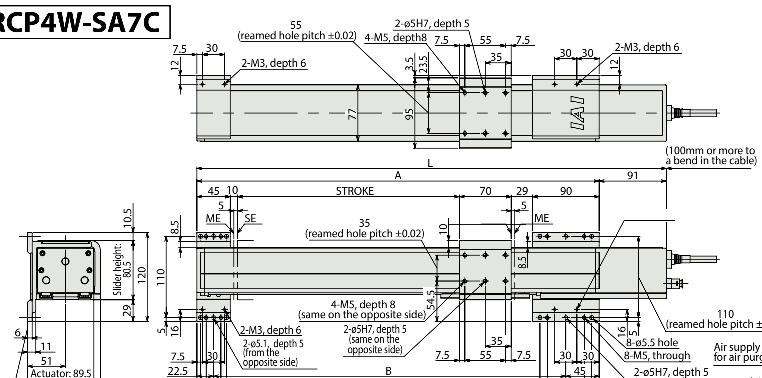
* The actuator is mounted sideways on the right (code: TFR) in this drawing. When the actuator is mounted sideways on the left (code: TFL), the actuator mounting surface comes to the left side.

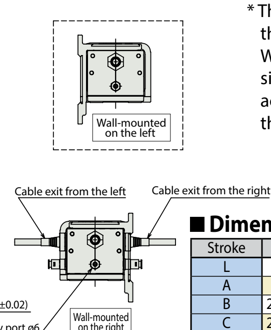
■ Dimensions and Mass by Stroke

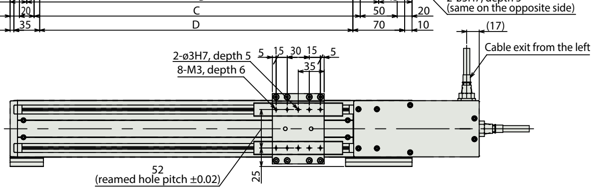
Stroke	100	150	200	250	300	350
L	395	445	495	545	595	645
A	334	384	434	484	534	584
B	266.5	316.5	366.5	416.5	466.5	516.5
C	231.5	281.5	331.5	381.5	431.5	481.5
D	214	264	314	364	414	464
Weight (kg)	3.9	4.1	4.3	4.5	4.7	4.9

Stroke	400	450	500	550	600
L	695	745	795	845	895
A	634	684	734	784	834
B	566.5	616.5	666.5	716.5	766.5
C	531.5	581.5	631.5	681.5	731.5
D	514	564	614	664	714
Weight (kg)	5.1	5.3	5.5	5.8	6.0

RCP4W-SA7C







* The actuator is mounted sideways on the right (code: TFR) in this drawing. When the actuator is mounted sideways on the left (code: TFL), the actuator mounting surface comes to the left side.

■ Dimensions and Mass by Stroke

Stroke	100	150	200	250	300	350	400
L	435	485	535	585	635	685	735
A	344	394	444	494	544	594	644
B	276.5	326.5	376.5	426.5	476.5	526.5	576.5
C	241.5	291.5	341.5	391.5	441.5	491.5	541.5
D	22w4	274	324	374	424	474	524
Weight (kg)	5.9	6.2	6.5	6.8	7.1	7.4	7.6

Stroke	450	500	550	600	650	700
L	785	835	885	935	985	1035
A	694	744	794	844	894	944
B	626.5	676.5	726.5	776.5	826.5	876.5
C	591.5	641.5	691.5	741.5	791.5	841.5
D	574	624	674	724	774	824
Weight (kg)	7.9	8.2	8.5	8.8	9.0	9.3

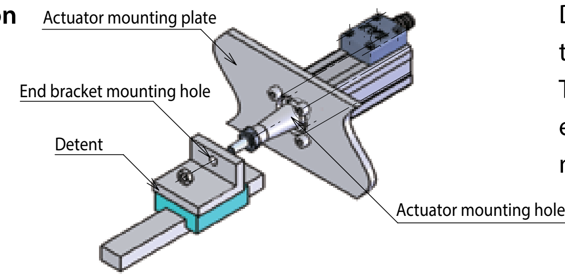
How to Install Detents on Mini Actuators of Rod Type

■ Detents on Mini ROBO Cylinders of Rod Type

The models specified below have no detents for the ball screw in the actuator, so an external detent must be installed while the actuator is in use. Install a detent based on the installation conditions specified below.

Applicable Models RCA2-RN3NA/RN4NA/RP3NA/RP4NA
RCS2-RN5N/RP5N

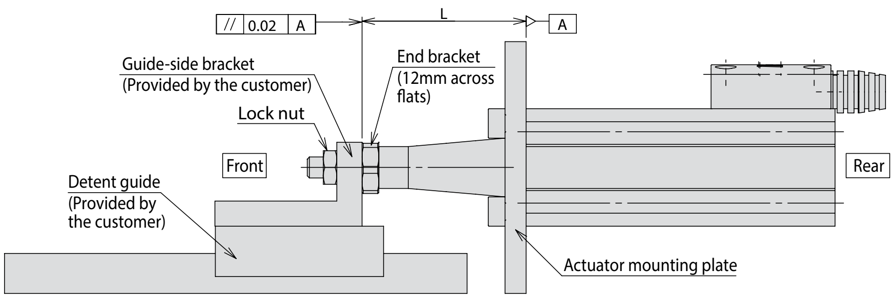
Image of Installation



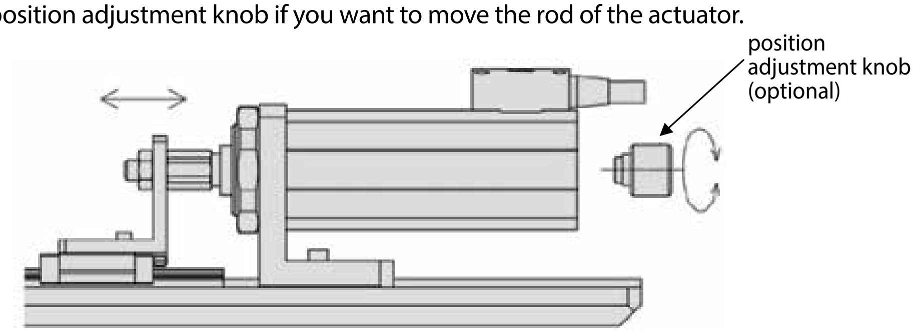
Do not connect the end of the actuator rod with the detent using a floating joint.
The screw axis will receive radial load due to eccentricity, potentially causing the actuator to malfunction or break down prematurely.

Installation Method and Conditions

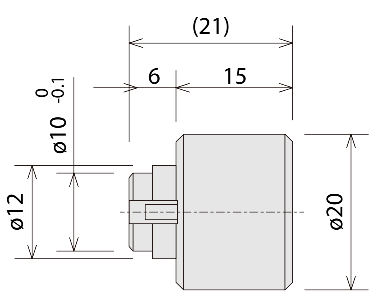
Keep the coaxiality of the actuator mounting hole in the actuator fixing plate and the tip bracket mounting hole in the guide-side bracket to within 0.05 mm. Also keep the parallelism to within 0.02mm.



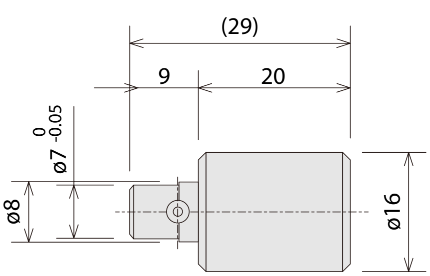
Use the optional position adjustment knob if you want to move the rod of the actuator.



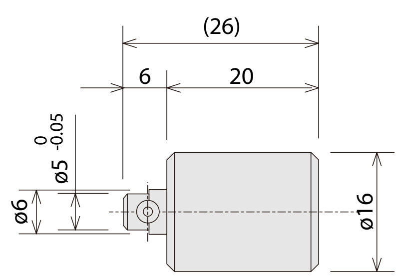
< Position Adjustment Knob >



For 5 series
Model: RCS2



For 4 series
Model: RCA2-AK-R4



For 4 series
Model: RCA2-AK-R3

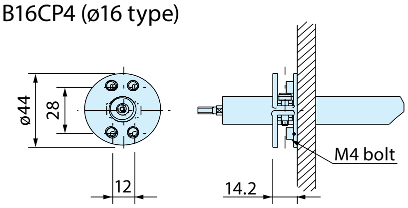
How to Install Linear Rod/RCD Actuators

■ How to Install RCL Mini Rod Actuators of Slim Type

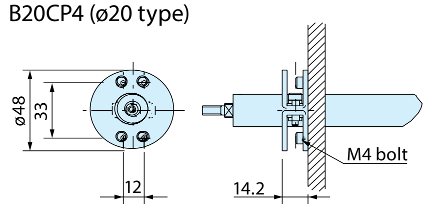
To install RCL Mini rod actuators of the slim type, use commercially available brackets like the ones shown below. For the details of each bracket, contact the manufacturer of the bracket directly.

●Shaft Brackets by Iwata Mfg. Co., Ltd.

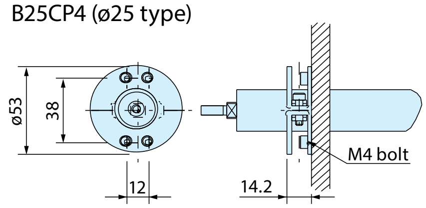
B16CP4 (ø16 type)



B20CP4 (ø20 type)

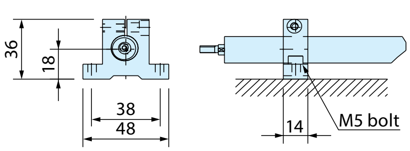


B25CP4 (ø25 type)

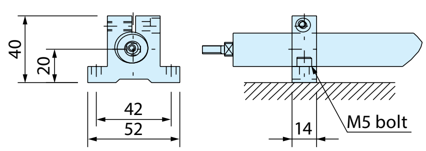


●Round Pijon Brackets by Miyoshi Pijon Co., Ltd.

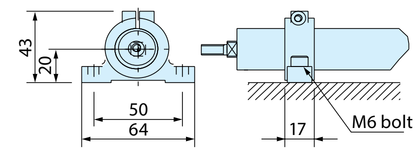
PN600 (ø16 type)



PQ600 (ø20 type)



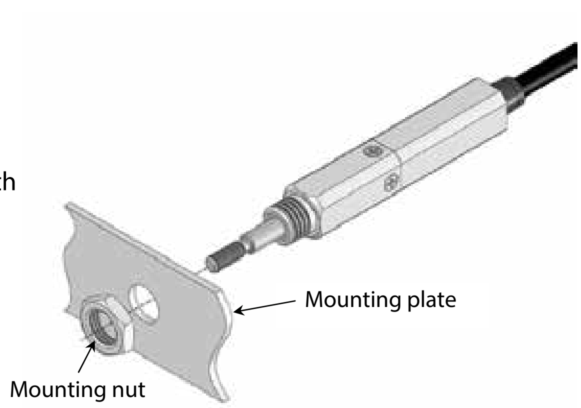
PH600 (ø25 type)



Note	When clamping the actuator pipe, strictly follow the tightening torque specified in the operation manual. If the actuator pipe is tightened with an excessive force, the pipe may deform and cause malfunction or breakdown.

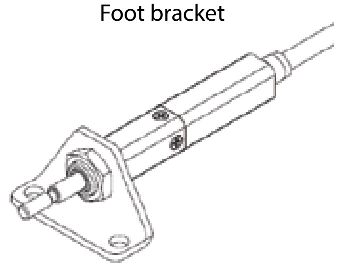
■ How to Install RCD Series Actuators

- Make sure the installation bracket has a sufficiently rigid structure and does not transmit vibration of over 0.3 G.
- Provide enough maintenance space.
  Press-fit the actuator into a through hole (ø10) provided in a smooth plate of approx. 1 to 3 mm in thickness to secure the actuator.
  The actuator can be installed either horizontally or vertically.
- The base of the actuator's male thread (M10 x 1.0) has a tolerance of h8, so use this part as a pilot joint.
- When fastening the supplied mounting nut, etc., keep to the maximum tightening torque of 9.0 N·m. If the nut is tightened to a greater torque, damage may result.

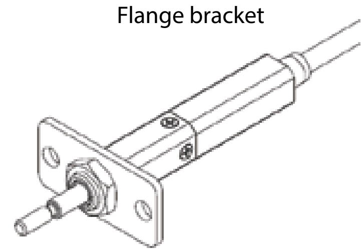


For the foot bracket and flange bracket, general-purpose products like the ones shown below may be used.
For the details of each foot bracket of flange bracket, contact the manufacturer of the bracket directly.

Foot bracket



Flange bracket



MEMO

MEMO

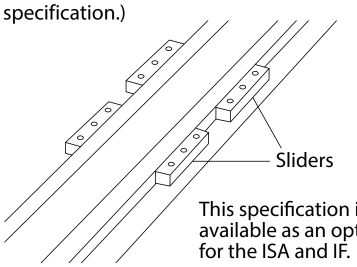
Custom Order Specifications

IAI accepts custom orders for various specifications in addition to the standard specifications featured in the catalog.
If you can't find any suitable product in the catalog, feel free to contact the IAI sales office near you.

Examples of Custom Order Specifications

Double Sliders

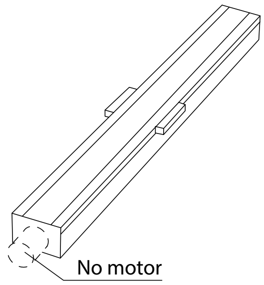
This specification is effective for an X/Y combination system where the X-axis requires a large moment and Y-axis, a long overhang load length. (Note: The double-slider specification has shorter effective strokes than a comparable standard specification.)



This specification is available as an option for the ISA and IF.

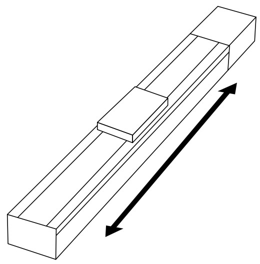
No Motor/Special Motor

If you are providing the motor and controller, only the axis without motor can be shipped. We can also ship the axis by installing the motor you specify.



Special Stroke

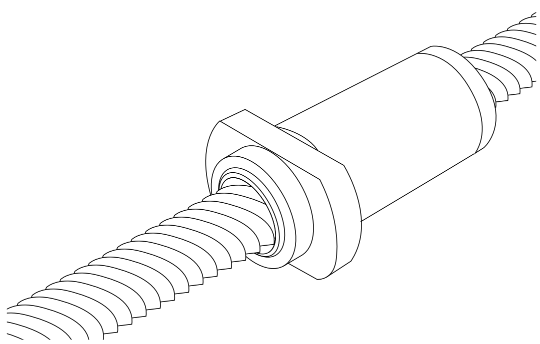
You can specify a desired stroke not achievable with any standard specification.



(A stroke that falls between standard strokes, or shorter or longer than a standard stroke)

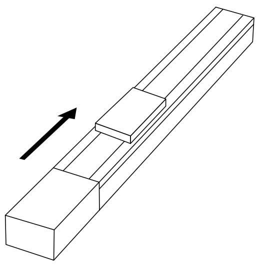
Special Ball Screw Lead

You can use a ball screw with a lead not available with any standard specification.



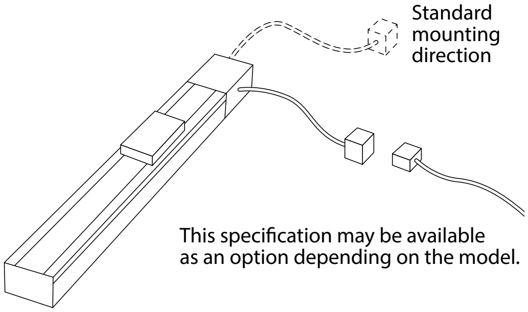
Special Home Position

You can change the home position (actuator end).



Cable Exiting from the Side

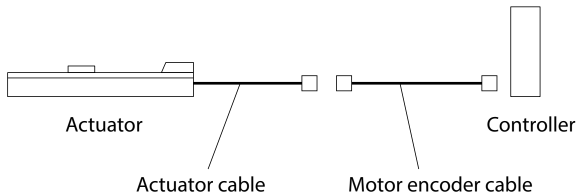
You can change the direction in which the cable exits, as shown below.



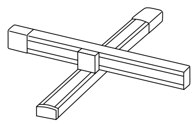
This specification may be available as an option depending on the model.

Special Actuator Cable

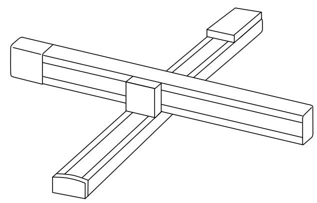
You can change the length of the actuator cable, specify a robot cable, or have the cable made with a specified wire material.



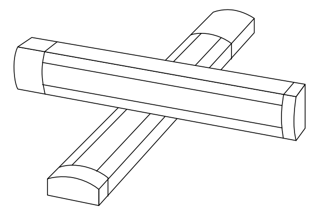
Special Cartesian Robot Combination



ROBO Cylinder combination (Combination not including the IK series)

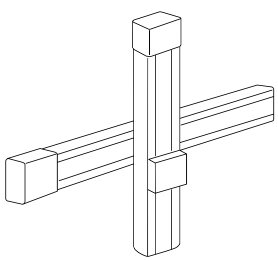


Cleanroom type combination

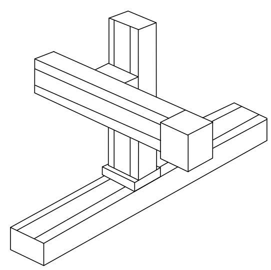


ISA (large type) combination

Special Cartesian Robot Combination



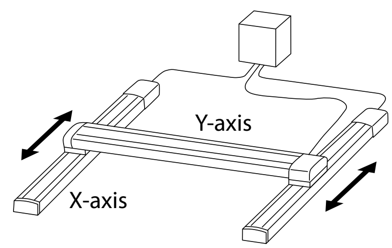
YZ fixed at the base



XZY

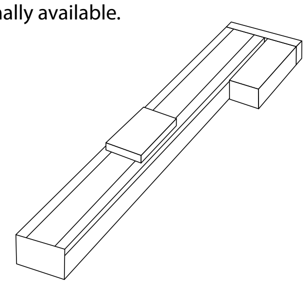
Synchronous Cartesian Robot, Gantry Type

You can order a gantry-type robot with a longer Y-axis so that its two X-axes can be operated synchronously.



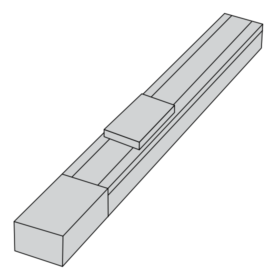
Side-mounted Motor

You can order a side-mounted motor type for any model for which this type is not normally available.



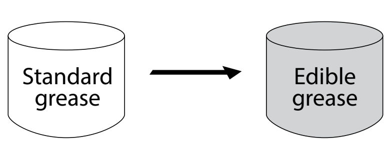
Surface Treatment

You can change the surface treatment to hard alumite coating, specified color, etc.



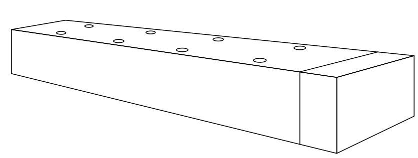
Grease

You can change the standard grease to an edible grease, a low dust-raising grease or any other grease you specify.



Mounting Holes

We can make mounting holes at any positions you specify.



Overseas Standards

1. RoHS Directive

The RoHS Directive, which is an acronym for "Restriction of Hazardous Substances," is a European Union (EU) Directive on "Restriction on Hazardous Substances in Electrical and Electronic Equipment."

The purpose of this Directive is to specify hazardous substances contained in electrical and electronic equipment and prohibit their use, thereby minimizing the negative effects these substances can have on the human body and the environment. Under this Directive, use of the following six types of substances has been banned or restricted since July 2006:

1. Lead
2. Mercury
3. Cadmium
4. Hexavalent chromium
5. Polybrominated biphenyl (PBB)
6. Polybrominated diphenyl ether (PBDE)

IAI is working to eliminate the use of substances controlled by the RoHS Directive. We have replaced all components with RoHS-compliant counterparts (some exceptions apply) effective January 2006.
Refer to the correspondence list provided later for our current status of compliance.

2. CE Marking

Products sold in the European Union (EU) bloc must display the CE Marking by law.

The CE Marking indicates that the product meets the mandatory safety requirements specified by all applicable EU (EC) Directives, and is displayed on the product at the responsibility of the manufacturer. The adoption of the "New Approach to Harmonization and Standardization" Directive in 1985 led to the enactment of the "EMC Directive," "Low Voltage Directive," "Machine Directive" and other directives that specify the mandatory safety requirements to be observed by each product and define the correlated tangible specifications to be enforced, respectively.

(1) EMC Directive

This Directive covers products that may emit electromagnetic waves or whose function may be affected by electromagnetic waves from external sources. These products must be designed to not release strong electromagnetic waves and also resist electromagnetic waves from external sources.
IAI's controllers, actuators and peripherals conform to the EMC Directive and all related standards based on the wiring/installation models (conditions) representing various combinations.

(2) Low Voltage Directive

This Directive aims to assure safety of electrical products driven by power supplies of 50 to 1000 VAC/75 to 1500 VDC.
Our ISA/ISPA, ISB/ISPB, ISDA/ISPDA, ISDB/ISPDB, ISDACR/ISPDACR, ISDBCR/ISPDBCR, ISWA/ISPWA, IX and TT-series actuators are designed to conform to the Low Voltage Directive when combined with applicable controllers.
(TT-series actuators are integrated with a controller.)
This Directive does not apply to 24-V ROBO Cylinders.

(3) Machine Directive

This Directive applies primarily to industrial machinery, but also to some general products, whose moving parts present danger. It defines the level of safety these mechanical products must provide.
Our IX series and TT series are subject to the Machine Directive.
Other IAI products do not comply with the Machine Directive (as of August 1, 2013).

3. UL Standards

UL (Underwriters Laboratories Inc.) is a nonprofit organization established in 1984 by the American Association of Fire Insurance Companies. It conducts research, testing and inspection for the protection of human lives and assets from fire, acts of God, theft and other accidents.

The UL Standards are product safety standards on function and safety. UL tests and evaluates samples of each product against these standards and if the product is deemed in compliance with the UL requirements, it can be shipped with the UL mark displayed on it.

RoHS Directive/CE Mark/UL Standard Correspondence Table

◎ : Compliant as standard specification / ◯ : Compliant with an option(s) / △ : Must be custom-ordered for compliance / ✕ : Not compliant (now or the foreseeable future)

Product configuration	Series	Type/model number		RoHS Directive	CE Mark	UL Standards
ROBO Cylinder Actuator	ERC3	Slider	SA5C/SA7C	◎		
		Rod	RA5C/RA6C	◎		
	ERC3D	Slider	SA5C/SA7C	◎		
	RCP4	Slider (motor unit type)	SA5C/SA6C/SA7C	◎	◎	
		Slider (side-mounted motor type)	SA5R/SA6R/SA7R	◎	◎	
		Rod (motor unit type)	RA5C/RA6C	◎	◎	
		Rod (side-mounted motor type)	RA5R/RA6R	◎	◎	
	RCD	Rod	RA1D	◎	◎	
	ERC2	Slider	SA6C/SA7C	◎	◎	
		Rod (standard)	RA6C/RA7C	◎	◎	
		Rod (with guide)	RGS6C/RGS7C/RGD6C/RGD7C	◎	◎	
	RCL	Rod	RA1L/RA2L/RA3L	◎		
		Slider (single slider)	SA1L/SA2L/SA3L/SA4L/SA5L/SA6L	◎		
		Slider (multi-sliders)	SM4L/SM5L/SM6L	◎		
	RCP3	Slider (motor unit type)	SA2AC/SA2BC	◎	◎	
			SA3C/SA4C/SA5C/SA6C	◎	◎	
		Slider (side-mounted motor type)	SA2AR/SA2BR	◎	◎	
			SA3R/SA4R/SA5R/SA6R	◎	◎	
		Table (motor unit type)	TA3C/TA4C	◎	◎	
			TA5C/TA6C/TA7C	◎	◎	
		Table (side-mounted motor type)	TA3R/TA4R	◎	◎	
			TA5R/TA6R/TA7R	◎	◎	
		Rod (standard)	RA2AC/RA2BC/RA2AR/RA2BR	◎	◎	
	RCP2	Slider (coupling)	SA5C/SA6C/SA7C/SS7C/SS8C	◎	◎	
		Slider (side-mounted motor type)	SA5R/SA6R/SA7R/SS7R/SS8R	◎	◎	
		Slider (belt-driven)	BA6/BA7/BA6U/BA7U	◎	◎	
		High-speed type	HS8C/HS8R	◎	◎	
		Rod (standard)	RA2C/RA3C/RA4C/RA6C/RA8C/RA10C	◎	◎	
			RA3R/RA4R/RA6R/RA8R/SRA4R	◎	◎	
		Rod (with guide)	RGS4C/RGS6C/RGD3C/RGD4C/RGD6C	◎	◎	
			SRGS4R/SRGD4R	◎	◎	
		Gripper	GRLS/GRSS/GRS/GRM/GRHM/GRHB	◎	◎	
			GR3L/GR3S	◎	◎	
		Gripper (long stroke)	GRST	◎	◎	
		Rotary	RTBS/RTBSL/RTB/RTBL/RTBB/RTBBL	◎	◎	
			RTCS/RTCSL/RTC/RTCL/RTCB/RTCBL	◎	◎	
		Simple absolute type	Models supporting simple absolute specification	◎	◎	
	ERC3CR	Slider	SA5C/SA7C	◎		
	RCP4CR	Slider	SA3C/SA4C/SA5C/SA6C/SA7C	◎	◎	
	RCP2CR	Slider	SA5C/SA6C/SA7C/SS7C/SS8C	◎	◎	
		Gripper	GRLS/GRSS	◎	◎	
	RCP4W	Slider	SA5C/SA6C/SA7C	◎	◎	
		Rod	RA6C/RA7C	◎	◎	
	RCP2W	Slider	SA16C	◎	◎	
		Rod	RA4C/RA6C	◎	◎	
		Rod (high thrust)	RA10C	◎	◎	
	RCA2	Slider	SA2AC/SA3C/SA4C/SA5C/SA6C	◎	◎	
			SA2AR/SA3R/SA4R/SA5R/SA6R	◎	◎	
		Rod	RA2AC/RA2AR/RN3N/RN4N/RP3N/RP4N	◎	◎	
			GS3N/GS4N/GD3N/GD4N/SD3N/SD4N	◎	◎	
			RN3NA/RN4NA/RP3NA/RP4NA/GS3NA/GS4NA	◎	◎	
			GD3NA/GD4NA/SD3NA/SD4NA	◎	◎	
		Table (short type)	TCA3N/TCA4N/TWA3N/TWA4N/TFA3N/TFA4N	◎	◎	
			TCA3NA/TCA4NA/TWA3NA/TWA4NA/TFA3NA/TFA4NA	◎	◎	
		Table (motor unit type)	TA4C/TA5C/TA6C/TA7C	◎	◎	
		Table (side-mounted motor type)	TA4R/TA5R/TA6R/TA7R	◎	◎	
	RCA	Slider (coupling)	SA4C/SA5C/SA6C	◎	◎	
		Slider (motor directly coupled)	SA4D/SA5D/SA6D/SS4D/SS5D/SS6D	◎	◎	
		Slider (side-mounted motor type)	SA4R/SA5R/SA6R	◎	◎	
		Rod (standard)	RA3C/RA4C/RA3D/RA4D/RA3R/RA4R	◎	◎	
			SAR4R	◎	◎	
		Rod (with guide)	RGS3C/RGS4C/RGS3D/RGS4D/SRGS4R	◎	◎	
			RGD3C/RGD4C/RGD3D/RGD4D	◎	◎	
			RGD3R/RGD4R/SRGD4R	◎	◎	
		Arm	A4R/A5R/A6R	◎	◎	
		Absolute type	All models	◎	◎	
	RCACR	Slider (coupling)	SA4C/SA5C/SA6C	◎	◎	
		Slider (motor directly coupled)	SA5D/SA6D	◎	◎	
	RCAW	Rod	RA3C/RA3D/RA3R/RA4C/RA4D/RA4R	◎	◎	
	RCS3	Slider	SA8C/SS8C	◎	◯	
		Slider (side-mounted motor type)	SA8R/SS8R	◎	◯	
	RCS3CR	Slider	SA8C/SS8C	◎	◯	

RoHS Directive/CE Mark/UL Standard Correspondence Table

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Product configuration	Series	Type/model number		RoHS Directive	CE Mark	UL Standards
ROBO Cylinder Actuator	RCS2	Slider (coupling)	SA4C/SA5C/SA6C/SA7C/SS7C/SS8C	◎	○	
		Slider (motor directly coupled)	SA4D/SA5D/SA6D	◎	○	
		Slider (side-mounted motor)	SA4R/SA5R/SA6R/SA7R/SS7R/SS8R	◎	○	
		Rod (standard)	RA4C/RA5C/RA4D/RA4R/RA5R	◎	○	
			SRA7BD	◎		
			RA13R	◎	○	
		Rod (with guide)	RGS4C/RGS5C/RGS4D/RGD4C/RGD5C	◎	○	
			RGD4C/RGD5C/RGD4D/RGD4R	◎	○	
			SRGS7BD/SRGD7BD	◎		
		Flat	F5D	◎	○	
		Gripper	GR8	◎	○	
		Rotary	RT6/RT6R/RT7R/RTC8/RTC10/RTC12	◎	○	
		Arm	A4R/A5R/A6R	◎	○	
		Absolute type	All models	◎	○	
	RCS2CR	Slider (coupling)	SA4C/SA5C/SA6C/SA7C/SS7C/SS8C	◎	○	
		Slider (motor directly coupled)	SA5D/SA6D	◎	○	
	RCS2W	Rod	RA4C/RA4D/RA4R	◎	○	
	ERC	Slider	SA6/SA7	◎		
		Rod	RA54/RA64	◎		
	RCP	Slider (side-mounted motor)	SA5/SA6/SS/SM	×		
			SSR/SMR	×		
		Rod	RS/RM	×		
	RCS	Slider (side-mounted motor)	SA4/SA5/SA6/SS/SM	×		
			SSR/SMR	×		
		Rod	RA/RB	×		
		Flat	F	×		
		Gripper	G	×		
		Rotary	R10/R20/R30	×		
		Absolute type	—	×		
Single-axis robot	SSPA	High rigidity (iron base)	S/M/L	◎		
	ISB ISPB	(standard)	SXM/SXL/MXM/MXL/MXMX LXM/LXL/LXMX/LXUWX	◎	◎	
	ISA ISPA	(standard)	SXM/SYM/SZM/MXM/MYM/MZM/MXMX LXM/LYM/LZM/LXMX/LXUWX/WXM/WXMX	◎	◎	
	IS	(standard)	S/M/L/T	×		
	ISP	(standard)	S/M/L/W	×		
	ISDB ISPDB	Simple, dustproof	S/M/MX/L/LX	◎	◎	
	ISDA ISPDA	Simple, dustproof	S/M/L	◎	◎	
	ISD ISPD	Simple, dustproof	S/M/L	×		
	ISWA ISPWA	Dustproof/splashproof	S/M/L	×	◎	
	SSPDACR	Cleanroom, high rigidity (iron base)	S/M/L	◎		
	ISDBCR ISPDBCR	Cleanroom	S/M/MX/L/LX	◎	◎	
	ISDACR ISPDACR	Cleanroom	S/M/MX/L/LX/W/WX	◎	◎	
	NS	(standard)	SXMS/SXMM	◎	◎	
			SZMS/SZMM	◎	◎	
			MXMS/MXMM/MXMXS	◎	◎	
			MZMS/MZMM	◎	◎	
			LXMS/LXMM/LXMXS	◎	◎	
			LZMS/LZMM	◎	◎	
	IF	(standard)	SA/MA	◎		
	FS	(standard)	N/W/L/H	◎		
	DS	Slider	SA4/SA5/SA6	×		
		Arm	A4/A5/A6	×		
		Cleanroom	—	×		
		Absolute	—	×		
	SS	(standard)	S/M	×		
	SSCR	Cleanroom	—	×		
	RS	Rotational axis	30/60	◎		
	ZR	Vertical/rotational axes integrated	S/M	◎		

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Product configuration	Series	Type/model number		RoHS Directive	CE Mark	UL Standards
Cartesian Robot	ICSA	—	—	◎		
	ICSPA			◎		
SCARA	IH	—	—	×		
	IX	Standard (NNN)	1205/1505/1805	◎		
			2515H/3515H	◎	◎	
			50□□H/60□□H	◎	◎	
			70□□H/80□□H	◎	◎	
		Clean room	2515H/3515H/50□□H/60□□H 70□□H/80□□H	◎	◎	
		Dust-proof/splash-proof		◎	◎	
		Ceiling, high speed, wall-mounted		◎	◎	
Linear	LS	Small/large	S/L	×		
	LSA LSAS	Small	H	◎		
		Medium	N	◎		
		Large	W	◎		
		Shaft	S	◎		
		Flat	L	◎		
Table top	TT (actuator part)	Old	TT-300	×		
		New	TT-A2/A3/C2/C3	◎	◎	
Other	TX	—	—	◎		
	Motor	ISAC	200W/400W	◎		
	Unit	ISAC high rigidity (T1)	60W (RS)/100W/150W	◎		
ROBO Cylinder controller	PMEC	Incremental	C	◎	◎(※1)	
	AMEC	Incremental	C	◎		
	PSEP	Incremental	C/CW	◎	◎	◎
		Simple absolute	C/CW-ABU	◎	◎	◎
	ASEP	Incremental	C/CW	◎	◎	◎
		Simple absolute	C/CW-ABU	◎	◎	◎
	DSEP	Incremental	C	◎	◎	
	MSEP	Incremental	C	◎	◎	◎
		Simple absolute	C-ABB	◎	◎	◎
	PSEP/ASEP	Absolute battery unit	SEP-ABU/SEP-ABU-W	◎	◎	◎
	PCON	High output	CA	◎	◎	◎
		Standard	C/CG	◎	◎(※2)	◎
		High thrust	CF/CFA	◎	◎	◎
		Compact	CY/SE/PL/PO	◎	◎	◎
		Simple absolute unit	PCON-ABU	◎	◎	◎
	ACON	Standard	C/CG	◎	◎(※2)	◎
		Compact	CY/SE/PL/PO	◎	◎	◎
		Simple absolute unit	ACON-ABU	◎	◎	◎
	SCON	High function	CA	◎	◎(※2)	◎
		Standard	C	◎	◎	
	MSCON	—	C	◎		
	PSEL	—	—	◎	◎	
	ASEL	—	—	◎	◎	
	SSEL	—	—	△	◎	
	ROBONET	Gateway R unit	RGW-DV/RGW-CC	◎	◎	◎
			RGW-PR/RGW-SIO	◎	◎	◎
		Controller unit	RACON/RPCON	◎	◎	◎
		Simple absolute R unit	RABU	◎	◎	◎
		Extension unit	REXT	◎	◎	◎
		Extension unit	REXT-SIO	◎	◎	◎
		Extension unit	REXT-CTL	◎	◎	◎
	RCP2	Standard	C/CG	◎	◎	◎
		High thrust	CF	◎	◎	◎
		Absolute	—	◎		
	RCS	100V/200V	C	×		
		24 V (general-purpose)		×		
		24 V (low-cost)	E	×		
		EU	—	×		
		CC-Link (256 points)	—	×		
		DeviceNet	—	×		
		ProfiBus	—	×		

(*1) Limited to the 200-V specifications
(*2) Among the field network specifications, the MechatroLink and EtherCAT/EthernetIP specifications are not compliant.

RoHS Directive/CE Mark/UL Standard Correspondence Table

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Product configuration	Series	Type/model number		RoHS Directive	CE Mark	UL Standards
Single-axis, orthogonal or SCARA controller	E-Con	Standard	—	×		
		EU	—	×		
		CC-Link (256 points)	—	×		
		DeviceNet	—	×		
		ProfiBus	—	×		
		Absolute	—	×		
	P-Driver	—	—	×		
	TX	TX-C1	—	◎		
	XSEL-J/K	Small	J	△		
		General-purpose	K	△		
		Global	KT	△	◎	
		CE	KE/KET	△	◎	
		SCARA	JX/KX	△		
		General-purpose expansion SIO	IA-105-X-MW-A/B/C	◎		
	XSEL-P/Q	Standard	P	△	◎	
		Global	Q	△	◎	
		SCARA	PX/QX	△	◎	
	XSEL-J/K options	CC-Link (256 points)	IA-NT-3206/4-CC256	◎		
		CC-Link (16 points)	IA-NT-3204-CC16	◎		
		DeviceNet	IA-NT-3206/4-DV	◎		
		ProfiBus	IA-NT-3206/4-PR	◎		
		EtherNet	IA-NT-3206/4-ET	◎		
		Expansion PIOs	IA-103-X-32/16	◎		
		Multi-point I/Os	IA-IO-3204/5-NP/PN	◎		
	DS-S-C1	Standard	—	×		
		EU	—	×		
	SEL-E/G	Standard	—	×		
		EU	—	×		
	SEL-F	—	—	×		
	IH	—	—	×		
Table top	TT TT (controller part)	Old	—	×		
		New	—	◎		
Teaching pendant	New RC series	Standard	CON-T	◎	◎	
		Safety-category 4 compliant	CON-TGS	◎	◎	◎
		Dedicated touch panel teaching pendant for SEP controller	SEP-PT	◎	◎	
		General-purpose touch panel teaching pendant, standard type (color LCD type)	CON-PTA-C	◎	(*)	
		General-purpose touch panel teaching pendant with enable switch (color LCD type)	CON-PDA-C	◎	(*)	
		General-purpose touch panel teaching pendant, safety-category compliant type (color LCD type)	CON-PGAS-C	◎	(*)	
		General-purpose touch panel teaching pendant, standard type (monochrome LCD type)	CON-PT-M	◎	◎	
		General-purpose touch panel teaching pendant with enable switch (monochrome LCD type)	CON-PD-M	◎	◎	
		General-purpose touch panel teaching pendant, safety-category compliant type (monochrome LCD type)	CON-PG-M	◎	◎	
	RCP2	Standard (with deadman switch)	RCA-T/TD	×		
	ERC		RCM-T/TD	×		
	RCS	Simple type	RCA-E	△		
	E-Con		RCM-E	◎		
	RC	Data setting unit	RCA-P	△		
			RCM-P	△		
	RCP2 ERC	Jog teaching	RCB-J	△		
	New SEL series	Standard	SEL-T	◎	◎	
		With deadman switch	SEL-TD	◎	◎	◎
		Safety-category 4 compliant	SEL-TG	◎	◎	◎
	XSEL	Standard (with deadman switch)	IA-T-X(IA-T-XD)	×		
	DS	DS-S-T1	—	×		
	E/G,F	NE-T-SS	—	×		
	IH	IA-T-IH	—	×		
	TX	TX-JB	—	◎		
Touch panel	—	RCM-PM-01	—	◎		

(*) To be compliant soon.

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Product configuration	Series	Type/model number		RoHS Directive	CE Mark	UL Standards
Simple absolute unit	PCON, ACON	PCON-ABU	—	◎	◎	◎
		ACON-ABU				
24-VDC power supply	—	PS-241/PS-242	—	◎		
Gateway unit	RCM-GW	DV	RCM-GW-DV	◎		
		CC	RCM-GW-CC	◎		
		PR	RCM-GW-PR	◎		
Regenerative resistance unit	E-Con	REU-1	—	◎		
	PDR					
	XSEL					
	SCON	REU-2	—	◎		
	SSEL					
	XSEL-P/Q					
Absolute battery	HAB	IA-HAB	—	*1		
	RCP	AB-2	—			
	XSEL-J/K	IA-XAB-BT	—	◎		
	RCS	AB-1	—	*1 Since these models are subject to the EU Battery Directive (2006/66/E), they are exempted from the RoHS Directive.		
	E-Con					
	P-Driver					
	IX SCARA (250~800)	AB-3	—			
	RCP2	AB-4	—			
	XSEL-P/Q	AB-5	—			
	ASEL					
	SCON					
	SSEL					
	IX SCARA (120 to 180)	AB-6	—			
	PCON-ABU	AB-7	—			
	ACON-ABU					
Brake box	E/G	1-axis AC	H-109-☐A	×		
		1-axis DC	H-109-☐D	×		
		Brake box	H-110-☐A	×		
		2-axis DC	H-110-☐D	×		
		Coil	H-500	×		
	GDS	1 axis	H-401	×		
		2 axes	H-402	×		
	XSEL-J/K	IA-110-X-0	—	◎		
PIO terminal block	—	—	RCB-TU-PIO-A/B	◎		
SIO converter	—	—	RCB-TU-SIO-A/B	◎		
RS232 conversion	RCS	New	RCB-CV-MW	◎		
Unit	ERC	Old	RCA-ADP-MW	×		
Multi-point I/O	XSEL-K	TU-MA96(-P)	—	◎		
Board terminal block						
Filter box	E-Con	PFB-1	—	×		
Pulse converter	PDR	AK-04	—	◎		
I/O expansion box	E/G	H-107-4	—	×		
M/PG cable	RCP4	Motor/encoder integrated cable	CB-CA-MPA	◎		
	RCP3/RCA2	Motor/encoder integrated cable	CB-APSEP-MPA	◎		
	RCP3	Motor/encoder integrated cable	CB-PCS-MPA	◎		
	RCP/RCP2	Motor/encoder integrated cable	CB-PSEP-MPA	◎		
		Motor/encoder integrated cable (for small rotary type only)	CB-RPSEP-MPA	◎		
		Motor cable	CB-RCP2-MA	◎		
		Encoder cable	CB-RCP2-PB	◎		
			CB-RFA-PA	◎		
			CB-RCP2-PB-**-RB	◎		
			CB-RFA-PA-**-RB	◎		
	RCA2	Motor/encoder integrated cable	CB-ACS-MPA	◎		
	RCA	Motor/encoder integrated cable	CB-ASEP-MPA	◎		
		Motor cable	CB-ACS-MA	◎		
		Encoder cable	CB-ACS-PA	◎		
			CB-ACS-PA-**-RB	◎		

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Product configuration	Series	Type/model number		RoHS Directive	CE Mark	UL Standards
M/PG cable	RCS2	Motor cable	CB-RCC-MA	◎		
			CB-RCC-MA-**-RB	◎		
		Encoder cable	CB-RCS2-PA	◎		
			CB-RCBC-PA	◎		
			CB-RCBC-PA-**-RB	◎		
	XSEL	Motor cable	CB-X-MA	◎		
		Encoder cable	CB-X-PA	◎		
			CB-X1-PA/PLA	◎		
			CB-X2-PA/PLA	◎		
			CB-X1-PA-**-WC	◎		
			CB-X3-PA	◎		
		Limit switch cable	CB-X-LC	◎		
	TX	Motor cable	CB-TX-ML050-RB	◎		
I/O cable	PMEC/AMEC	For standard type	CB-APMEC-PIO***-NC	◎		
	PSEP/ASEP	For standard type	CB-APSEP-PIO, CB-APSEPW-PIO	◎		
	PCON/ACON	For standard type (C/CG type)	CB-PAC-PIO	◎		
		For solenoid valve type (CY type)	CB-PACY-PIO	◎		
		For pulse-train control type (PL/PO type)	CB-PACPU-PIO	◎		
	SCON	For standard type	CB-PAC-PIO	◎		
	PSEL/ASEL SSEL	For standard type	CB-DS-PIO	◎		
	XSEL	For standard type	CB-X-PIO	◎		
	ERC/ERC2	Power supply for PIO type	CB-ERC-PWBIO	◎		
			Power supply & I/O cable	◎		
		Power supply & I/O cable	CB-ERC-PWBIO***-H6	◎		
		Power supply for SIO type	CB-ERC2-PWBIO	◎		
			CB-ERC2-PWBIO***-RB	◎		
Other	RC	PC software	RCM-101-MW	◎		
			External communication cable	◎		
		External communication cable	CB-RCA-SIO050	◎		
		RS232C conversion cable	RCB-CV-MW	◎		
		USB cable	CB-SEL-USB010	◎		
			Link cable	◎		
		USB conversion adapter	CB-CV-USB	◎		
		Link cable	CB-RCB-CTL002	◎		
		Unit link cable	CB-REXT-SIO010	◎		
		Controller connection cable	CB-REXT-CTL010	◎		
		CON-TG adapter	RCB-LB-TGS	◎		
	SCON			◎		
		Pulse-train control cable	CB-SC-PIOS	◎		
	XSEL	PC software (cable + emergency box)	IA-101-X-MW	◎		
			IA-101-XA-MW	◎		
			IA-101-X-USBS	◎		
			IA-101-X-USBMW	◎		
			EMG SW BOX	◎		
		Insulation cable (cable only)	CB-ST-E1MW050	◎		
			CB-ST-A1MW050	◎		
			CB-SEL-USB010	◎		
		USB conversion adapter	IA-CV-USB	◎		
		I/O flat cable	CB-X-PIO	◎		
		SEL-TG adapter	IA-LB-TGS	◎		
		Joint cable	CB-ST-232J001/CB-ST-422J010	◎		
		SEL-TG connection cable	CB-SEL25-LBS005	◎		
	A/P/SSEL		CB-SEL26H-LBS005	◎		
	SEL series	Dummy plug	DP-4S	◎		
		Panel unit	PU-1	◎		
		Connector conversion cable	CB-SEL-SJSO002	◎		
	TX	Connection cable	CB-TX-P1MW020	◎		

Discontinued Models and Successor Models

Classification	Series			When discontinued	Successor model (substitute) *
Actuator	IA	DS-S	SA4 SA5 SA6 A4R A5R A6R	October 2008	RCA, RCS2
		EX	12EX	August 2007	RCP2-BA
		AS	12L 12G2 12R2 12H2 12V CS-DC 12AR	October 2003	ISB
		E/F	12E 12ED 12F 12FD	October 2003	ISB, RCA
		Former AS	12G 02G 02W 12GR 12R 02R GSJ RP MR CR	December 2001	ISB
	ROBO Cylinder	RCP	SA5 SA6 SS SM SSR SMR RSA RMA RSW RSI RMI RMW RSIW RMIW RSGS RMGS RSGD RMGD RSGB RMGB G10	October 2004	RCP2
	TA	TA	28 35	December 2003	TX

* The successor models are not compatible with the discontinued models in terms of shape, installation dimensions, wirings, etc.
Contact IAI for details.

Discontinued Models and Successor Models

Classification	Series			When discontinued	Successor model (substitute) *
Controller	DS	DS-S	DS-S-C1	October 2008	ASEL
		SA-C	SA-C1, C2, C3, C4	December 2001	ASEL
		DS-C	DS-C1, C2, C3, C4		
	Super SEL controller	SEL-F	F	August 2007	SSEL
		SEL-ES	M-SEL-ES-1	October 2004	XSEL
		SEL-GS	M-SEL-GS-2~4		
		SEL-E	S-SEL-E-1-□ S-SEL-EDS-1-□		
		SEL-G	M-SEL-G-2~8 M-SEL-GDS-2~8 M-SEL-GID-2~8 M-SEL-GX-2~9		
		SEL-A	A-1 A-2 A-3 A-4	October 2003	XSEL
		SEL-B (AC included)	B-2 B-3 B-4 B-7 B-8	October 2003	XSEL
		SEL-H	H-3 HAB-4	October 2003	XSEL
		SEL-C/D	D-2	December 2001	XSEL
	Multi-axis controller	SEL	SEL-2~4	December 2001	XSEL
	Single axis controller	S-SEL (AC included)	35 60 100 200	October 2003	SSEL XSEL
		C-S	S C-S	December 2001	SCON
	ROBO Cylinder	RCP2	RCP2-C/CF	May 2014	PCON-CA
		RCS	RCS-C		SCON,ACON
		ECON	ECON		SCON
		P-Driver	PDR		SCON
		RCP	RCP-C-□ RCP-C-□-EU	October 2004	PCON-CA
	TA	TA	TA-C1	December 2003	TX-C1
Tabletop type	TT-300			December 2001	TT
Display	Touch panel display	RCM-PM-01		December 2013	—
Teaching pendant	Simple teaching pendant	RCM-E		March 2014	CON-PTA-C
	Data setting unit	RCM-P			—

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Programs

SuperSEL Language

Our PSEL/ASEL/SSEL/XSEL controllers control actuator operation and communications, etc. using programs that have been prepared using the SuperSEL language.

The SuperSEL language is the simplest of the numerous robotic languages.
SuperSEL adeptly solves the difficult question of "realizing a high level of control with a simple language."

SuperSEL has a step-wise structure in which commands are entered in operation sequence, which are then executed in sequence from step 1, making it extremely easy to understand, even for a novice.

The SuperSEL language has two types of data: "program data," which runs commands to move the various axes and commands to performed external communications, and "position data," which records the positions to which the various axes are moved.

Program data can be entered up to 9,999 command steps, which can be divided into 128 programs.
Position data can be registered for up to 20,000 positions, with 3 axes worth of position data for each position.
(These maximum values are different depending on each controller. For details, please refer to the catalog page for each controller.)

When each of the axes is moved, the motion command in the program data designates the number of the position data, and it is moved to the position registered in the position data.

● Program Data

No.	B	E	N	Cnd	Cmnd	Operand 1	Operand 2
1					HOME	100	
2					HOME	11	
3					VEL	200	
4					WTON	1	
5					MOVL	1	
6					BTON	301	
7					WTON	2	
8					BTOF	301	
9					MOVL	2	
10					BTON	302	

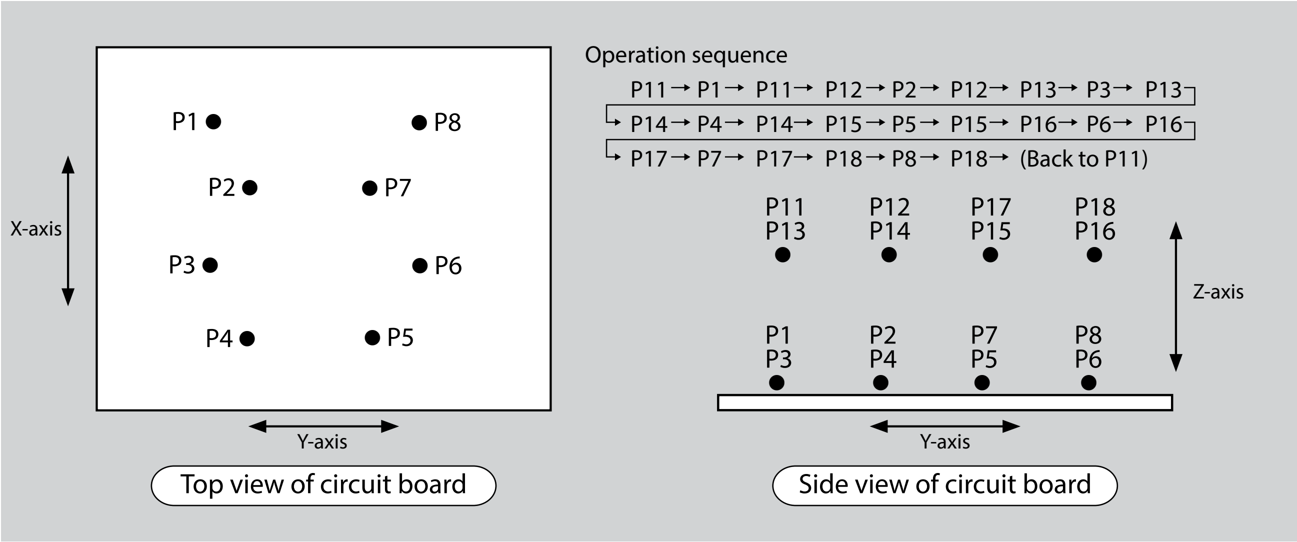
● Position Data

No.	Axis1	Axis2	Axis3
1	10.000	150.000	50.000
2	20.000	140.000	50.000
3	30.000	150.000	50.000
4	40.000	140.000	50.000
5	40.000	110.000	50.000
6	30.000	100.000	50.000

Sample Program 1 Soldering

Operation Overview

Register solder positions as position data and move the soldering head (attached to the Z-axis) using a program to the registered positions sequentially.



Position data

	X-axis	Y-axis	Z-axis
P1	10	150	50
P2	20	140	50
P3	30	150	50
P4	40	140	50
P5	40	110	50
P6	30	100	50
P7	20	110	50
P8	10	100	50

	X-axis	Y-axis	Z-axis
P11	10	150	0
P12	20	140	0
P13	30	150	0
P14	40	140	0
P15	40	110	0
P16	30	100	0
P17	20	110	0
P18	10	100	0

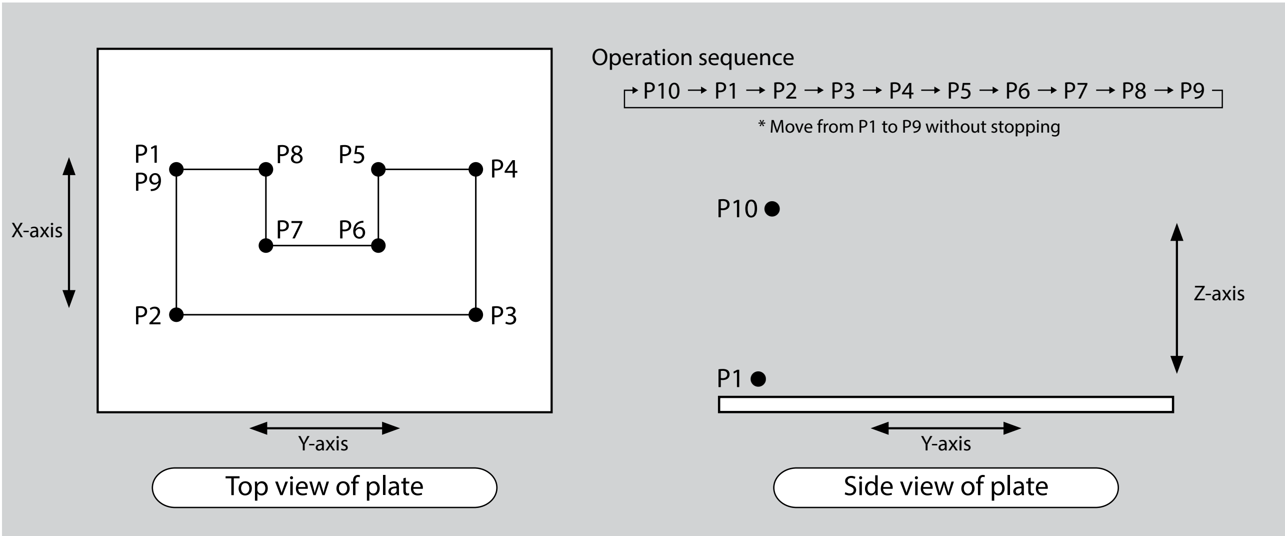
Program

Step	Extension condition	Input condition	Command	Operand 1	Operand 2	Output condition	Comment
1			HOME	100			Bring only the Z-axis to home
2			HOME	11			Bring the X- and Y-axes to home
3			VEL	100			Set the speed to 100 mm/sec.
4			ACC	0.3			Set the acceleration to 0.3 G
5			TAG	1			Destination of GOTO 1 in step 32
6			WTON	16			Stop until start button input 16 turns on
7			MOVP	11			Move to above position 1 (= position 11)
8			MOVP	1			Move (descend) to position 1
9			TIMW	3			Stop for 3 seconds
10			MOVP	11			Move (ascend) to position 11
11			MOVP	12			Move to above position 2 (= position 12)
12			MOVP	2			Move (descend) to position 2
13			TIMW	3			Stop for 3 seconds
				12			Move (ascend) to positi
28			MOVP	18			Move to above position 8 (= position 18)
29			MOVP	8			Move (descend) to position 8
30			TIMW	3			Stop for 3 seconds
31			MOVP	18			Move (ascend) to position 18
32			GOTO	1			Jump to TAG 1
33							
34							

Sample Program 2 Coating

Operation Overview

Apply sealant to a plate along the path illustrated below.
The actuator moves continuously, without stopping, from position 1 to position 9 based on the movement path.



Position data

	X-axis	Y-axis	Z-axis
P1	10	150	50
P2	40	150	50
P3	40	70	50
P4	10	70	50
P5	10	90	50
P6	20	90	50
P7	20	130	50
P8	10	130	50
P9	10	150	50
P10	10	150	0

Program

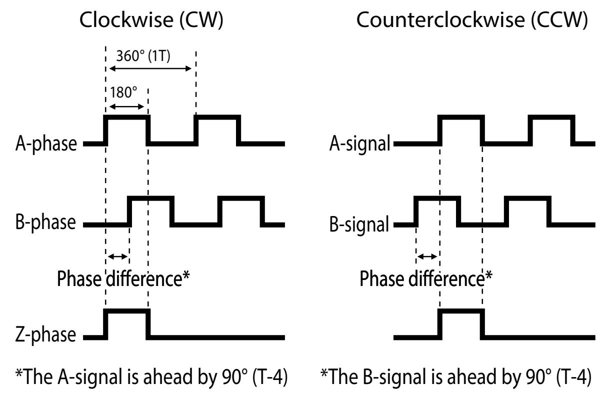
Step	Extension condition	Input condition	Command	Operand 1	Operand 2	Output condition	Comment
1			HOME	100			Bring only the Z-axis to home
2			HOME	11			Bring the X- and Y-axes to home
3			VEL	100			Set the speed to 100 mm/sec.
4			ACC	0.3			Set the acceleration to 0.3 G
5			TAG	1			Destination of GOTO 1 in step 11
6			WTON	16			Stop until start button input 16 turns on
7			MOVP	10			Move to above position 1 (= position 10)
8			MOVP	1			Move (descend) to position 1
9			PATH	2	9		With position 1 as the base point, move continuously to position 9
10			MOVP	10			Move (ascend) to position 10
11			GOTO	1			Jump to TAG1

Explanation of Terms (This terminology is related to IAI products, and so the definitions are more limited than usual.)

A-phase (signal) output / B-phase (signal) output

The direction of rotation (CW or CCW) of the axis is determined from the phase difference between the A-phase and the B-phase of the incremental encoder output, as shown in the diagram below.
In a clockwise rotation, the A-phase is ahead of the B-phase.

■ Diagram of Output Modes



Note: 360° (1T) in reference to electrical angle, not the mechanical angle.

Absolute battery

A battery required by absolute-type controllers.
It is used to retain encoder information in case the power is cut off.
IAI's absolute battery offerings include the AB-5 and IA-XAB-BT for single-axis/orthogonal robots and the AB-3 and AB-6 for SCARA robots.
"Simple Absolute" is a type of absolute battery. An incremental actuator can be used as an absolute actuator when combined with a simple absolute battery.
PCON (other than CF), ACON, PSEP, ASEP, MSEP, ROBONET (RPCON, RACON) and PSEL controllers support such "simple absolute" actuators.

Absolute positioning accuracy

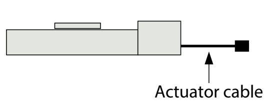
When positioning is performed to an arbitrary target point specified in coordinate values, the difference between the coordinate values and the actual measured values.

Actuator

A mechanical element of machinery, device, etc., that receives supplied energy and converts it to final mechanical work. Actuators include motorized cylinders, servo motors, hydraulic cylinders, air cylinders and solenoids.

Actuator cable

The cable projecting by 300 mm or so from the back of the actuator motor.
i.e. pigtail cable



Air purge

Applying air pressure to the interior of a dust-proof/splash-proof actuator to ensure dust-proofing/splash-proofing property and thereby prevent dust, etc., from entering the actuator.

ANSI standards

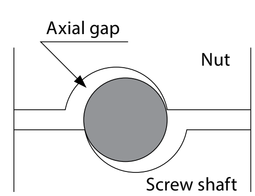
The ANSI Standards are U.S. standards for manufactured products equivalent to the JIS standards in Japan. Among the ANSI Standards, ANSI/RIA R15.06 is a subset of standards for industrial robots and robot systems, covering the safety of these systems. Among IAI's products, teaching pendants (CON-TD, CON-TG, CON-PD, CON-PG, CON-PDA, CON-PGA, SEL-TD) are equipped with a 3-position enable switch to comply with ANSI/RIA R15.06.

AQ seal

AQ seal is a lubrication member made of resin-solidified lubrication oil. The porous member is impregnated with a large amount of lubrication oil that allows the lubrication oil to seep to its surface by means of capillary effect when it is pressed against the surface of the guide or ball screw (rolling surface of the steel ball). The synergistic effect harnessed by a combined use of this AQ seal and grease makes it possible for an actuator to run maintenance-free for a long period of time.

Backlash

As shown in the figure below, there is a gap between the nut and the ball (steel ball) and the screw shaft. Even if the screw shaft moves, the nut will not move the extent of the gap. The mechanical play in the direction of this slider movement is called the backlash.



The measurement method used is to feed the slider, then use the reading for the slight amount of movement time shown on a test indicator as a standard. Also, in that condition, without using the feed device, move the slider in the same direction with a fixed load, then without the load. Then find the difference between the standard value and the time when the load was removed. This measurement is conducted at the midpoint of the distance of movement and at points nearly at the two ends.
The maximum value obtained among the values is used as the measurement value.

Base

The bottom part of the actuator. The base is mostly made of aluminum, but some actuators may have an iron base.

Brake

Primarily used for the vertical axis to prevent the slider from dropping when the servo is turned off. The brake activates when the power is turned off.

Brake box

The ultra-high thrust type RCS2-RA13R, nut-rotation type NS-LZMS/LZMM (vertical specification) and ZR unit must have the brake box connected between the brake and controller. The brake box, which comes with the actuator, can also be used to release the brake.

C10

One of the grades of a ball screw. The lower the number, the higher the precision. Grade C10 has a typical movement error of ±0.21mm for a 300mm stroke.

C5

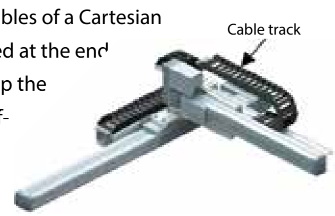
A grade of ball screw, representing a significantly higher accuracy compared to the C10 ball screw. Accordingly, high-accuracy actuators using the C5 ball screw offer significantly higher positioning repeatability and lower lost motion value to support accurate positioning.
While a ROBO Cylinder using the C10 ball screw normally has a positioning repeatability of ±0.02mm, one using the C5 ball screw normally has a positioning repeatability of ±0.01mm.

Cable bending radius

The bending dimension of the motor/encoder cable that connects the actuator and controller (= radius of the arcing cable), specified by the cable manufacturer to prevent excessive bending and consequent wire breakage of the cable.
The bending radius varies from one motor/encoder cable to another, so refer to the wiring diagram included in the catalog.
Also, the cable for connecting the motor/encoder cable ("actuator cable"), which projects by approx. 300 mm from the motor cover of the actuator to connect, should have a bending radius of 100 mm or more for ease of work.

Cable track

A part that manages the actuator cables of a Cartesian robot or cables of the device installed at the end of the actuator. Cable tracks can keep the height lower compared to when self-supported cables are used.



CCW (Counterclockwise rotation)

Abbreviation for counterclockwise rotation.
It describes a rotation to the left, as viewed from above, i.e. opposite of the rotation of a clock's hands.

Choco Tei

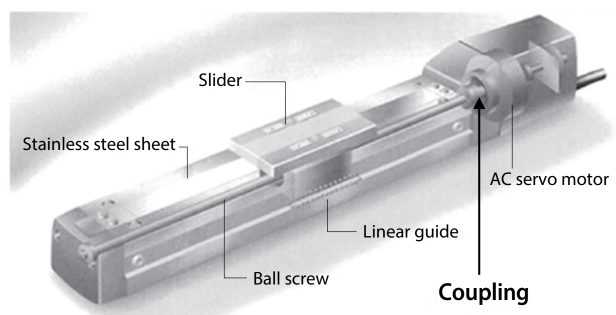
A type of temporary trouble that manifests as sudden stopping of the equipment during operation, which can be reset with ease. If downtime, no matter how short, occurs frequently, the production efficiency will drop.

Cleanliness

Class 100 and Class 10, etc. are units for expressing cleanliness. Class 10 (0.1 μm) indicates an environment in which there are fewer than 10 particles of debris 0.1 μm or smaller per cubic foot.

Coupling

A part that joins a shaft with another shaft.
Example: The joint between the ball screw and the motor.



Creep sensor

An optional sensor to allow high-speed homing operation.

CT effects

By replacing the air cylinders that constitute equipment with motorized actuators, productivity improves due to shorter cycle time and less frequent downtime, which in turn leads to lower equipment investment, labor cost, etc., and consequently greater benefit to the customer.
CT stands for "Cycle Time" and "Choco Tei (frequent downtime)."

CW (Clockwise rotation)

Abbreviation for clockwise rotation.
It describes a rotation to the right, as viewed from above, i.e. same as the rotation of a clock's hands.

Explanation of Terms (This terminology is related to IAI products, and so the definitions are more limited than usual.)

Cycle time

The actual time needed to produce one product, indicated by "time per piece."

Dangerous speed

The slider speed (number of revolutions of the ball screw) at which the ball screw resonates.
Because of this dangerous speed, generally the longer the stroke, the lower the maximum speed becomes.
Note that single-axis robots come with an intermediate support mechanism so as not to reach the dangerous speed.

Differential line driver

A method for inputting/outputting pulse-train signals, characterized by greater resistance to noise compared to another I/O method called "Open Collector."
Since the open collector method requires less costly equipment to generate pulses, many customers choose the open collector method.
IAI's controllers supporting pulse-train signals include the PCON (ACON)-PL/PO, PCON-CA and SCON-C/CA, of which PCON (ACON) PL controllers are the differential line driver type and PO controllers are the open collector type. However, PCON-CA, SCON-C/CA controllers are available only in the differential line driver specification, so if a PCON-CA or SCON-C/CA controller is to be connected to open collector equipment, do so via the optional "AK-04" (input side)" and "JM-08" (output side).

Dispenser

A device that controls the flow rate of a liquid. This is integrated into devices for applying adhesives, sealants, etc.

Double sliders

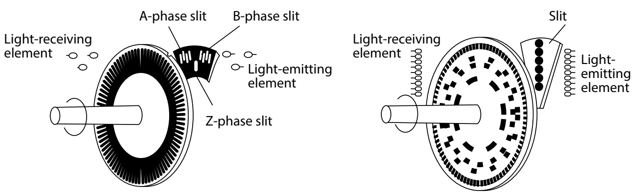
An option that adds a free slider not connected to the ball screw or driving belt. By adding a slider, the moment and overhung load length can be increased.

Duty

The ratio of the time during which the actuator is actually operating, and the time during which it is stopped, within one cycle.

Encoder

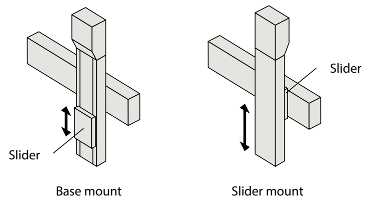
A device for recognizing the RPM and the direction of a rotation by shining a light onto a disc with slits, and using a sensor to detect whether the light is ON or OFF as the disc is rotated. (i.e. a device that converts rotation into pulses.) The controller uses this signal from the encoder to determine the position and speed of the slider.



An incremental encoder detects the rotational angle and the RPM of the axis from the number of output pulses. To detect the rotational angle and the RPM, a counter is needed to cumulatively add the number of output pulses. An incremental encoder allows one to electrically increase the resolution by using the rise and fall points on the pulse waveform to double or quadruple the pulse generation frequency.
An absolute encoder detects the rotation angle of the axis from the state of the rotation slit, enabling one to know the absolute position at all times, even when the rotating slit is at rest. Consequently, the rotational position of the axis can always be checked even without a counter.
In addition, since the home position of the input rotation axis is determined at the time it is assembled into the machine, the number of rotations from home can always be accurately expressed, even when turning the power ON during startup or after a power outage or an emergency stop.

Fixed slider

Normally the base of the actuator (actuator itself) is fixed and the slider is moved (fixed base), but "Fixed Slider" refers to the operating method where the slider is fixed and the base (actuator) is moved.
This method is often used with the vertical axis (Z-axis), but since the actuator itself moves, this method is particularly suited for operations where obstacles must be avoided or the arm must be inserted into a space.
One drawback is that, while the actuator should be able to perpendicularly transport the mass of the work part installed on the slider when the base is fixed, under the fixed slider method the mass of the actuator is also included in the payload and consequently the transportable mass decreases.



Flexible hose

Tube for SCARA Robot MPG cable that the user passes wiring through.

Gain

The numeric value of an adjustment of the controller's reaction (response) when controlling the servo motor. Generally, the higher the gain the faster the response, and the lower it is the slower the response.

Gantry

A type of two-axis (X and Y) assembly in which a support guide is mounted to support the Y-axis, so that heavier objects can be carried on the Y-axis.

Global specification

The type of controllers and teaching pendants equipped with redundant emergency stop circuits, 3-position enable switch and other functions to meet a given safety category. IAI's XSEL-Q/S controllers are global specification products, while our global specification teaching pendants include the CON-PGAS and SEL-TGS.

Grease

Highly viscous oil applied to the contact surface of a guide or ball screw to ensure its smooth movement. For food processing machines, edible grease is available by a special order.

Greasing

Injection or application of grease to sliding parts.

Gripping

To grip something. The force with which the gripper grips an object is called the "Gripping Force." Push operation is used for gripping with the gripper.

Guide

A mechanism for guiding (supporting) the slider of the actuator.
A bearing mechanism that supports linear motions.

Guide module

An axis in a two-axis assembly that is used in parallel with the X-axis to support the end of the Y-axis when the Y-axis overhang is long.
Typical models include the FS-12WO and FS-12NO.

Home

Reference point for actuator operation. The pulse counts are determined and recorded for all positions the actuator moves to / from home.

Home accuracy

The amount of variation among the positions when home return is performed (if home varies, all positions vary).

Interpolation operation

When a Cartesian robot, etc., is moved along an arc or angled line, each axis moves according to real-time calculations to generate the specified locus. This is called "Interpolation Operation." Program-type controllers (XSEL, SSEL) supports interpolation operation, which is a function needed in coating, deburring and other applications where the equipment installed on the actuator is moved along a specific shape.

Jog operation

Jog operation refers to manually pressing and holding a switch on the teaching pendant or a button on the PC software screen to move the motor at the specified speed, while the switch/button is pressed, to adjust the position.

Kyouji

Same as teaching. (Refer to "Teaching.")

Lead

The lead of the feed screw is the distance moved after the motor (hence the feed screw) has rotated one turn.

Load cell

A sensor that measures pressing force.
If the force control function of the RCS2-RA13R is used, the load cell installed at the tip of the actuator feeds back the measured force to the controller.

Long slider

Longer than the standard slider, the long slider increases the moment and overhang load length.
The long slider is available with the ISB and ISPB series and has the same effect as the double-slider option of the ISA series.

Explanation of Terms (This terminology is related to IAI products, and so the definitions are more limited than usual.)

Lost motion [mm]

First, for one position, run with positioning straight in front and then measure that position. Next, make a movement in the same direction by issuing a command. Then, issue the same command for movement in a negative direction from the position. Conduct positioning in the negative direction and measure that position. Again, issue a command for a movement in the negative direction, and issue the same command for a positioning movement straight ahead from that position. Then measure that position. Using this method, repeat measurement in positive and negative directions, seven times each. Conduct positioning for each and obtain the deviation from the average value for each stop position. Determine the position for the center of the movements in these measurements and positions nearly at both ends. The measurement value will be the maximum value among those obtained. (Complies with JIS B6201).

Ma (Pitching)

Forward-backward motion along the axis of the slider's movement. (Direction of Ma).

Mb (Yawing)

Motion at an angle in a left-right direction along slider movement axis. (Mb direction).Along with pitching, laser angle measurement system is used for measurement, and the reading is the indication of maximum difference.

Mc (Rolling)

An angular movement around the axis of the slider's movement. (Mc direction).

Mechanical end

Position where the actuator's slider comes to the mechanical stop. Mechanical stopper. (Example: Urethane rubber).

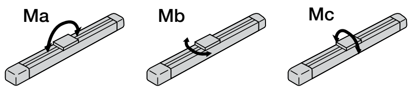
Mis-stepping

The pulse motor (= stepping motor) turns in proportion to the number of input pulses, but the distance traveled may not correspond to the input pulses due to impact, overload or other reason. This condition is called "Mis-stepping."

Normally the pulse motor (= stepping motor) has no encoder, so even when the motor mis-steps, it cannot be detected and the motor will continue to operate with position deviation. However, all IAI actuators are equipped with an encoder, which means that such abnormality can be detected in the form of a deviation error or overload error.

Moment

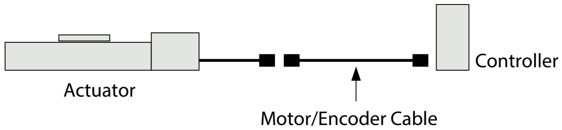
The rotational force applied to an object, calculated by "Force x Distance" and indicated in units of Nm. Three types of moments, Ma, Mb and Mc, apply to the slider-type actuator, as shown below, and the allowable value for each moment is specified in the catalog.



Please refer to page Appendix-5 for further details.

Motor/encoder cable

A cable that connects the actuator and controller. The motor/encoder cable is available as a standard cable or a robot cable offering excellent flexibility.



Multi-slider

The name of a system having two or more sliders driven along one axis. The multi-slider specification, where each slider is self-driven, is available with the "Nut-rotation Type NS Series" and "Linear Servo Actuator LSA/LSAS Series." (Refer to "Double-slider" for the synonym of "Mulitiple-slider.")

Offset

To shift from a position.

Open collector output

A system with no overload resistance in the voltage output circuit, that outputs signals by sinking the load current. Since this circuit can turn the load current ON/OFF regardless of voltage potential to which the current is connected, it is useful for switching an external load and is widely used as a relay or ramp circuit or the like for switching external loads, etc.

Open loop system

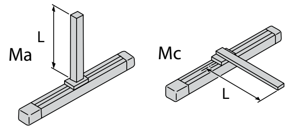
A type of control system. This system only outputs commands and does not take feedback. A typical example of this is the stepping motor. Since it does not compare each actual value against the commanded value, even if a loss of synchronization (i.e signal error) occurs, the controller would not be able to correct it.

Overhang

The state in which the object that is mounted onto the actuator extends out to the front/rear, left/right, or above/below the axis of movement.

Overhang load length

A value indicating how much the device or jig installed on the slider-type actuator is allowed to overhang, specified by the maximum values in two directions as shown below.



Overload error

This error generates when the actuator is operated continuously at a load, acceleration or duty exceeding the applicable rating. It can be resolved by changing the operating conditions.

Override

A setting for the percentage with respect to the running speed. (e.g. If VEL is set to 100mm/sec, an override setting of 30 will yield 30mm/sec).

Overshoot

In general, "overshoot" means for the object to be controlled to pass the target value.
In the context of an actuator, it refers to going a little beyond the target coordinate or speeding a little too much. In the context of a temperature controller, this term means momentarily exceeding the target temperature.

Payload capacity

The maximum mass that can be supported by the slider and the slider is still expected to operate properly at the acceleration/deceleration (factory-set value) indicated in the specification sheet without causing significant disturbance to the speed waveform or current waveform.
The mass of an object that can be moved by the slider/rod of the actuator.

PLC

Abbreviation for Programmable Logic Controller.
(Also referred to as sequencers or programmable controllers).
These are controllers that can be programmed to control production facilities and equipment.

Positioning band

The span within which a positioning operation is deemed as complete with respect to the target point. This is specified by a parameter. (PEND BAND).

Positioning completion

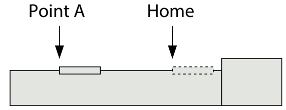
End of movement to a specified position.
When movement is complete, a positioning completion signal is output. In the case of standard ROBO Cylinders, this positioning signal turns ON 0.1 mm before the target coordinates. This distance is called the "In-position Band" or "Position Band" and can be changed.

Positioning repeatability

The difference between a coordinate value and the measured value achieved by positioning to the point specified by the coordinate value.

Positioning settling time

The gap between the actual movement time and the ideal calculated value for movement. (Positioning operation time; processing time for internal controller operations.) The broader meaning includes the time for convergence of the mechanical swing.



Pulse-train control

A method of control used with the motion controller, etc., where the connected actuator is controlled according to the number of pulses (signals) output and the rate (frequency) at which a pulse is output. Among IAI's controllers, the PCON (ACON)-PL/PO, PCON-CA, SCON-C and SCON-CA support pulse-train control.

Radial load

The load applied perpendicularly to the axial direction.

Regenerative energy

Energy, generated by the motor's rotation. When the motor decelerates, this energy returns to the motor's driver (controller). This energy is called regenerative energy.

Regenerative resistance

The resistance that discharges the regenerative current. The regenerative resistance required for IAI's controllers is noted in the respective page of each controller.

Explanation of Terms (This terminology is related to IAI products, and so the definitions are more limited than usual.)

Regulator

An air pressure system needed to use an air cylinder, designed to lower the pressure of air delivered to the air cylinder to an appropriate level and stabilize the pressure at this level. Normally one air cylinder device has one regulator.

Safety category

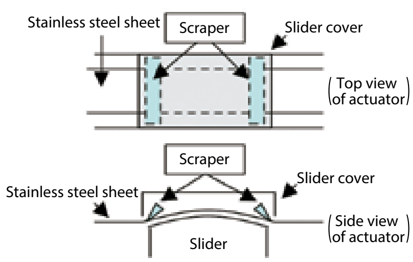
The ISO 13849-1 international standard specifies a classification of functions for ensuring safety (safety functions). There are five categories of B, 1, 2, 3 and 4, each corresponding to different safety criteria, with Category 4 representing the highest safety criteria.

SCARA

SCARA is an acronym for Selective Compliance Assembly Robot Arm, and refers to a robot that maintains compliance (tracking) in a specific direction (horizontal) only, and is highly rigid in the vertical direction.

Scraper

A part used to remove dust attached on the stainless steel sheet.
As the slider moves, the sheets (scrapers) pressed against the stainless steel sheet inside the slider cover, scrape dust off the stainless steel sheet to prevent it from entering the actuator. Scrapers are installed on actuators with stainless steel sheet, except for actuators of clean room specification. (Actuators of clean room specification are used in a cleaner environment, so these robots are equipped with roller mechanisms, instead of scrapers, to prevent generation of dust.)



Screw type

The types of screws for converting rotary motion of a motor to linear motion are summarized below. IAI's single-axis robots and electric cylinders use rolled ball screws as a standard feature.

		Characteristics
Ball screw	Polished	Screws are polished for good precision, but expensive
	Rolled	Since the screws are rolled, they can be mass produced.
Lead screw		Cheap, but poor precision and short life. Also not suitable for high-speed operation

SEL language

The name of IAI's proprietary programming language, derived from an acronym for SHIMIZUKIDEN ECOLOGY LANGUAGE.

Semi-closed loop system

A system for controlling the position information or velocity information sent from the encoder with constant feedback to the controller.

Servo-free (servo OFF)

A state where the motor power is turned off. The slider can be moved by hand in the servo-free state.

Servo-lock (servo ON)

The state in which, opposite to the above, the motor power is turned ON. The slider is continually held at a determined position.

Slave

The antonym of "Master," referring to whatever that follows the master. To give you an example using a specific product, assume that two axes are moved synchronously by an XSEL controller. In this case, one axis is set as the master axis and the other, as the slave axis. This way, the two axes operate synchronously with the slave axis following the master axis. Also note that any equipment (such as IAI's controller, sensor, etc.) which is connected to a field network and receives commands from the master unit installed in the PLC, etc., of the network is also called the "Slave."

Software limit

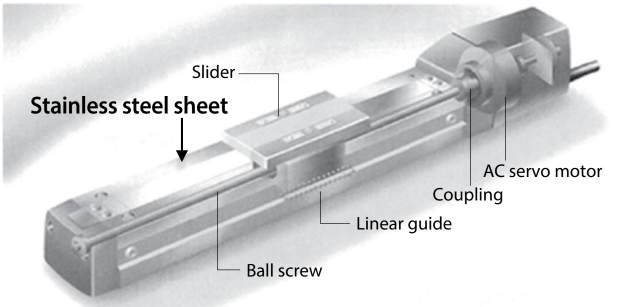
A limit in the software beyond which a given set stroke will not advance.

Solenoid type

A type of controller adopting the input/output method that allows the actuator to be operated using the same signals governing the operation of the solenoid valve of the air cylinder.
With the positioner-type controller, the actuator operates when a position number signal is input, followed by a start signal. With the solenoid-valve type, on the other hand, all you need is to input a position number signal, and the actuator will move to the applicable position.
This method is supported by PCON (ACON)-CY, PSEP (ASEP)-C/CW and PMEC (AMEC)-C controllers.

Stainless steel sheet

A dust-proof sheet used on ISDB, ROBO Cylinder and other actuators of the slider type.



Stepper motor

Also called the "Pulse Motor," this motor is normally used for angular positioning in proportions to the input pulse signal under open-loop control. The pulse motor used in the RCP4, etc., is feedback controlled according to the semi-closed loop method.

Stroke

The range of operation of the actuator.
With an actuator whose stroke is 300 mm, for example, the slider or rod can move a distance of 300 mm. The overall length (external dimension) of the actuator is longer than its stroke.

Takt time

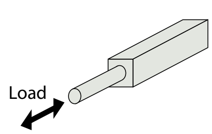
(Planned) work time per piece, assigned to produce the target quantity on the production line within the specified time.

Teaching

The process of registering position data (such as the position to move to, speed and acceleration) in the controller. Also called "Kyouji." The position to move to can be registered by one of the following methods:
[1] Enter the coordinates in numbers.
[2] Move the actuator by hand to the desired position.
[3] Use jog operation (move the motor with a switch to move to the desired position).

Thrust load

The load exerted in the axial direction.



Traveling life

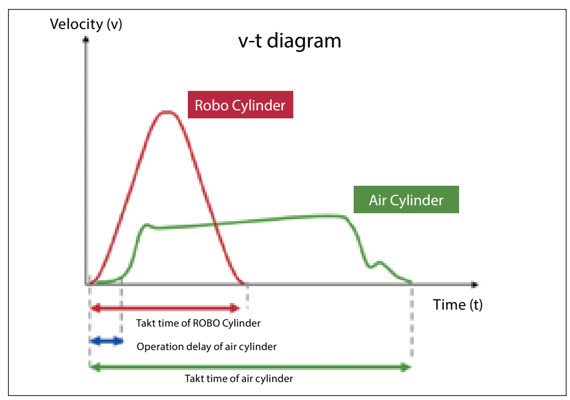
For an actuator to be actually used in the field, it must be assured for around 10,000 hours of operation. When the traveling speed, utilization ratio, etc., are considered, this is equivalent to 5,000 km or 10,000 km of distance travelled. The guide has an ample life against radial loads, but its life is affected by uneven loads from moment forces.

Understanding lead value

The lead value changes the actuator speed and thrust.
● Speed: Expressed as the product of lead and number of revolutions, the speed rises as the lead increases. Take a motor whose number of revolutions is 3600 rpm, for example. The number of revolutions per second is 3600 / 60 sec = 60 rev/sec, and if the lead is 20 mm, the speed is calculated as 60 rev/sec x 20 = 1200 mm/sec.
● Thrust: The thrust decreases as the lead increases.

v-t diagram

A graph used for the visualization of operating characteristics of ROBO Cylinders and air cylinders, where the horizontal axis represents time and the vertical axis represents speed, an example of which is shown in the figure below.



Z-phase

The phase (signal) that detects the incremental encoder reference point, used to detect the home position during homing operation.
Searching for the Z-phase signal for the reference during homing is called the "Z-phase search".

Explanation of Options

Model-specific Option Correspondence Table

			Option codes																					
			Cable exit direction									Simple absolute	Brake				No brake box	CE compliant	With cover	Flange bracket	Front flange	Rear flange	Foot	Foot (right, left)
			A□	A1□	A3□	CJT	CJR	CJL	CJB	CJO	K□	ABU	B	BE	BL	BR	BN		CO	FB	FL	FLR	FT	FT□
Sider type	RCP4	SA5/6/7C				●	●	●	●				●											
		SA5/6/7R				●			●	●			●											
	RCP3	SA2□C																						
		SA3/4/5/6C				●	●	●	●				●											
		SA2□R																						
		SA3/4/5/6R				●			●	●			●											
	RCP2	SS7/SS8/HS8C											●											
		SS7/SS8/HS8R											●											
		BA6/7																						
	ERC3	SA5/7C										●	●											
	ERC3D	SA5/7C										●	●											
	ERC2	SA6/SA7C											●											
	RCA2	SA2AC																						
		SA2AR																						
		SA3/4/5/6C				●	●	●	●				●											
		SA3/4/5/6R				●			●	●			●											
	RCA	SA4C											●										●	
		SA5/6C											●										●	
		SA4D												●	●	●							●	
		SA5/6D												●	●	●							●	
		SA4R											●											
		SA5/6R											●											
	RCS3	SA8C		●	●								●					●						
		SS8C		●	●								●					●						
		SA8R											●					●						
		SS8R											●					●						
		SA4C											●					●					●	
		SA5/6C											●					●					●	
		SA7C												●	●	●		●						
		SS7C											●					●						
		SA4D												●	●	●		●						
		SA5/6D												●	●	●		●						
		SA4R											●					●						
		SA5/6R											●					●						
		SA7R											●					●						
		SS7R											●					●						
Rod type	RCP4	RA5/6C				●	●	●	●				●								●			
		RA5/6R				●			●	●			●								●			
	RCP3	RA2□C											●											
		RA2□R											●											
		RA2C																			●		●	
	RCP2	RA3C																			●		●	
		RA8C	●										●								●		●	
		RA8R	●										●								●		●	
		RA10C	●										●								●		●	
		SR□4R											●								●	●	●	●
	ERC3	RA4/6C										●	●								●		●	
	ERC2	R□6/R□7C											●										●	
	RCA2	RA2AC																						
		RA2AR																						
		RN/RP/GS/GD□NA									●													
		SD□NA									●													
	RCA	RA3/4C											●								●	●	●	
		RA3/4D																			●	●	●	
		RA3/4R											●								●	●	●	
		SR□4R											●								●	●	●	●
	RCS2	RN/RP/GS/GD5N									●							●						
		SD5N									●							●						
		RA4C											●					●			●	●	●	
		RA5C	●										●					●			●		●	
		RA4D																●			●	●	●	
		SRA7BD	●										●								●		●	
		RA4R											●					●			●	●	●	
		RA5R	●										●					●			●		●	
		RA13R											●				●	●			●		●	

High acceleration/ deceleration	Ceiling-mounted	Home sensor	Limit switch	Power-saving	Load cell	No cover	Non-motor end	Knuckle joint	Clevis	Side-mounted motor direction				Side-mounted motor direction, cable exit direction		Extended rod	Back mounting plate	Shaft adapter	Shaft bracket	Scraper	Slider roller	Slider spacer	Table adapter	Sideways mounted	Front trunnion	Rear trunnion	Vacuum on opposite side
HA	HF□	HS	L	LA	LC□	NCO	NM	NJ	QR	MB	ML	MR	MT	ML□	MR□	RE	RP	SA	SB	SC	SR	SS	TA	TF□	TRF	TRR	VR
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Model-specific Option Correspondence Table

			Option codes: Cable exit direction									Simple absolute	Brake				No brake box	CE compliant	With cover	Flange bracket	Front flange	Rear flange	Foot	Foot (right, left)
			A□	A1□	A3□	CJT	CJR	CJL	CJB	CJO	K□	ABU	B	BE	BL	BR	BN		CO	FB	FL	FLR	FT	FT□
Table arm flat type	RCP3	TA3C											●											
		TA4/5/6/7C				●	●	●	●				●											
		TA3R											●											
		TA4/5/6/7R				●			●	●			●											
	RCA2	TCA/TWA/TFA□NA									●													
		TA4/5/6/7C				●	●	●	●				●											
		TA4/5/6/7R				●			●	●			●											
	RCA	A4/5/6R											●											
	RCS2	TCA/TWA/TFA5N									●							●						
		A4/5/6R											●					●						
		F5D											●					●						
Gripper type	RCP2	GRSS/GRLS																		●				
		GRS/GRM																		●				
		GRST	●																					
		GRHM/GRHB				●	●	●	●											●				
		GR3□□																		●				
Rotary type	RCP2	RT□□																						
		RT□□L																						
	RCS2	RTC□L											●					●						
		RT6																●						
Linear servo type	RCL	SA4/5/6L																						
		RA1/2/3L											●				●							
Cleanroom	ERC3CR	SA5/7C										●	●											
	RCP4CR	SA5/6/7C				●	●	●	●				●											
	RCP2CR	SS7/SS8/HS8C											●											
		GRSS																		●				
	RCACR	SA4C											●										●	
		SA5/6C											●										●	
		SA5/6D												●	●	●							●	
	RCS3CR	SA8C/SS8C		●	●								●					●						
	RCS2CR	SA4C											●					●					●	
		SA5/6C											●					●					●	
		SA7C												●	●	●		●						
		SS7C											●					●						
		SA5/6D												●	●	●		●						
Splash-proof type	RCP4W	SA5/6/7C	●																					
		RA6/7C	●										●								●		●	
	RCP2W	SA16C																	●					
		RA4/6C											●								●		●	
		RA10	●										●								●		●	
		GRSS																		●				
	RCAW	RA3/4C											●								●	●	●	
		RA3/4D																			●	●	●	
		RA3/4R											●								●	●	●	
	RCS2W	RA4C											●					●			●	●	●	
		RA4D																●			●	●	●	
		RA4R											●					●			●	●	●	

	High acceleration/ deceleration	Ceiling-mounted	Home sensor	Limit switch	Power-saving	Load cell	No cover	Non-motor end	Knuckle joint	Clevis	Side-mounted motor direction				Side-mounted motor direction, cable exit direction		Extended rod	Back mounting plate	Shaft adapter	Shaft bracket	Scraper	Slider roller	Slider spacer	Table adapter	Sideways mounted	Front trunnion	Rear trunnion	Vacuum on opposite side
	HA	HF□	HS	L	LA	LC□	NCO	NM	NJ	QR	MB	ML	MR	MT	ML□	MR□	RE	RP	SA	SB	SC	SR	SS	TA	TF□	TRF	TRR	VR
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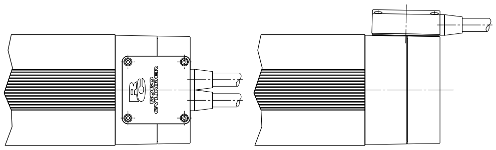
Explanation of Actuator Options

Cable Exit Direction

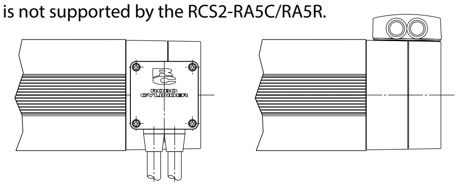
■ Model number A1, A2, A3

Applicable Models	RCP2-RA8C / RA8R / RA10C RCP2 / RCP2W-RA10C RCS2-RA5C / RA5R / SRA7BD
Description	Specify one of these codes indicating the actuator cable exit direction you want to change to.

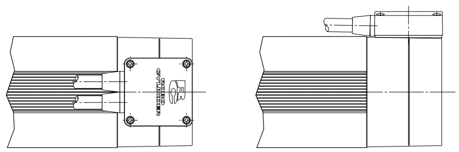
From the motor side (standard) ■ No option specified (blank)



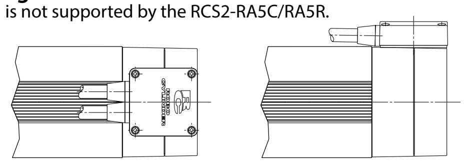
From the left ■ Specified option: A1
* This option is not supported by the RCS2-RA5C/RA5R.



From the rod side ■ Specified option: A2

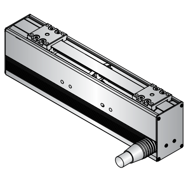


From the right ■ Specified option: A3
* This option is not supported by the RCS2-RA5C/RA5R.

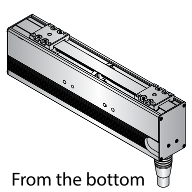


■ Model number A0, A1

Applicable Models	RCP2-GRST
Description	You can select one of two actuator cable exit directions: side and bottom. *At least one exit direction must be selected.



From the side
Option code: A1



From the bottom
Option code: A0

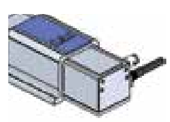
■ Model number A1, A3, AT

Applicable Models	RCP4W-SA5C/SA6C/SA7C/RA6C/RA7C
Description	You can change the actuator cable exit direction to left, right, or top (RA6C, RA7C only). If nothing is specified, the cable exits from the rear.

<RCP4W-SA5C/SA6C/SA7C>

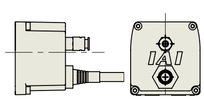
From the rear (standard)
Option code: (blank)

From the left
Option code: A1

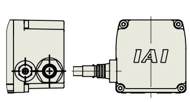


From the right
Option code: A3

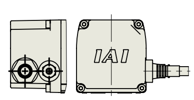
<RCP4W-RA6C/RA7C>



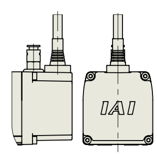
From the rear (standard)
Option code: (blank)



From the left
Option code: A1



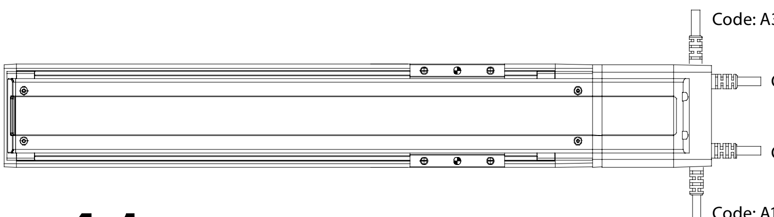
From the right
Option code: A3



From the top
Option code: AT

■ Model number A1E, A1S A3E, A3S

Applicable Models	RCS3-SA8C / SS8C
Description	You can select one of four actuator cable exit directions: rear left, left, rear right and right. *At least one exit direction must be selected.



Simple Absolute Specification (for ERC3)

■ Model number ABU

Applicable Models	All ERC3 models
Description	This option allows the actuator to operate immediately without completing home return after the power is input. This option is essentially for controllers, but it applies to ERC3 actuators because all models in the ERC3 series come with a built-in controller.

Caution

This option can be selected only when "SE" (SIO communication type) is selected as the I/O type for the actuator. Also remember to order the optional PIO converter, because this controller option is needed for the actuator to function as a simple absolute unit.

Additional Alumite Coating

■ Model number AL

Applicable Models	RCP4W-SA5C / SA6C / SA7C
Description	These actuators are coated with alumite, but the machined areas of their table and front/rear mounting brackets are not. This option adds alumite coating to these areas. (It is recommended that you specify this option if the actuator is subject to water splashes.)

Brake

■ Model number B, BE, BL, BR

Applicable Models	All slider type models (excluding RCP3-SA2A□/SA2B□, RCP2-BA6/BA7) All rod type models (excluding RCP2-RA2C/RA3C, RCA2-SD□NA/RCS2-SD5N, RCA/RCS2 built-in type) All table type models All arm type and flat type models (The brake is a standard equipment for arm type models.) Linear servo, rod type All cleanroom models Dustproof/splashproof specifications (excluding RCP2W-SA16C, RCAW-RA3/4D, RCS2W-RA4D)
Description	If the actuator is used vertically, the brake provides a holding mechanism to prevent the slider from dropping when the power or servo is turned off and damaging the work part, etc., as a result.

CE Compliance

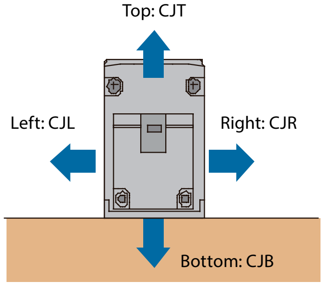
■ Model number CE

Applicable Models	All RCS3 and RCS2 models (*)
Description	RCS3 and RCS2-series actuators are not CE-compliant based on their standard specification. Specify this option if your RCS3/RCS2 actuator must be CE-compliant. (*) This option is not available for the RCS2-SRA7BD/SRGS7BD/SRGD7BD.

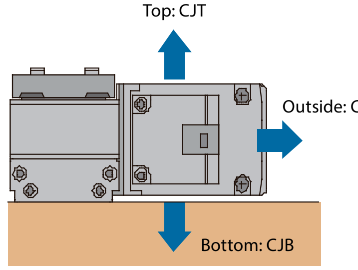
Cable Exit Direction

■ Model number CJT, CJR, CJL CJB, CJO

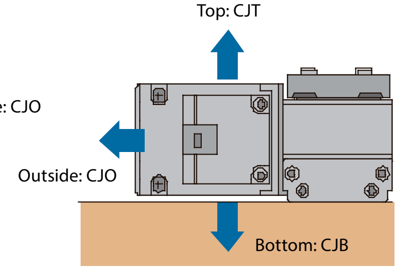
Applicable Models	RCP4-SA5C / SA6C / SA7C / SA5R / SA6R / SA7R RCP4-RA5C / RA6C / RA5R / RA6R RCP3□RCA2□-SA3C / SA4C / SA5C / SA6C / SA3R / SA4R / SA5R / SA6R RCP3□RCA2□-TA4C / TA5C / TA6C / TA7C / TA4R / TA5R / TA6R / TA7R
Description	You can change the direction in which the motor/encoder cable exits from the actuator, to the top, bottom, left or right.



Straight type



Side-mounted motor type
Side-mounted direction: Left (ML)



Side-mounted motor type
Side-mounted direction: Right (MR)

Explanation of Options

Actuator Cover

■Model number　CO

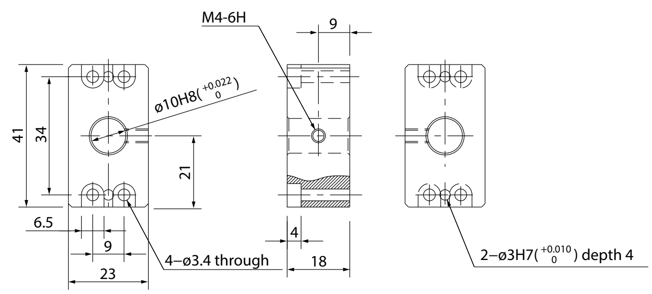
Applicable Models	RCP2W-SA16
Description	This cover protects the guide area and slider area on the waterproof slider type.

Flange bracket

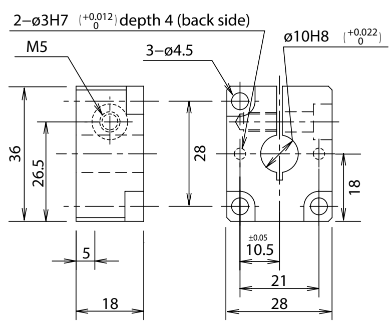
■Model number　FB

Applicable Models	RCP2-GRSS / GRLS / GRS / GRM / GR3LS / GR3LM / GR3SS / GR3SM
Description	A bracket for affixing the gripper body.

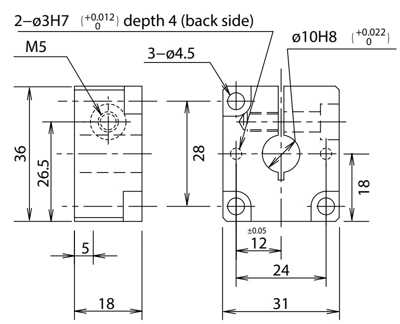
GRSS/GRLS type
Unit model　RCP2-FB-GRSS



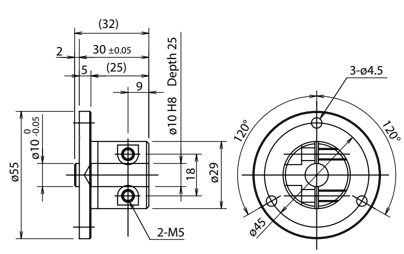
GRS type
Unit model　RCP2-FB-GRS



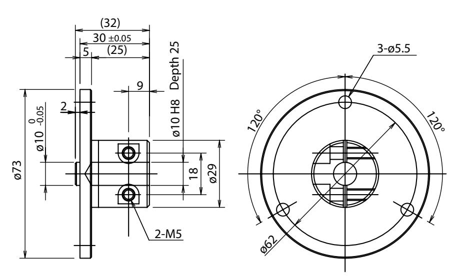
GRM type
Unit model　RCP2-FB-GRM



GR3LS/GR3SS type
Unit model　RCP2-FB-GR3S



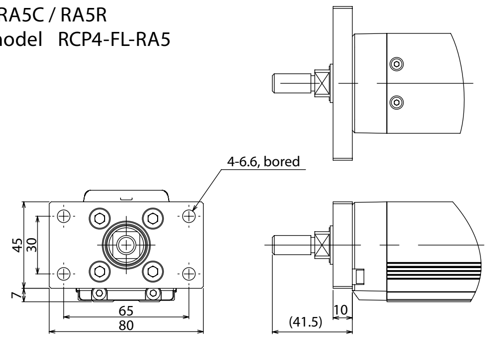
GR3LM/GR3SM type
Unit model　RCP2-FB-GR3M



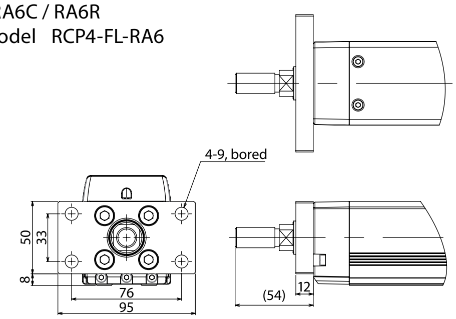
Front Flange

■ Model number FL		
	Applicable Models	All rod type models (excluding the RCP3, RCA2 and RCS2 Mini types)
	Description	This bracket is used to secure the actuator from the actuator side using bolts.

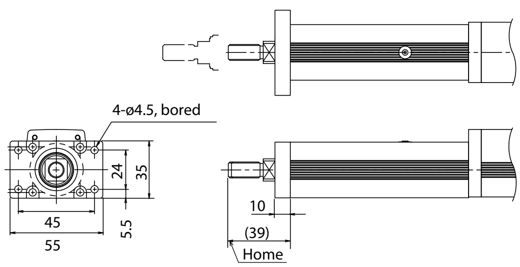
RCP4-RA5C / RA5R
Unit model RCP4-FL-RA5



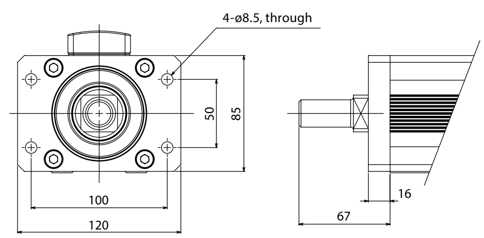
RCP4-RA6C / RA6R
Unit model RCP4-FL-RA6



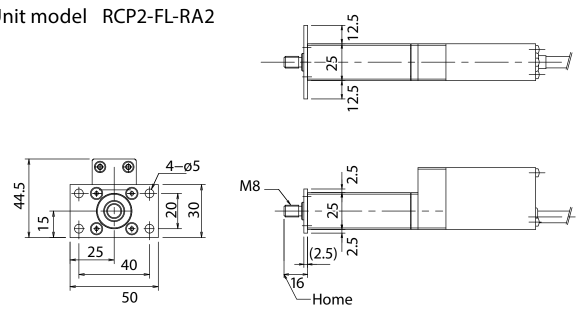
RCP2-RA3C
Unit model RCP2-FL-RA3



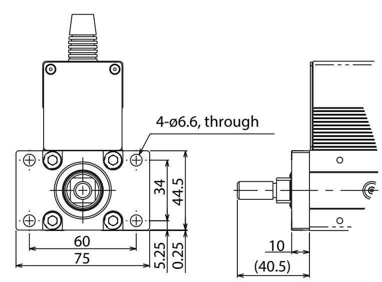
RCP2-RA8C / RA8R
Unit model RCP2-FL-RA8



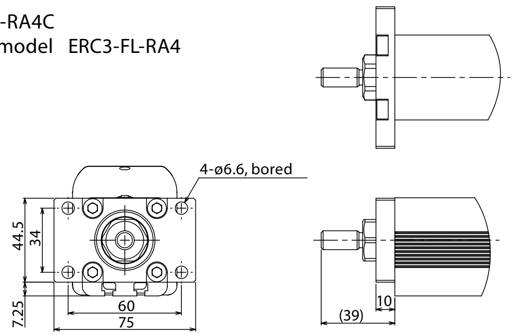
RCP2-RA2C
Unit model RCP2-FL-RA2



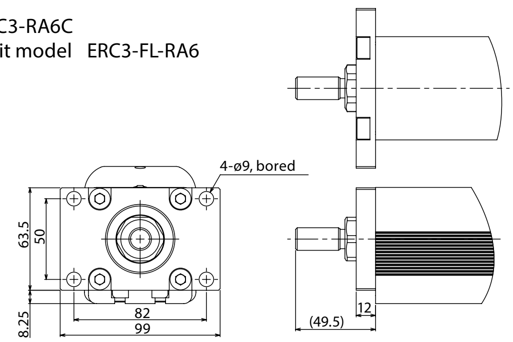
RCP2/RCA-SRA4R
Unit model RCP2-FL-SRA4



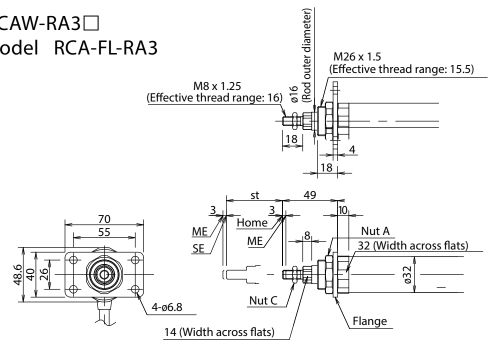
ERC3-RA4C
Unit model ERC3-FL-RA4



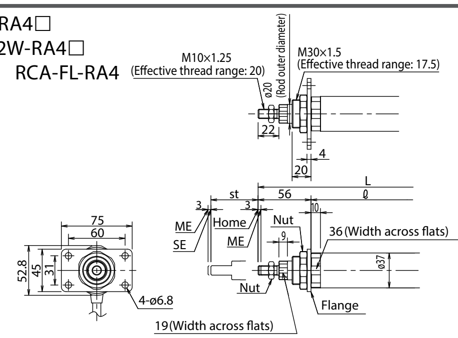
ERC3-RA6C
Unit model ERC3-FL-RA6



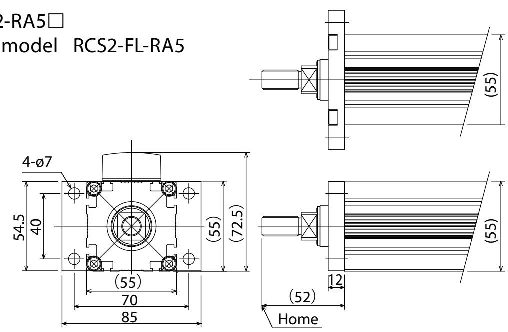
RCA/RCAW-RA3□
Unit model RCA-FL-RA3



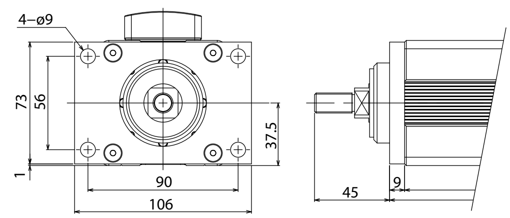
RCA/RCS2-RA4□
RCAW/RCS2W-RA4□
Unit model RCA-FL-RA4



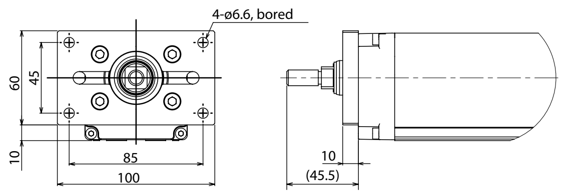
RCS2-RA5□
Unit model RCS2-FL-RA5



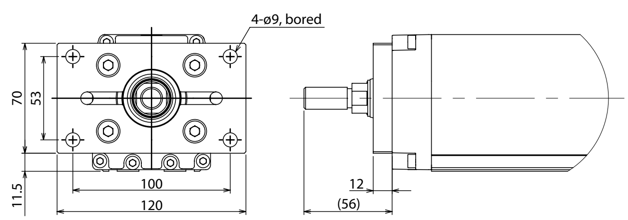
RCS2-SRA7BD
Unit model RCS2-FL-SRA7



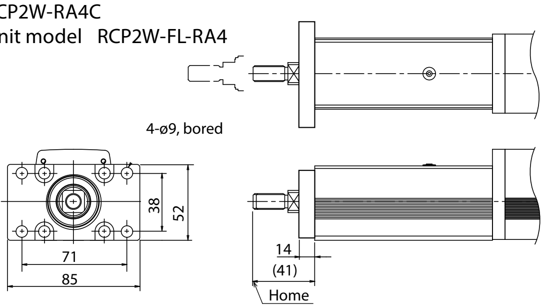
RCP4W-RA6C
Unit model RCP4W-FL-RA6



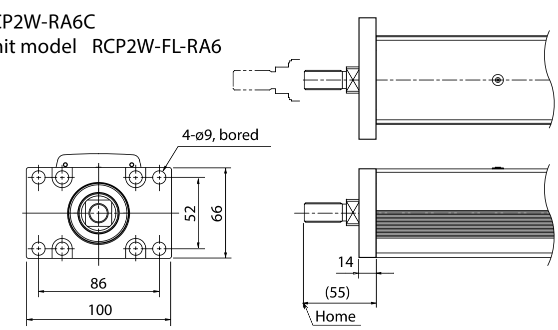
RCP4W-RA7C
Unit model RCP4W-FL-RA7



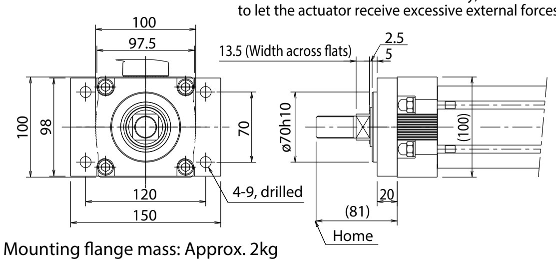
RCP2W-RA4C
Unit model RCP2W-FL-RA4



RCP2W-RA6C
Unit model RCP2W-FL-RA6

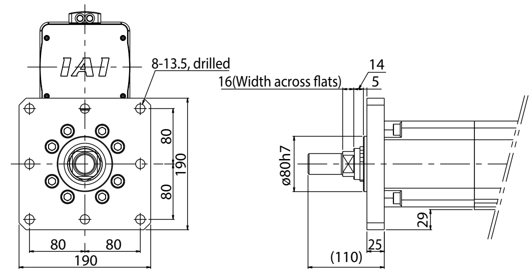


RCP2/RCP2W-RA10C
Unit model RCP2-FL-RA10



Mounting flange mass: Approx. 2kg

RCS2-RA13R
Unit model RCS2-FL-RA13

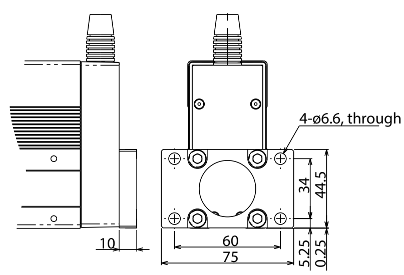


Rear Flange

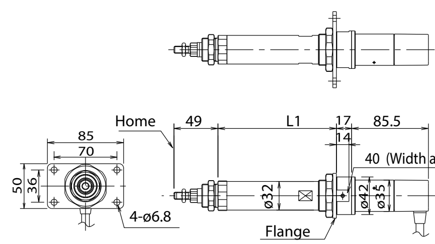
■ **Model number FLR**

Applicable Models	RCP2-SRA4R RCA (RCAW)-RA3C / RA3D / RA3R / RA4C / RA4D / RA4R / SRA4R RCS2(RCS2W)-RA4C / RA4D / RA4R
Description	This bracket is used to secure the actuator (rod type) at the rear (motor end) of the actuator.

RCP2/RCA-SRA4R
Unit model RCP2-FL-SRA4



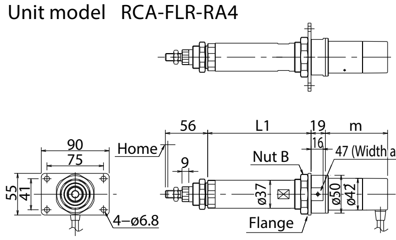
RCA/RCAW-RA3C, RA3D
Unit model RCA-FLR-RA3



st	L1
50	132
100	182
150	232
200	282

RCA/RCAW-RA4C, RA4D
RCS2/RCS2W-RA4C/RA4D
Unit model RCA-FLR-RA4

st	L1
50	137
100	187
150	237
200	287
250	337
300	487

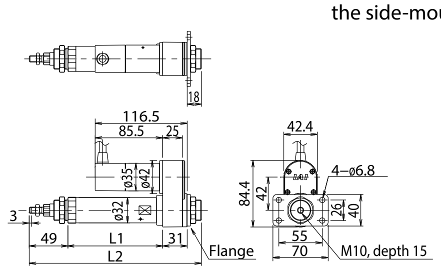


Dimensions in m

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

RCA/RCAW-RA3R
Unit model RCA-FL-RA3

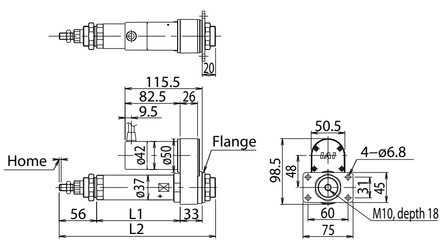
* The front flange and rear flange are interchangeable if used on the side-mounted motor type.



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

RCA/RCAW-RA4R
RCS2/RCS2W-RA4R
Unit model RCA-FL-RA4

* The front flange and rear flange are interchangeable if used on the side-mounted motor type.



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

Explanation of Options

Foot Bracket

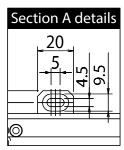
■ Model number FT

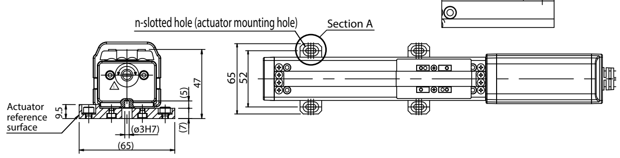
* For the installation pitch of foot brackets, refer to the installation pitch specified on the actuator drawing.

Applicable Models	Slider type	RCA (RCACR)-SA4C / SA5C / SA6C / SA4D / SA5D / SA6D RCS2 (RCS2CR)-SA4C / SA5C / SA6C
	Rod type	ERC3-RA4C / RA6C, ERC2-RA6C / RA7C RCP2-RA2C / SRA4R, RCP2 (RCP2W)-RA10C
Description	This bracket is used to secure the actuator from above using bolts. In the case of a slider type subject to a large moment load, install the foot brackets in all of the mounting holes provided on the actuator. If there are not enough foot brackets, the actuator may deflect and its service life may decrease.	

RCA (CR)/RCS2 (CR)-SA4C/SA4D
Unit model RCA-FT-SA4

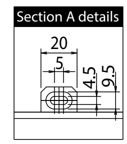
* When the actuator is ordered with the option code (FT) specified, the actuator will come with two foot brackets.
If you want more foot brackets, order the necessary number of foot brackets by specifying the unit model of the bracket.

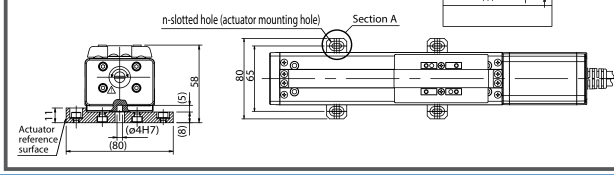




RCA (CR)/RCS2 (CR)-SA5C/SA5D
Unit model RCA-FT-SA5

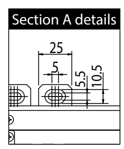
* When the actuator is ordered with the option code (FT) specified, the actuator will come with two foot brackets.
If you want more foot brackets, order the necessary number of foot brackets by specifying the unit model of the bracket.

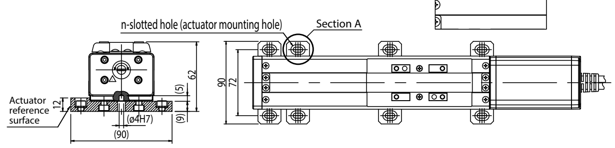




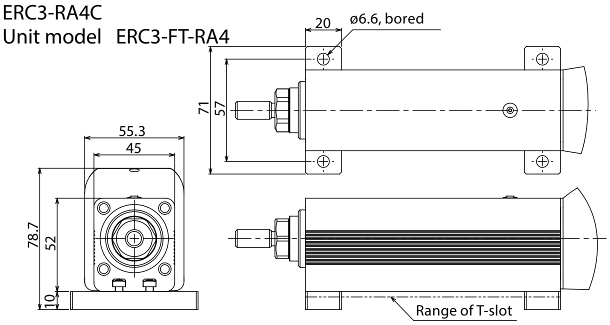
RCA (CR)/RCS2 (CR)-SA6C/SA6D
Unit model RCA-FT-SA6

* When the actuator is ordered with the option code (FT) specified, the actuator will come with two foot brackets.
If you want more foot brackets, order the necessary number of foot brackets by specifying the unit model of the bracket.

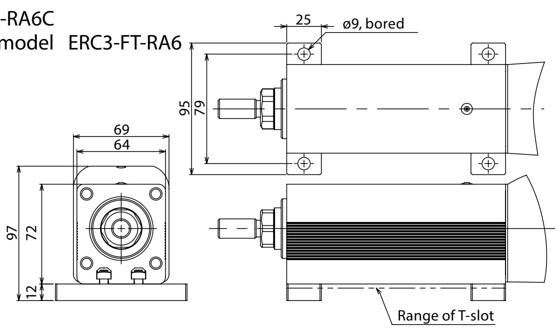




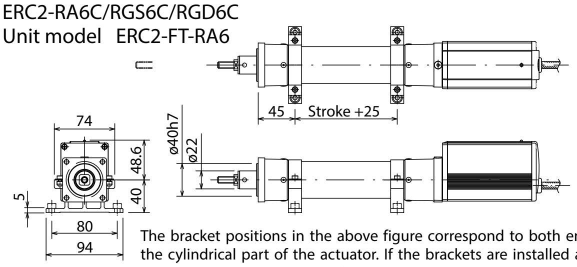
ERC3-RA4C
Unit model ERC3-FT-RA4



ERC3-RA6C
Unit model ERC3-FT-RA6



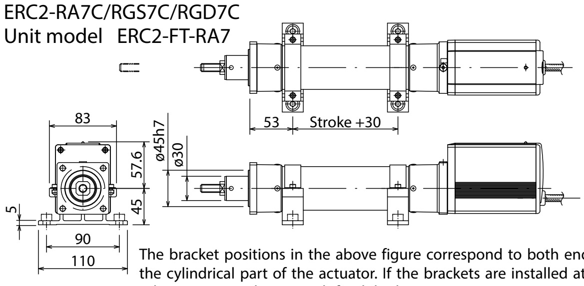
ERC2-RA6C/RGS6C/RGD6C
Unit model ERC2-FT-RA6



The bracket positions in the above figure correspond to both ends of the cylindrical part of the actuator. If the brackets are installed at any other positions, they may shift while the actuator is operating. Be sure to install the brackets at the positions shown in the above figure.

* Mounting bolts (M6) must be provided by the customer.

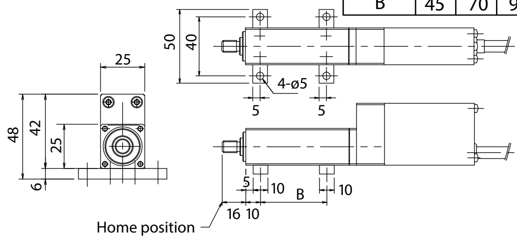
ERC2-RA7C/RGS7C/RGD7C
Unit model ERC2-FT-RA7



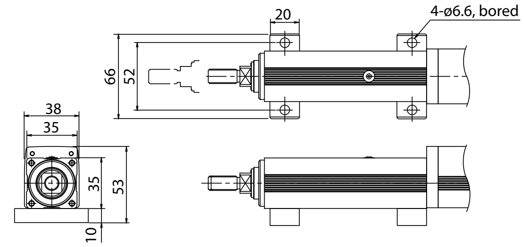
The bracket positions in the above figure correspond to both ends of the cylindrical part of the actuator. If the brackets are installed at any other positions, they may shift while the actuator is operating. Be sure to install the brackets at the positions shown in the above figure.

RCP2-RA2C
Unit model RCP2-FT-RA2

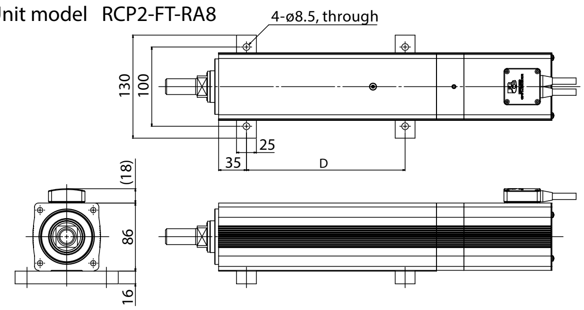
Location \ Stroke	25	50	75	100
B	45	70	95	120



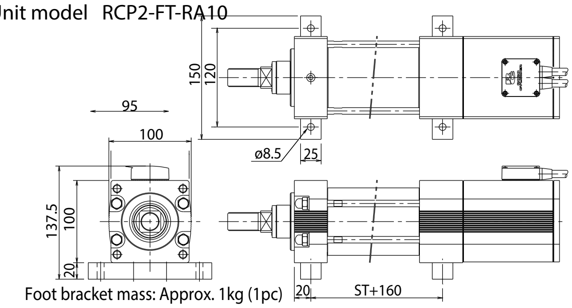
RCP2-RA3C/RGD3C
Unit model RCP2-FT-RA3



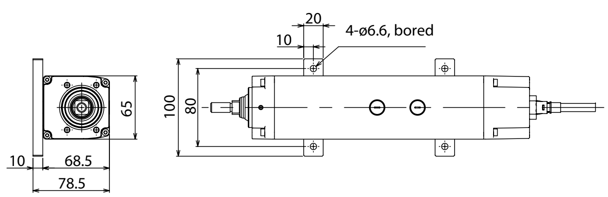
RCP2-RA8C/RA8R
Unit model RCP2-FT-RA8



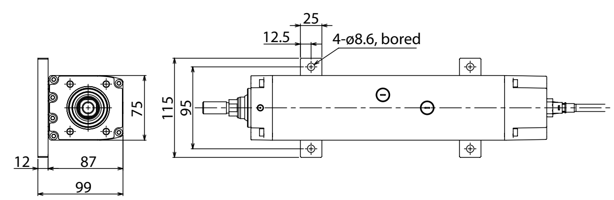
RCP2-RA10C/RCP2W-RA10C
Unit model RCP2-FT-RA10



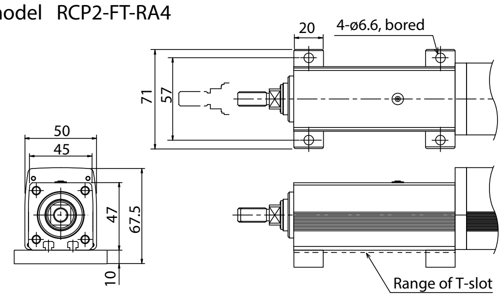
RCP4W-RA6C
Unit model RCP4W-FT-RA6



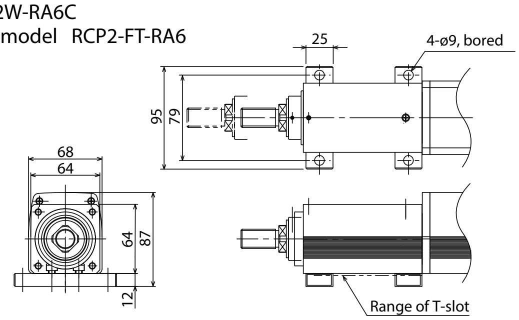
RCP4W-RA7C
Unit model RCP4W-FT-RA7



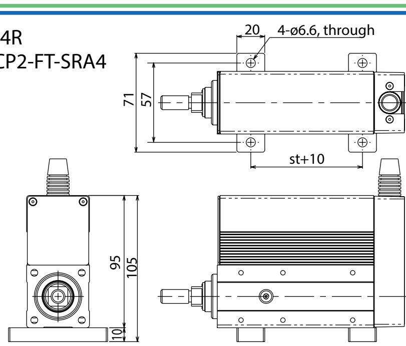
RCP2W-RA4C
Unit model RCP2-FT-RA4



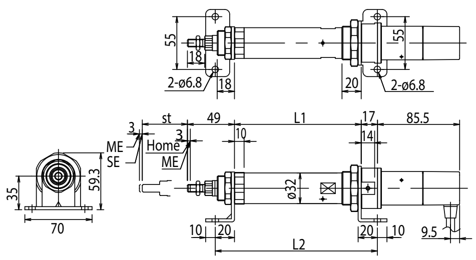
RCP2W-RA6C
Unit model RCP2-FT-RA6



RCP2/RCA-SRA4R
Unit model RCP2-FT-SRA4



RCA-RA3C/RGS3C/RGD3C
Unit model RCA-FT-RA3



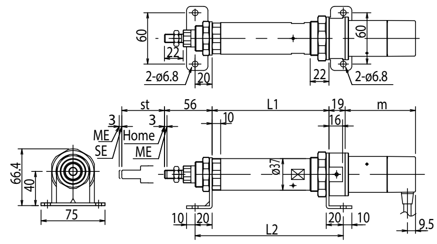
<RA3C>

st	L1	L2
50	132	168.8
100	182	218.8
150	232	268.8
200	282	318.8

<RGS3C/RGD3C>

st	L1	L2
50	140	176.8
100	190	226.8
150	240	276.8
200	290	326.8

RCA (RCS2)-RA4C/RGS4C/RGD4C
Unit model 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

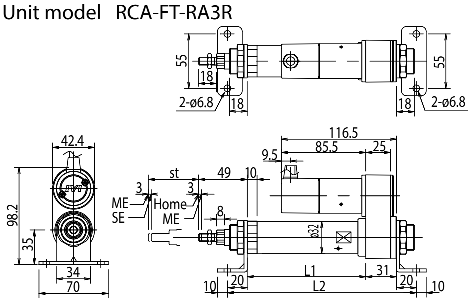
<RGS4C/RGD4C>

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

Dimensions in m

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

RCA/RA3R/RGS3R/RGD3R
Unit model RCA-FT-RA3R



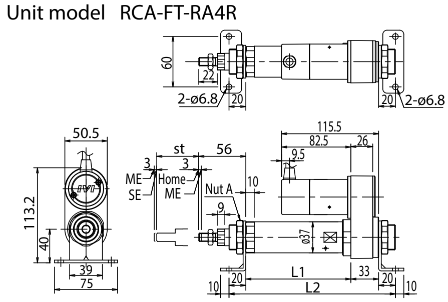
<RA3R>

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 (RCS2)-RA4R/RGS4R/RGD4R
Unit model RCA-FT-RA4R



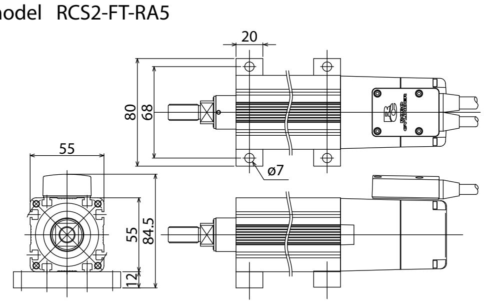
<RA4R>

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

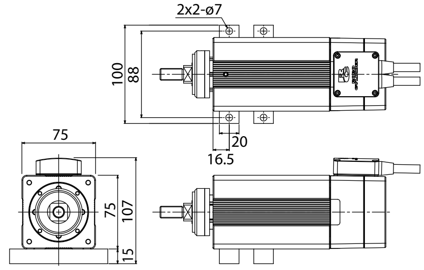
<RGS4R/RGD4R>

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

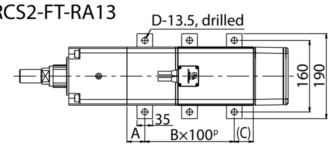
RCS2-RA5C/RA5R/RGS5C/RGD5C
Unit model RCS2-FT-RA5

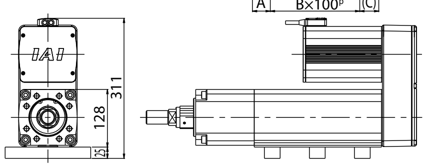


RCS2-SRA7BD/SRGS7BD/SRGD7BD
Unit model RCS2-FT-SRA7



RCS2-RA13R
Unit model RCS2-FT-RA13





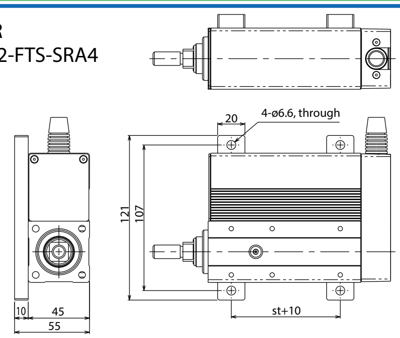
st	A	B	C	D
50	40	2	42.5	6
100	65	2	67.5	6
150	40	3	42.5	8
200	65	3	67.5	8

Foot (for Right-side/Left-side Mounting)

■ **Model number** **FT2** (for right-side Mounting)
FT4 (for Left-side Mounting)

Applicable Models	RCP2 (RCA)-SRA4R
Description	This bracket is used to secure the actuator from above using bolts. With the RCP2 (RCA)-SRA4R, it can also be installed on a side face.

RCP2/RCA-SRA4R
Unit model RCP2-FTS-SRA4



Edible Grease

■ **Model number GE**

Applicable Models	RCP4W-SA5C / SA6C / SA7C
Description	Normally the actuator comes with industrial grease applied to its guide and ball screw. This option changes this standard grease to edible grease.

Guide Mounting Direction (Applicable Only to Single Guide Types)

■ **Model number GS2, GS3, GS4**

Applicable Models	RCP2 (RCA)-SRGS4R RCS2-RGS5C / SRA7BD
Description	For actuators with the single guide, you can select right (GS2), bottom (GS3) or left (GS4) as the position of the guide.

High Acceleration/Deceleration

■ **Model number HA**

Applicable Models	RCA-SA4C / SA5C / SA6C / RA3C / RA4C RCS2-SA4C / SA5C / SA6C / SA7C / RA4C / RA5C
Description	This option increases the rated acceleration (0.3 G) of the standard specification to 1 G. The actuator can be operated at an acceleration/deceleration of 1 G with the same payload at 0.3 G. To support this high acceleration/deceleration, the controller must be set up differently from the standard specification. If the actuator is operated with the high acceleration/deceleration option, the controller must also be of the high acceleration/ deceleration specification.

Home Sensor

■ **Model number HS**

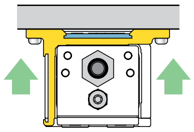
Applicable Models	Slider type	RCA(RCACR)-SA4C / SA5C / SA6C, RCS2(RCS2CR)-SA4C / SA5C / SA6C RCA-SA4R / SA5R / SA6R, RCS2-SA4R / SA5R / SA6R
	Rod type	RCA-RA3C / RA3D / RA3R / RA4C / RA4D / RA4R, RCS2-RA4C / RA4D / RA4R
Description	This sensor is used to check, after the home return, whether the slider has certainly moved to the home position. * This option cannot be specified for rod type actuators of the non-motor end specification.	

Explanation of Options

Actuator Mounting Bracket (Ceiling Mount)

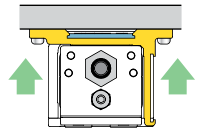
■ Model number HFL, HFR

Applicable Models	RCP4W-SA5C / SA6C / SA7C
Description	This actuator fixing bracket is used to mount a slider-type RCP4W actuator on the ceiling. (Refer to Appendix-9 for dimensions, etc.)



(Rear view)

Ceiling mount
(Bracket installed on the left)
Model number: HFL



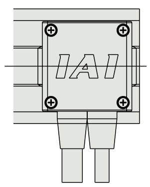
(Rear view)

Ceiling mount
(Bracket installed on the right)
Model number: HFR

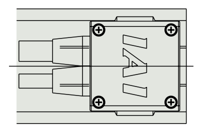
Connector Cable Exit Direction

■ Model number K1, K2, K3

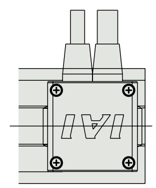
Applicable Models	RCA2-RN□NA / RP□NA / GS□NA / GD□NA / SD□NA / TCA□NA / TWA□NA / TFA□NA RCS2-RN□N / RP□N / GS□N / GD□N / SD□N / TCA□N / TWA□N / TFA□N
Description	You can select one of three directions–left, front and right–from which the connector cable exits.



Model number: K1
(From the left)



Model number: K2
(From the front)



Model number: K3
(From the right)

Limit Switch

■ Model number L

Applicable Models	Rotary type RCS2-RT6 / RT6R / RT7R
Description	With actuators adopting the contact method of home return, the axis contacts the mechanical end and then reverses, at which point the home is confirmed. This option specifies that a sensor is used to cue reversing. (All rotary models come standard with this limit switch.)

With Load Cell

■ Model number LCT, LCN

Applicable Models	RCS2-RA13R
Description	When this option is specified for the RCS2-RA13R (ultra-high thrust actuator), a load cell will be installed at the end of the rod to permit actuator operation based on force control. The "LCT" specification comes with a cable track for wiring the load cell, while the "LCN" specification comes with no cable track so that the customer can wire the load cell as desired.

Caution: Only the SCON-CA controller supports force-controlled operation of the RCS2-RA13R.

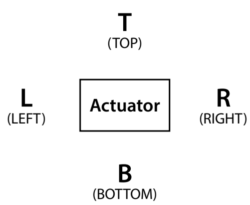
Power-saving

■ Model number LA

Applicable Models	RCA / RCA2 / RCACR / RCA W-series models
Description	This option reduces the power-supply capacity of the controller. If the actuator is of the standard specification or high acceleration/deceleration specification, the maximum power-supply capacity of 5.1 A will drop to 3.4 A when the power-saving option is selected. (Since the maximum value varies depending on the model, refer to the power-supply capacity of your ACON/ASEL controller.)

Side-mounted Motor Direction

■ Model number MB, ML, MR, MT



Applicable Models	All side-mounted motor models
Description	This code specifies the side-mounted motor direction for side-mounted motor actuators. "MB" (limited to arm types) indicates that the motor is mounted at the bottom, "ML" (all models) indicates that the motor is mounted on the left, "MR" (all models) indicates that the motor is mounted on the right, and "MT" indicates that the motor is mounted at the top. The standard direction is "MB" for arm types and "ML" for all other models. (With the RCS2-RA13R, the standard direction is "MT.")

No Cover

■ Model number NCO

Applicable Models	RCP3 (RCA2)-SA3C / SA4C / SA5C / SA6C / SA3R / SA4R / SA5R / SA6R
Description	Eliminating the covers from the actuator reduces the cost while improving the ease of maintenance.

Non-motor End Specification

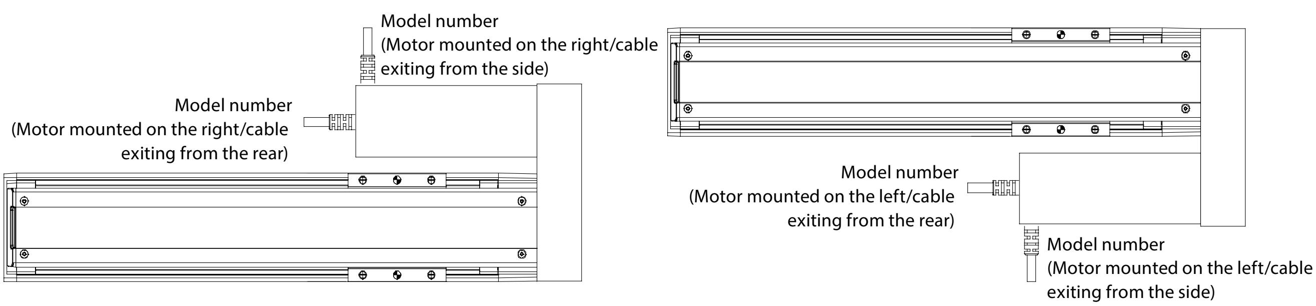
■ Model number NM

Applicable Models	All slider type models All rod type/table type/arm type/flat type models (* Excluding RCP2-RA2C / RA10C, RCA2(RCS2)-RN / RP / GS / GD / SD / TCA / TWA / TFA☐N, RCS2-RA5C / RA5R / SRA7BD / RA13R / RCD-RA1D)
Description	Normally the home position is set on the motor end for both slider and rod types. If you want to set the home position on the opposite end due to the layout of your system, etc., you can do so by selecting this option. (Since your actuator has been shipped with its home position pre-adjusted at the factory, you must send the actuator back to us for adjustment to change the home direction after delivery.)

Cable Exit Direction (Side-mounted Motor Type)

■ Model number MLE, MLS MRE, MRS

Applicable Models	RCS3-SA8R / SS8R
Description	You can select one of four directions--rear left, left, rear right and right--as the direction in which the actuator cable exits. * At least one exit direction must be selected.



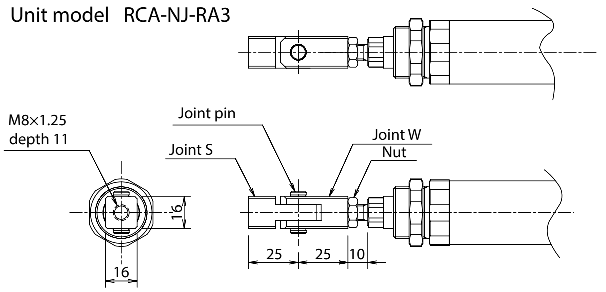
Explanation of Options

Knuckle joint

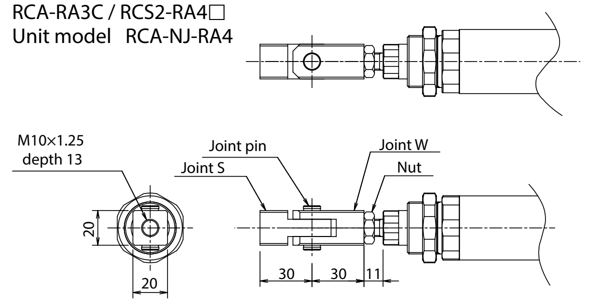
■ Model number NJ

Applicable Models	Rod Type	RCA-RA3C / RA3D / RA3R / RA4C / RA4D / RA4R RCS2-RA4C / RA4D / RA4R
Description	Clevis or trunnion fittings give rotational freedom of movement for the ends of the actuator rods.	

RCA-RA3□
Unit model RCA-NJ-RA3



RCA-RA3C / RCS2-RA4□
Unit model RCA-NJ-RA4



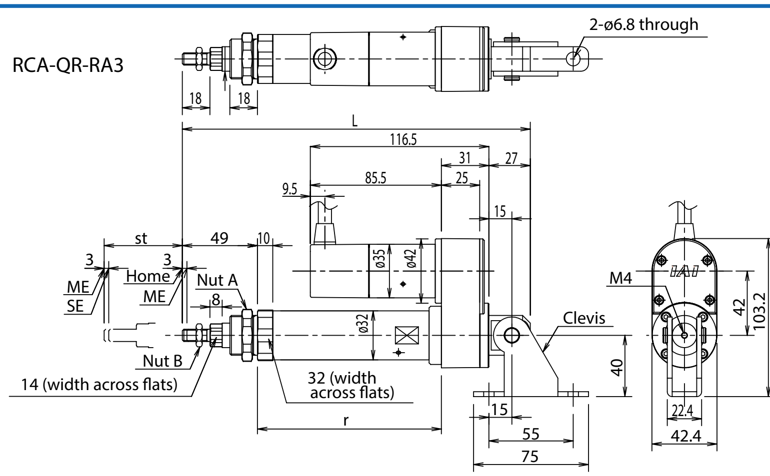
Clevis

■ Model number QR

Applicable Models	Rod Type	RCA-RA3R / RA4R RCS2-RA4R
Description	A bracket for aligning the cylinder movement when the load installed at the tip of the rod moves in a direction different from the rod.	

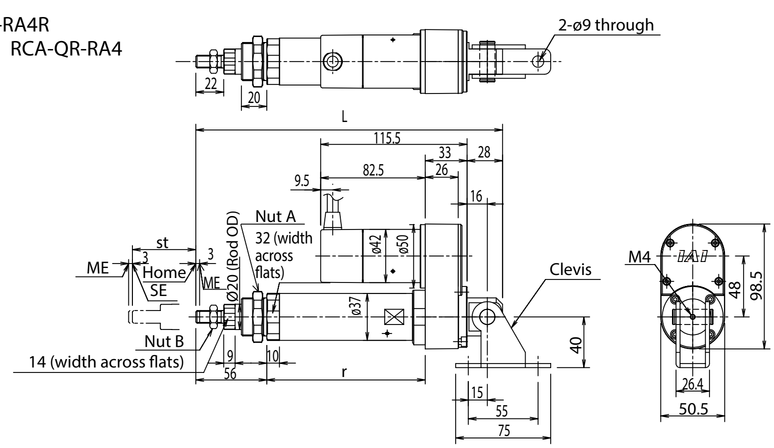
Caution If the rod is to be moved with a clevis bracket attached to it, use a guide type or install an external guide to prevent the rod from receiving any load other than from its moving direction.

RCA-RA3R
Unit model RCA-QR-RA3



st	ℓ	L
50	120	227
100	170	277
150	220	327
200	270	377

RCA / RCS2-RA4R
Unit model RCA-QR-RA4



st	ℓ	L
50	125	242
100	175	292
150	225	342
200	275	392
250	325	442
300	375	492

Rod End Extension Specification

■ Model number RE

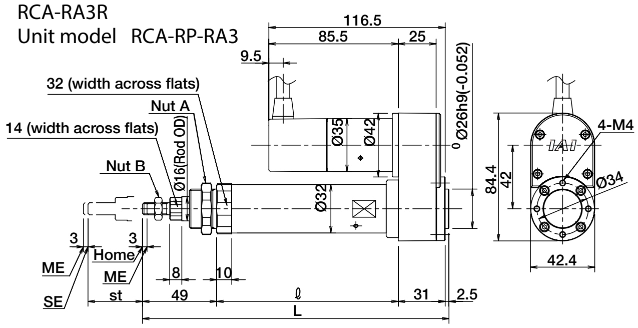
Applicable Models	RCS2-SRA7BD
Description	An adapter for extending the rod end so that the distance between the mounting hole and the rod end can be the same as that of RCS2-RA7BD.

Rear Mounting Plate

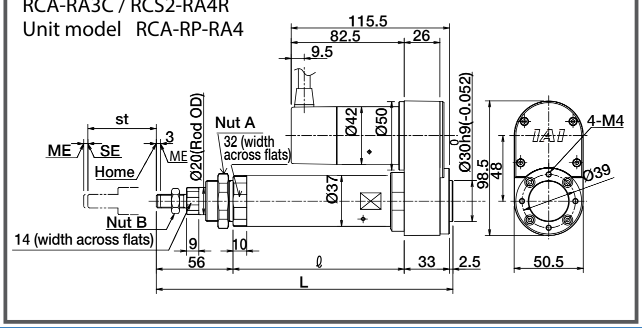
■ Model number RP

Applicable Models	Side-mounted motor rod types RCA-RA3R / RA4R and RCS2-RA4R
Description	A bracket (plate) for affixing the back of a side-mounted motor rod type (RA3R/RA4R) to the system.

RCA-RA3R
Unit model RCA-RP-RA3



RCA-RA3C / RCS2-RA4R
Unit model RCA-RP-RA4

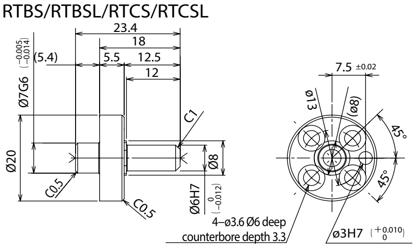


Shaft Adapter

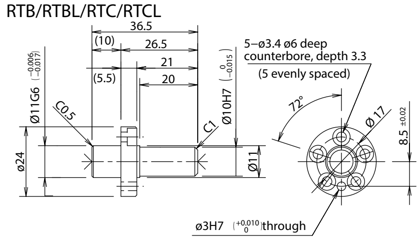
■ Model number SA

Applicable Models	All rotary type models
Description	An adapter for installing a jig, onto the rotating part of a rotary type

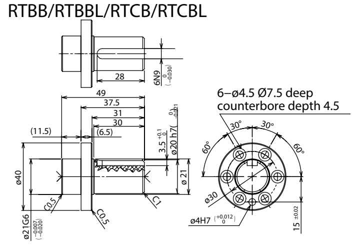
RTBS/RTBSL/RTCS/RTCSL



RTB/RTBL/RTC/RTCL

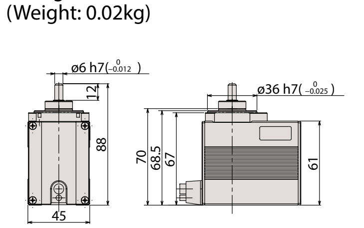


RTBB/RTBBL/RTCB/RTCBL



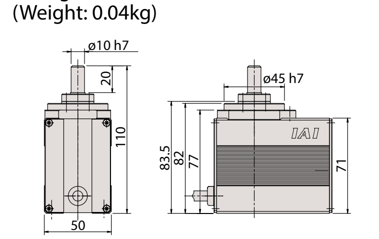
Combined w/ RCP2-RTBS/RTBSL

Configuration: RCP2-SA-RTS
(Weight: 0.02kg)



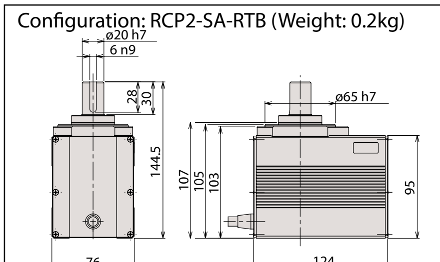
Combined w/ RCP2-RTB/RTBL

Configuration: RCP2-SA-RT
(Weight: 0.04kg)



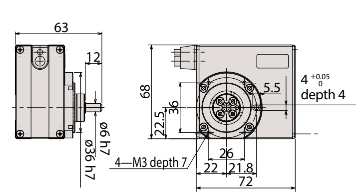
Combined w/ RCP2-RTBB/RTBBL

Configuration: RCP2-SA-RTB (Weight: 0.2kg)



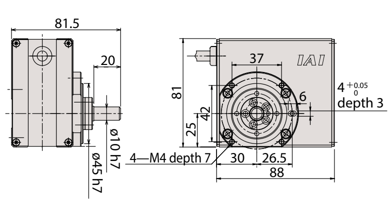
Combined w/ RCP2-RTCS/RTCSL

Configuration: RCP2-SA-RTS
(Weight: 0.02kg)



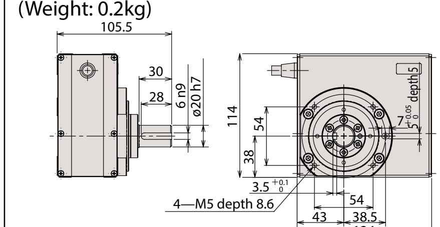
Combined w/ RCP2-RTC/RTCL

Configuration: RCP2-SA-RT
(Weight: 0.04kg)



Combined w/ RCP2-RTCB/RTCBL

Configuration: RCP2-SA-RTB
(Weight: 0.2kg)



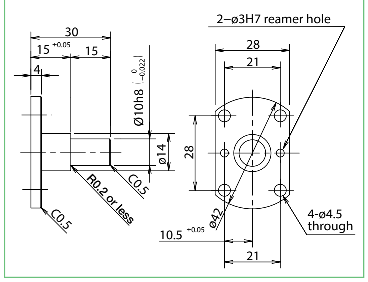
Explanation of Options

Shaft Bracket

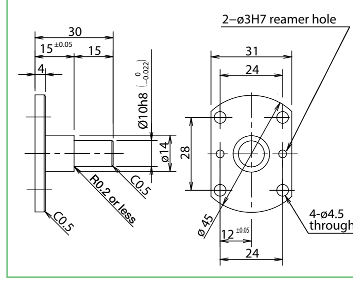
■ Model number SB

Applicable Models	Gripper Type	RCP2-GRS / GRM / GR3LS GR3LM / GR3SS / GR3SM
Description	This bracket is for mounting the gripper unit.	

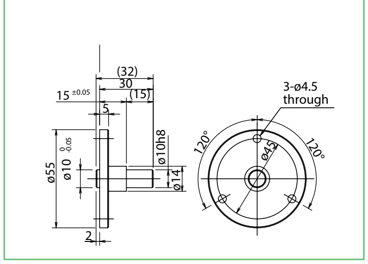
Unit model for RCP2-GRS: RCP2-SB-GRS



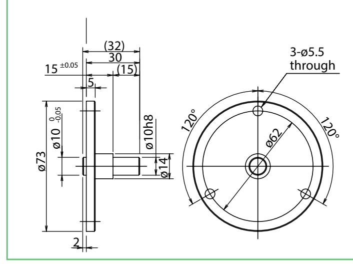
Unit model for RCP2-GRM: RCP2-SB-GRM



Unit model for GR3LS/GR3SS: RCP2-SB-GR3S



Unit model for GR3LM/GR3SM: RCP2-SB-GR3M



Scraper

■ Model number SC

Applicable Models	RCP4-RA5C / RA6R / RA5R / RA6R
Description	When a rod actuator is used, select this option if you want to prevent dust attached to the rod from entering the actuator.

Slider Roller Specification

■ Model number SR

Applicable Models	Slider type	RCA-SA4□ / SA5□ / SA6□ RCS2-SA4□ / SA5□ / SA6□ / SA7□ / SS7□ / SS8□
Description	This changes the structure of the standard slider type that is similar to those found in cleanroom types.	

Slider Spacer

■ Model number SS

Applicable Models	Gripper Type	RCP4-SA4C / SA4R RCA-SA4C / SA4R RCS2-SA4C / SA4R
Description	A spacer for raising the top face of the slider on the SA4 type to above the motor. This spacer is not required for non-SA4 types because the top face of the slider is above the motor on these actuators.	

For RCA / RCS2-SA4□
Unit model RCA-SS-SA4

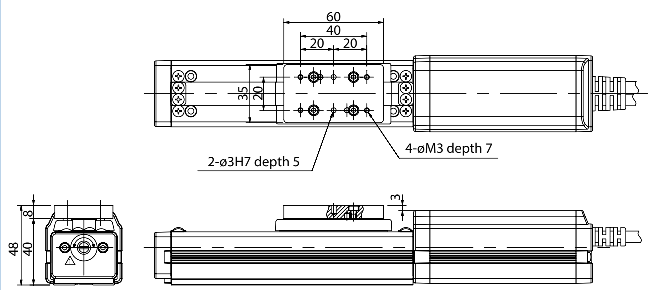
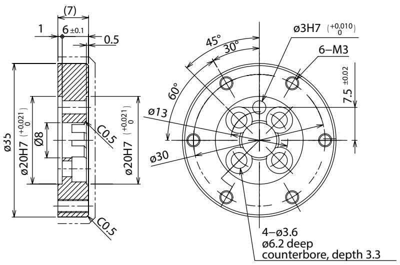


Table Adapter

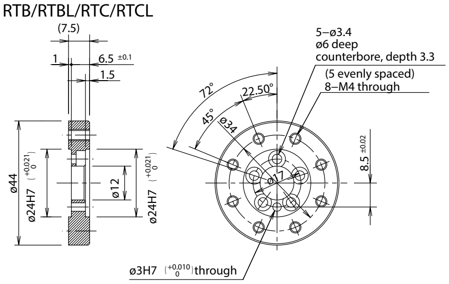
■ Model number TA

Applicable Models	All rotary type models
Description	An adapter for installing a jig, etc., onto the rotating part of a rotary type.

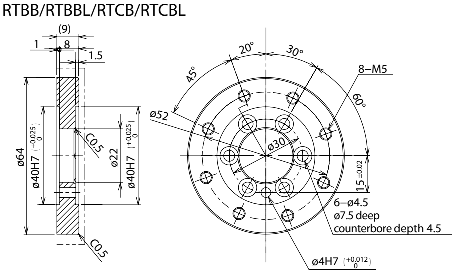
RTBS/RTBSL/RTCS/RTCSL



RTB/RTBL/RTC/RTCL

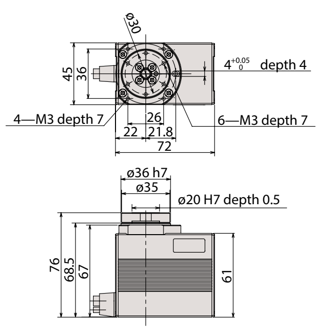


RTBB/RTBBL/RTCB/RTCBL



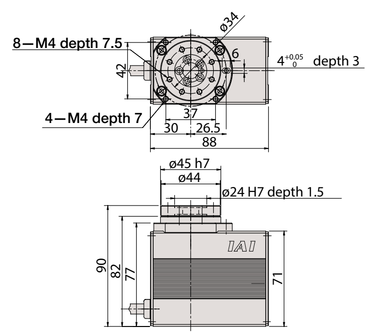
Combined w/ RCP2-RTBS/RTBSL

Configuration: RCP2-TA-RTS
(Weight: 0.02kg)



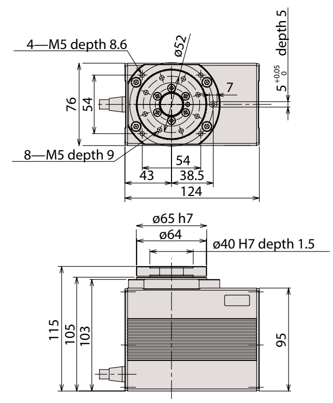
Combined w/ RCP2-RTB/RTBL

Configuration: RCP2-TA-RT
(Weight: 0.03kg)



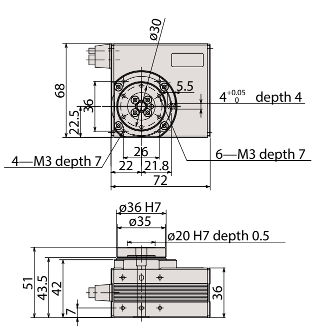
Combined w/ RCP2-RTBB/RTBBL

Configuration: RCP2-TA-RTB
(Weight: 0.06kg)



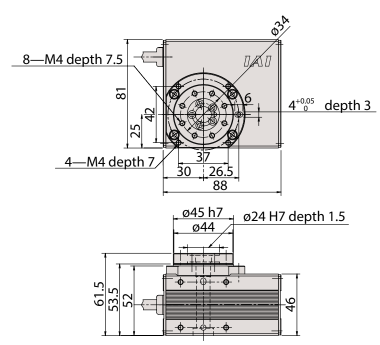
Combined w/ RCP2-RTCS/RTCSL

Configuration: RCP2-TA-RTS
(Weight: 0.02kg)



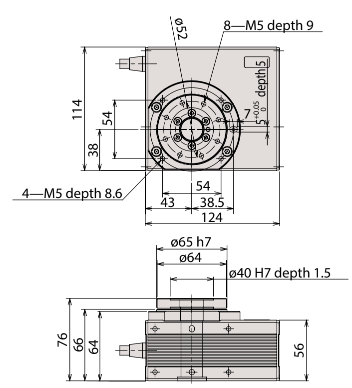
Combined w/ RCP2-RTC/RTCL

Configuration: RCP2-TA-RT
(Weight: 0.03kg)



Combined w/ RCP2-RTCB/RTCBL

Configuration: RCP2-TA-RTB
(Weight: 0.06kg)

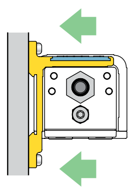


Explanation of Options

Actuator Mounting Bracket (Wall-mounted Specifications)

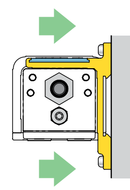
■Model number TFL, TFR

Applicable Models	RCP4W-SA5C / SA6C / SA7C
Description	A bracket to secure the slider type RCP4W to a wall. (See page A-10 for dimensions.)



Wall mount sideways on the left
Model: TFL

(Rear view)



Wall mount sideways on the right
Model: TFR

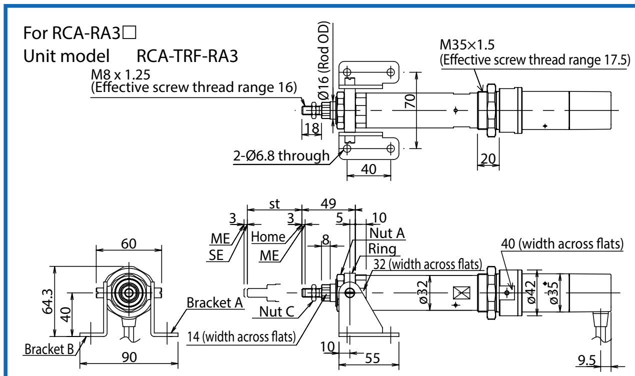
(Rear view)

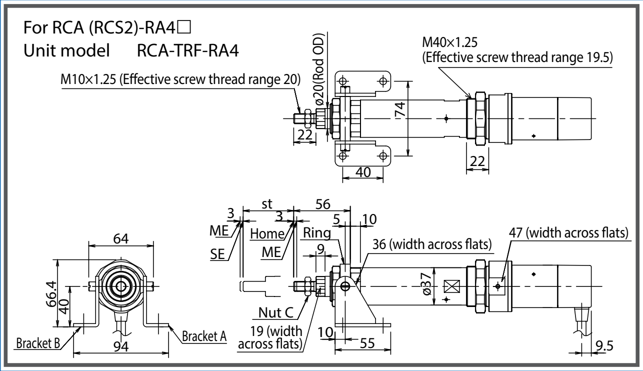
Front Trunnion

■Model number TRF

Applicable Models	Rod Type	RCA-RA3C / RA3D / RA3R / RA4C / RA4D / RA4R RCS2-RA4C / RA4D / RA4R
Description	A bracket for aligning the cylinder movement when the load installed at the tip of the rod moves in a direction different from the rod.	

Caution If a rod is moved with a trunnion bracket mounted to it, use a guide type or install an external guide so no load is applied to the rod in a direction other than the proper direction the rod travels.



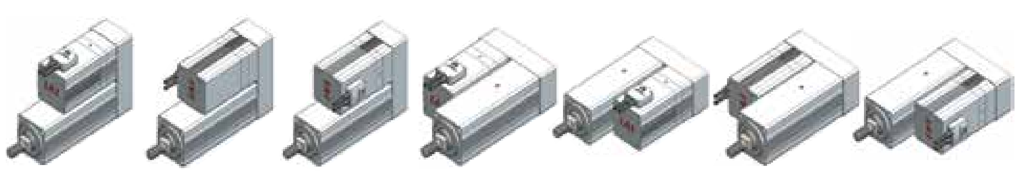


Side-mounted motor direction/cable exit position

■Model MT□, MR□, ML□

Applicable Models	Rod Type	RCP2-RA8R / RCS2-RA13R
Description	You can specify a combination of cable exit and side-mounted motor direction.	

Note
Be sure to include the option code indicating the side-mounted motor direction/cable exit position for your model in the model number.



Option code	MT1	MT2	MT3	MR1	ML1	MR2	ML3
Side-mounted motor direction	Top (standard)	Top	Top	Right	Left	Right	Left
Cable exit position	Top (standard)	Right	Left	Top	Top	Right	Left

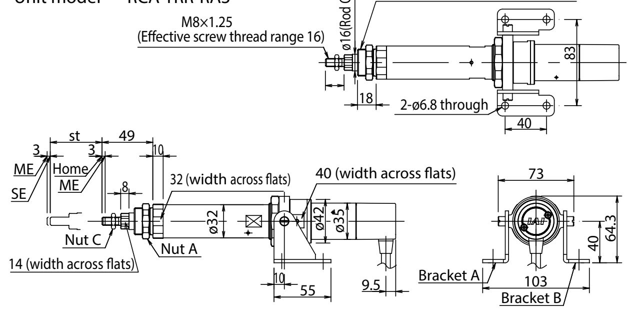
Rear trunnion

■Model number TRR

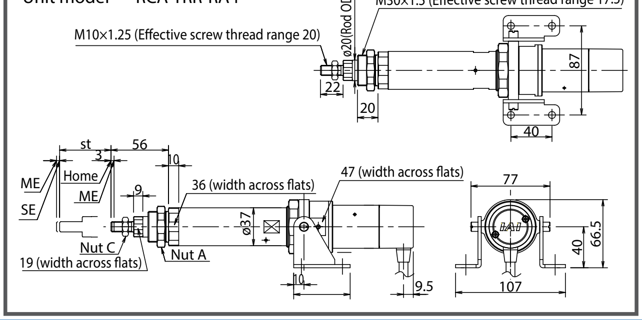
Applicable Models	Rod Type RCA-RA3C / RA3D / RA4C / RA4D RCS2-RA4C / RA4D
Description	A bracket for aligning the cylinder movement when the load installed at the tip of the rod moves in a direction different from the rod.

Caution If the rod is moved with a trunnion bracket mounted to it, use a guide type or install an external guide so no load is applied to the rod in a direction other than the proper direction the rod travels.

For RCA-RA3□
Unit model RCA-TRR-RA3



For RCA (RCS2)-RA4□
Unit model RCA-TRR-RA4



Vacuum Fitting L-Specification

■Model number VL

Applicable Models	RCS3CR-SA8C / SS8C
Description	The vacuum joint of the clean room specification is changed from the straight type to an L-shaped (elbow) type.

No Vacuum Fittings

■Model number VN

Applicable Models	RCS3CR-SA8C
Description	Same as the clean room specification, less the vacuum joint.

Vacuum Joint mounted on opposite side

■Model number VR

Applicable Models	All cleanroom type models (except RCS3CR)
Description	Looking from the motor side, the standard position for the vacuum joint is on the left side of the actuator, but this option allows users to change the position to the opposite side (right side).

Actuator/Controller Connection Cable Model Number List

The model names of the cables that connect actuators (vertical axis) and controllers (horizontal axis) are listed below. For the wiring, dimensions and other specifics of each cable, refer to the detail page indicated below the model number.

Connected actuator		Cable type	Connected controller				
			PMEC PSEP	AMEC ASEP	DSEP	MSEP	PCON-CA
RCP4 RCP4CR		Motor/encoder integrated cable	Cannot be connected	Cannot be connected	Cannot be connected	CB-CA-MPA□□□ (→See P575)	CB-CA-MPA□□□ (→See P620)
		Motor/encoder integrated robot cable	Cannot be connected	Cannot be connected	Cannot be connected	CB-CA-MPA□□□-RB (→See P575)	CB-CA-MPA□□□-RB (→See P620)
RCP4W (Note 1)		Motor/encoder integrated cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	CB-CA-MPA□□□ (→See P620)
		Motor/encoder integrated robot cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	CB-CA-MPA□□□-RB (→See P620)
RCP3		Motor/encoder integrated robot cable	CB-APSEP-MPA□□□ (→See P545)	Cannot be connected	Cannot be connected	CB-APSEP-MPA□□□ (→See P575)	CB-APSEP-MPA□□□ (→See P620)
		Motor/encoder integrated cable	CB-APSEP-MPA□□□-LC (→See P545)	Cannot be connected	Cannot be connected	CB-APSEP-MPA□□□-LC (→See P575)	CB-APSEP-MPA□□□-LC (→See P620)
RCP2 RCP2CR RCP2W	GRSS/GRLS/GRST GRHM/GRHB SRA4R/SRGS4R SRGD4R	Motor/encoder integrated robot cable	CB-APSEP-MPA□□□ (→See P545)	Cannot be connected	Cannot be connected	CB-APSEP-MPA□□□ (→See P575)	CB-APSEP-MPA□□□ (→See P620)
		Motor/encoder integrated cable	CB-APSEP-MPA□□□-LC (→See P545)	Cannot be connected	Cannot be connected	CB-APSEP-MPA□□□-LC (→See P575)	CB-APSEP-MPA□□□-LC (→See P620)
	RTBS/RTBSL RTCS/RTCSL	Motor/encoder integrated robot cable	CB-RPSEP-MPA□□□ (→See P546)	Cannot be connected	Cannot be connected	CB-RPSEP-MPA□□□ (→See P576)	CB-RPSEP-MPA□□□ (→See P621)
	HS8C/HS8R SA16C RA8C RA10C	Motor/encoder integrated cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
		Motor/encoder integrated robot cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
	Models other than the above	Motor cable	Motor/encoder integrated robot cable (The robot cable is the standard.) CB-PSEP-MPA□□□ (→See P545)	Cannot be connected	Cannot be connected	Motor/encoder integrated robot cable (The robot cable is the standard.) CB-PSEP-MPA□□□ (→See P575)	Motor/encoder integrated robot cable (The robot cable is the standard.) CB-PSEP-MPA□□□ (→See P621)
		Encoder cable		Cannot be connected	Cannot be connected		
		Encoder robot cable		Cannot be connected	Cannot be connected		
RCA2		Motor/encoder integrated robot cable	Cannot be connected	CB-APSEP-MPA□□□ (→See P545)	Cannot be connected	CB-APSEP-MPA□□□ (→See P575)	Cannot be connected
		Motor/encoder integrated cable	Cannot be connected	CB-APSEP-MPA□□□-LC (→Refer to P. 545.)	Cannot be connected	CB-APSEP-MPA□□□-LC (→See P575)	Cannot be connected
RCA RCACR RCAW	SRA4R SRGS4R SRGD4R	Motor/encoder integrated robot cable	Cannot be connected	CB-APSEP-MPA□□□ (→See P545)	Cannot be connected	CB-APSEP-MPA□□□ (→See P575)	Cannot be connected
		Motor/encoder integrated cable	Cannot be connected	CB-APSEP-MPA□□□-LC (→See P545)	Cannot be connected	CB-APSEP-MPA□□□-LC (→See P575)	Cannot be connected
	Models other than the above	Motor cable	Cannot be connected	Motor/encoder integrated robot cable (The robot cable is the standard.) CB-ASEP-MPA□□□ (→See P545)	Cannot be connected	Motor/encoder integrated robot cable (The robot cable is the standard.) CB-ASEP-MPA□□□ (→See P576)	Cannot be connected
		Encoder cable	Cannot be connected		Cannot be connected		Cannot be connected
		Encoder robot cable	Cannot be connected		Cannot be connected		Cannot be connected
RCS3 RCS2 RCS3CR RCS2CR RCS2W	RTC□L RT6 (Note 1) RA13R (Note 2)	Motor cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
		Encoder cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
		Motor robot cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
		Encoder robot cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
	Models other than the above	Motor cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
		Encoder cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
		Motor robot cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
		Encoder robot cable	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
RCD		Motor/encoder integrated cable	Cannot be connected	Cannot be connected	CB-CA-MPA□□□ (→See P562)	Cannot be connected	Cannot be connected
		Motor/encoder integrated robot cable	Cannot be connected	Cannot be connected	CB-CA-MPA□□□-RB (→See P562)	Cannot be connected	Cannot be connected
RCL		Motor/encoder integrated cable	Cannot be connected	CB-APSEP-MPA□□□ (→See P545)	Cannot be connected	Cannot be connected	Cannot be connected

(Note 1) The applicable controller for the RCP4W-RA7C high-thrust type actuator is the PCON-CFA controller. Other RCP4W models' applicable controller is the PCON-CA controller.
(Note 2) When operating the RCS2-RT6 actuator with the XSEL-J/K controller, the limit switch cable (CB-X-LC □□□type) is required in addition to the motor and encoder cables.
(Note 3) Please note that the RCS2-RA13R actuator is not operable with the MSCON or XSEL-J/K controllers. Also, a dedicated cable is required for the load cell specification. Please ask IAI for details.
(Note 4) In addition to the encoder cable, the limit switch cable (CB-X-LC □□□type) is also required.

Connected controller						
PCON-CY/SE/PL/PO PSEL	PCON-CFA	ACON ASEL	SCON SSEL	MSCON	XSEL J/K	XSEL P/Q/R/S
Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	CB-CFA2-MPA□□□ (→See P620) (Note 1)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	CB-CFA2-MPA□□□-RB (→See P620) (Note 1)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
CB-PCS-MPA□□□ (→See P630)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
(Not set)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
CB-PCS-MPA□□□ (→See P630)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
(Not set)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
CB-PCS-MPA□□□ (→See P630)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	CB-CFA-MPA□□□ (→See P620)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	CB-CFA-MPA□□□-RB (→See P620)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
CB-RCP2-MA□□□ (→See P630)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
CB-RCP2-PB□□□ (→See P630)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
CB-RCP2-PB□□□-RB (→See P630)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	CB-ACS-MPA□□□ (→See P640)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	(Not set)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	CB-ACS-MPA□□□ (→See P640)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	(Not set)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	CB-ACS-MA□□□ (→See P639)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	CB-ACS-PA□□□ (→See P640)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	CB-ACS-PA□□□-RB (→See P640)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	Cannot be connected	CB-RCC-MA□□□ (→See P653)	CB-RCC-MA□□□ (→See P663) (Note 3)	CB-RCC-MA□□□ (→See P715) (Note 3)	CB-RCC-MA□□□ (→See P715)
Cannot be connected	Cannot be connected	Cannot be connected	CB-RCS2-PLA□□□ (→See P653)	CB-RCS2-PLA□□□ (→See P663) (Note 3)	CB-RCBC-PA□□□ (→See P716) (Note 3, 4)	CB-RCS2-PLA□□□ (→See P716)
Cannot be connected	Cannot be connected	Cannot be connected	CB-RCC-MA□□□-RB (→See P653)	CB-RCC-MA□□□-RB (→See P663) (Note 3)	CB-RCC-MA□□□-RB (→See P715) (Note 3)	CB-RCC-MA□□□-RB (→See P715)
Cannot be connected	Cannot be connected	Cannot be connected	CB-X2-PLA□□□ (→See P653)	CB-X2-PLA□□□ (→See P663) (Note 3)	CB-RCBC-PA□□□-RB (→See P716) (Note 3, 4)	CB-X2-PLA□□□ (→See P716)
Cannot be connected	Cannot be connected	Cannot be connected	CB-RCC-MA□□□ (→See P653)	CB-RCC-MA□□□ (→See P663)	CB-RCC-MA□□□ (→See P715)	CB-RCC-MA□□□ (→See P715)
Cannot be connected	Cannot be connected	Cannot be connected	CB-RCS2-PA□□□ (→See P653)	CB-RCS2-PA□□□ (→See P663)	CB-RCBC-PA□□□ (→See P715)	CB-RCS2-PA□□□ (→See P715)
Cannot be connected	Cannot be connected	Cannot be connected	CB-RCC-MA□□□-RB (→See P653)	CB-RCC-MA□□□-RB (→See P663)	CB-RCC-MA□□□-RB (→See P715)	CB-RCC-MA□□□-RB (→See P715)
Cannot be connected	Cannot be connected	Cannot be connected	CB-X3-PA□□□ (→See P653)	CB-X3-PA□□□ (→See P663)	CB-RCBC-PA□□□-RB (→See P715)	CB-X3-PA□□□ (→See P715)
Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected
Cannot be connected	Cannot be connected	CB-ACS-MPA□□□ (→See P640)	Cannot be connected	Cannot be connected	Cannot be connected	Cannot be connected

Replacement Stainless Steel Sheet Model Number List

Series	Type			Stainless steel sheet model
ERC3D ERC3CR	SA5C			ST-4A5-(Stroke)
	SA7C			ST-4A7-(Stroke)
RCP4	SA5C	SA5R		ST-4A5-(Stroke)
	SA6C	SA6R		ST-4A6-(Stroke)
	SA7C	SA7R		ST-4A7-(Stroke)
RCP3 RCA2	SA3C	SA3R		ST-3A3-(Stroke)
	SA4C	SA4R		ST-3A4-(Stroke)
	SA5C	SA5R		ST-3A5-(Stroke)
	SA6C	SA6R		ST-3A6-(Stroke)
RCP2	SA5C	SA5R		ST-2A5-(Stroke)
	SA6C	SA6R		ST-2A6-(Stroke)
	SA7C	SA7R		ST-2A7-(Stroke)
	SS7C (Single slider)	SS7R (Single slider)		ST-SS1-(Stroke)
	SS7C (Double slider)	SS7R (Double slider)		ST-SS1D-(Stroke)
	SS8C (Single slider)	SS8R (Single slider)		ST-SM1-(Stroke)
	SS8C (Double slider)	SS8R (Double slider)		ST-SM1D-(Stroke)
	HS8C	HS8R		ST-SM1-(Stroke)
RCA	SA4C	SA4D	SA4R	ST-SA4-(Stroke)
	SA5C	SA5D	SA5R	ST-SA5-(Stroke)
	SA6C	SA6D	SA6R	ST-SA6-(Stroke)
	SS4D			ST-SS4-(Stroke)
	SS5D			ST-SS5-(Stroke)
	SS6D			ST-SS6-(Stroke)
RCS3	SS8C		SS8R	ST-SS8-(Stroke)
RCS2	SA4C	SA4D	SA4R	ST-SA4-(Stroke)
	SA5C	SA5D	SA5R	ST-SA5-(Stroke)
	SA6C	SA6D	SA6R	ST-SA6-(Stroke)
	SA7C		SA7R	ST-SA7-(Stroke)
	SS7C (Single slider)		SS7R (Single slider)	ST-SS1-(Stroke)
	SS7C (Double slider)		SS7R (Double slider)	ST-SS1D-(Stroke)
	SS8C (Single slider)		SS8R (Single slider)	ST-SM1-(Stroke)
	SS8C (Double slider)		SS8R (Double slider)	ST-SM1D-(Stroke)

Series	Type			Stainless steel sheet model
RCL	SA1L			ST-SA1L-(Stroke)
	SA2L			ST-SA2L-(Stroke)
	SA3L			ST-SA3L-(Stroke)
	SA4L			ST-SA4L-(Stroke)
	SA5L			ST-SA5L-(Stroke)
	SA6L			ST-SA6L-(Stroke)
	SM4L			ST-SM4L-(Stroke)
	SM5L			ST-SM5L-(Stroke)
	SM6L			ST-SM6L-(Stroke)
RCP4CR	SA5C			ST-4A5-(Stroke)
	SA6C			ST-4A6-(Stroke)
	SA7C			ST-4A7-(Stroke)
RCP2CR	SA5C			ST-2A5-(Stroke)
	SA6C			ST-2A6-(Stroke)
	SA7C			ST-2A7-(Stroke)
	SS7C			ST-SS2-(Stroke)
	SS8C			ST-SM2-(Stroke)
	HS8C			ST-SM2-(Stroke)
RCACR	SA4C			ST-SA4-(Stroke)
	SA5C	SA5D		ST-SA5-(Stroke)
	SA6C	SA6D		ST-SA6-(Stroke)
RCS3CR	SA8C			ST-SA8-(Stroke)
	SS8C			ST-SS8-(Stroke)
RCS2CR	SA4C			ST-SA4-(Stroke)
	SA5C	SA5D		ST-SA5-(Stroke)
	SA6C	SA6D		ST-SA6-(Stroke)
	SA7C			ST-SA7-(Stroke)
	SS7C			ST-SS2-(Stroke)
	SS8C			ST-SM2-(Stroke)

ROBO Cylinder Replacement Motor Model Numbers

Series	Type				Motor type	
	Size	Encoder	I/O type	Controller type	Without brake	With brake
ERC3	SA5C	Incremental	NP	CN	ERC3-MUSA5I-NP-CN	ERC3-MUSA5I-NP-CN-B
				MC	ERC3-MUSA5I-NP-MC	ERC3-MUSA5I-NP-MC-B
			PN	CN	ERC3-MUSA5I-PN-CN	ERC3-MUSA5I-PN-CN-B
				MC	ERC3-MUSA5I-PN-MC	ERC3-MUSA5I-PN-MC-B
			SE	CN	ERC3-MUSA5I-SE-CN	ERC3-MUSA5I-SE-CN-B
				MC	ERC3-MUSA5I-SE-MC	ERC3-MUSA5I-SE-MC-B
			PLN	CN	ERC3-MUSA5I-PLN-CN	ERC3-MUSA5I-PLN-CN-B
				MC	ERC3-MUSA5I-PLN-MC	ERC3-MUSA5I-PLN-MC-B
			PLP	CN	ERC3-MUSA5I-PLP-CN	ERC3-MUSA5I-PLP-CN-B
				MC	ERC3-MUSA5I-PLP-MC	ERC3-MUSA5I-PLP-MC-B
		Simple absolute	NP	CN	ERC3-MUSA5A-NP-CN	ERC3-MUSA5A-NP-CN-B
				MC	ERC3-MUSA5A-NP-MC	ERC3-MUSA5A-NP-MC-B
			PN	CN	ERC3-MUSA5A-PN-CN	ERC3-MUSA5A-PN-CN-B
				MC	ERC3-MUSA5A-PN-MC	ERC3-MUSA5A-PN-MC-B
			SE	CN	ERC3-MUSA5A-SE-CN	ERC3-MUSA5A-SE-CN-B
				MC	ERC3-MUSA5A-SE-MC	ERC3-MUSA5A-SE-MC-B
			PLN	CN	ERC3-MUSA5A-PLN-CN	ERC3-MUSA5A-PLN-CN-B
				MC	ERC3-MUSA5A-PLN-MC	ERC3-MUSA5A-PLN-MC-B
			PLP	CN	ERC3-MUSA5A-PLP-CN	ERC3-MUSA5A-PLP-CN-B
				MC	ERC3-MUSA5A-PLP-MC	ERC3-MUSA5A-PLP-MC-B
	SA7C	Incremental	NP	CN	ERC3-MUSA7I-NP-CN	ERC3-MUSA7I-NP-CN-B
				MC	ERC3-MUSA7I-NP-MC	ERC3-MUSA7I-NP-MC-B
			PN	CN	ERC3-MUSA7I-PN-CN	ERC3-MUSA7I-PN-CN-B
				MC	ERC3-MUSA7I-PN-MC	ERC3-MUSA7I-PN-MC-B
			SE	CN	ERC3-MUSA7I-SE-CN	ERC3-MUSA7I-SE-CN-B
				MC	ERC3-MUSA7I-SE-MC	ERC3-MUSA7I-SE-MC-B
			PLN	CN	ERC3-MUSA7I-PLN-CN	ERC3-MUSA7I-PLN-CN-B
				MC	ERC3-MUSA7I-PLN-MC	ERC3-MUSA7I-PLN-MC-B
			PLP	CN	ERC3-MUSA7I-PLP-CN	ERC3-MUSA7I-PLP-CN-B
				MC	ERC3-MUSA7I-PLP-MC	ERC3-MUSA7I-PLP-MC-B
		Simple absolute	NP	CN	ERC3-MUSA7A-NP-CN	ERC3-MUSA7A-NP-CN-B
				MC	ERC3-MUSA7A-NP-MC	ERC3-MUSA7A-NP-MC-B
			PN	CN	ERC3-MUSA7A-PN-CN	ERC3-MUSA7A-PN-CN-B
				MC	ERC3-MUSA7A-PN-MC	ERC3-MUSA7A-PN-MC-B
			SE	CN	ERC3-MUSA7A-SE-CN	ERC3-MUSA7A-SE-CN-B
				MC	ERC3-MUSA7A-SE-MC	ERC3-MUSA7A-SE-MC-B
			PLN	CN	ERC3-MUSA7A-PLN-CN	ERC3-MUSA7A-PLN-CN-B
				MC	ERC3-MUSA7A-PLN-MC	ERC3-MUSA7A-PLN-MC-B
			PLP	CN	ERC3-MUSA7A-PLP-CN	ERC3-MUSA7A-PLP-CN-B
				MC	ERC3-MUSA7A-PLP-MC	ERC3-MUSA7A-PLP-MC-B

Series	Type				Motor Type	
	Size	Encoder	I/O type	Controller type	Without brake	With brake
ERC3	RA4C	Incremental	NP	CN	ERC3-MURA4I-NP-CN	ERC3-MURA4I-NP-CN-B
				MC	ERC3-MURA4I-NP-MC	ERC3-MURA4I-NP-MC-B
			PN	CN	ERC3-MURA4I-PN-CN	ERC3-MURA4I-PN-CN-B
				MC	ERC3-MURA4I-PN-MC	ERC3-MURA4I-PN-MC-B
			SE	CN	ERC3-MURA4I-SE-CN	ERC3-MURA4I-SE-CN-B
				MC	ERC3-MURA4I-SE-MC	ERC3-MURA4I-SE-MC-B
			PLN	CN	ERC3-MURA4I-PLN-CN	ERC3-MURA4I-PLN-CN-B
				MC	ERC3-MURA4I-PLN-MC	ERC3-MURA4I-PLN-MC-B
			PLP	CN	ERC3-MURA4I-PLP-CN	ERC3-MURA4I-PLP-CN-B
				MC	ERC3-MURA4I-PLP-MC	ERC3-MURA4I-PLP-MC-B
		Simple absolute	NP	CN	ERC3-MURA4A-NP-CN	ERC3-MURA4A-NP-CN-B
				MC	ERC3-MURA4A-NP-MC	ERC3-MURA4A-NP-MC-B
			PN	CN	ERC3-MURA4A-PN-CN	ERC3-MURA4A-PN-CN-B
				MC	ERC3-MURA4A-PN-MC	ERC3-MURA4A-PN-MC-B
			SE	CN	ERC3-MURA4A-SE-CN	ERC3-MURA4A-SE-CN-B
				MC	ERC3-MURA4A-SE-MC	ERC3-MURA4A-SE-MC-B
			PLN	CN	ERC3-MURA4A-PLN-CN	ERC3-MURA4A-PLN-CN-B
				MC	ERC3-MURA4A-PLN-MC	ERC3-MURA4A-PLN-MC-B
			PLP	CN	ERC3-MURA4A-PLP-CN	ERC3-MURA4A-PLP-CN-B
				MC	ERC3-MURA4A-PLP-MC	ERC3-MURA4A-PLP-MC-B
	RA6C	Incremental	NP	CN	ERC3-MURA6I-NP-CN	ERC3-MURA6I-NP-CN-B
				MC	ERC3-MURA6I-NP-MC	ERC3-MURA6I-NP-MC-B
			PN	CN	ERC3-MURA6I-PN-CN	ERC3-MURA6I-PN-CN-B
				MC	ERC3-MURA6I-PN-MC	ERC3-MURA6I-PN-MC-B
			SE	CN	ERC3-MURA6I-SE-CN	ERC3-MURA6I-SE-CN-B
				MC	ERC3-MURA6I-SE-MC	ERC3-MURA6I-SE-MC-B
			PLN	CN	ERC3-MURA6I-PLN-CN	ERC3-MURA6I-PLN-CN-B
				MC	ERC3-MURA6I-PLN-MC	ERC3-MURA6I-PLN-MC-B
			PLP	CN	ERC3-MURA6I-PLP-CN	ERC3-MURA6I-PLP-CN-B
				MC	ERC3-MURA6I-PLP-MC	ERC3-MURA6I-PLP-MC-B
		Simple absolute	NP	CN	ERC3-MURA6A-NP-CN	ERC3-MURA6A-NP-CN-B
				MC	ERC3-MURA6A-NP-MC	ERC3-MURA6A-NP-MC-B
			PN	CN	ERC3-MURA6A-PN-CN	ERC3-MURA6A-PN-CN-B
				MC	ERC3-MURA6A-PN-MC	ERC3-MURA6A-PN-MC-B
			SE	CN	ERC3-MURA6A-SE-CN	ERC3-MURA6A-SE-CN-B
				MC	ERC3-MURA6A-SE-MC	ERC3-MURA6A-SE-MC-B
			PLN	CN	ERC3-MURA6A-PLN-CN	ERC3-MURA6A-PLN-CN-B
				MC	ERC3-MURA6A-PLN-MC	ERC3-MURA6A-PLN-MC-B
			PLP	CN	ERC3-MURA6A-PLP-CN	ERC3-MURA6A-PLP-CN-B
				MC	ERC3-MURA6A-PLP-MC	ERC3-MURA6A-PLP-MC-B

ROBO Cylinder Replacement Motor Model Numbers

Series	Type		Optional cable exit directions	Motor Type	
	Size	Encoder		Without brake	With brake
RCP4	SA5C	Incremental	Not specified	RCP4-MUSA56	RCP4-MUSA56-B
			From the top	RCP4-MUSA56-CJT	RCP4-MUSA56-B-CJT
			From the right	RCP4-MUSA56-CJR	RCP4-MUSA56-B-CJR
			From the left	RCP4-MUSA56-CJL	RCP4-MUSA56-B-CJL
			From the bottom	RCP4-MUSA56-CJB	RCP4-MUSA56-B-CJB
	SA6C	Incremental	Not specified	RCP4-MUSA56	RCP4-MUSA56-B
			From the top	RCP4-MUSA56-CJT	RCP4-MUSA56-B-CJT
			From the right	RCP4-MUSA56-CJR	RCP4-MUSA56-B-CJR
			From the left	RCP4-MUSA56-CJL	RCP4-MUSA56-B-CJL
			From the bottom	RCP4-MUSA56-CJB	RCP4-MUSA56-B-CJB
	SA7C	Incremental	Not specified	RCP4-MUSA7	RCP4-MUSA7-B
			From the top	RCP4-MUSA7-CJT	RCP4-MUSA7-B-CJT
			From the right	RCP4-MUSA7-CJR	RCP4-MUSA7-B-CJR
			From the left	RCP4-MUSA7-CJL	RCP4-MUSA7-B-CJL
			From the bottom	RCP4-MUSA7-CJB	RCP4-MUSA7-B-CJB
	SA5R	Incremental	Not specified	RCP4-MURA5	RCP4-MURA5-B
			From the top	RCP4-MURA5-CJT-□ (*)	RCP4-MURA5-B-CJT-□ (*)
			From the outside	RCP4-MURA5-CJO-□ (*)	RCP4-MURA5-B-CJO-□ (*)
			From the bottom	RCP4-MURA5-CJB-□ (*)	RCP4-MURA5-B-CJB-□ (*)
	SA6R	Incremental	Not specified	RCP4-MURA5	RCP4-MURA5-B
			From the top	RCP4-MURA5-CJT-□ (*)	RCP4-MURA5-B-CJT-□ (*)
			From the outside	RCP4-MURA5-CJO-□ (*)	RCP4-MURA5-B-CJO-□ (*)
			From the bottom	RCP4-MURA5-CJB-□ (*)	RCP4-MURA5-B-CJB-□ (*)
	SA7R	Incremental	Not specified	RCP4-MURA7	RCP4-MURA7-B
			From the top	RCP4-MURA7-CJT-□ (*)	RCP4-MURA7-B-CJT-□ (*)
			From the outside	RCP4-MURA7-CJO-□ (*)	RCP4-MURA7-B-CJO-□ (*)
			From the bottom	RCP4-MURA7-CJB-□ (*)	RCP4-MURA7-B-CJB-□ (*)
	RA5C	Incremental	Not specified	RCP4-MURA5	RCP4-MURA5-B
			From the top	RCP4-MURA5-CJT	RCP4-MURA5-B-CJT
			From the right	RCP4-MURA5-CJR	RCP4-MURA5-B-CJR
			From the left	RCP4-MURA5-CJL	RCP4-MURA5-B-CJL
			From the bottom	RCP4-MURA5-CJB	RCP4-MURA5-B-CJB
	RA6C	Incremental	Not specified	RCP4-MURA6	RCP4-MURA6-B
			From the top	RCP4-MURA6-CJT	RCP4-MURA6-B-CJT
			From the right	RCP4-MURA6-CJR	RCP4-MURA6-B-CJR
			From the left	RCP4-MURA6-CJL	RCP4-MURA6-B-CJL
			From the bottom	RCP4-MURA6-CJB	RCP4-MURA6-B-CJB
	RA5R	Incremental	Not specified	RCP4-MURA5	RCP4-MURA5-B
			From the top	RCP4-MURA5-CJT-□ (*)	RCP4-MURA5-B-CJT-□ (*)
			From the outside	RCP4-MURA5-CJO-□ (*)	RCP4-MURA5-B-CJO-□ (*)
			From the bottom	RCP4-MURA5-CJB-□ (*)	RCP4-MURA5-B-CJB-□ (*)
	RA6R	Incremental	Not specified	RCP4-MURA6	RCP4-MURA6-B
			From the top	RCP4-MURA6-CJT-□ (*)	RCP4-MURA6-B-CJT-□ (*)
			From the outside	RCP4-MURA6-CJO-□ (*)	RCP4-MURA6-B-CJO-□ (*)
			From the bottom	RCP4-MURA6-CJB-□ (*)	RCP4-MURA6-B-CJB-□ (*)

(*) Please specify the motor mounting direction (ML or MR) in □.

Series	Type			Cable exit direction	Motor Type	
	Size	Motor wattage	Encoder		Without brake	With brake
RCP4CR	SA5C	—	Incremental	Not specified	RCP4-MUSA56	RCP4-MUSA56-B
				From the top	RCP4-MUSA56-CJT	RCP4-MUSA56-B-CJT
				From the right	RCP4-MUSA56-CJR	RCP4-MUSA56-B-CJR
				From the left	RCP4-MUSA56-CJL	RCP4-MUSA56-B-CJL
				From the bottom	RCP4-MUSA56-CJB	RCP4-MUSA56-B-CJB
	SA6C	—	Incremental	Not specified	RCP4-MUSA56	RCP4-MUSA56-B
				From the top	RCP4-MUSA56-CJT	RCP4-MUSA56-B-CJT
				From the right	RCP4-MUSA56-CJR	RCP4-MUSA56-B-CJR
				From the left	RCP4-MUSA56-CJL	RCP4-MUSA56-B-CJL
				From the bottom	RCP4-MUSA56-CJB	RCP4-MUSA56-B-CJB
	SA7C	—	Incremental	Not specified	RCP4-MUSA7	RCP4-MUSA7-B
				From the top	RCP4-MUSA7-CJT	RCP4-MUSA7-B-CJT
				From the right	RCP4-MUSA7-CJR	RCP4-MUSA7-B-CJR
				From the left	RCP4-MUSA7-CJL	RCP4-MUSA7-B-CJL
				From the bottom	RCP4-MUSA7-CJB	RCP4-MUSA7-B-CJB
RCS3	SA8C SS8C	100W	Incremental	From the rear left	RCS3-MU8C-100-TC-A1E-CO	RCS3-MU8C-100-TC-A1E-B-CO
				From the left	RCS3-MU8C-100-TC-A1S-CO	RCS3-MU8C-100-TC-A1S-B-CO
				From the rear right	RCS3-MU8C-100-TC-A3E-CO	RCS3-MU8C-100-TC-A3E-B-CO
				From the right	RCS3-MU8C-100-TC-A3S-CO	RCS3-MU8C-100-TC-A3S-B-CO
			Absolute	From the rear left	RCS3-MU8C-100-NA-A1E-CO	RCS3-MU8C-100-NA-A1E-B-CO
				From the left	RCS3-MU8C-100-NA-A1S-CO	RCS3-MU8C-100-NA-A1S-B-CO
				From the rear right	RCS3-MU8C-100-NA-A3E-CO	RCS3-MU8C-100-NA-A3E-B-CO
				From the right	RCS3-MU8C-100-NA-A3S-CO	RCS3-MU8C-100-NA-A3S-B-CO
		150W	Incremental	From the rear left	RCS3-MU8C-150-TC-A1E-CO	RCS3-MU8C-150-TC-A1E-B-CO
				From the left	RCS3-MU8C-150-TC-A1S-CO	RCS3-MU8C-150-TC-A1S-B-CO
				From the rear right	RCS3-MU8C-150-TC-A3E-CO	RCS3-MU8C-150-TC-A3E-B-CO
				From the right	RCS3-MU8C-150-TC-A3S-CO	RCS3-MU8C-150-TC-A3S-B-CO
			Absolute	From the rear left	RCS3-MU8C-150-NA-A1E-CO	RCS3-MU8C-150-NA-A1E-B-CO
				From the left	RCS3-MU8C-150-NA-A1S-CO	RCS3-MU8C-150-NA-A1S-B-CO
				From the rear right	RCS3-MU8C-150-NA-A3E-CO	RCS3-MU8C-150-NA-A3E-B-CO
				From the right	RCS3-MU8C-150-NA-A3S-CO	RCS3-MU8C-150-NA-A3S-B-CO
	SA8R SS8R	100W	Incremental	From the rear	RCS3-MU8R-100-TC-M□E-PU	RCS3-MU8R-100-TC-B-M□E-PU
				From the outside	RCS3-MU8R-100-TC-M□S-PU	RCS3-MU8R-100-TC-B-M□S-PU
			Absolute	From the rear	RCS3-MU8R-100-NA-M□E-PU	RCS3-MU8R-100-NA-B-M□E-PU
				From the outside	RCS3-MU8R-100-NA-M□S-PU	RCS3-MU8R-100-NA-B-M□S-PU
		150W	Incremental	From the rear	RCS3-MU8R-150-TC-M□E-PU	RCS3-MU8R-150-TC-B-M□E-PU
				From the outside	RCS3-MU8R-150-TC-M□S-PU	RCS3-MU8R-150-TC-B-M□S-PU
			Absolute	From the rear	RCS3-MU8R-150-NA-M□E-PU	RCS3-MU8R-150-NA-B-M□E-PU
				From the outside	RCS3-MU8R-150-NA-M□S-PU	RCS3-MU8R-150-NA-B-M□S-PU

(*) Please specify the motor mounting direction (ML or MR) in □.

ROBO Cylinder Replacement Motor Model Numbers

Series	Type: Size	Type: Motor wattage	Type: Encoder	Cable exit direction	Motor type: Without brake	Motor type: With brake
RCS3CR	SA8C SS8C	100W	Incremental	From the rear left	RCS3CR-MU8C-100-TC-A1E-CO	RCS3CR-MU8C-100-TC-A1E-B-CO
				From the left	RCS3CR-MU8C-100-TC-A1S-CO	RCS3CR-MU8C-100-TC-A1S-B-CO
				From the rear right	RCS3CR-MU8C-100-TC-A3E-CO	RCS3CR-MU8C-100-TC-A3E-B-CO
				From the right	RCS3CR-MU8C-100-TC-A3S-CO	RCS3CR-MU8C-100-TC-A3S-B-CO
				From the rear left/vacuum joint L specification	RCS3CR-MU8C-100-TC-A1E-CO-VL	RCS3CR-MU8C-100-TC-A1E-B-CO-VL
				From the left/vacuum joint L specification	RCS3CR-MU8C-100-TC-A1S-CO-VL	RCS3CR-MU8C-100-TC-A1S-B-CO-VL
				From the rear right/vacuum joint L specification	RCS3CR-MU8C-100-TC-A3E-CO-VL	RCS3CR-MU8C-100-TC-A3E-B-CO-VL
				From the right/vacuum joint L specification	RCS3CR-MU8C-100-TC-A3S-CO-VL	RCS3CR-MU8C-100-TC-A3S-B-CO-VL
			Absolute	From the rear left	RCS3CR-MU8C-100-NA-A1E-CO	RCS3CR-MU8C-100-NA-A1E-B-CO
				From the left	RCS3CR-MU8C-100-NA-A1S-CO	RCS3CR-MU8C-100-NA-A1S-B-CO
				From the rear right	RCS3CR-MU8C-100-NA-A3E-CO	RCS3CR-MU8C-100-NA-A3E-B-CO
				From the right	RCS3CR-MU8C-100-NA-A3S-CO	RCS3CR-MU8C-100-NA-A3S-B-CO
				From the rear left/vacuum joint L specification	RCS3CR-MU8C-100-NA-A1E-CO-VL	RCS3CR-MU8C-100-NA-A1E-B-CO-VL
				From the left/vacuum joint L specification	RCS3CR-MU8C-100-NA-A1S-CO-VL	RCS3CR-MU8C-100-NA-A1S-B-CO-VL
				From the rear right/vacuum joint L specification	RCS3CR-MU8C-100-NA-A3E-CO-VL	RCS3CR-MU8C-100-NA-A3E-B-CO-VL
				From the right/vacuum joint L specification	RCS3CR-MU8C-100-NA-A3S-CO-VL	RCS3CR-MU8C-100-NA-A3S-B-CO-VL
		150W	Incremental	From the rear left	RCS3CR-MU8C-150-TC-A1E-CO	RCS3CR-MU8C-150-TC-A1E-B-CO
				From the left	RCS3CR-MU8C-150-TC-A1S-CO	RCS3CR-MU8C-150-TC-A1S-B-CO
				From the rear right	RCS3CR-MU8C-150-TC-A3E-CO	RCS3CR-MU8C-150-TC-A3E-B-CO
				From the right	RCS3CR-MU8C-150-TC-A3S-CO	RCS3CR-MU8C-150-TC-A3S-B-CO
				From the rear left/vacuum joint L specification	RCS3CR-MU8C-150-TC-A1E-CO-VL	RCS3CR-MU8C-150-TC-A1E-B-CO-VL
				From the left/vacuum joint L specification	RCS3CR-MU8C-150-TC-A1S-CO-VL	RCS3CR-MU8C-150-TC-A1S-B-CO-VL
				From the left/vacuum joint L specification	RCS3CR-MU8C-150-TC-A3E-CO-VL	RCS3CR-MU8C-150-TC-A3E-B-CO-VL
				From the rear right/vacuum joint L specification	RCS3CR-MU8C-150-TC-A3S-CO-VL	RCS3CR-MU8C-150-TC-A3S-B-CO-VL
			Absolute	From the rear left	RCS3CR-MU8C-150-NA-A1E-CO	RCS3CR-MU8C-150-NA-A1E-B-CO
				From the left	RCS3CR-MU8C-150-NA-A1S-CO	RCS3CR-MU8C-150-NA-A1S-B-CO
				From the rear right	RCS3CR-MU8C-150-NA-A3E-CO	RCS3CR-MU8C-150-NA-A3E-B-CO
				From the right	RCS3CR-MU8C-150-NA-A3S-CO	RCS3CR-MU8C-150-NA-A3S-B-CO
				From the rear left/vacuum joint L specification	RCS3CR-MU8C-150-NA-A1E-CO-VL	RCS3CR-MU8C-150-NA-A1E-B-CO-VL
				From the left/vacuum joint L specification	RCS3CR-MU8C-150-NA-A1S-CO-VL	RCS3CR-MU8C-150-NA-A1S-B-CO-VL
				From the rear right/vacuum joint L specification	RCS3CR-MU8C-150-NA-A3E-CO-VL	RCS3CR-MU8C-150-NA-A3E-B-CO-VL
				From the right/vacuum joint L specification	RCS3CR-MU8C-150-NA-A3S-CO-VL	RCS3CR-MU8C-150-NA-A3S-B-CO-VL

Series	Type: Size	Type: Encoder	Cable exit direction	Motor type: Without brake	Motor type: With brake
RCP3	SA2AC	Incremental	Not specified	RCP3-MU00A	—
	SA2BC		Not specified	RCP3-MU00A	—
	SA3C	Incremental	Not specified	RCP3-MU1A	RCP3-MU1A-B
			From the top	RCP3-MU1A-CJT	RCP3-MU1A-B-CJT
			From the right	RCP3-MU1A-CJR	RCP3-MU1A-B-CJR
			From the left	RCP3-MU1A-CJL	RCP3-MU1A-B-CJL
			From the bottom	RCP3-MU1A-CJB	RCP3-MU1A-B-CJB
	SA4C	Incremental	Not specified	RCP3-MU2A	RCP3-MU2A-B
			From the top	RCP3-MU2A-CJT	RCP3-MU2A-B-CJT
			From the right	RCP3-MU2A-CJR	RCP3-MU2A-B-CJR
			From the left	RCP3-MU2A-CJL	RCP3-MU2A-B-CJL
			From the bottom	RCP3-MU2A-CJB	RCP3-MU2A-B-CJB
	SA5C	Incremental	Not specified	RCP3-MU3A	RCP3-MU3A-B
			From the top	RCP3-MU3A-CJT	RCP3-MU3A-B-CJT
			From the right	RCP3-MU3A-CJR	RCP3-MU3A-B-CJR
			From the left	RCP3-MU3A-CJL	RCP3-MU3A-B-CJL
			From the bottom	RCP3-MU3A-CJB	RCP3-MU3A-B-CJB
	SA6C	Incremental	Not specified	RCP3-MU3A	RCP3-MU3A-B
			From the top	RCP3-MU3A-CJT	RCP3-MU3A-B-CJT
			From the right	RCP3-MU3A-CJR	RCP3-MU3A-B-CJR
			From the left	RCP3-MU3A-CJL	RCP3-MU3A-B-CJL
			From the bottom	RCP3-MU3A-CJB	RCP3-MU3A-B-CJB
	SA2AR	Incremental	Not specified	RCP3-MU00B	—
	SA2BR		Not specified	RCP3-MU00B	—
	SA3R	Incremental	Not specified	RCP3-MU1B	RCP3-MU1B-B
			From the top	RCP3-MU1B-CJT-☐ (*)	RCP3-MU1B-B-CJT-☐ (*)
			From the outside	RCP3-MU1B-CJO-☐ (*)	RCP3-MU1B-B-CJO-☐ (*)
			From the bottom	RCP3-MU1B-CJB-☐ (*)	RCP3-MU1B-B-CJB-☐ (*)
	SA4R	Incremental	Not specified	RCP3-MU2B	RCP3-MU2B-B
			From the top	RCP3-MU2B-CJT-☐ (*)	RCP3-MU2B-B-CJT-☐ (*)
			From the outside	RCP3-MU2B-CJO-☐ (*)	RCP3-MU2B-B-CJO-☐ (*)
			From the bottom	RCP3-MU2B-CJB-☐ (*)	RCP3-MU2B-B-CJB-☐ (*)
	SA5R	Incremental	Not specified	RCP3-MU3B	RCP3-MU3B-B
			From the top	RCP3-MU3B-CJT-☐ (*)	RCP3-MU3B-B-CJT-☐ (*)
			From the outside	RCP3-MU3B-CJO-☐ (*)	RCP3-MU3B-B-CJO-☐ (*)
			From the bottom	RCP3-MU3B-CJB-☐ (*)	RCP3-MU3B-B-CJB-☐ (*)
	SA6R	Incremental	Not specified	RCP3-MU3B	RCP3-MU3B-B
			From the top	RCP3-MU3B-CJT-☐ (*)	RCP3-MU3B-B-CJT-☐ (*)
			From the outside	RCP3-MU3B-CJO-☐ (*)	RCP3-MU3B-B-CJO-☐ (*)
			From the bottom	RCP3-MU3B-CJB-☐ (*)	RCP3-MU3B-B-CJB-☐ (*)
	RA2AC RA2BC	Incremental	Not specified	RCP3-MU00A	RCP3-MU00A-B
	RA2AC High thrust RA2BC High thrust		Not specified	RCP3-MU00SA	RCP3-MU00SA-B
	RA2AR RA2BR		Not specified	RCP3-MU00B	RCP3-MU00B-B
	RA2AR High thrust RA2BR High thrust		Not specified	RCP3-MU00SB	RCP3-MU00SB-B
	TA3C		Not specified	RCP3-MU0A	RCP3-MU0A-B
	TA4C	Incremental	Not specified	RCP3-MU1A	RCP3-MU1A-B
			From the top	RCP3-MU1A-CJT	RCP3-MU1A-B-CJT
			From the right	RCP3-MU1A-CJR	RCP3-MU1A-B-CJR
			From the left	RCP3-MU1A-CJL	RCP3-MU1A-B-CJL
			From the bottom	RCP3-MU1A-CJB	RCP3-MU1A-B-CJB

(*) Please specify the motor mounting direction (ML or MR) in ☐.

ROBO Cylinder Replacement Motor Model Numbers

Series	Type		Cable exit direction	Motor type	
	Size	Encoder		Without brake	With brake
RCP3	TA5C	Incremental	Not specified	RCP3-MU2A	RCP3-MU2A-B
			From the top	RCP3-MU2A-CJT	RCP3-MU2A-B-CJT
			From the right	RCP3-MU2A-CJR	RCP3-MU2A-B-CJR
			From the left	RCP3-MU2A-CJL	RCP3-MU2A-B-CJL
			From the bottom	RCP3-MU2A-CJB	RCP3-MU2A-B-CJB
	TA6C	Incremental	Not specified	RCP3-MU3A	RCP3-MU3A-B
			From the top	RCP3-MU3A-CJT	RCP3-MU3A-B-CJT
			From the right	RCP3-MU3A-CJR	RCP3-MU3A-B-CJR
			From the left	RCP3-MU3A-CJL	RCP3-MU3A-B-CJL
			From the bottom	RCP3-MU3A-CJB	RCP3-MU3A-B-CJB
	TA7C	Incremental	Not specified	RCP3-MU3A	RCP3-MU3A-B
			From the top	RCP3-MU3A-CJT	RCP3-MU3A-B-CJT
			From the right	RCP3-MU3A-CJR	RCP3-MU3A-B-CJR
			From the left	RCP3-MU3A-CJL	RCP3-MU3A-B-CJL
			From the bottom	RCP3-MU3A-CJB	RCP3-MU3A-B-CJB
	TA3R	Incremental	Not specified	RCP3-MU0B	RCP3-MU0B-B
	TA4R	Incremental	Not specified	RCP3-MU1B	RCP3-MU1B-B
			From the top	RCP3-MU1B-CJT-□ (*)	RCP3-MU1B-B-CJT-□ (*)
			From the outside	RCP3-MU1B-CJO-□ (*)	RCP3-MU1B-B-CJO-□ (*)
			From the bottom	RCP3-MU1B-CJB-□ (*)	RCP3-MU1B-B-CJB-□ (*)
	TA5R	Incremental	Not specified	RCP3-MU2B	RCP3-MU2B-B
			From the top	RCP3-MU2B-CJT-□ (*)	RCP3-MU2B-B-CJT-□ (*)
			From the outside	RCP3-MU2B-CJO-□ (*)	RCP3-MU2B-B-CJO-□ (*)
			From the bottom	RCP3-MU2B-CJB-□ (*)	RCP3-MU2B-B-CJB-□ (*)
	TA6R	Incremental	Not specified	RCP3-MU3B	RCP3-MU3B-B
			From the top	RCP3-MU3B-CJT-□ (*)	RCP3-MU3B-B-CJT-□ (*)
			From the outside	RCP3-MU3B-CJO-□ (*)	RCP3-MU3B-B-CJO-□ (*)
			From the bottom	RCP3-MU3B-CJB-□ (*)	RCP3-MU3B-B-CJB-□ (*)
	TA7R	Incremental	Not specified	RCP3-MU3B	RCP3-MU3B-B
			From the top	RCP3-MU3B-CJT-□ (*)	RCP3-MU3B-B-CJT-□ (*)
			From the outside	RCP3-MU3B-CJO-□ (*)	RCP3-MU3B-B-CJO-□ (*)
			From the bottom	RCP3-MU3B-CJB-□ (*)	RCP3-MU3B-B-CJB-□ (*)
RCA2	SA2AC	Incremental	Not specified	RCA2-MU00A	—
	SA3C	Incremental	Not specified	RCA2-MU1A	RCA2-MU1A-B
			From the top	RCA2-MU1A-CJT	RCA2-MU1A-B-CJT
			From the right	RCA2-MU1A-CJR	RCA2-MU1A-B-CJR
			From the left	RCA2-MU1A-CJL	RCA2-MU1A-B-CJL
			From the bottom	RCA2-MU1A-CJB	RCA2-MU1A-B-CJB
	SA4C	Incremental	Not specified	RCA2-MU2A	RCA2-MU2A-B
			From the top	RCA2-MU2A-CJT	RCA2-MU2A-B-CJT
			From the right	RCA2-MU2A-CJR	RCA2-MU2A-B-CJR
			From the left	RCA2-MU2A-CJL	RCA2-MU2A-B-CJL
			From the bottom	RCA2-MU2A-CJB	RCA2-MU2A-B-CJB
	SA5C	Incremental	Not specified	RCA2-MU3A	RCA2-MU3A-B
			From the top	RCA2-MU3A-CJT	RCA2-MU3A-B-CJT
			From the right	RCA2-MU3A-CJR	RCA2-MU3A-B-CJR
			From the left	RCA2-MU3A-CJL	RCA2-MU3A-B-CJL
			From the bottom	RCA2-MU3A-CJB	RCA2-MU3A-B-CJB
	SA6C	Incremental	Not specified	RCA2-MU4A	RCA2-MU4A-B
			From the top	RCA2-MU4A-CJT	RCA2-MU4A-B-CJT
			From the right	RCA2-MU4A-CJR	RCA2-MU4A-B-CJR
			From the left	RCA2-MU4A-CJL	RCA2-MU4A-B-CJL
			From the bottom	RCA2-MU4A-CJB	RCA2-MU4A-B-CJB

(*) Please specify the motor mounting direction (ML or MR) in □.

Series	Type		Cable exit direction	Motor type	
	Size	Encoder		Without brake	With brake
RCA2	SA2AR	Incremental	Not specified	RCA2-MU00B	—
	SA3R	Incremental	Not specified	RCA2-MU1B	RCA2-MU1B-B
			From the top	RCA2-MU1B-CJT-□ (*)	RCA2-MU1B-B-CJT-□ (*)
			From the outside	RCA2-MU1B-CJO-□ (*)	RCA2-MU1B-B-CJO-□ (*)
			From the bottom	RCA2-MU1B-CJB-□ (*)	RCA2-MU1B-B-CJB-□ (*)
	SA4R	Incremental	Not specified	RCA2-MU2B	RCA2-MU2B-B
			From the top	RCA2-MU2B-CJT-□ (*)	RCA2-MU2B-B-CJT-□ (*)
			From the outside	RCA2-MU2B-CJO-□ (*)	RCA2-MU2B-B-CJO-□ (*)
			From the bottom	RCA2-MU2B-CJB-□ (*)	RCA2-MU2B-B-CJB-□ (*)
	SA5R	Incremental	Not specified	RCA2-MU3B	RCA2-MU3B-B
			From the top	RCA2-MU3B-CJT-□ (*)	RCA2-MU3B-B-CJT-□ (*)
			From the outside	RCA2-MU3B-CJO-□ (*)	RCA2-MU3B-B-CJO-□ (*)
			From the bottom	RCA2-MU3B-CJB-□ (*)	RCA2-MU3B-B-CJB-□ (*)
	SA6R	Incremental	Not specified	RCA2-MU4B	RCA2-MU4B-B
			From the top	RCA2-MU4B-CJT-□ (*)	RCA2-MU4B-B-CJT-□ (*)
			From the outside	RCA2-MU4B-CJO-□ (*)	RCA2-MU4B-B-CJO-□ (*)
			From the bottom	RCA2-MU4B-CJB-□ (*)	RCA2-MU4B-B-CJB-□ (*)
	RA2AC	Incremental	Not specified	RCA2-MU00A	—
	RA2AR		Not specified	RCA2-MU00B	—
	TA4C	Incremental	Not specified	RCA2-MU1A	RCA2-MU1A-B
			From the top	RCA2-MU1A-CJT	RCA2-MU1A-B-CJT
			From the right	RCA2-MU1A-CJR	RCA2-MU1A-B-CJR
			From the left	RCA2-MU1A-CJL	RCA2-MU1A-B-CJL
			From the bottom	RCA2-MU1A-CJB	RCA2-MU1A-B-CJB
	TA5C	Incremental	Not specified	RCA2-MU2A	RCA2-MU2A-B
			From the top	RCA2-MU2A-CJT	RCA2-MU2A-B-CJT
			From the right	RCA2-MU2A-CJR	RCA2-MU2A-B-CJR
			From the left	RCA2-MU2A-CJL	RCA2-MU2A-B-CJL
			From the bottom	RCA2-MU2A-CJB	RCA2-MU2A-B-CJB
	TA6C	Incremental	Not specified	RCA2-MU3A	RCA2-MU3A-B
			From the top	RCA2-MU3A-CJT	RCA2-MU3A-B-CJT
			From the right	RCA2-MU3A-CJR	RCA2-MU3A-B-CJR
			From the left	RCA2-MU3A-CJL	RCA2-MU3A-B-CJL
			From the bottom	RCA2-MU3A-CJB	RCA2-MU3A-B-CJB
	TA7C	Incremental	Not specified	RCA2-MU4A	RCA2-MU4A-B
			From the top	RCA2-MU4A-CJT	RCA2-MU4A-B-CJT
			From the right	RCA2-MU4A-CJR	RCA2-MU4A-B-CJR
			From the left	RCA2-MU4A-CJL	RCA2-MU4A-B-CJL
			From the bottom	RCA2-MU4A-CJB	RCA2-MU4A-B-CJB
	TA4R	Incremental	Not specified	RCA2-MU1B	RCA2-MU1B-B
			From the top	RCA2-MU1B-CJT-□ (*)	RCA2-MU1B-B-CJT-□ (*)
			From the outside	RCA2-MU1B-CJO-□ (*)	RCA2-MU1B-B-CJO-□ (*)
			From the bottom	RCA2-MU1B-CJB-□ (*)	RCA2-MU1B-B-CJB-□ (*)
	TA5R	Incremental	Not specified	RCA2-MU2B	RCA2-MU2B-B
			From the top	RCA2-MU2B-CJT-□ (*)	RCA2-MU2B-B-CJT-□ (*)
			From the outside	RCA2-MU2B-CJO-□ (*)	RCA2-MU2B-B-CJO-□ (*)
			From the bottom	RCA2-MU2B-CJB-□ (*)	RCA2-MU2B-B-CJB-□ (*)
	TA6R	Incremental	Not specified	RCA2-MU3B	RCA2-MU3B-B
			From the top	RCA2-MU3B-CJT-□ (*)	RCA2-MU3B-B-CJT-□ (*)
			From the outside	RCA2-MU3B-CJO-□ (*)	RCA2-MU3B-B-CJO-□ (*)
			From the bottom	RCA2-MU3B-CJB-□ (*)	RCA2-MU3B-B-CJB-□ (*)
	TA7R	Incremental	Not specified	RCA2-MU4B	RCA2-MU4B-B
			From the top	RCA2-MU4B-CJT-□ (*)	RCA2-MU4B-B-CJT-□ (*)
			From the outside	RCA2-MU4B-CJO-□ (*)	RCA2-MU4B-B-CJO-□ (*)
			From the bottom	RCA2-MU4B-CJB-□ (*)	RCA2-MU4B-B-CJB-□ (*)

(*) Please specify the motor mounting direction (ML or MR) in □.

Push Operation

The push operation function causes the rod or slider to keep pushing the work part, etc., just like an air cylinder does. This function is not available on some actuator models, so read below to check if your actuator can perform push operation, and if so, how the function is used and if any cautionary note is applicable.

[Whether or Not Push Operation Is Supported]

Motor type	Series	Model	Supported	Remarks
Pulse motor	RCP4/RCP3/ RCP2	Slider type	○	Able to perform push operation. (Refer to 1 in "Notes" below.)
		Rod type	◎	Suitable for push operation. (Refer to 2 in "Notes" below.)
	RCP2	Belt type	×	Unable to perform push operation because the belt mechanism does not generate a stable push force.
Servo motor (DC24V)	RCA2/RCA	All models	△	Refer to 2 in "Notes" below.
Servo motor (AC100/200V)	RCS2	RA13R	◎	Suitable for push operation.
		Other models	△	Refer to (2 in "Notes") below.
Linear servo motor	RCL	Slider type	×	Unable to perform push operation.
		Rod type	○	Able to perform push operation.

[Notes]

1. To perform push operation with a slider type actuator, the dynamic allowable moment of its guide must be considered. For details, refer to the page featuring the push force vs. electric current limit correlation graph for each slider type actuator.
2. The RCP4/RCP3/RCP series are recommended for applications requiring push operation.
   Models in the RCP4/RCP3/RCP series offer excellent stability when standing still while pushing the work part, and they also generate a greater push force compared to actuators of comparable cross-section area and other dimensions in the RCA2/RCA/RCS2 series.
   Contact IAI if you are considering using any actuator in the RCA2/RCA/RCS2 series.

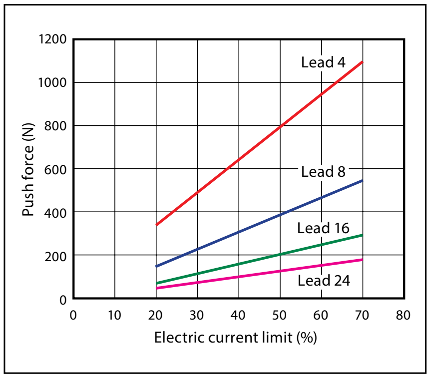
[Adjustment of Push Force]

- The push force exerted by the actuator during push operation (push force) can be adjusted by changing the electric current limit of the controller.
- Select a model that meets your specific conditions by checking the push forces of different models on the "Push Force vs. Electric Current Limit Correlation Graph" for each model featured on page A-73 to 85.

*Check the information provided in "Caution" below regarding the "Push Force vs. Electric Current Limit Correlation Graph."

(Example)

RA6C Type



<Push Force vs. Electric Current Limit Correlation Graph>

Caution

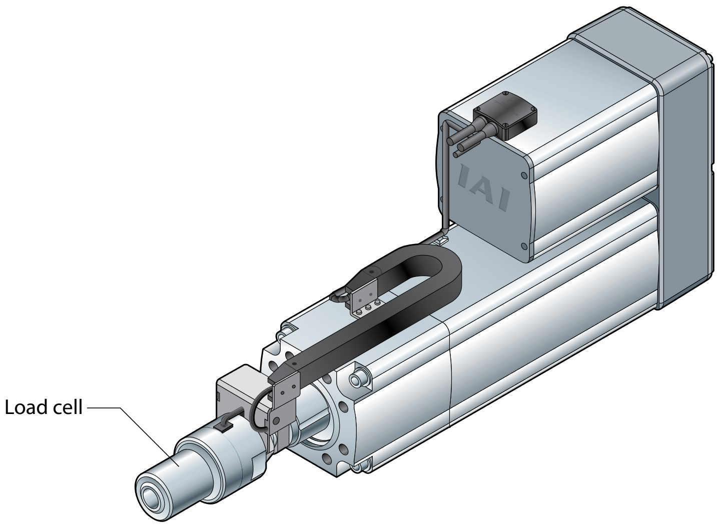
The push force vs. electric current limit correlation graph provides a rough guide for the lower limit of push force at each electric current limit. Even when the electric current limit remains the same, the push force may become as much as 40% above the lower limit on some actuators depending on the individual differences of the motor and varying mechanical efficiency.

Except when the force control function is enabled, the thrust is not fed back during push operation, but the push force is controlled by way of limiting the current value. This means that the push force may differ from one actuator to another or the push force of a specific actuator may also vary depending on various effects such as variation of motor holding torque, differences of the ball screw, bearing, etc., change in lubrication condition, and so on. Around 30% of variation is anticipated from the motor holding torque, lot difference, etc.

If the push force must be controlled accurately, use actuators and controllers that support the force control function. (Refer to the facing page.)

Force Control Function

Force control is a function that allows for more accurate push control than the traditional push-motion operation, by feeding back the push force via the dedicated load cell (actuator option) fitted on the actuator. When this function is enabled on an actuator of the ultra-high thrust type where the dedicated load cell can be mounted, the actuator can be used as a simple servo press of up to 2 tons (19,600 N) in capacity.



■Load Cell Specifications

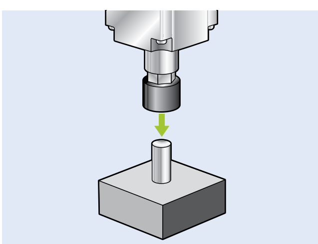
Item	Specification
Load cell method	Strain gauge, hollow cylinder type
Rated capacity	20,000N
Allowable overload	200%R.C*
Accuracy	±1%R.C*
Specified temperature range	0~40°C
Dielectric voltage	DC50V

*RC: Rated capacity

Note

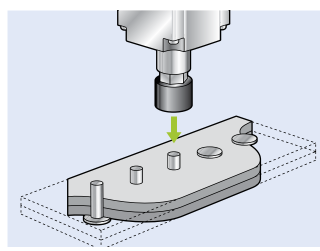
- The optional load cell is used only for push-motion operation. Force control cannot be implemented in the tensile direction.
- The load cell has a life of 2 million pushes.
- The load cell specifications apply to the load cell alone and not to the actuator as a whole.
- The force control function cannot be used if the actuator operates in the pulse-train mode.

■Purpose of Use



Press-fitting pins

The push force can be controlled accurately.
Also, defects can be recognized by setting an appropriate threshold even when the pins to be press-fitted are thin and loose.



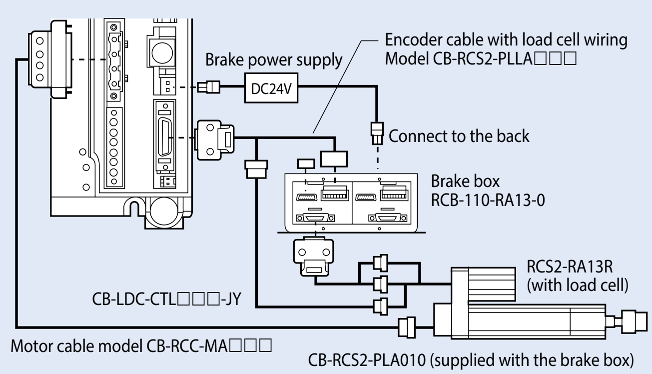
Clinching

A different push force can be set precisely for each product, and whether the clinching completion position has been reached can be checked, as well.

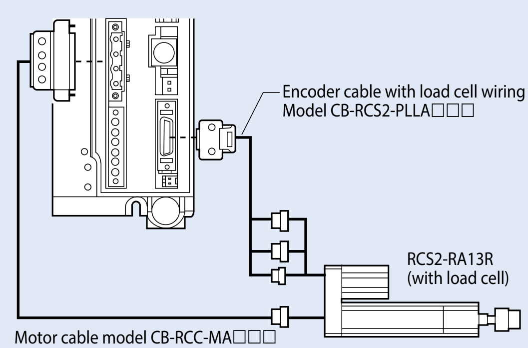
■How to Use

An ultra-high thrust actuator (RCS2-RA13R) with load cell is required to implement force control. Push-motion operation is performed in the same manner as before, so all you need is to set a desired push force in the position data table in percent (%).

With brake



Without brake

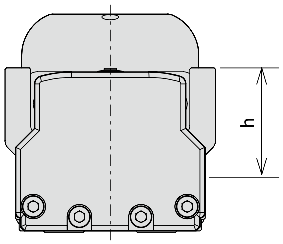


Push Force vs. and Electric Current Limit Correlation Graph

ERC3 Series | Slider Type / Rod Type

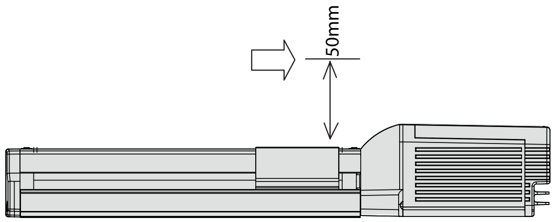
In a push-motion operation, the push force can be used by changing the current-limiting value of the controller over a range of 20% to 70%. The maximum push-force varies depending on the model, so check the required push force from the table below and select an appropriate type meeting the purpose of use.

When using slider type for pressing operation, limit pressing current to prevent anti-moment generated by push force from exceeding 80% of the catalog spec rating for moment (Ma, Mb).
To calculate the moment, use the guide moment action position shown in the figure at the right, and consider the amount of offset at the push force action position. Be aware that, if excess force above the rated moment is applied, the guide can be damaged and its use life can be shortened. Therefore, carefully set the current with safety in mind.



ERC3
SA5C : h=36.5mm
SA7C : h=46.5mm
ERC3CR/ERC3D
SA5C : h=39mm
SA7C : h=43mm

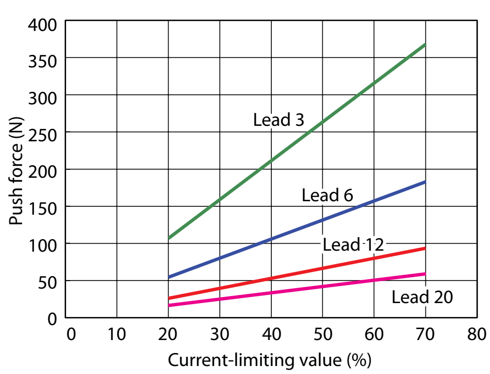
Example of calculation:
With this type, at the position shown in the figure at the right, when there is 100N of pressing the moment received by the guide is Ma = (46.5 + 50) x 100
= 9650 (N•mm)
= 9.65 (N•m).
The SA7C rated moment is Ma = 15 (N•m)
and 15 x 0.8 = 12 > 9.65, which means it is OK.
Also, when pressing generates moment Mb, use the overhang calculation to similarly confirm that the moment is within 80% of the rated moment.



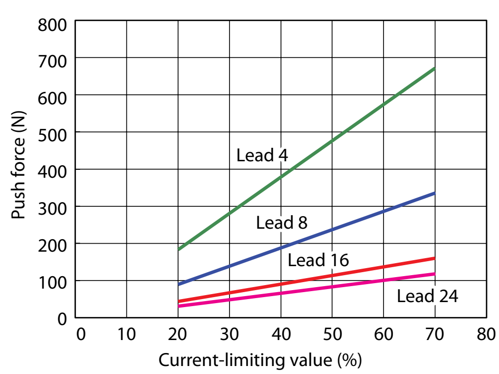
Push Force and Current Limit Correlation Graph

* In the table below, standard figures are shown. Actual figures will differ slightly.

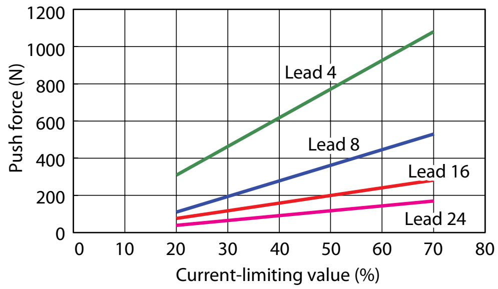
SA5C/RA4C type



SA7C type



RA6C type

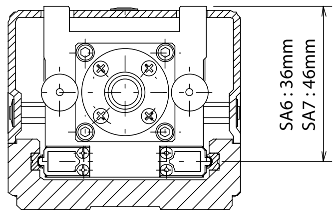


Notes on Use

- The relationship of the push force and the current-limiting value is only a reference, and the graphs may vary slightly from the actual values.
- If the current-limiting value is less than 20%, the push force may vary. Make sure the current-limiting value remains 20% or more.
- The graphs assume a traveling speed of 20 mm/s during push-motion operation.

ERC2 Series | Slider Type / Rod Type

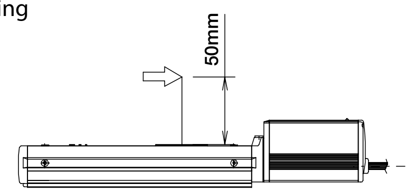
When using slider type for pressing operation, limit pressing current to prevent anti-moment generated by push force from exceeding 80% of the catalog spec rating for moment (Ma, Mb).
To calculate the moment, use the guide moment action position shown in the figure below, and consider the amount of offset at the push force action position.
Be aware that, if excess force above the rated moment is applied, the guide can be damaged and its use life can be shortened.
Therefore, carefully set the current with safety in mind.



Moment operation position

Caution:
Note: The movement speed during pressing is fixed at 20mm/s.

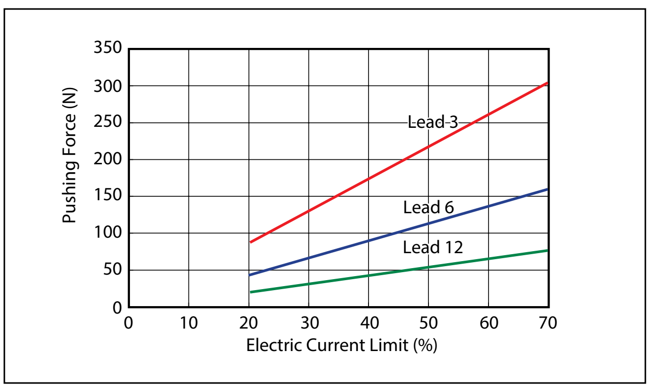
Example of calculation:
With this type, at the position shown in the figure at the right, when there is 100N of pressing the moment received by the guide is Ma = (46 + 50) x 100
= 9600 (N•m)
= 9.6 (N•m).
The SA7C rated moment is Ma = 13.8 (N•m)
and 13.8 x 0.8 = 11.04 > 9.6, which means it is OK.
Also, when pressing generates moment Mb, use the overhang calculation to similarly confirm that the moment is within 80% of the rated moment.



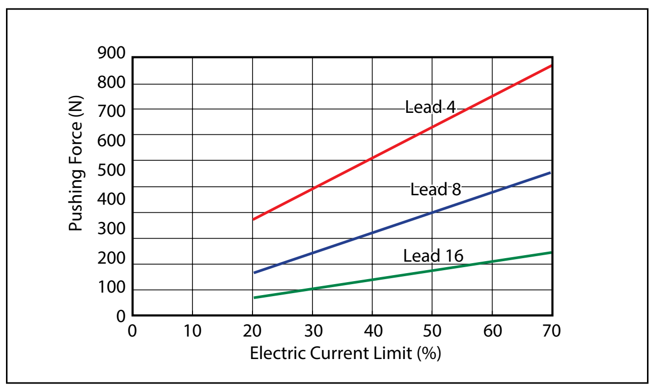
Push Force and Current Limit Correlation Graph

* In the table below, standard figures are shown. Actual figures will differ slightly.

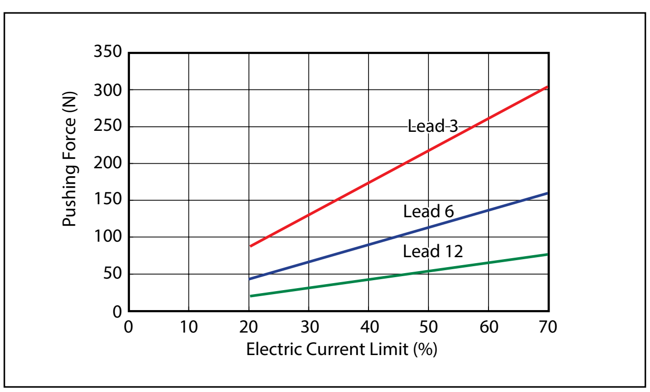
SA6C type



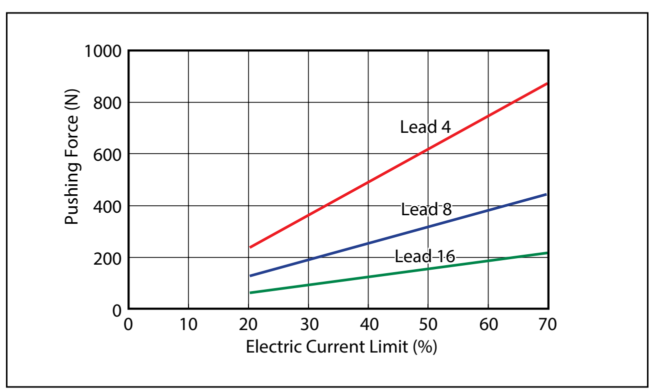
SA7C type



RA6C type



RA7C type

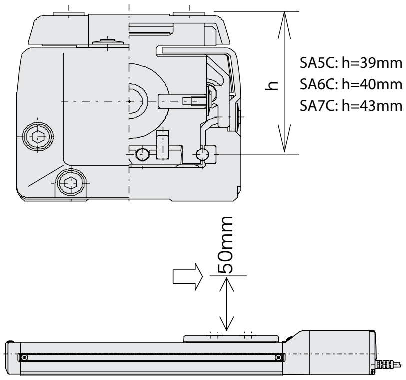


Push Force vs. and Electric Current Limit Correlation Graph

RCP4 Series | Slider Type / Rod Type

In a push-motion operation, the push force can be used by changing the current-limiting value of the controller over a range of 20% to 70%. The maximum push-force varies depending on the model, so check the required push force from the table below and select an appropriate type meeting the purpose of use.

When using slider type for pressing operation, limit pressing current to prevent anti-moment generated by push force from exceeding 80% of the catalog spec rating for moment (Ma, Mb). To calculate the moment, use the guide moment action position shown in the figure at the right, and consider the amount of offset at the push force action position.
Be aware that, if excess force above the rated moment is applied, the guide can be damaged and its use life can be shortened. Therefore, carefully set the current with safety in mind.

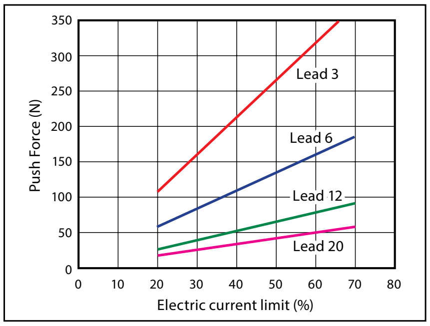


Example of calculation:
With this type, at the position shown in the figure at the right, when there is 100N of pressing the moment received by the guide is Ma = (43 + 50) x 100
= 9300 (N•mm)
= 9.3 (N•m).
The SA7C rated moment is Ma = 13.9 (N•m)
and 13.9 x 0.8 = 11.12 > 9.3, which means it is OK. Also, when pressing generates moment Mb, use the overhang calculation to similarly confirm that the moment is within 80% of the rated moment.

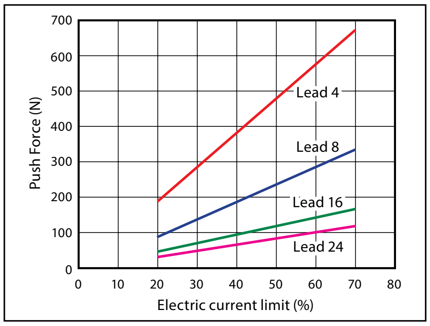
Push Force and Current Limit Correlation Graph

* In the table below, standard figures are shown. Actual figures will differ slightly.

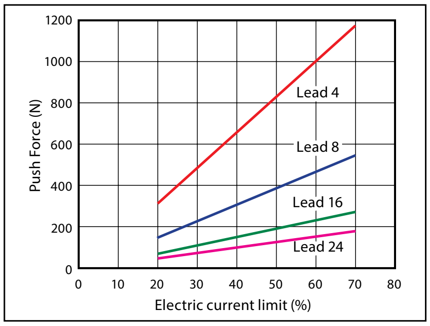
SA5C/SA5R/SA6C/SA6R/RA5C/RA5R type



SA7C/SA7R type



RA6C/RA6R type

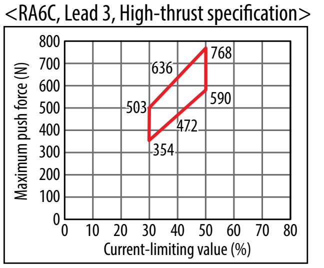


Notes on Use

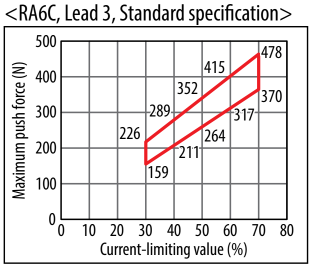
- The relationship of push force and current-limiting value is only a reference, and the graphs may vary slightly from the actual values.
- If the current-limiting value is less than 20%, the push force may vary. Make sure the current-limiting value remains 20% or more.
- The graphs assume a traveling speed of 20mm/s during push-motion operation.

RCP4W-RA6C/RA7C type

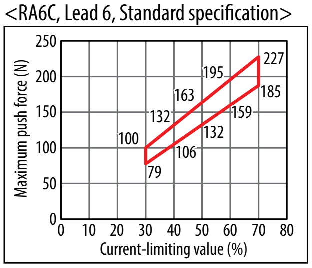
<RA6C, Lead 3, High-thrust specification>



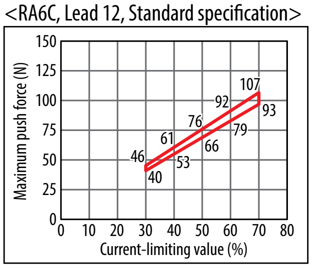
<RA6C, Lead 3, Standard specification>



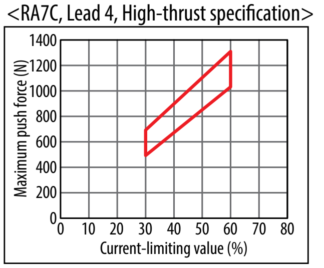
<RA6C, Lead 6, Standard specification>



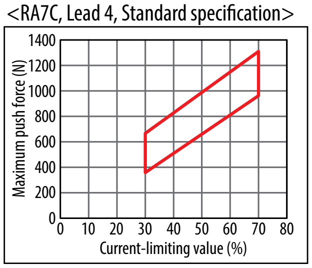
<RA6C, Lead 12, Standard specification>



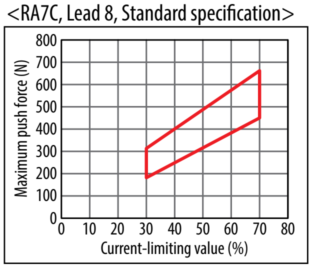
<RA7C, Lead 4, High-thrust specification>



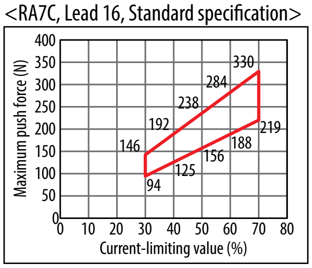
<RA7C, Lead 4, Standard specification>



<RA7C, Lead 8, Standard specification>



<RA7C, Lead 16, Standard specification>



Notes on Use

- The relationship of push force and current-limiting value is only a reference, and the graphs may vary slightly from the actual values.
- If the current-limiting value is less than 20%, the push force may vary. Make sure the current-limiting value remains 20% or more.
- The graphs assume a traveling speed of 20mm/s during push-motion operation. Please be aware that the push force changes as the speed changes.

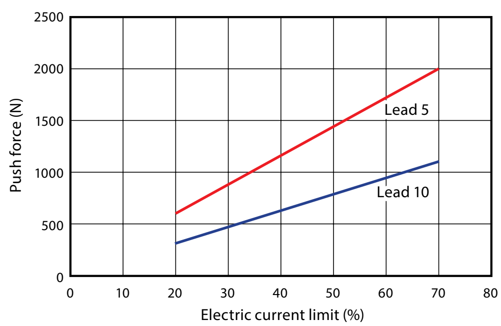
RCP2 Series High-Thrust Rod Type

You can change the push force exerted by the actuator during push operation, as desired, by changing the electric current limit of the controller. Since the maximum push force varies depending on the model, check the graphs below to identify the necessary push force and select a type that meets your specific purpose.

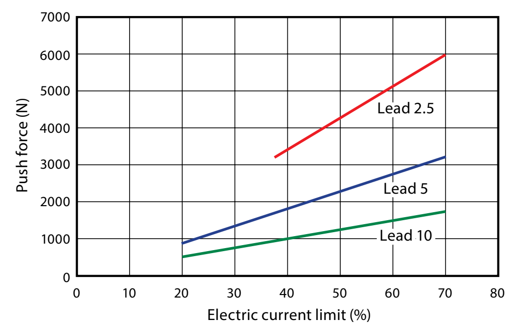
Push Force and Current Limit Correlation Graph

* In the table below, standard figures are shown. Actual figures will differ slightly.

RA8C type



RA10C type



Important

The RCP2-RA8C can perform push operation continuously at electric current limits of up to 60%, but if the electric current limit must be between 60% and 70%, some limitations apply to the operation pattern.
Check the information in "Reference for Selection" below to see if your operation pattern meets the specified conditions.

RCP2-RA8 - Reference for Selection

With the RCP2-RA8, the electric current limit at which the actuator can perform continuous operation is specified as 60% or below in light of heat generation from the motor. If you will be using this actuator to push the work or remain standstill at electric current limits exceeding 60%, the operating torque per cycle must be no more than 60% (2.08 N•m).
Follow the reference for selection below to confirm that your operation pattern meets the specified conditions.

<Operating Conditions>

Condition 1. The actuator does not push the work part or remain for any longer than the time specified for the electric current limit.

Condition 2. The continuous operating torque per cycle is no more than 2.08 N•m.

Condition 3. The actuator does not push the work part or remain standstill at a electric current limit exceeding 60% more than once per cycle.

Condition 1 Pushing/Standstill Time

◎Refer to Table 1/Fig. 1 for the pushing/standstill time.

Table 1 Electric Current Limits and Maximum Times

Electric current limit when pushing/standstill (%)	Maximum time (sec)
70	600
68	850
66	1050
64	1250
62	1500
61	1700
No more than 60	(Continuous operation is possible)

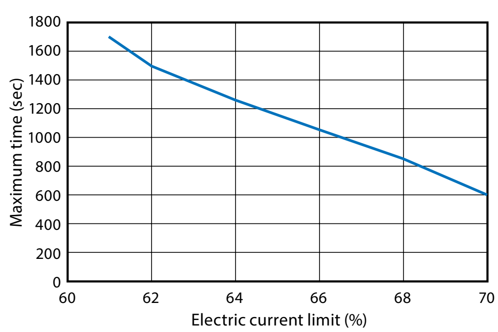


Fig. 1 Electric Current Limit vs. Maximum Time

Push Force vs. and Electric Current Limit Correlation Graph

Condition 2 Continuous Operating Torque

◎Refer to Table 2/Fig. 2 for the pushing/standstill torque.

Table 2 Electric Current Limits and Motor Torques

Electric current limit when pushing/standstill (%)	Motor torque (N•m)
70	2.43
60	2.08
50	1.74
40	1.39
30	1.04

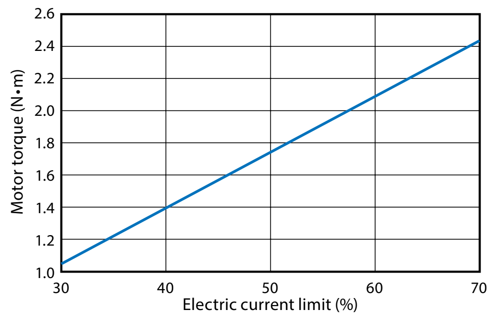
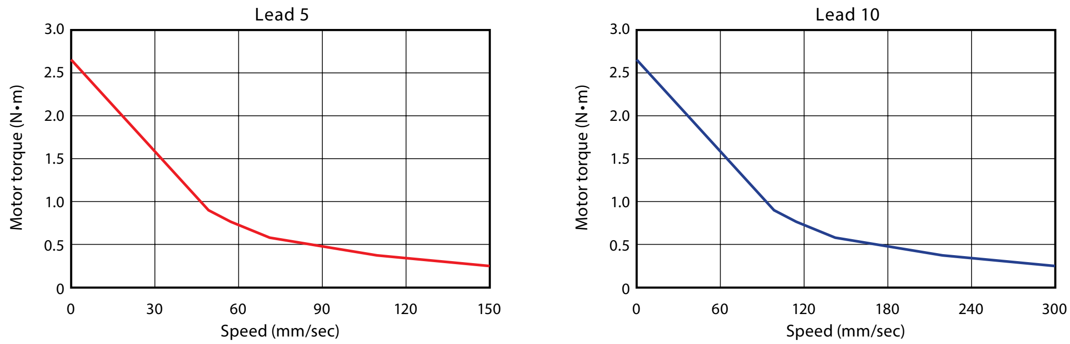


Fig. 2 Electric Current Limit vs. Motor Torque

◎Refer to Fig. 3 for the torque required for constant-speed movement.

◎Refer to Fig. 3 to calculate the motor torque required for acceleration/deceleration by dividing the attained speed by 2.



◎Calculation of continuous operating torque

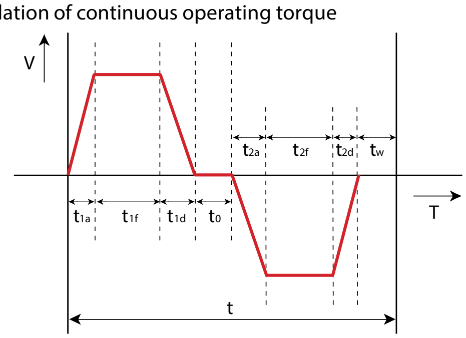


Fig. 4 Change in Actuator Speed Over Time

- t : Operating time per cycle (sec)
- t_{1a} : Acceleration time 1
- t_{1f} : Constant-speed movement time 1
- t_{1d} : Deceleration time 1
- t_0 : Push operation time * Within the scope of Condition 1
- t_{2a} : Acceleration time 2
- t_{2f} : Constant-speed movement time 2
- t_{2d} : Deceleration time 2
- t_w : Wait time

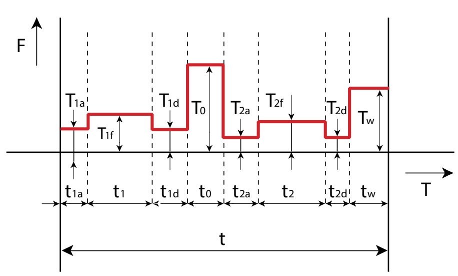


Fig. 5 Change in Torque Over Time

- T_{1a} : Motor torque required for acceleration 1
- T_{1f} : Motor torque required for constant-speed movement 1
- T_{1d} : Motor torque required for deceleration 1
- T_0 : Motor torque required for push operation
- T_{2a} : Motor torque required for acceleration 2
- T_{2f} : Motor torque require d for constant-speed movement 2
- T_{2d} : Motor torque required for deceleration 2
- T_w : Motor torque required for stand-by

$$T_t = \sqrt{\frac{T_{1a}^2 \cdot t_{1a} + T_{1f}^2 \cdot t_{1f} + T_{1d}^2 \cdot t_{1d} + T_0^2 \cdot t_0 + T_{2a}^2 \cdot t_{2a} + T_{2f}^2 \cdot t_{2f} + T_{2d}^2 \cdot t_{2d} + T_w^2 \cdot t_w}{t}} \quad \cdots \text{(Equation 1)}$$

$$T_t \leqq 2.08 \quad \cdots \text{(Equation 2)}$$

Calculation Example

- Let's select an operation pattern according to the selection steps described above.

Operating conditions

- Applicable model : RCP2-RA8 Lead 10
- Speed : 200mm/sec
- Acceleration/deceleration : $1.96m/s^2$ (0.2G)
- Travel distance : 100mm
- Push command value : 70% (1,000N)
- Pushing time : 60 sec
- Electric current limit at standstill : 40%
- Wait time : 36 sec
- Move 100 mm forward and perform push operation, move 100mm backward and wait
- Operation pattern in Fig. 6

The above operation pattern is expressed in the graph shown to the right.

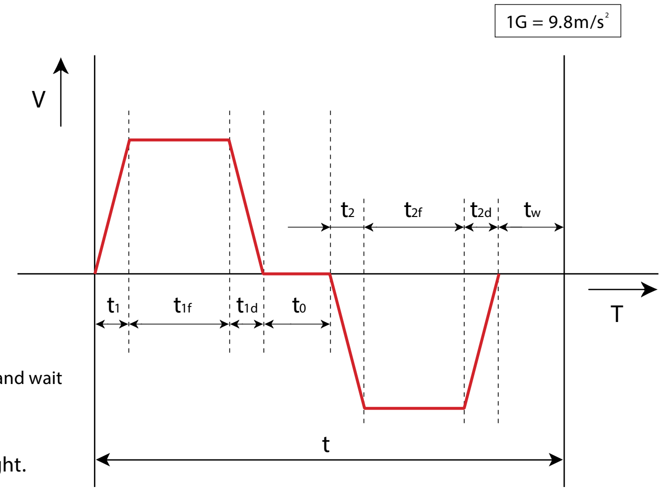


Fig. 6 Operation Pattern

Condition 1 Check the push operation time

From Table 1, the maximum pushing time at the push command value of 70% is 600 sec.
Since the pushing time under this operation pattern is 60 sec, no problem is anticipated in terms pushing time.

Condition 2 Check the continuous operating torque

Check the continuous operating torque
When the operation pattern is assigned to the continuous torque calculation equation (Equation 1):

$$T_t = \sqrt{\frac{T_{1a}^2 \cdot t_{1a} + T_{1f}^2 \cdot t_{1f} + T_{1d}^2 \cdot t_{1d} + T_0^2 \cdot t_0 + T_{2a}^2 \cdot t_{2a} + T_{2f}^2 \cdot t_{2f} + T_{2d}^2 \cdot t_{2d} + T_w^2 \cdot t_w}{t}} \quad \cdots \text{(Equation 1)}$$

Here,
$T_{1a} = t_{1d} = t_{2a} = t_{2d} = 0.93$ N•m (200 mm/sec / 2 = 100 mm/sec → Find the torque from Fig. 3.)
$T_{1f} = t_{2f} = 0.42$ N•m (200 mm/sec → Find the torque from Fig. 3.)
$T_0 = 2.43$ N•m (70% → Find the torque from Table 2.)
$T_w = 1.39$ N•m (40% → Find the torque from Table 2.)
$t_{1a} = t_{1d} = t_{2a} = t_{2d} = 0.2$ sec, $t_{1f} = t_{2f} = 0.9$ sec, $t_0 = 60$ sec, $t_w = 36$ sec
Accordingly, the continuous operating torque under the above operation pattern is calculated as follows:

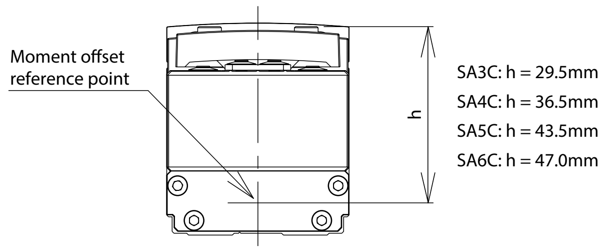
$T_t = 2.076$

Since (Equation 2) is satisfied, no problem is anticipated in terms of continuous operating torque.

Push Force vs. Electric Current Limit Correlation Graph

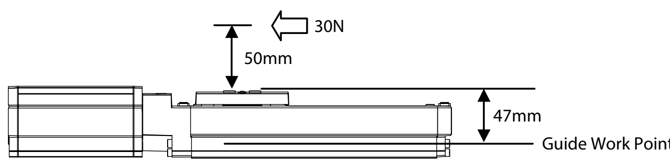
RCP3 Series Slider Type

When using the slider type for the pressing operation, limit the pressing current to prevent anti-moment generated by push force from exceeding 80% of catalog spec rating for moment (Ma, Mb).
To calculate moment, use the guide moment action position shown in the figure at the right, and consider the amount of offset at the push force action position.
Be aware that, if excess force above the rated moment is applied, the guide can be damaged and its use life can be shortened. Therefore, carefully set the current with safety in mind.



When using slider type for the pressing operation, use setting to ensure that anti-moment generated by push force does not exceed 80% of catalog spec moment tolerance.

Example of calculations:
With the RCP3-SA6C (Lead 12) type, using the position shown in the figure at the right, and pressing at 30N,
the moment received by the guide is Ma = (47 + 50) x 30
= 2910 (N•mm)
= 2.91 (N•m).

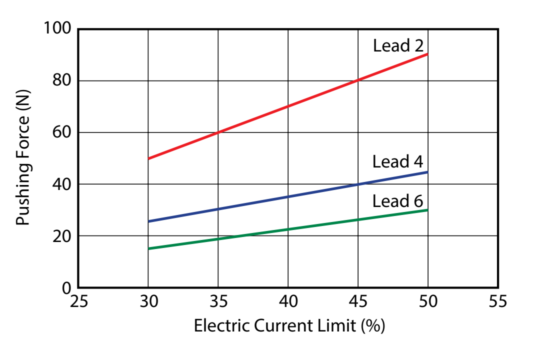


The SA6C allowable load moment (Ma) is 4.31(N•m), 80% of which is 3.448, which is greater than the actual moment load received by the guide (2.91). Therefore, it can be decided that this moment load can be used.

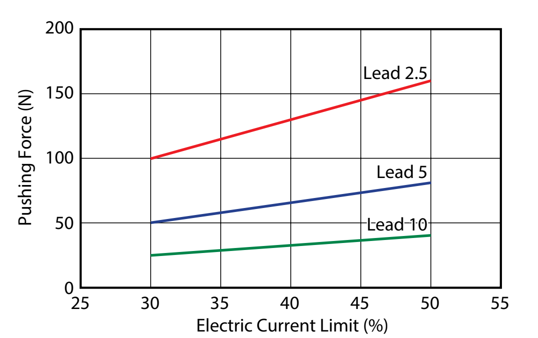
Push Force and Current Limit Correlation Graph

* In the table below, standard figures are shown. Actual figures will differ slightly.

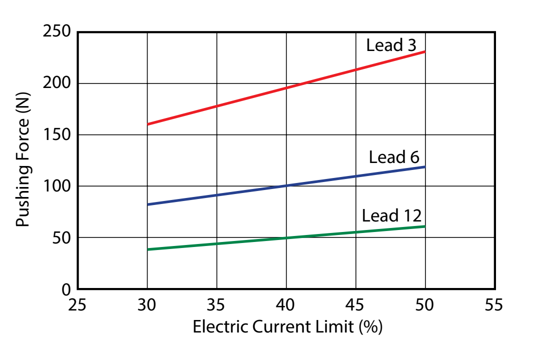
SA3C type



SA4C type

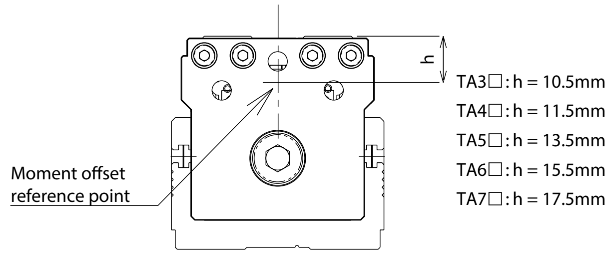


SA5C/SA6C type



RCP3 Series Table Type

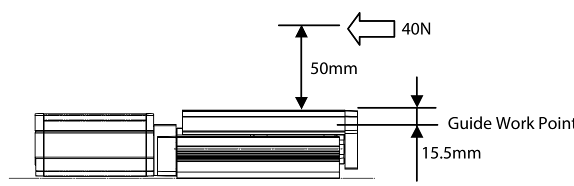
When using the table type for the pressing operation, limit the pressing current to prevent anti-moment generated by push force from exceeding 80% of catalog spec rating for moment (Ma, Mb).
To calculate moment, use the guide moment action position shown in the figure at the right, and consider the amount of offset at the push force action position.
Be aware that, if excess force above the rated moment is applied, the guide can be damaged and its use life can be shortened. Therefore, carefully set the current with safety in mind.



When using a table type for the pressing operation, use setting to ensure that anti-moment generated by the push force does not exceed 80% of catalog spec moment tolerance.

Example of calculations:
With the RCP3-TA6C (Lead 12) type, using the position shown in the figure at the right, and pressing at 40N,
the moment received by the guide is Ma = (15.5 + 50) x 40
= 2620 (N•mm)
= 2.62 (N•m).

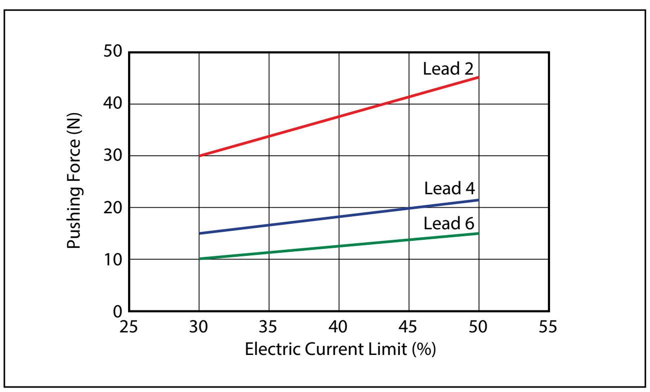
The TA6C allowable load moment (Ma) is 7.26(N•m),
80% of which is 5.968, which is greater than the actual moment load received by
the guide (2.62). Therefore, it can be decided that this moment load can be used.



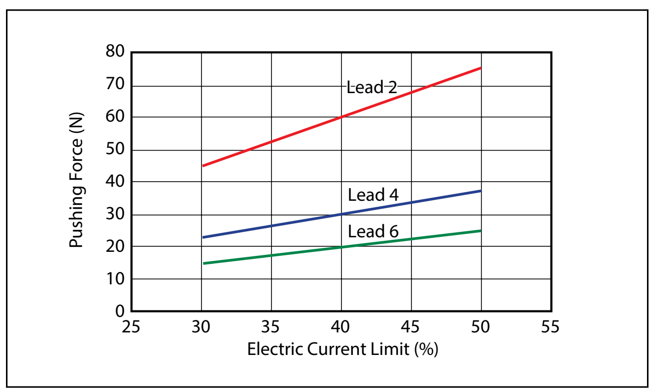
Push Force and Current Limit Correlation Graph

* In the table below, standard figures are shown. Actual figures will differ slightly.

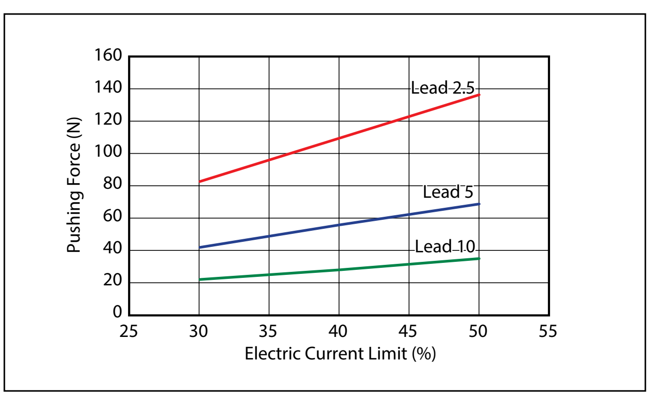
TA3C type



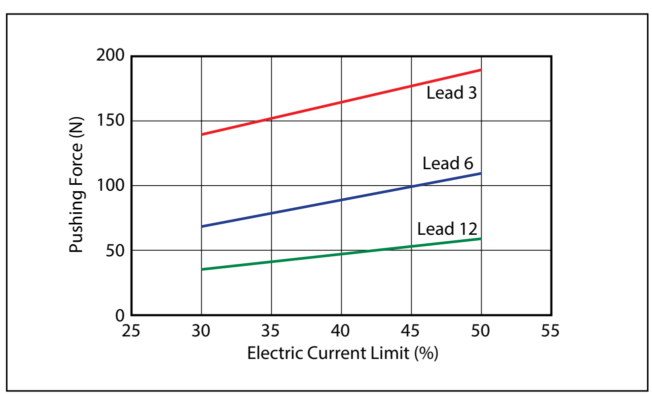
TA4C type



TA5C type



TA6C/TA7C type



Push Force vs. Electric Current Limit Correlation Graph

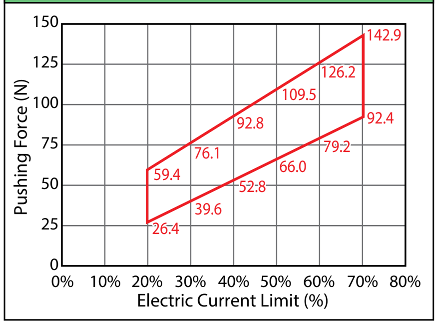
RCP3 Series | Mini Rod Type (RA2AC/RA2BC/RA2AR/RA2BR)

*The specification value is shown within an area indicated by a red line.

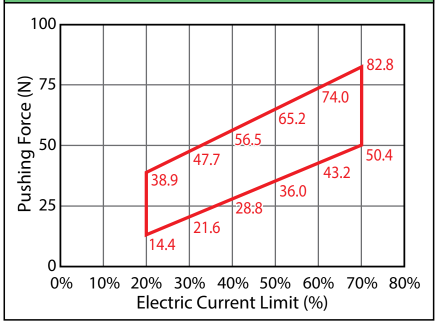
When performing a pressing operation, select a model which has desired push force within an area indicated by the red line in the graph below. (The graph makes allowance for efficiency reduction due to change due to wear.)

Caution:
Movement speed during pressing operation is fixed at 5mm/s.

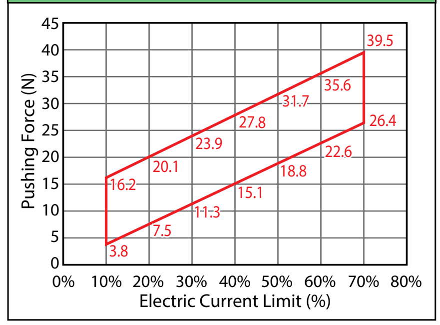
Ball screw high-thrust type <lead 1>



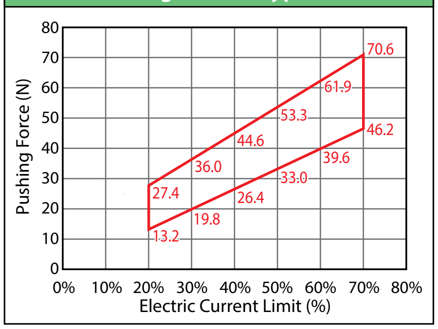
Ball screw standard type <lead 1>



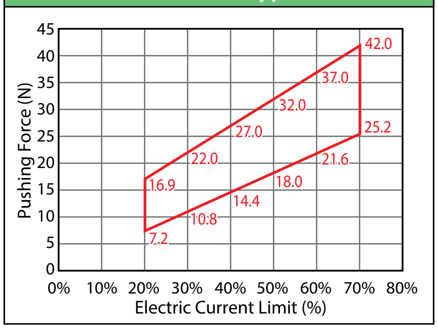
Lead screw type <lead 1>



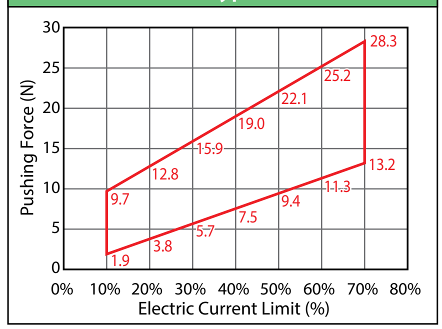
Ball screw high-thrust type <lead 2>



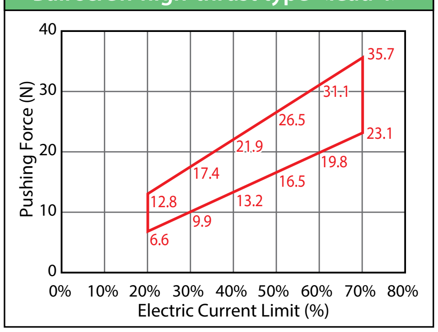
Ball screw standard type <lead 2>



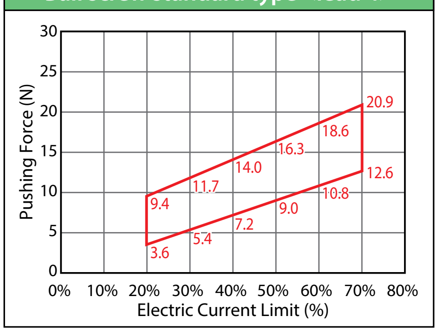
Lead screw type <lead 2>



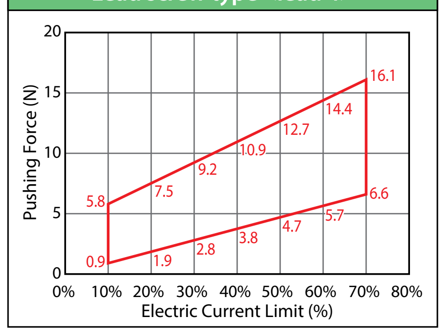
Ball screw high-thrust type <lead 4>



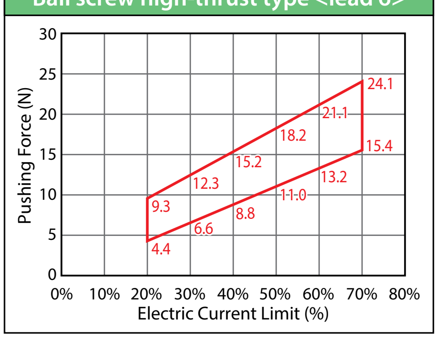
Ball screw standard type <lead 4>



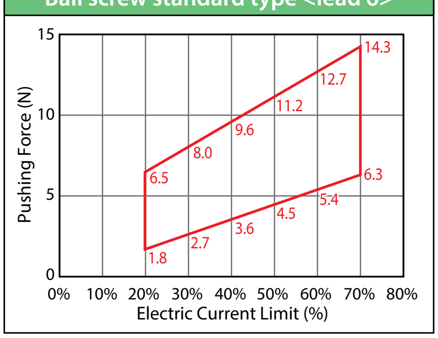
Lead screw type <lead 4>



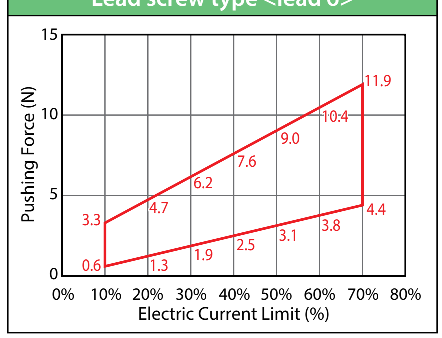
Ball screw high-thrust type <lead 6>



Ball screw standard type <lead 6>

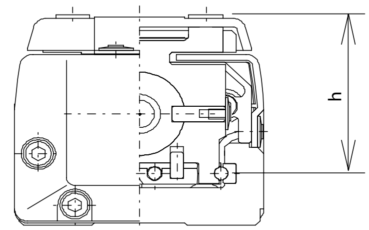


Lead screw type <lead 6>



RCP2 Series — Slider Type / Rod Type

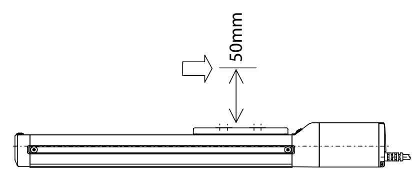
When using the slider type for the pressing operation, limit the pressing current to prevent anti-moment generated by the push force from exceeding 80% of the catalog spec rating for moment (Ma, Mb).
To calculate moment, use the guide moment action position shown in the figure at the right, and consider the amount of offset at the push force action position.
Be aware that, if excess force above the rated moment is applied, the guide can be damaged and its use life can be shortened. Therefore, carefully set the current with safety in mind.



Caution:
- Pressing operations cannot be perfomed for Belt type (BA6/BA7).
- Note: The movement speed during pressing is fixed at 20mm/s.

Example of calculations:
With the RCP2-SS7C type, and using the position in the figure at right for 100N pressing,

the moment received by the guide is Ma = (36 + 50) x 100
= 8600 (N•mm)
= 8.6 (N•m).

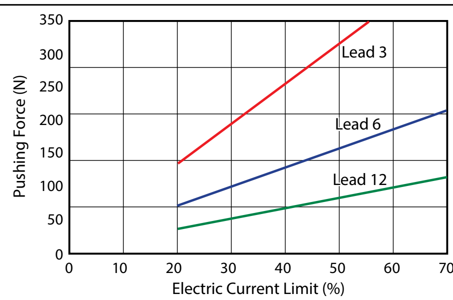


The SS rated moment is Ma = 14.7 (N•m)
and 14.7 x 0.8 = 11.76 > 8.6, which means it is OK.
Also, when pressing generates moment Mb, use the overhang calculation to similarly confirm that the moment is within 80% of the rated moment.

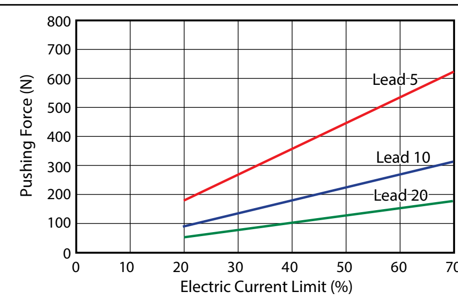
Push Force and Current Limit Correlation Graph

* In the table below, standard figures are shown. Actual figures will differ slightly.

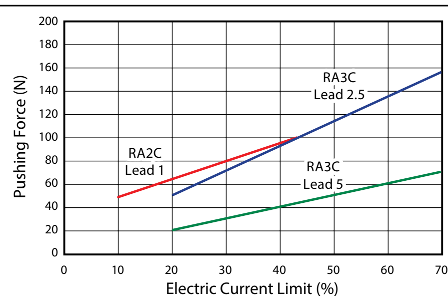
SS7C type



SS8C type

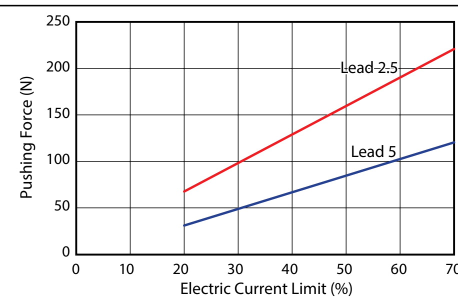


RA2C/RA3C type

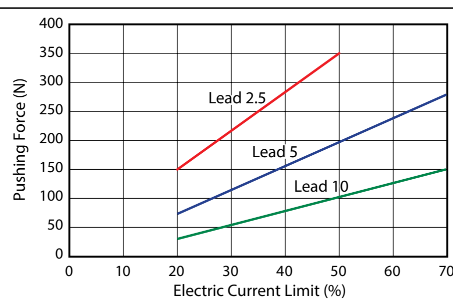


* With the RCS2 models the upper limit of the push force is set according to the stroke. 25.50 stroke: 100N, 75 stroke: 70N, 100 stroke: 55N

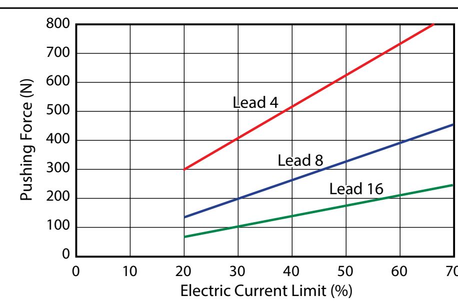
SRA4R/SRGS4R/SRGD4R type



RCP2W-RA4C type



RCP2W-RA6C type



Push Force vs. Electric Current Limit Correlation Graph

RCS2 Series | Rod Ultra-high thrust type

The following three conditions must be met when using this device.
Condition 1: The pushing time must be less than the time determined.
Condition 2: One cycle of continuous thrust must be less than the rated thrust for an ultra-high thrust actuator.
Condition 3: There must be one pushing operation in one cycle.

Selection Method

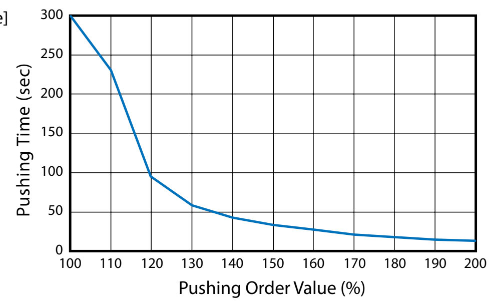
Condition 1. Pushing Time

The maximum pressing time for each pressing order must be determined as shown in the table below. The pressing time used must be less than the tin indicated in the table below.
Actuator malfunction could result if the process is used without adhering to the table below.

Table 1

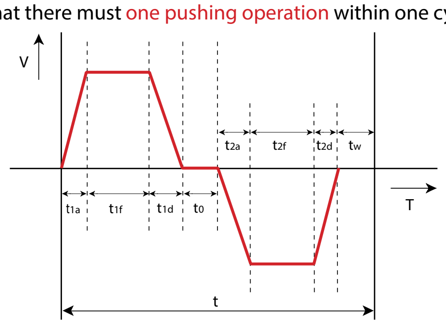
Pushing Order Value (%)	Maximum Pushing Time (sec)
70 or less	(Continuous pushing possible)
80~100	300
110	230
120	95
130	58
140	43
150	33
160	27
170	21
180	18
190	15
200	13

[Pushing Time]

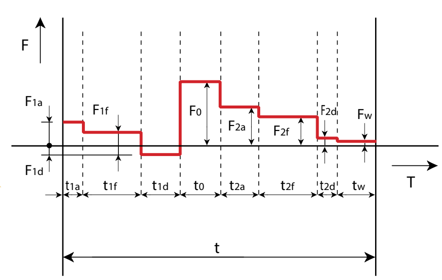


Condition 2. Continuous Operation Thrust

Confirm that 1 cycle of continuous operation thrust Ft, based on a consideration of load and duty, is less than that of the rated thrust for a ultra-high-thrust actuator.
Note that there must one pushing operation within one cycle.



Re-plot this using the thrust values as the vertical axis



t : Operation duration per cycle (s)
t_{1a} : Acceleration duration1
t_{1f} : Constant speed duration1
t_{1d} : Deceleration duration1
t_0 : Pushing duration
t_{2a} : Acceleration duration2
t_{2f} : Constant speed duration2
t_{2d} : Deceleration duration2
t_w : Waiting duration

F_{1a} : Thrust1 needed for acceleration
F_{1f} : Thrust1 needed for motion at constant speed
F_{1d} : Thrust1 needed for deceleration
F_0 : Thrust needed for pushing
F_{2a} : Thrust2 needed for acceleration
F_{2f} : Thrust2 needed for motion at constant speed
F_{2d} : Thrust2 needed for deceleration
F_w : Thrust needed for waiting

Use the equation below to calculate the continuous operation thrust Ft for one cycle.

$$F_t = \sqrt{\frac{F_{1a}^2 \times t_{1a} + F_{1f}^2 \times t_{1f} + F_{1d}^2 \times t_{1d} + F_0^2 \times t_0 + F_{2a}^2 \times t_{2a} + F_{2f}^2 \times t_{2f} + F_{2d}^2 \times t_{2d} + F_w^2 \times t_w}{t}}$$

*For horizontal use, it is not necessary to calculate the thrust needed for constant speed motion and for waiting.

- Since $F_{1a}/F_{2a}/F_{1d}/F_{2d}$ will change with the direction of motion, use the equations below.

Horizontal use (for both accel./decel.)	$F_{1a} = F_{1d} = F_{2a} = F_{2d} = (M+m) \times d$
Vertical use, downward acceleration	$F_{1a} = (M+m) \times 9.8 - (M+m) \times d$
Vertical use, constant downward speed	$F_{1f} = (M+m) \times 9.8 + \alpha$ (*1)
Vertical use, downward deceleration	$F_{1d} = (M+m) \times 9.8 + (M+m) \times d$
Vertical use, upward acceleration	$F_{2a} = (M+m) \times 9.8 + (M+m) \times d$
Vertical use, constant upward motion	$F_{2f} = (M+m) \times 9.8 + \alpha$ (*1)
Vertical use, upward deceleration	$F_{2d} = (M+m) \times 9.8 - (M+m) \cdot d$
Vertical use, waiting	$F_w = (M+m) \times 9.8$

M : Moveable weight (kg)
m : Loaded weight (kg)
d : Accel./decel. (m/s²)
α : Thrust (taking into account the travel resistance by the external guide.)

*1 If an external guide is attached, it is necessary to consider travel resistance.

Moveable weight for ultra-high thrust actuator: 9kg

- The method of calculating t□a, which is the acceleration duration, will vary for 1 trapezoidal pattern vs. 2 triangular pattern movements.
  Whether a movement pattern is trapezoidal or triangular can be determined by whether the peak speed reached after accelerating over a distance at a specified rate is greater than or less than the specified speed.

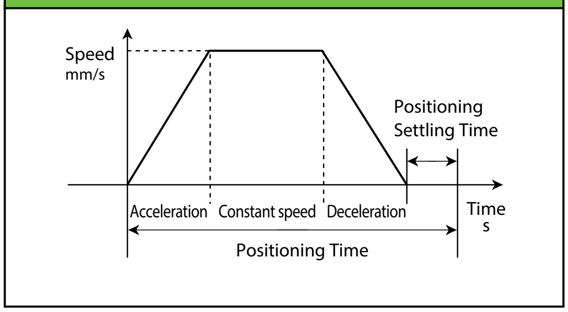
  Peak Speed (Vmax)= $\sqrt{\text{Distance Moved (m)} \times \text{Set Acceleration (m/s}^2\text{)}}$

  Set Speed < Peak Speed → ①Trapezoidal Pattern
  Set Speed > Peak Speed → ②Triangular Pattern

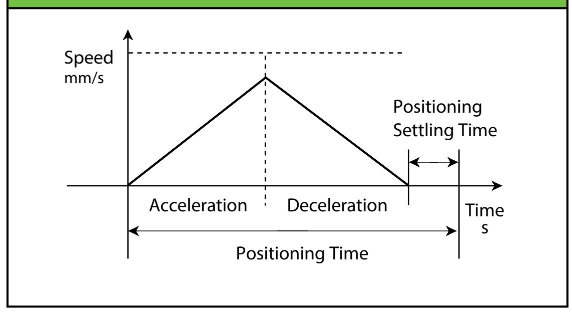
① For trapezoidal pattern,
t□a=Vs/a Vs : Set speed (m/s) a : Ordered acceleration (m/s²)

② For triangular pattern
t□a=Vt/a Vt : Peak speed (m/s) a : Ordered acceleration (m/s²)

① Trapezoidal Pattern



② Triangular Pattern



- t□f is the time taken to move at constant speed. You can calculate this time by computing the distance moved at constant speed.
  t□f= Lc/V Lc : Distance moved at constant speed (m) V : Commanded acceleration (m/s)

  * Distance moved at constant speed = total distance – accelerated distance – decelerated distance Accel./decel. distance = V²/2a

- t□d is the deceleration time. This is the same as the acceleration time, if the magnitude of acceleration and deceleration are the same.
  t□d=V/a V : Set speed (trapezoidal pattern) or Peak speed (triangular pattern)(m/s) a : Commanded deceleration (m/s²)

If the continuous operation thrust Ft by this method is less than the rated thrust, then operation is possible.

Rated thrust for ultra-high thrust actuator with 2.5 lead: 5,100N	**Rated thrust for ultra-high thrust actuator with 1.25 lead: 10,200N**

Operation is possible if both of the above operating conditions 1 and 2 are met.
If either condition cannot be met, make adjustments such as shortening the pushing operation time or decreasing the duty.

Sample Problem

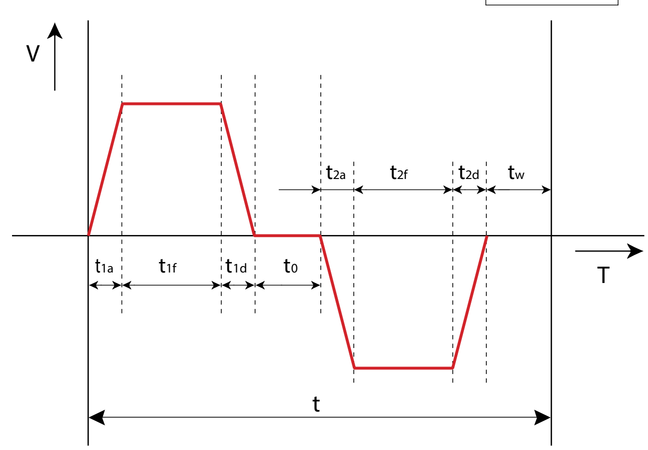
- Select an operation pattern by using the selection method described above.

Operating Conditions

- Model used : Ultra-high thrust actuator with 1.25 lead
- Mounting orientation : Vertical
- Speed : 62mm/s
- Acceleration : 0.098m/s² (0.01G, same value for deceleration.)
- Distance moved : 50mm
- Payload : 100kg
- Push order value : 200% (2,000kgf)
- Pushing Time : 3 seconds
- Wait time : 2 seconds
- Push down 50mm, then raise 50mm, and finally wait 2 seconds.
  The conditions for downward and upward motions are identical.

Plotting the above operation yields the graph on the right.

1G = 9.8m/s²



Push Force vs. Electric Current Limit Correlation Graph

Using the selection method:

Condition 1. Confirm push operation time

By comparing our push time of 3 seconds with the maximum push time for a push order value of 200%, which is 13 seconds (see Table 1 on page A-83), it is clear that the pressing time is acceptable.

Condition 2. Calculate the continuous operation thrust

Substitute the above operational pattern to the previously mentioned equation for continuous operation thrust.

$$Ft = \sqrt{\frac{F_{1a}^2 \times t_{1a} + F_{1f}^2 \times t_{1f} + F_{1d}^2 \times t_{1d} + F_0^2 \times t_0 + F_{2a}^2 \times t_{2a} + F_{2f}^2 \times t_{2f} + F_{2d}^2 \times t_{2d} + F_w^2 \times t_w}{t}}$$

At this point, by looking at the motion pattern for t1a/t1d/t2a/t2d, the peak speed (Vmax) $= \sqrt{0.05\times0.098} \rightarrow 0.07$m/s, which is greater that the set speed, 62mm/s (0.06m/s). Hence this is a trapezoidal pattern.

Hence, $t_{1a}/t_{1d}/t_{2a}/t_{2d} = 0.062\div0.098 \rightarrow 0.63$s

Next, calculate t_{1f}/t_{2f}:
Distance moved at constant speed $= 0.05-\{(0.062\times0.062)\div(2\times0.098)\}\times2 \rightarrow 0.011$m, so $t_{1f}/t_{2f} = 0.011\div0.062 \rightarrow 0.17$s.

Also, calculating the $F_{1a}/F_{1f}/F_{1d}/F_{2a}/F_{2f}/F_{2d}$ from the equations yields the following:
$F_{1a} = F_{2d} = (9+100)\times9.8-(9+100)\times0.098 \rightarrow 1058$N
$F_{1d} = F_{2a} = (9+100)\times9.8+(9+100)\times0.098 \rightarrow 1079$N
$F_{1f} = F_{2f} = fw = (9+100)\times9.8 \rightarrow 1068$N

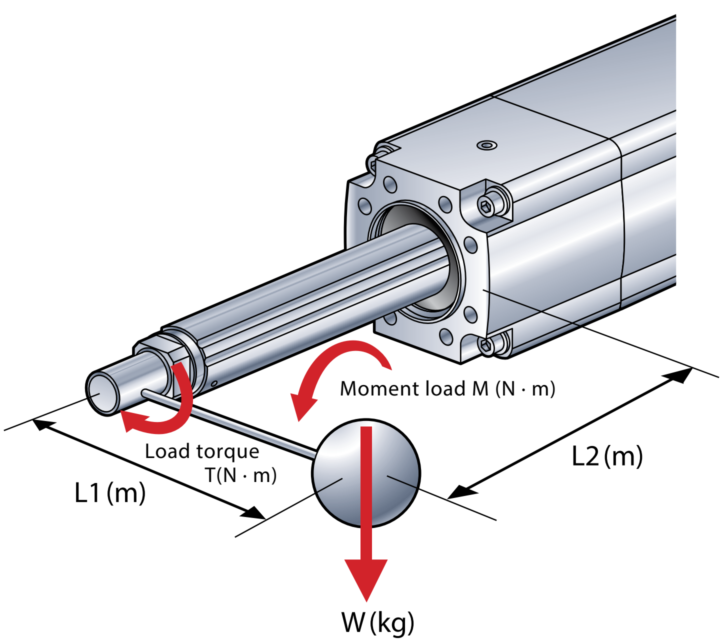
By substituting these values to the continuous operation thrust equation,

$$Ft = \sqrt{\{(1058\times1058)\times0.63+(1068\times1068)\times0.17+(1079\times1079)\times0.63+(19600\times19600)\times3+(1079\times1079)\times0.63+(1068\times1068)\times0.17+(1058\times1058)\times0.63+(1068\times1068)\times2\}\div(0.63+0.17+0.63+3+0.63+0.17+0.63+2)} \rightarrow 12113\text{N}$$

Since this exceeds the rated thrust for the 2-ton ultra-thrust actuator, which is 10,200N, operation with this pattern is not possible.

In response, let us increase the wait time. (i.e. decrease the duty)
Recalculating with tw=6.12s(t=12s) will change the thrust to Ft=9,814N, making it operable.

Information on Moment Selection



The ultra-high thrust actuator can apply a load on the rod within the range of conditions calculated below.

M+T ≦ 120 (N · m)
Moment Load M = Wg×L_2
Load Torque T = Wg×L_1

* g = Gravitational acceleration 9.8
* L1 = Distance from the center of rod to the center of gravity of the work piece
* L2 = Distance from the actuator mounting surface to the center of gravity of the work piece + 0.07

If the above condition is not met, consider installing an external guide, or the like, so that the load is not exerted on the rod.

Selection Guide (Gripping Force)

RCP2 Series | Gripper Slide Type

Step 1 Check the necessary gripping force and transportable work part weight

Step 2 Check the distance to gripping point

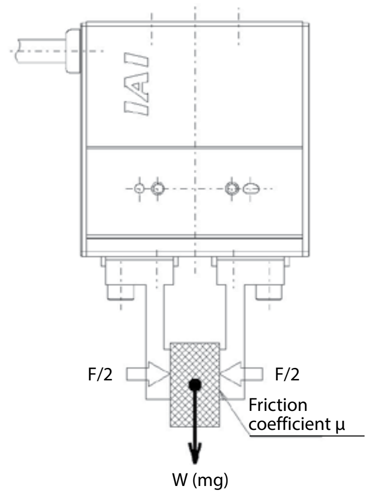
Step 3 Check the external force applied to the finger attachment (claw)

Step 1 Check necessary gripping force and transportable work part weight

When gripping with frictional force, calculate the necessary gripping force as shown below.

(1) Normal transportation

F : Gripping force [N] ...... Sum of push forces
μ : Coefficient of static friction between the finger attachment and the work part
m : Work part weight [Kg]
g : Gravitational acceleration [= 9.8m/s²]



A condition in which a work part does not drop when the work part is gripped statistically:

$$F\mu > W$$

$$F > \frac{mg}{\mu}$$

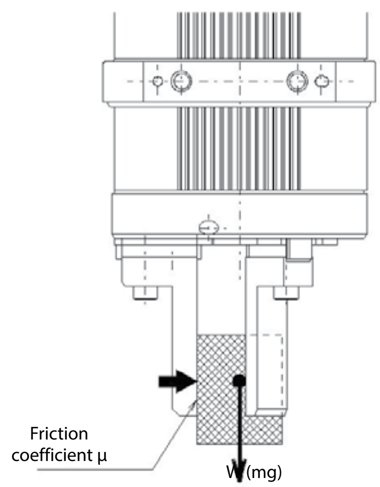
Necessary gripping force as the recommended safety factor of 2 in normal transportation:

$$F > \frac{mg}{\mu} \times 2 \text{ (safety factor)}$$

When the friction coefficient μ is between 0.1 and 0.2:

$$F > \frac{mg}{0.1\sim0.2} \times 2 = (10\sim20) \times mg$$

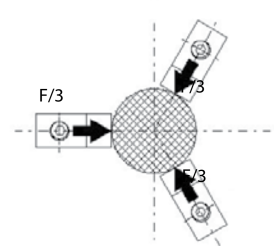
* As the Coefficient of static friction increases, the work part weight also increases.
Select a model which can achieve the gripping force of 10 to 20 times or more.



Normal work part transportation	
Necessary gripping force	→ 10 to 20 times the work part weight or more
Transportable work part weight	→ One-tenth to one-twentieth or less of the gripping force

(2) When remarkable acceleration, deceleration and/or impact occur at work part transportation

Stronger inertial force is applied to a work part by gravity.
In this case, consider the sufficient safety rate when selecting a model.



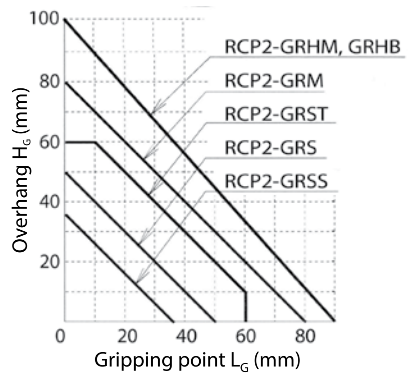
When remarkable acceleration, deceleration and/or impact occur	
Necessary gripping force	→ 30 to 50 times the work part weight or more
Transportable work part weight	→ One-thirtieth to one-fiftieth or less of the gripping force

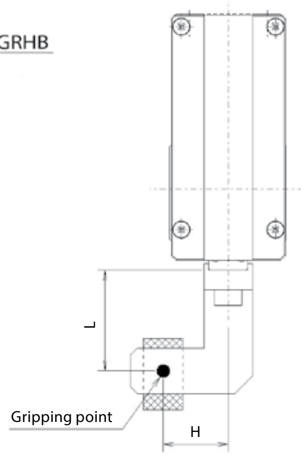
How to Select Gripper Actuators

Step 2 Finger Attachment (Finger) to Gripping Point Distances

Use the actuator so that the distances (L, H) from the finger mounting surface to the gripping point fall in the ranges specified below. If the limits are exceeded, excessive moments may act upon the sliding part of the finger and internal mechanism, negatively affecting the service life of the actuator.

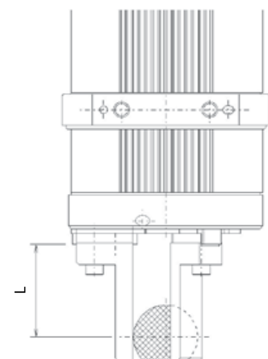
◆2-finger Gripper





◆3-finger Gripper

RCP2-GR3SS	⇛	L50mm or less
RCP2-GR3SM	⇛	L80mm or less

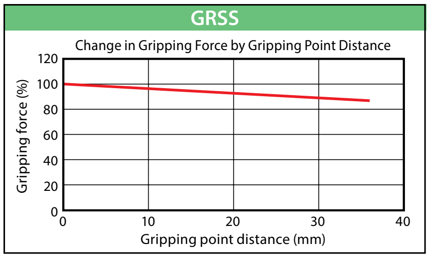


Even when the gripping point distances are within the limits, still design your actuator as small and lightweight as possible. If the finger is long and large, or heavy, the inertial forces generating upon opening/closing as well as bending moments that may cause the performance of the actuator to drop or negatively affect its guide.

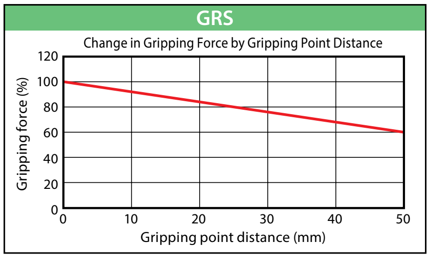
■ Rough Guide for Shape and Mass of Work Part

1. The graphs show the gripping force as a function of the gripping point distance when the maximum gripping force represents 100%.
2. The gripping point distance indicates the vertical distance from the finger attachment mounting surface to the gripping point.
3. The gripping force varies from one actuator to another, so use these values only as a reference.

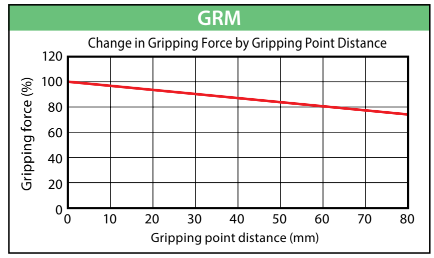
GRSS



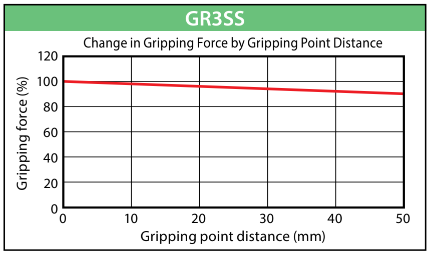
GRS



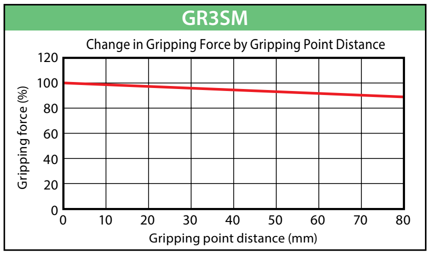
GRM



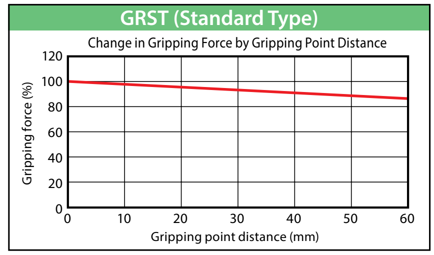
GR3SS



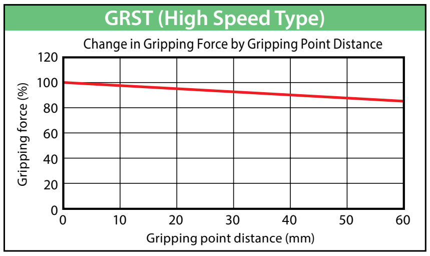
GR3SM



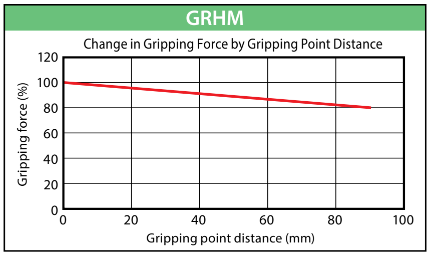
GRST (Standard Type)



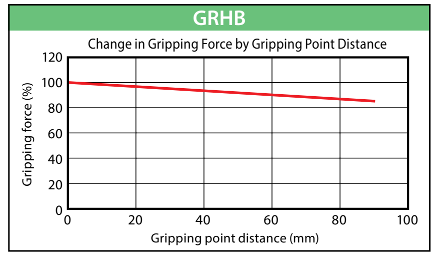
GRST (High Speed Type)



GRHM



GRHB



Step 3 Checking external force applied to finger

(1) Allowable vertical load

Confirm that the vertical load applied to each finger is the allowable load or less.

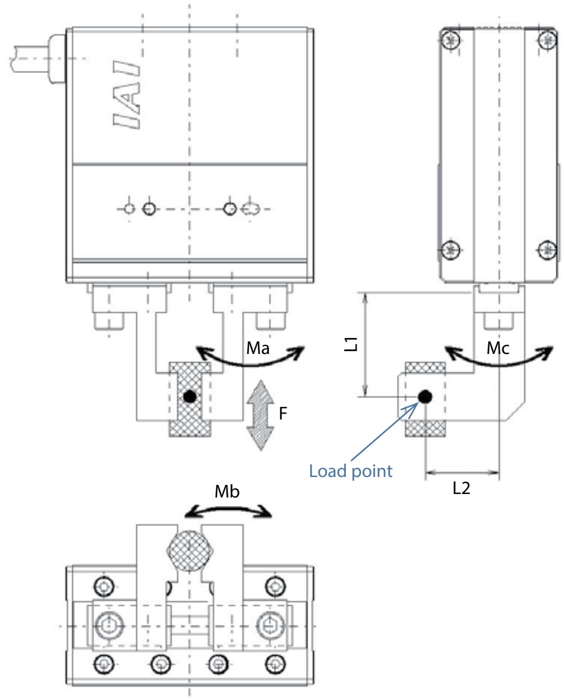
(2) Allowable load moment

Calculate Ma and Mc using L1 and Mb using L2.
Confirm that the moment applied to each finger is the maximum allowable load moment or less.

Allowable external force when the moment load is applied to each claw:

$$\text{Allowable load F (N)} > \frac{\text{M (Maximum allowable moment (N•m)}}{\text{L (mm)} \times 10^{-3}}$$

Calculate the allowable load F (N) using both of L1 and L2.
Confirm that the external force applied to finger is the calculated allowable load F (N) (L1 or L2, whichever is smaller) or less.



* The load point above indicates the position of the load on the fingers. The position may vary depending on the type of the load.
- The load generated by the gripping force: Gripping position
- The load due to gravity: Center of gravity position
- The inertia force at the time of the movement, the centrifugal force at the time of turning: Center of gravity position

The load moment is the total value that was calculated from each type of load.

Model	Allowable vertical load F (N)	Maximum allowable load moment (N • m)		
		Ma	Mb	Mc
RCP2-GRSS	60	0.5	0.5	1.5
RCP2-GRS	253	6.3	6.3	7.0
RCP2-GRM	253	6.3	6.3	8.3
RCP2-GRST	275	2.93	2.93	5.0
RCP2-GR3SS	169	3.8	3.8	3.0
RCP2-GR3SM	253	6.3	6.3	5.7

1. The allowable value above shows a static value.
2. The allowable value per finger is shown.

* Finger weight and work part weight are also a part of the external force. Centrifugal force when the gripper is rotated gripping a work part and the inertial force due to acceleration or deceleration when moving are also the external force applied to the finger.

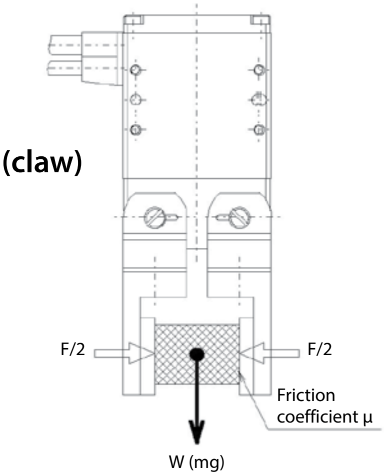
Selection Guide (Gripping Force)

RCP2 Series | Gripper Lever Type

Step 1 Check the necessary gripping force and transportable work part weight

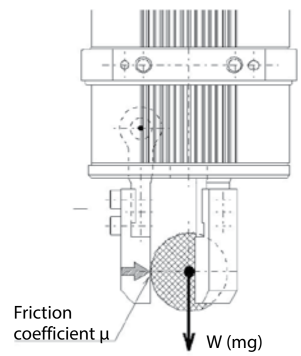
Step 2 Check the moment of inertia of the finger attachment (claw)

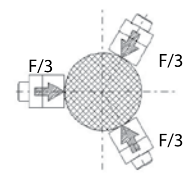
Step 3 Check the external force applied to the finger



Step 1 Check the necessary gripping force and transportable work part weight

Like Step 1 of the Slide type, calculate the necessary gripping force and confirm that the gripping force meets conditions. Calculate it referring to "Paragraph 5.3 Adjustment of Gripping Force", effective gripping force by gripping point.





Normal work transportation

Necessary gripping force	→	10 to 20 times the work part weight or more
Transportable work part weight	→	One-tenth to one-twentieth or less of the gripping force

When remarkable acceleration, deceleration and/or impact occur

Necessary gripping force	→	30 to 50 times the work part weight or more
Transportable work part weight	→	One-thirtieth to one-fiftieth or less of the gripping force

Step 2 Checking the moment of inertia of the finger attachment (claw)

Confirm that all moments of inertia around the Z axis (fulcrum) of the finger attachment (claw) fall within an allowable area. Depending on the configuration and/or shape of the finger, divide it into several elements when calculating.
For your reference, an example of calculation by dividing into two elements is shown below.

(1) Moment of inertia around Z1 axis (the center of gravity of A) (section A)

m_1 : Weight of A [Kg]

a_1, b_1, c_1 : Dimension of Section A [mm]

m_1 [Kg] $= a_1 \times b_1 \times c_1 \times$ specific gravity $\times 10^{-6}$

$$I_{z1}\ [\mathrm{kg.m^2}] = \frac{m_1\,(a_1^2 + b_1^2)}{12} \times 10^{-6}$$

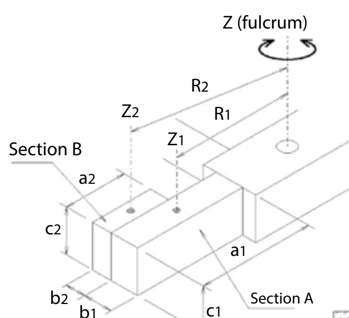
(2) Moment of inertia around Z2 axis (the center of gravity of B) (section B)

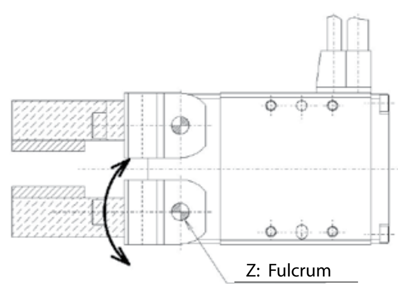
m_2 : Weight of B [Kg]

a_2, b_2, c_2 : Dimension of Section B [mm]

m_2 [Kg] $= a_2 \times b_2 \times c_2 \times$ specific gravity $\times 10^{-6}$

$$I_{z2}\ [\mathrm{kg.m^2}] = \frac{m_2\,(a_2^2 + b_2^2)}{12} \times 10^{-6}$$



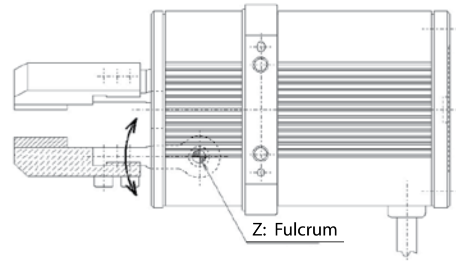


(3) All moments of inertia around the Z axis (fulcrum)

R_1 : Distance from the center of gravity of A to the finger opening/closing fulcrum [mm]

R_2 : Distance from the center of gravity of B to the finger opening/closing fulcrum [mm]

$I\,[kg \cdot m^2] = (I_{Z1} + m_1 R_1^2 \times 10^{-6}) + (I_{Z2} + m_2 R_2^2 \times 10^{-6})$



Model	Allowable moment of inertia [kg•m²]	Weight (Reference) [kg]
RCP2-GRLS	1.5×10^{-4}	0.07
RCP2-GR3LS	3.0×10^{-4}	0.15
RCP2-GR3LM	9.0×10^{-4}	0.5

Step 3 Checking the external force applied to the finger

(1) Allowable load torque

Confirm that the load torque applied to the finger is the maximum allowable load torque or less.

The load torque is calculated by the finger and work part weight as stated below.

m_1 : Work part weight (kg)

R_1 : Distance from the center of gravity of the work part to the finger opening/closing fulcrum (mm)

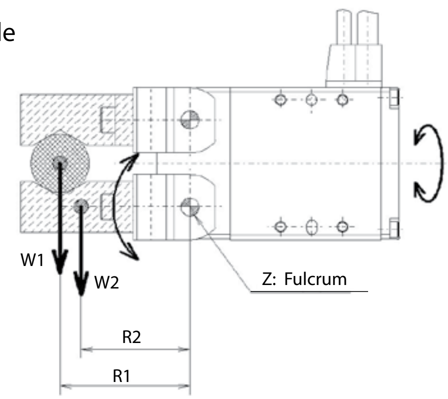
m_2 : Claw weight (kg)

R_2 : Distance from the center of gravity of the claw to the finger opening/closing fulcrum (mm)

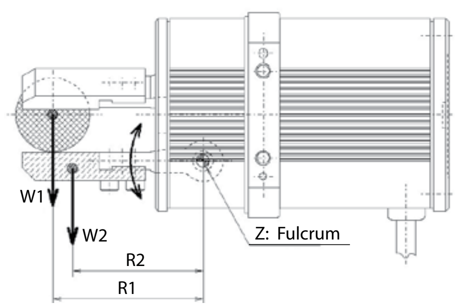
g: Gravitational acceleration ($9.8 m/s^2$)

$T = (W_1 \text{ x } R_1 \times 10^{-3}) + (W_2 \text{ x } R_2 \times 10^{-3})$ + (other load torque)

$= (m_1 g \text{ x } R_1 \times 10^{-3}) + (m_2 g \text{ x } R_2 \times 10^{-3})$ + (other load torque)



* Centrifugal force when the gripper is rotated gripping a work part and the inertial force due to acceleration or deceleration when moving horizontally are also the load torque applied to the finger. If applicable, confirm that the total torque including the torque above is the maximum allowable load torque or less.



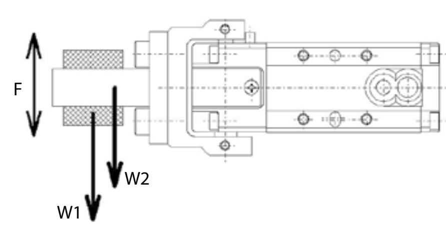
Model	Allowable max. load torque T [N•m]
RCP2-GRLS	0.05
RCP2-GR3LS	0.15
RCP2-GR3LM	0.4

(2) Allowable thrust load

Confirm that the thrust load of the finger opening/closing the axis is the allowable load or less.

$F = W_1 + W_2$ + (other thrust load)

$= m_1 g + m_2 g$ + (other thrust load)



Model	Allowable thrust load F [N]
RCP2-GRLS	15
RCP2-GR3LS	—
RCP2-GR3LM	—

How to Select Rotary Actuators

To select a rotational axis, you must calculate the inertial moments that will generate under the conditions in which the axis will be used and make sure a model on which the calculated inertial moments are accommodated will be used.
Use the inertial moment calculation formulas for representative shapes shown below to calculate and check the inertial moments that will act upon the work part and mounting jigs you will be using. (Correlation graphs of shape vs. mass for different work parts are provided on the following page, so use a graph representing your work part as a rough guide.)
Also, you must check the load moment in addition to the allowable inertial moment. Select a model that can accommodate the moments that will generate, based on the shape and size of the work part.

Inertial Moment

An inertial moment indicates the inertial mass of an object in rotational motion and corresponds to the mass of an object in linear motion.
The greater the inertial moment, the more difficult it becomes for the object to move or stop.
In other words, whether or not the inertial moment of the object to be rotated can be controlled becomes a key point when selecting a rotary actuator.
The inertial moment varies depending on the mass and shape of the object. Refer to the calculation formulas for representative examples given below.

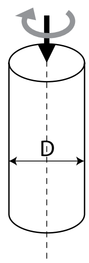
Allowable inertial moments for rotary actuators are indicated by **load inertias.**
If the calculated inertial moment is smaller than the load inertia of the rotary actuator, the actuator can be used.

● How to Calculate Inertial Moments for Representative Shapes

1. Rotational Axis Passing through the Center of the Object

(1) Inertial moment of cylinder 1
* The same formula can be used regardless of the height of the cylinder (or disk).

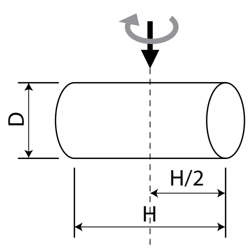
<Calculation Formula> $I = M \times D^2/8$



Inertial moment of cylinder: I ($kg \cdot m^2$)
Mass of cylinder: M (kg)
Diameter of cylinder: D (m)

(2) Inertial moment of cylinder 2

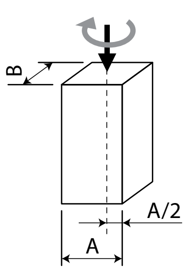
<Calculation Formula> $I = M \times (D^2/4 + H^2/3)/4$



Inertial moment of cylinder: I ($kg \cdot m^2$)
Mass of cylinder: M (kg)
Diameter of cylinder: D (m)
Length of cylinder: H (m)

(3) Inertial moment of prism 1
* The same formula can be used regardless of the height of the prism (or block).

<Calculation Formula> $I = M \times (A^2 + B^2)/12$

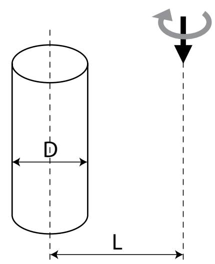


Inertial moment of prism: I ($kg \cdot m^2$)
One side of prism: A (m)
One side of prism: B (m)

2. Center of the Object Offset from the Rotational Axis

(4) Inertial moment of cylinder 3
* The same formula can be used regardless of the height of the cylinder (or disk).

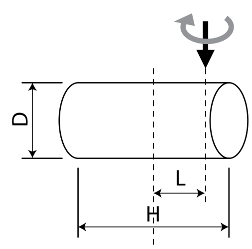
<Calculation Formula> $I = M \times D^2/8 + M \times L^2$



Inertial moment of cylinder: I ($kg \cdot m^2$)
Mass of cylinder: M (kg)
Diameter of cylinder: D (m)
Distance from rotational axis to center: L (m)

(5) Inertial moment of cylinder 4

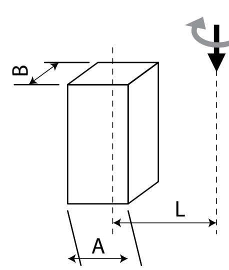
<Calculation Formula>$I = M \times (D^2/4 + H^2/3)/4 + M \times L^2$



Inertial moment of cylinder: I ($kg \cdot m^2$)
Mass of cylinder: M (kg)
Diameter of cylinder: D (m)
Length of cylinder: H (m)
Distance from rotational axis to center: L (m)

(6) Inertial moment of prism 2
* The same formula can be used regardless of the height of the prism (or block).

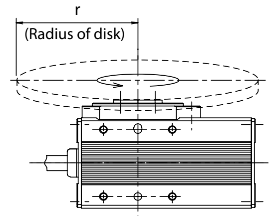
<Calculation Formula> $I = M \times (A^2 + B^2)/12 + M \times L^2$



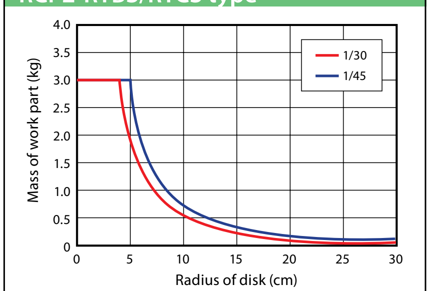
Inertial moment of prism: I ($kg \cdot m^2$)
Mass of prism: M (kg)
One side of prism: A (m)
One side of prism: B (m)
Distance from rotational axis to center: L (m)

■ Rough Guide for Shape and Mass of Work Part

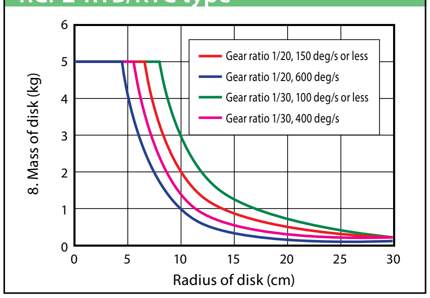
A. Work part in disk at the center of the output shaft



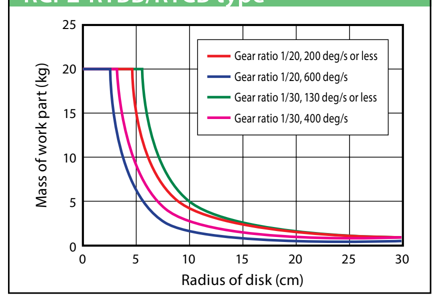
RCP2-RTBS/RTCS type



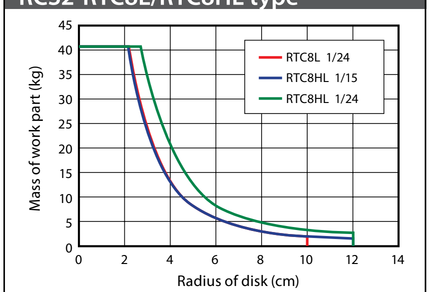
RCP2-RTB/RTC type



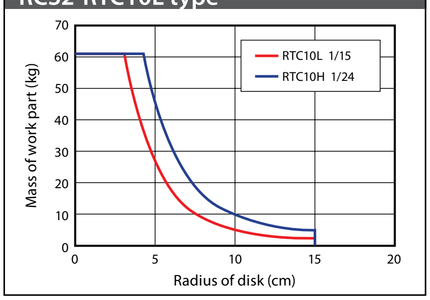
RCP2-RTBB/RTCB type



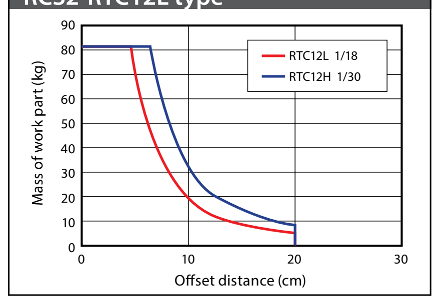
RCS2-RTC8L/RTC8HL type



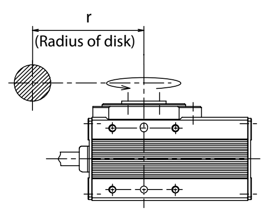
RCS2-RTC10L type



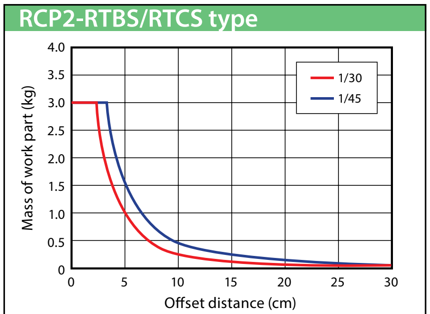
RCS2-RTC12L type



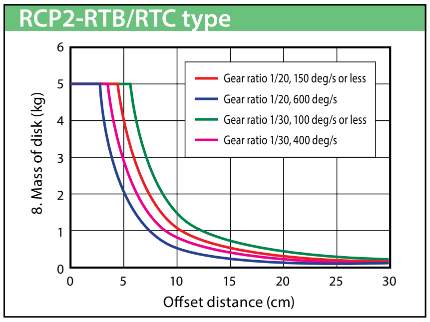
B. Work part offset from the center of the output shaft



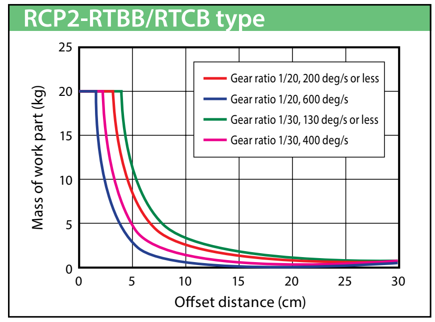
RCP2-RTBS/RTCS type



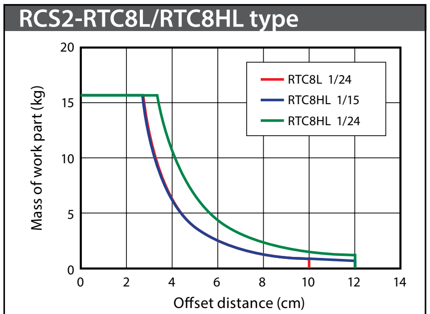
RCP2-RTB/RTC type



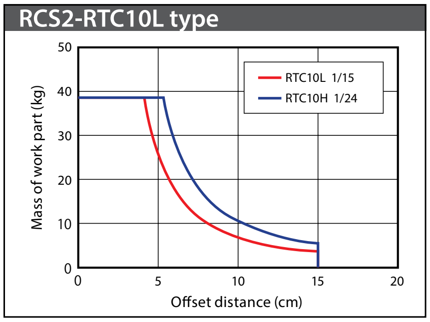
RCP2-RTBB/RTCB type



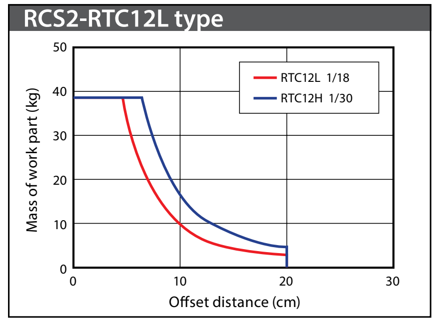
RCS2-RTC8L/RTC8HL type



RCS2-RTC10L type



RCS2-RTC12L type



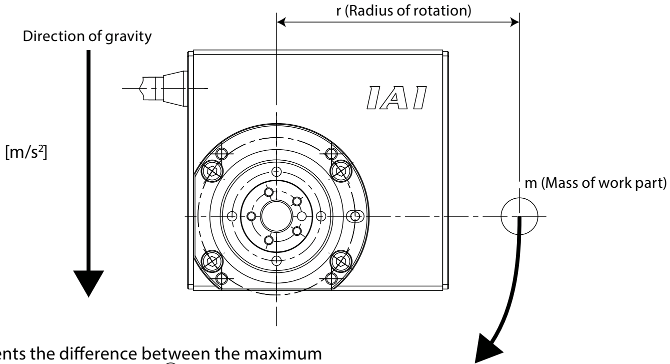
How to Select Rotary Actuators

If you are planning to use the rotary actuator with its rotational part positioned vertically to the floor surface (the axis of rotation is parallel to the plane of the floor), use the calculation formula below to check if it is feasible.

1. Calculate the generating torque based on the work part and gravitational torque.

Wg=mgr [N•m] • • • • • ①

m: Mass of work part [kg]
g: Gravitational acceleration [m/s^2]
r: Radius of rotation [m]



2. Calculate the differential torque. *The differential torque represents the difference between the maximum torque of the actuator and the torque calculated in ①.

ΔT = (Tmax - Wg) • • • • • ② Tmax: Maximum torque of output shaft [N•m]

Size	Model	Gear ratio	Maximum torque
Small	RTBS, RTBSL, RTCS, RTCSL	1/30	0.24
		1/45	0.36
Medium	RTB, RTBL, RTC, RTCL	1/20	1.1
		1/30	1.7
Large	RTBB, RTBBL, RTCB, RTCBL	1/20	3
		1/30	4.6

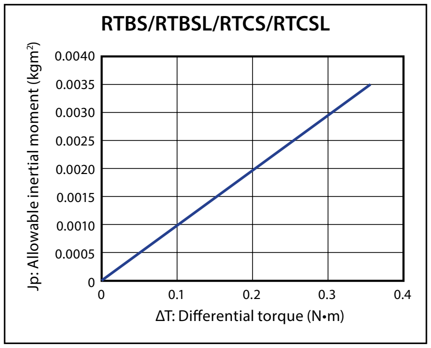
3. Check if the model you wish to use accommodates the differential torque.

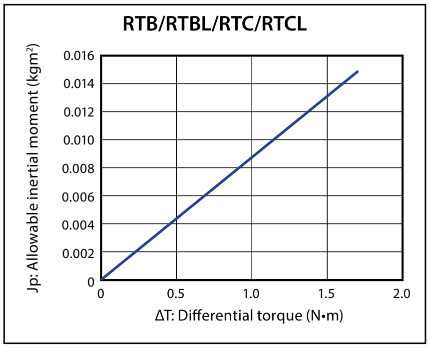
ΔT ≦ 0 • • • • • The model cannot be used. Change to a model of higher torque capacity or reduce the mass of the work part or radius of rotation of the actuator.

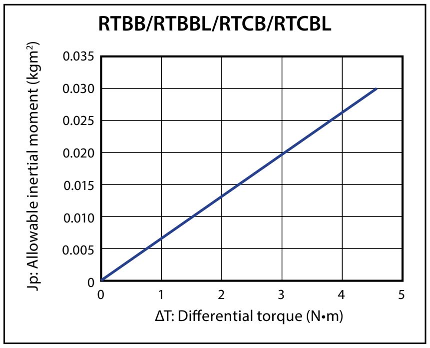
ΔT > 0 • • • • • The model can be used. Proceed to the next check.

4. Use the differential torque (ΔT) calculated in ② to obtain the allowable inertial moment (Jp) of the actuator sitting on it side. The allowable inertial moment varies from one model to another, so use an applicable graph below to calculate the allowable inertial moment for your specific model. The allowable inertial moment is not affected by the gear ratio of each model.

Example) The allowable inertial moment of the RTB subject to a differential torque of 0.6 N•m is 0.005 kgm^2.







5. Judgment of Allowable Inertial Moment

If the calculated allowable inertial moment (J_P) is greater than the inertial moment of the work part (J_W), the model can be used.

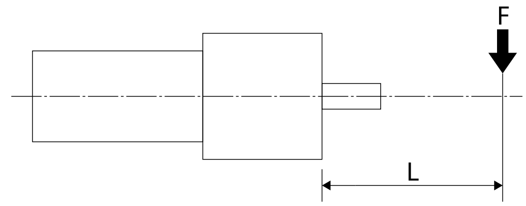
Allowable inertial moment J_P > Inertial moment J_W • • • • • The model can be used.

Allowable inertial moment J_P ≦ Inertial moment J_W • • • • • The model cannot be used.

(Change to a model of higher torque capacity or reduce the mass of the work part or radius of rotation of the actuator.)

Load Moment

While the inertial moment provides a rough guide in terms of control (from electrical viewpoints), the load moment provides a rough guide for use limit in terms of strength (from mechanical viewpoints).
The reference position of moment is the end face on the actuator at the base of the output shaft. Check if the load moment that will act upon the output shaft is within the allowable load moment specified in the catalog.
Exercise caution that, if the actuator is used under load moments exceeding the allowable load moment, the service life of the actuator may be shortened or the actuator may break down.

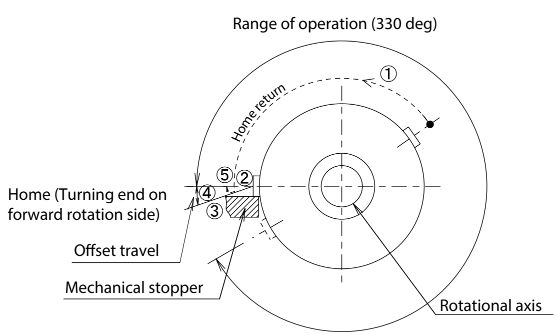


Load Moment (N•m)=F(N) x L(m)

■Points to Note Regarding the Home of the Rotary Type

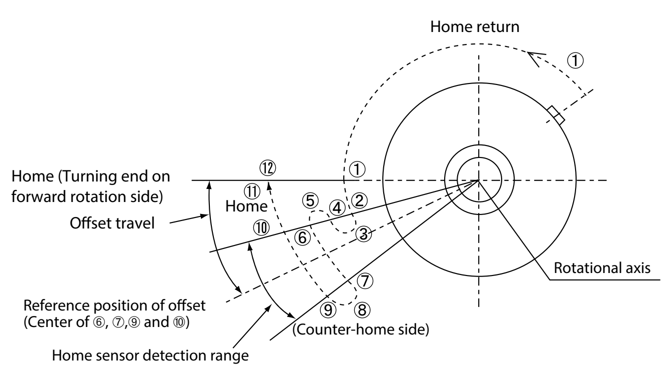
Rotary actuators are classified into the two types of "330-deg type" and "360-deg type" according to the range of operation. Both have the same home position, but if you wish to change the home return operation and direction of home return (turning direction), pay attention to the following points.

		330-deg type	360-deg type
Method of home return (Standard specification)		The actuator turns counterclockwise from the current position, hits the stopper, and reverses its direction. The point where the actuator reverses its direction becomes the home. (Refer to [1] in the figure below.)	The actuator turns counterclockwise from the current position until the sensor signal is detected, after which the actuator moves back and forth within the home sensor detection range to confirm an appropriate position that becomes the home. (Refer to [2] in the figure below.)
Non-motor end specification (Reverse rotation specification)		During home return, the actuator turns clockwise from the current position, hits the stopper, and reverses its direction. The point where the actuator reverses its direction becomes the home. With the non-motor end specification, the stopper position is different from that of the standard specification. Accordingly, the standard specification cannot be retrofitted to the non-motor end specification.	During home return, the actuator turns clockwise from the current position until the sensor signal is detected, after which the actuator moves back and forth within the home sensor detection range to confirm an appropriate position that becomes the home. Since there is no stopper, the standard specification can be retrofitted to the non-motor end specification.
Accuracy of home return	Small	Within ±0.05°	Within ±0.05°
	Medium	Within ±0.01°	Within ±0.05°
	Large	Within ±0.01°	Within ±0.03°



330-deg Rotation Specification

[1]



Multi-rotation Specification

[2]

Duty

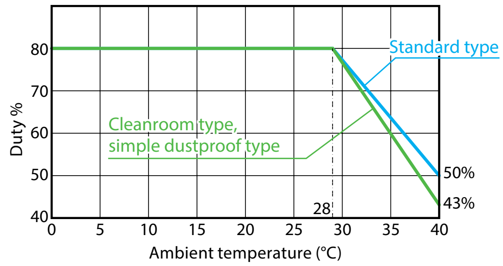
The duty represents the utilization ratio of the actuator (time during which the actuator operates per cycle).
If the duty is too high for the load on the actuator, speed or acceleration, an overload error may generate. Since a rough guide for the feasible duty varies depending on the type of motor the actuator is using, refer to the calculation methods below and use an appropriate duty.

[1. Duty Calculation Methods for Different Motor Types]

<Pulse Motor>

Actuators of the pulse motor specification can be operated at a duty of 100%.
Applicable models: RCP2 (CR) (W), RCP3, RCP4, ERC2, ERC3*1
*1: With the ERC3, the duty is limited when the high output setting is enabled, in order to prevent the motor from generating heat. Refer to the graph below for details.

The limitation of duty shown below applies when the high output setting of the controller is enabled. If the high output setting is disabled, the payload and maximum speed drop, but the actuator can be operated at a duty of 100%. Refer to the operation manual for information on how to change the high output setting.



Make sure the cycle time does not exceed the applicable limit specified below.

Model	Cycle time ($T_M + T_R$)
SA5C/RA4C	15 minutes or less
SA7C/RA6C	10 minutes or less

Notes:
Do not operate the actuator at a duty exceeding the allowable value.
If the actuator is operated at a duty exceeding the allowable value, the service life of the capacitor used in the controller part of the ERC3 will become shorter.

<AC Servo Motor>

AC servo motors are subject to duty limitations according to the operating conditions.
How to calculate the duty of a servo motor is described below.
Based on the "Load Factor" and "Acceleration/Deceleration Time Ratio" obtained from the operating conditions of each model, read off an applicable duty from each "Graph of Rough Duty." The calculation formulas for "Load Factor" are shown below.

●Calculation Formula for Load Factor ①: "Applicable models: RCA, RCA2, RCS2"

Calculate the load factor LF①using the calculation formula below:

$$\text{Load factor: } LF_{①} = \frac{M \times \alpha}{M_1 \times \alpha_1} \%$$

Actual mass of work part : M
Command acceleration/deceleration : α
Payload at rated acceleration/deceleration : M_1
Rated acceleration/deceleration : α_1 (0.2G/0.3G)
Load factor
($M \leqq M_1$, $\alpha \leqq \alpha_1$)

(Note) For the payload at rated acceleration/deceleration and rated acceleration/deceleration of each model, refer to the model/specification table for the model.

If the actuator is operated under the operating conditions below, the load factor is calculated as specified.

<Example 1>
Actual mass of work part : 5kg
Command acceleration/deceleration : 0.3G
Payload at rated acceleration/deceleration : 5kg
Rated acceleration/deceleration : 0.3G
Load factor: LF① = 100%

<Example 2>
Actual mass of work part : 2.5kg
Command acceleration/deceleration : 0.3G
Payload at rated acceleration/deceleration : 5kg
Rated acceleration/deceleration : 0.3G
Load factor: LF① = 50%

<Example 3>
Actual mass of work part : 5kg
Command acceleration/deceleration : 0.15G
Payload at rated acceleration/deceleration : 5kg
Rated acceleration/deceleration : 0.3G
Load factor: LF① = 50%

●Calculation Formula for Load Factor②: "Applicable model: RCS3"

With the above model, the set acceleration/deceleration can be greater than the rated acceleration/deceleration. The calculation formula to use varies depending on whether or not the command acceleration/deceleration is greater than the rated acceleration/deceleration.

- ◆ If the command acceleration/deceleration is no greater than the rated acceleration/deceleration, use the **calculation formula for load factor**①.
- ◆ If the command acceleration/deceleration is greater than the rated acceleration/deceleration, use the calculation formula below to calculate the load factor LF②:

$$\text{Load factor: LF②} = \frac{M \times \alpha}{M_2 \times \alpha}\ \% = \frac{M}{M_2}\ \%$$

Actual mass of work part : M
Command acceleration/deceleration : α
Payload at rated acceleration/deceleration : M_2
$(M \leqq M_2)$

(Note) For the acceleration/deceleration and acceleration/deceleration vs. payload of each model, refer to the table of payload by acceleration applicable to the model.

An example of using the table of payload by acceleration applicable to "RCS3-SA8C, 150 W, lead 30mm is shown.

Model	Type	Motor output	Lead [mm]	Payload by acceleration [kg]			
				0.3G	0.5G	0.7G	1G
RCS3	SA8C	150W	30	12	10	6	2

(Note) Installed and used horizontally at a rated acceleration/deceleration of 0.3 G

<Example 1>
Actual mass of work part : 2kg
Command acceleration/deceleration : 1.0G
Payload at command acceleration/deceleration : 2kg
Load factor: LF② = 100%

<Example 2>
Actual mass of work part : 5kg
Command acceleration/deceleration : 0.5G
Payload at command acceleration/deceleration : 10kg
Load factor: LF② = 50%

<Example 3>
Actual mass of work part : 12kg
Command acceleration/deceleration : 0.3G
Payload at command acceleration/deceleration : 12kg
(Note) Use the calculation formula for load factor ①.

[2. Duty Calculation Method When the Optional High Acceleration/Deceleration Specification Is Selected]

"Applicable models: RCA and RCS2 models with the high acceleration/deceleration option selected"

Use the calculation formula below to calculate the load factor LF[3]. With the high acceleration/deceleration specification, the rated acceleration is the same as that of the standard specification.
From the obtained "Load Factor" and "Acceleration/Deceleration Time Ratio," read off an applicable duty from "Graph of Rough Duty 2 (for High Acceleration/Deceleration Specification)."

$$\text{Load factor: LF ③} = \frac{M \times \alpha_2}{M_1 \times \alpha_1}\ \%$$

Actual mass of work part : M
Command acceleration/deceleration : α_2
Payload at rated acceleration/deceleration : M_2
Rated acceleration/deceleration : α_1 (0.3G)

Maximum acceleration/deceleration of each model: α max
$(M \leqq M_1,\ \alpha_1 < \alpha_2 \leqq \alpha\,max)$

α max list

Model	Lead	α max
RCA/RCS2-SA4C	10	1
	5	1
RCA/RCS2-SA5C	12	0.8
	6	0.8
RCA/RCS2-SA6C	12	1
	6	1
RCS2-SA7C	16	1
	8	0.8
RCA-RA3C	10	1
	5	1
RCA-RA4C 30W	12	1
	6	1
RCS2-RA4C 30W	12	1
	6	1
RCS2-RA5C 100W	16	1
	8	1

<Example 1>
Actual mass of work part : 2kg
Command acceleration/deceleration : 0.6G
Payload at command acceleration/deceleration : 2kg
Rated acceleration/deceleration : 0.3G
Load factor: LF③ = 200%

<Example 2>
Actual mass of work part : 1kg
Command acceleration/deceleration : 0.9G
Payload at command acceleration/deceleration : 2kg
Rated acceleration/deceleration : 0.3G
Load factor: LF③ = 150%

Duty

● **Calculation Method for Acceleration/Deceleration Time Ratio t_{od}**

Use the calculation formula below to calculate the acceleration/deceleration time ratio t_{od}:

$$\text{Acceleration/deceleration time ratio: } t_{od} = \frac{\text{Acceleration time + Deceleration time}}{\text{Operating time}} \%$$

$$\text{Acceleration time} = \frac{\text{Speed (mm/s)}}{\text{Acceleration (mm/s}^2\text{)}} \text{ (sec.)}$$

Acceleration (mm/s^2) = Acceleration (G) x 9,800 mm/s^2

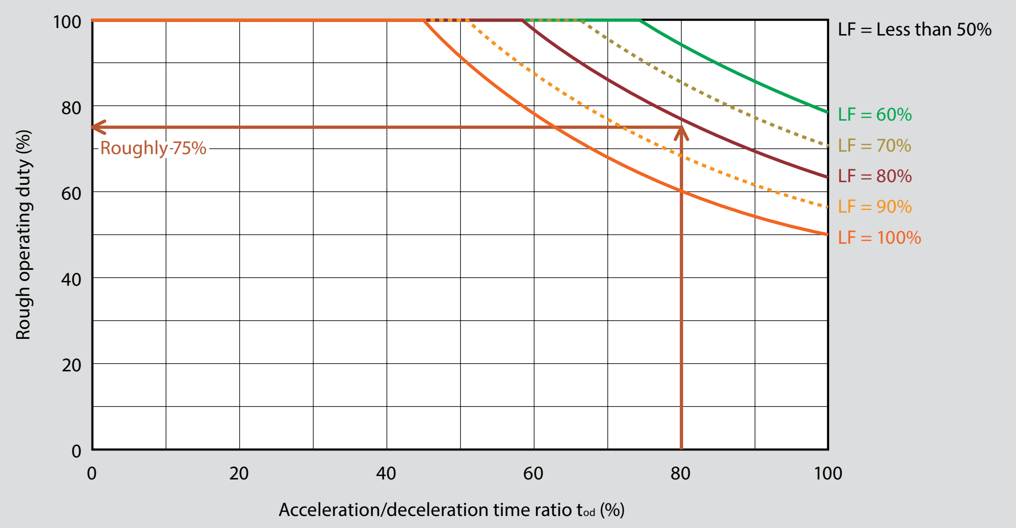
$$\text{Deceleration time} = \frac{\text{Speed (mm/s)}}{\text{Acceleration (mm/s}^2\text{)}} \text{ (sec.)}$$

Deceleration (mm/s^2) = Deceleration (G) x 9,800 mm/s^2

Graph of Rough Duty 1 (for Standard Specification)

Read off a rough duty from this graph based on the "Load Factor" and "Acceleration/Deceleration Time Ratio" you have calculated.

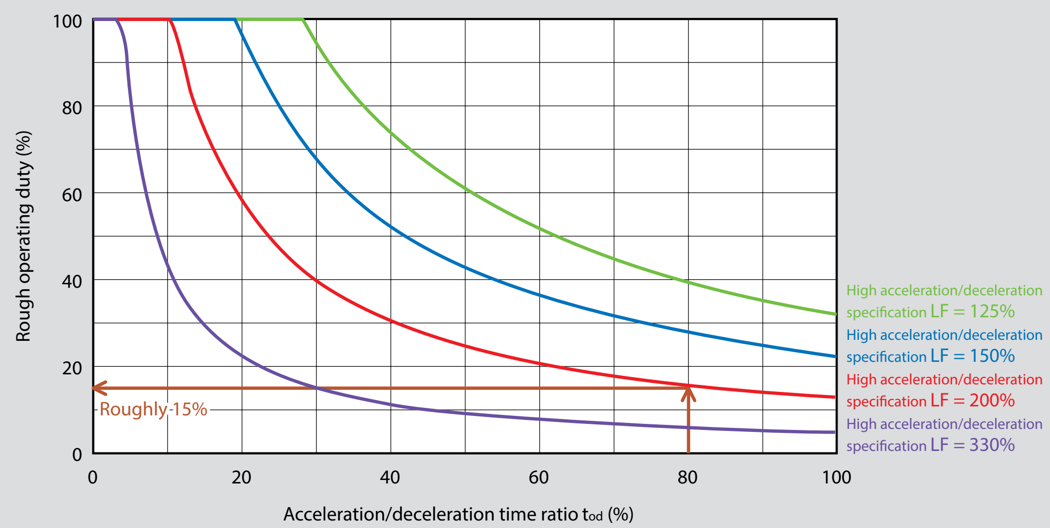
Example: If the load factor is 80% and acceleration/deceleration time ratio is 80%, the duty is roughly 75%.



Graph of Rough Duty 2 (for High Acceleration/Deceleration Specification)

Read off a rough duty from this graph based on the "Load Factor" and "Acceleration/Deceleration Time Ratio" you have calculated.

Example: If the load factor is 200% and acceleration/deceleration time ratio is 80%, the duty is roughly 15%.



Offboard Tuning Function

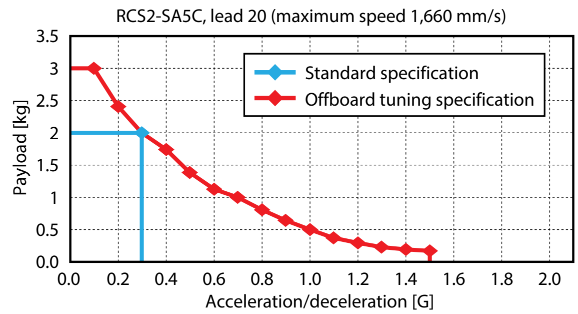
Increasing the Transfer Capacity of the Actuator

Supported by PC Software Ver. 8.05.00.00 or later

The offboard tuning function allows an optimal gain to be set automatically according to the work part in order to improve the payload and acceleration/deceleration and thereby increase the transfer capacity and reduce the takt time of the actuator.
Offboard tuning provides the following three benefits:

① By setting a lower acceleration/deceleration, the actuator can transfer work parts heavier than the rated payload.
② If the mass of the work part is smaller than the rated payload, the acceleration/deceleration can be increased.
③ The maximum speed can be raised.

Example) A graph showing how offboard tuning benefits the RCS2-SA5C of lead, 20 is shown to the right.
① By lowering the acceleration/deceleration from the rated acceleration of 0.3G to 0.1G, the maximum payload increases from 2kg to 3kg.
② If the mass of the work part is smaller, the acceleration/deceleration can be increased to up to 1.5G.
③ The maximum speed can be raised from 1,300mm/s of the standard specification to 1,660 mm/s.



Offboard tuning is effective when a SCON-CA controller is combined with any of the actuators listed in the table below.
Also note that the specific benefits of this function vary depending on the actuator model. (Refer to the table below.)

■ Offboard Tunable Models and Benefits

Series	Type	Lead	Motor	Installed horizontally					
				Standard specification			After offboard tuning		
				Rated acceleration	Payload	Maximum speed	Maximum acceleration	Payload	Maximum speed
		mm	W	G	kg	mm/s	G	kg	mm/s
RCS2	SA4C	10	20	0.3	4	665	1.5	0.5	665
	SA5C	20	20		2	1300	1.5	0.2	1660
	SA6C	20	30		3	1300	1.5	0.25	1660
	SA7C	16	60		12	800	2	1	1060
	SS7C	12	60		15	600	2	2	800
	SA4R	10	20		4	665	0.8	1	665
	SA5R	12	20		4	800	0.8	1	800
	SA6R	12	30		6	800	0.8	1	800
	SA7R	16	60		12	800	0.8	3.5	800
	SS7R	12	60		15	600	0.8	4	600
	RA4C	12	20		3	600	1	0.25	600
			30		4	600	1.5	0.25	600
	RA5C	16	60		12	800	1.5	2	800
			100		15	800	1.5	2.5	800
RCS3	SA8C/SS8C	30	100	1	1	1800	2	0.25	2000
			150		2	1800	2	0.5	2000
	SA8R/SS8R	30	100		1	1800	1.2	0.25	1800
			150		2	1800	1.2	1	1800
RCS2CR	SA4C	10	20	0.3	4	665	0.3	4	665
	SA5C	20	20		2	1300		2	1330
	SA6C	20	30		3	1300		3	1330
	SA7C	16	60		12	800		12	800
	SS7C	12	60		15	600		15	600
RCS3CR	SA8C/SS8C	30	100	1	1	1800	1	1	1800
			150		2	1800		2	1800
ISB ISPB	SXM/SXL	16	60	1.2	3.5	960	2	1.5	960
	MXM/MXL	30	100		3	1800		0.75	1800
			200		9	1800		4.5	1800
	LXM/LXL	40	200		6	2400		2	2400
			400		15	2400		6.5	2400
ISDB ISPDB	S	16	60	1	4.5	960	1.8	1.8	960
	M	30	100		4	1800		1.25	1800
			200		12	1800		5.5	1800
	L	40	200		7	1800		2.5	1800
			400		17	1800		7	1800
SSPA	SXM	30	200	1.2	10	1800	2	4.5	1800
	MXM	40	400		13.5	2400		5.5	2400
	LXM	50	750		20	2500		8	2500
ISDBCR ISPDBCR	S	16	60	1	4.5	960	1	4.5	960
	M	30	100		4	1800		4	1800
			200		12	1800		12	1800
	L	40	200		7	1800		7	1800
			400		17	1800		17	1800
SSPDACR	SXM	30	200	1.2	10	1600	1.2	10	1600
	MXM	40	400		13.5	1600		13.5	1600
	LXM	50	750		20	1600		20	1600

Selection Guideline (Table of Payload by Speed/Acceleration)

ERC3 Series — Slider type/Rod type/ High-output setting enabled (Factory default)

The maximum acceleration/deceleration of the ERC3☐ is 1.0 G in a horizontal application or 0.5 G in vertical application. The payload drops as the acceleration increases, so when selecting a model, use the tables below to find one that meets the desired speed, acceleration and payload.

ERC3☐-SA5C Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6.5	6.5	5	5	4	1	1	1
160	6.5	6.5	5	5	4	1	1	1
320	6.5	6.5	5	5	4	1	1	1
480	6.5	6.5	4	4	4	1	1	1
640	6.5	6.5	3.5	3.5	3	1	1	1
800	5.5	5.5	3.5	3	1	1	1	1
960		5.5	2.5	2	1		0.5	0.5
1120		5.5	1	1	1		0.5	0.5

ERC3☐-SA5C Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	9	9	9	9	8	2.5	2.5	2.5
100	9	9	9	9	8	2.5	2.5	2.5
200	9	9	9	9	8	2.5	2.5	2.5
300	9	9	9	9	7	2.5	2.5	2.5
400	9	9	8	8	6	2.5	2.5	2.5
500	9	9	8	5.5	5.5	2.5	2.5	2
600	9	9	8	5.5	4	2.5	2	1.5
700	9	7	6	4	2.5	2.5	1	0.5
800		5.5	3.5	2	1		0.5	0.5
900		5	2.5	1			0.5	

ERC3☐-SA5C Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	18	18	13	12	11	6	6	6
50	18	18	13	12	11	6	6	6
100	18	18	13	12	11	6	6	6
150	18	18	13	12	11	6	6	6
200	18	18	13	12	11	6	6	6
250	18	17	13	12	9	6	5	4.5
300	16	16	12	11	7	4.5	4	3.5
350	14	14	8	8	6	4	3.5	3
400	10.5	10	7	4.5	4	2.5	2	1.5
450	7.5	7	4	2.5	1	1	0.5	

ERC3☐-SA5C Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	16	16	13	12	12	12
25	20	20	16	16	13	12	12	12
50	20	20	16	16	12	12	12	12
75	20	20	16	16	12	12	12	12
100	20	18	14	12	10	12	10.5	10.5
125	20	17	14	9.5	8	12	10.5	10.5
150	20	17	11	8	7	9.5	8	8
175	20	10	10	4.5	3.5	7	7	6
200	20	9	3			6	4	2
225	15					4.5		

ERC3☐-SA7C Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	17	15	13	11	3	3	3
200	20	17	15	13	11	3	3	3
400	20	14	14	13	10	3	3	3
600	20	14	10	8	8	3	3	3
800	10	10	8	6	2.5		3	2.5
1000		8	4	2	1		2	
1200		4	2				1	

ERC3☐-SA7C Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	35	35	35	26.5	26.5	7	6	4
140	35	35	35	26.5	26.5	7	6	4
280	35	28	28	22	18	7	6	4
420	30	23	12.5	11	10	5	5	4
560	22	15	9.5	7.5	5.5	5	4	3
700	20	11	5.5	3.5	2	3.5	2.5	1.5
840		4	2.5				1	
980		2						

ERC3☐-SA7C Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	43	40	40	40	40	15	14	13
70	43	40	40	40	40	15	14	13
140	40	40	40	38	35	15	14	13
210	40	36	35	30	24	11	9	9
280	40	23	11	8	2	8	7	6
350	35	4	2	2		5	3.5	1.5
420	25					2.5		
490	15					1.5		

ERC3☐-SA7C Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	45	45	40	35	22	22	22
35	45	45	45	40	35	22	22	22
70	45	42	42	35	35	22	22	22
105	42	40	40	35	35	20	20	19
140	42	40	25	25	22	15	12	11
175	38	18				10	4.5	
210	35					6.5		

ERC3-RA4C Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6	6	6	5	4.5	1.5	1.5	1.5
160	6	6	6	5	4.5	1.5	1.5	1.5
320	6	6	6	5	3	1.5	1.5	1.5
480	6	6	6	4.5	3	1	1	1
640		6	4	3	2		1	1
800		4	3				0.5	0.5

ERC3-RA4C Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	14	14	12	4.5	4.5	3.5
100	25	25	14	14	12	4.5	4.5	3.5
200	25	25	11	8	8	4.5	4.5	3.5
300	25	25	11	7	5.5	4	4	3.5
400	17.5	16.5	8	4	3.5	3.5	3.5	2.5
500		15	5.5	2	2		3.5	2
600		10	3.5				2	1
700		6	2				1	1

ERC3-RA4C Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	31.5	30	25	12	12	10
50	40	40	31.5	30	25	12	12	10
100	40	40	31.5	24.5	21	12	12	10
150	40	40	24.5	17.5	17.5	11	11	7
200	40	40	21	14	12.5	8	8	5.5
250	35	24.5	17.5	14	11	7	7	4
300	28	21	12.5	12.5	8	5.5	5.5	4
350	24.5	17.5	9.5	5.5	5.5	4	3.5	3.5
400	17.5	9.5	7	4	2.5	3.5	2.5	2
450	17.5	5.5	2				1	1

ERC3-RA4C Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	40	40	35	18	18	17
25	40	40	40	40	35	18	18	17
50	40	40	40	40	35	18	18	17
75	40	40	40	40	35	16	16	16
100	40	40	40	40	35	16	15	15
125	40	40	40	40	30	16	12	10
150	40	40	40	30	25	10	8	5.5
175	36	36	35	25	20	10	5.5	5
200	36	28	28	19.5	14	7	5	4.5
225	36	16	14	10	6	4	3.5	2

ERC3-RA6C Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	13	11	10	8	3	3	2
200	20	13	11	10	8	3	3	2
400	20	13	11	10	8	2	2	2
600		13	7	5	3.5		2	2
800		3	1					

ERC3-RA6C Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	40	30	28	26	8	8	8
140	45	40	30	28	26	8	8	8
280	45	34	30	24	18	6.5	5.5	5.5
420	45	22	17	13	10	5.5	4	3
560		9.5	5	2.5	1.5		2	1
700		2						

ERC3-RA6C Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	60	55	45	40	40	17.5	17.5	17.5
70	60	55	45	40	40	17.5	17.5	17.5
140	60	55	40	40	40	11	11	11
210	60	50	40	28	26	7.5	7.5	7
280	60	32	20	15	11	6	5.5	4.5
350	50	14	4.5	1		3	2.5	2
420	15					2		

ERC3-RA6C Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	70	70	60	60	50	25	25	25
35	70	70	60	60	50	25	25	25
70	70	70	60	60	50	25	25	25
105	70	70	55	45	40	15	15	15
140	70	50	30	20	15	11.5	10	8
175	50	15				6	3	
210	20							

RCP4 Series | Slider type, Motor unit coupled + PCON-CA

The tables on page 100 to page 108 show payloads by acceleration and speed. Since the payload drops as the acceleration and speed increase, select from the tables and use a model that meets the required conditions. The applicable payload table varies depending on the actuator model and connected controller, so select and check the table for the model you will be using.

RCP4(CR)-SA5C Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6.5	6.5	5	5	4	1	1	1
160	6.5	6.5	5	5	4	1	1	1
320	6.5	6.5	5	5	4	1	1	1
480	6.5	6.5	5	5	4	1	1	1
640	6.5	6.5	5	5	4	1	1	1
800	6.5	6.5	5	4	3	1	1	1
960		6.5	5	3	2		1	1
1120		6	3	2	1.5		0.5	0.5
1280			1	1	1			0.5
1440			1	0.5				

RCP4(CR)-SA5C Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	9	9	9	9	8	2.5	2.5	2.5
100	9	9	9	9	8	2.5	2.5	2.5
200	9	9	9	9	8	2.5	2.5	2.5
300	9	9	9	9	8	2.5	2.5	2.5
400	9	9	9	9	8	2.5	2.5	2.5
500	9	9	9	8	6.5	2.5	2.5	2.5
600	9	9	9	6	4	2.5	2.5	2.5
700	9	9	8	4	2.5	2.5	2.5	2
800		7	5	2	1		1.5	1
900		5	3	1	1		0.5	0.5

RCP4(CR)-SA5C Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	18	18	14	14	12	6	6	6
50	18	18	14	14	12	6	6	6
100	18	18	14	14	12	6	6	6
150	18	18	14	14	12	6	6	6
200	18	18	14	14	12	6	6	6
250	18	18	14	14	12	6	6	5.5
300	18	18	14	14	10	6	5.5	5
350	18	18	12	11	8	6	4.5	4
400	18	14	10	7	6	4.5	3.5	3
450	16	10	6	4	2	3.5	2	2

RCP4(CR)-SA5C Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	18	18	14	12	12	12
25	20	20	18	18	14	12	12	12
50	20	20	18	18	14	12	12	12
75	20	20	18	18	14	12	12	12
100	20	18	18	16	12	12	12	12
125	20	18	18	16	12	12	12	12
150	20	18	18	12	10	12	11	10
175	20	18	14	10	6	11	9	8
200	20	18	8			9	7	6
225	20	6				6	5	

RCP4(CR)-SA6C Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	10	10	9	7	6	1	1	1
160	10	10	9	7	6	1	1	1
320	10	10	9	7	6	1	1	1
480	10	10	9	7	6	1	1	1
640	10	10	8	6	5	1	1	1
800	10	9	6.5	4.5	3	1	1	1
960		8	5	3.5	2		1	1
1120		6.5	3	2	1.5		0.5	0.5
1280			1	1	1			0.5
1440			1	0.5				

RCP4(CR)-SA6C Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	15	15	12.5	11	10	2.5	2.5	2.5
100	15	15	12.5	11	10	2.5	2.5	2.5
200	15	15	12.5	11	10	2.5	2.5	2.5
300	15	15	12.5	11	10	2.5	2.5	2.5
400	15	14	11	10	8.5	2.5	2.5	2.5
500	15	13	10	8	6.5	2.5	2.5	2.5
600	15	12	9	6	4	2.5	2.5	2.5
700	12	10	8	4	2.5	2.5	2.5	2
800	10	7	5	2	1	2	1.5	1
900		5	3	1	1		0.5	0.5

RCP4(CR)-SA6C Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	20	16	14	6	6	6
50	25	25	20	16	14	6	6	6
100	25	25	20	16	14	6	6	6
150	25	25	20	16	14	6	6	6
200	25	25	20	16	14	6	6	6
250	25	25	20	16	14	6	6	5.5
300	25	25	20	15	11	6	5.5	5
350	25	20	14	12	9	6	4.5	4
400	25	16	10	8	6.5	4.5	3.5	3
450	18	12	6	5	2.5	3.5	2	2

RCP4(CR)-SA6C Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	25	25	25	12	12	12
25	25	25	25	25	25	12	12	12
50	25	25	25	25	25	12	12	12
75	25	25	25	25	25	12	12	12
100	25	25	25	25	25	12	12	12
125	25	25	25	25	25	12	12	12
150	25	25	25	25	22.5	12	11	10
175	25	25	25	20	19	11	9	8
200	25	25	20	18	16	9	7	6
225	25	18	16	15	12	6	5	

RCP4(CR)-SA7C Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	18	16	14	3	3	3
200	20	20	18	16	14	3	3	3
400	20	20	18	16	14	3	3	3
600	20	16	15	10	9	3	3	3
800	16	12	10	7	4		3	2.5
1000		8	4.5	4	2		2	1.5
1200		5.5	2	2	1		1	1

RCP4(CR)-SA7C Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	35	28	27	8	8	8
140	40	40	35	28	27	8	8	8
280	40	38	35	25	24	8	8	8
420	35	25	20	15	10	6	5	4.5
560	25	20	15	10	6	5	4	3
700	20	15	10	5	3	4	3	2
840		9	4	2	2		1	
980		4						

RCP4(CR)-SA7C Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	45	45	40	40	16	16	16
70	45	45	45	40	40	16	16	16
140	45	45	40	38	35	16	16	16
210	45	40	35	30	24	11	10	9.5
280	40	30	25	20	15	9	8	7
350	35	20	9	4		7	5	4
420	25	7				5	2	
490	15					2		

RCP4(CR)-SA7C Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	45	45	40	40	25	25	25
35	45	45	45	40	40	25	25	25
70	45	45	45	40	40	25	25	25
105	45	45	45	40	35	22	20	19
140	45	45	35	30	25	16	14	12
175	45	30	18			11	9	7.5
210	40	8				8		
245	35							

Selection Guideline (Table of Payload by Speed/Acceleration)

RCP4 Series | **Rod type, Motor unit coupled + PCON-CA**

RCP4-RA5C Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6	6	6	5	5	1.5	1.5	1.5
160	6	6	6	5	5	1.5	1.5	1.5
320	6	6	6	5	3	1.5	1.5	1.5
480	6	6	6	5	3	1.5	1.5	1.5
640		6	4	3	2		1.5	1.5
800		4	3				1.5	1.5

RCP4-RA5C Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	18	16	12	4	4	4
100	25	25	18	16	12	4	4	4
200	25	25	18	16	10	4	4	4
300	25	25	18	12	8	4	4	4
400	20	20	14	10	6	4	4	4
500	15	15	8	6	4	4	3.5	3
600	10	10	6	3	2	4	3	2
700		6	2				2	1

RCP4-RA5C Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	35	30	25	10	10	10
50	40	40	35	30	25	10	10	10
100	40	40	35	30	25	10	10	10
150	40	40	35	25	25	10	10	10
200	40	40	30	25	20	10	10	10
250	40	40	27.5	22.5	18	10	9	8
300	40	35	25	20	14	6	6	6
350	40	30	14	12	10	5	5	5
400	30	18	10	6	5	4	3	3
450	25	8	3			2	2	1

RCP4-RA5C Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	60	60	50	45	40	20	20	20
25	60	60	50	45	40	20	20	20
50	60	60	50	45	40	20	20	20
75	60	60	50	45	40	20	20	20
100	60	60	50	45	40	20	20	20
125	60	60	50	40	30	18	14	10
150	60	50	40	30	25	14	10	6
175	60	40	35	25	20	12	6	5
200	60	35	30	20	14	8	5	4.5
225	40	16	16	10	6	5	5	4

RCP4-RA6C Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	18	15	12	3	3	3
200	20	20	18	15	12	3	3	3
400	20	20	18	15	10	3	3	3
600	15	14	9	7	4	3	3	2
800		5	1	1				

RCP4-RA6C Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	50	50	40	35	30	8	8	8
140	50	50	40	35	30	8	8	8
280	50	50	35	25	20	8	7	7
420	50	25	18	14	10	6	4.5	4
560	12	10	5	3	2	4	2	1
700	3	2						

RCP4-RA6C Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	60	60	50	45	40	18	18	18
70	60	60	50	45	40	18	18	18
140	60	60	50	45	40	16	16	12
210	60	60	40	31	26	10	10	9
280	60	34	22	15	11	8	7	6
350	60	14	5	1		3	3	2
420	15	1				2		

RCP4-RA6C Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	80	80	70	65	60	28	28	28
35	80	80	70	65	60	28	28	28
70	80	80	70	65	60	28	28	28
105	80	80	60	50	40	22	20	18
140	80	50	30	20	15	16	12	10
175	50	15				9	4	
210	20					2		

RCP4 Series | Slider type, Motor unit coupled + MSEP

RCP4(CR)-SA5C Lead 20

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0	5	4	3	3	0.5	0.5
160	5	4	3	3	0.5	0.5
320	5	4	3	3	0.5	0.5
480	4.5	4	3	3	0.5	0.5
640	4	3.5	2	2	0.5	0.5
800	3	2.5	1	1	0.5	0.5
960	2	2	1	0.5		0.5

RCP4(CR)-SA5C Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	8	6	5.5	5	2	2	2
100	8	6	5.5	5	2	2	2
200	8	6	5.5	5	2	2	2
300	8	6w	5.5	5	2	2	2
400	8	6	4	3.5	2	2	1.5
500	7	5	2	1.5	1.5	1.5	1
600	5	4	2	1.5	1	1	0.5

RCP4(CR)-SA5C Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	13	13	13	12	5	5	5
50	13	13	13	12	5	5	5
100	13	13	13	12	5	5	5
150	13	13	13	12	5	5	5
200	13	13	13	12	5	4.5	4
250	13	10	8	7	4	4	3
300	13	9	5	4	3	2.5	2

RCP4(CR)-SA5C Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	16	16	16	16	10	10	10
25	16	16	16	16	10	10	10
50	16	16	16	16	10	10	10
75	16	16	16	14	10	10	10
100	16	16	14	12	10	9	8
125	16	13	11	10	7	6	6
150	16	10	9	8	5	4.5	3

RCP4(CR)-SA6C Lead 20

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0	6	6	4	4	0.5	0.5
160	6	6	4	4	0.5	0.5
320	6	6	4	4	0.5	0.5
480	5	5	3	3	0.5	0.5
640	4	4	2	2	0.5	0.5
800	3	3	1	1	0.5	0.5
960	2	2	1	0.5		0.5

RCP4(CR)-SA6C Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	8.5	8.5	7	6	2	2	2
100	8.5	8.5	7	6	2	2	2
200	8.5	8.5	7	6	2	2	2
300	8.5	8.5	7	6	2	2	2
400	8	7	4	3.5	2	2	1.5
500	7	6	3	2	1.5	1.5	1
600	6	6	2	1.5	1	1	0.5

RCP4(CR)-SA6C Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	16	15	13	12	5	5	5
50	16	15	13	12	5	5	5
100	16	15	13	12	5	5	5
150	16	15	13	12	5	5	5
200	16	15	13	12	5	4.5	4
250	15	12	10	7	4	4	3
300	13	12	6	4	3	2.5	2

RCP4(CR)-SA6C Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	19	19	19	19	10	10	10
25	19	19	19	19	10	10	10
50	19	19	19	16	10	10	10
75	19	19	19	19	10	10	10
100	19	16	14	12	10	9	8
125	18	14	11	10	7	6	6
150	16	13	9	8	5	4.5	3

RCP4(CR)-SA7C Lead 24

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.1	0.3	0.5	0.7	0.1	0.2
0		18				2
200		18				2
400		18				2
600		10				1.5
800		5				1
1000		1.5				

RCP4(CR)-SA7C Lead 16

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0		35				5	
140		35				5	
280		25				3	
420		15				1.5	
560		7				0.5	

RCP4(CR)-SA7C Lead 8

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0		40				10	
70		40				10	
140		40				7	
210		25				4	
280		10				1.5	

RCP4(CR)-SA7C Lead 4

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					15	
35	40					15	
70	40					15	
105	40					10	
140	40					5	

Selection Guideline (Table of Payload by Speed/Acceleration)

RCP4 Series — Rod type, Motor unit coupled + MSEP

RCP4-RA5C Lead 20

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0		6				1.5
160		6				1.5
320		6				1.5
480		4				1
640		3				0.5

RCP4-RA5C Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	25					4	
100	25					4	
200	25					4	
300	20					3	
400	10					2	
500	5					1	

RCP4-RA5C Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					10	
50	40					10	
100	40					10	
150	40					8	
200	35					5	
250	10					3	

RCP4-RA5C Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					20	
25	40					20	
50	40					16	
75	40					12	
100	40					9	
125	40					5	

RCP4-RA6C Lead 24

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0		18				3
200		18				3
400		10				2
600		1				

RCP4-RA6C Lead 16

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					5	
140	40					5	
280	30					3	
420	15					1	

RCP4-RA6C Lead 8

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	50					17.5	
70	50					17.5	
140	50					7	
210	30					2	

RCP4-RA6C Lead 4

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	55					26	
35	55					26	
70	55					15	
105	55					4	
140	35					2	

RCP4 Series — Slider type, Side-mounted motor + PCON-CA

RCP4-SA5R Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6.5	6.5	5	5	4	1	1	1
160	6.5	6.5	5	5	4	1	1	1
320	6.5	6.5	5	5	4	1	1	1
480	6.5	6.5	5	5	4	1	1	1
640	6.5	6.5	5	5	4	1	1	1
800	6.5	6.5	5	4	3	1	1	1
960		6.5	5	3	2		1	1
1120		6	3	2	1.5		0.5	0.5
1280			1	1	1			0.5
1440			1	0.5				

RCP4-SA5R Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	9	9	9	9	8	2.5	2.5	2.5
100	9	9	9	9	8	2.5	2.5	2.5
200	9	9	9	9	8	2.5	2.5	2.5
300	9	9	9	9	8	2.5	2.5	2.5
400	9	9	9	9	8	2.5	2.5	2.5
500	9	9	9	8	6.5	2.5	2.5	2.5
600	9	9	9	6	4	2.5	2.5	2.5
700	9	9	8	4	2.5	2.5	2.5	1.5
800		7	5	2	1		2	0.5
900		5	3	1	1		1	

RCP4-SA5R Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	18	18	14	14	12	6	6	6
50	18	18	14	14	12	6	6	6
100	18	18	14	14	12	6	6	6
150	18	18	14	14	12	6	6	6
200	18	18	14	14	12	6	6	6
250	18	18	14	14	12	6	5	5.5
300	18	18	14	14	10	6	5.5	5
350	18	18	12	11	8	5.5	4.5	4
400	18	14	10	7	6	4.5	3.5	3
450	16	10	6	4	2	2.5	2	1.5

RCP4-SA5R Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	18	18	14	12	12	12
25	20	20	18	18	14	12	12	12
50	20	20	18	18	14	12	12	12
75	20	20	18	18	14	12	12	12
100	20	18	18	16	12	12	12	12
125	20	18	18	16	12	12	12	12
150	20	18	18	12	10	12	11	10
175	20	18	14	10	6	11	9	8
200	20	18	8			9	7	6
225	20	6				5	3	

RCP4-SA6R Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	10	10	9	7	6	1	1	1
160	10	10	9	7	6	1	1	1
320	10	10	9	7	6	1	1	1
480	10	10	9	7	6	1	1	1
640	10	10	8	6	5	1	1	1
800	10	9	6.5	4.5	3	1	1	1
960		8	5	3.5	2		1	1
1120		6	3	2	1.5		0.5	0.5
1280			1	0.5	0.5			

RCP4-SA6R Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	15	15	12.5	11	10	2.5	2.5	2.5
100	15	15	12.5	11	10	2.5	2.5	2.5
200	15	15	12.5	11	10	2.5	2.5	2.5
300	15	15	12.5	11	10	2.5	2.5	2.5
400	15	14	11	10	8.5	2.5	2.5	2.5
500	15	13	10	8	6.5	2.5	2.5	2.5
600	15	12	9	6	4	2.5	2.5	2.5
700	12	10	8	4	2.5	2.5	2	1.5
800	10	7	5	2	1	2	1	0.5
900		4	2	1				

RCP4-SA6R Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	20	16	14	6	6	6
50	25	25	20	16	14	6	6	6
100	25	25	20	16	14	6	6	6
150	25	25	20	16	14	6	6	6
200	25	25	20	16	14	6	6	6
250	25	25	20	16	14	6	6	5.5
300	25	25	20	15	11	6	5.5	5
350	25	20	14	12	9	5.5	4.5	4
400	25	16	10	8	6.5	4.5	3.5	3
450	18	12	6	5	2.5	3.5	2	1.5

RCP4-SA6R Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	25	25	25	12	12	12
25	25	25	25	25	25	12	12	12
50	25	25	25	25	25	12	12	12
75	25	25	25	25	25	12	12	12
100	25	25	25	25	25	12	12	12
125	25	25	25	25	25	12	12	12
150	25	25	25	25	22.5	12	11	10
175	25	25	25	20	19	11	9	8
200	25	25	20	18	12	9	7	6
225	25	18	12	6	4	5	3	

RCP4-SA7R Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	18	16	14	3	3	3
200	20	20	18	16	14	3	3	3
400	20	20	18	16	14	3	3	3
600	20	16	15	10	9	3	3	3
800	16	12	10	6	4		3	2.5
1000		8	4.5	2	1		1	1

RCP4-SA7R Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	35	28	27	8	8	8
140	40	40	35	28	27	8	8	8
280	40	38	35	25	24	8	8	8
420	35	25	20	15	10	6	5	4.5
560	25	20	15	10	6	5	4	3
700	20	15	8	5	3	3	2	1.5
840		6	2					

RCP4-SA7R Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	45	45	40	40	16	16	16
70	45	45	45	40	40	16	16	16
140	45	45	40	38	35	16	16	16
210	45	40	35	30	24	11	10	9.5
280	40	30	25	20	15	9	8	7
350	35	20	9	4		7	5	4
420	25	7				5	1	
490	13					1		

RCP4-SA7R Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	45	45	45	40	40	25	25	25
35	45	45	45	40	40	25	25	25
70	45	45	45	40	40	25	25	25
105	45	45	45	40	35	22	20	19
140	45	45	35	30	25	16	14	12
175	45	30	16			11	7	5
210	40					4		

Selection Guideline (Table of Payload by Speed/Acceleration)

RCP4 Series | Rod type, Side-mounted motor + PCON-CA

RCP4-RA5R Lead 20

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	6	6	6	5	5	1.5	1.5	1.5
160	6	6	6	5	5	1.5	1.5	1.5
320	6	6	6	5	3	1.5	1.5	1.5
480	6	6	6	5	3	1.5	1.5	1.5
640		6	4	3	2		1.5	1.5
800		4	3				1	1

RCP4-RA5R Lead 12

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	25	25	18	16	12	4	4	4
100	25	25	18	16	12	4	4	4
200	25	25	18	16	10	4	4	4
300	25	25	18	12	8	4	4	4
400	20	20	14	10	6	4	4	4
500	15	15	8	6	4	4	3.5	3
600	10	10	6	3	2	4	3	2
700		6	2				2	1

RCP4-RA5R Lead 6

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	40	40	35	30	25	10	10	10
50	40	40	35	30	25	10	10	10
100	40	40	35	30	25	10	10	10
150	40	40	35	25	25	10	10	10
200	40	40	30	25	20	10	10	10
250	40	40	27.5	22.5	18	10	9	8
300	40	35	25	20	14	6	6	6
350	40	30	14	12	10	5	5	5
400	30	18	10	6	5	4	3	3
450	25	8	3			2	2	1

RCP4-RA5R Lead 3

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	60	60	50	45	40	20	20	20
25	60	60	50	45	40	20	20	20
50	60	60	50	45	40	20	20	20
75	60	60	50	45	40	20	20	20
100	60	60	50	45	40	20	20	20
125	60	60	50	40	30	18	14	10
150	60	50	40	30	25	14	10	6
175	60	40	35	25	20	12	6	5
200	60	35	30	20	14	8	5	4.5
225	40	16	16	10	6	5	5	4

RCP4-RA6R Lead 24

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	20	20	18	15	12	3	3	3
200	20	20	18	15	12	3	3	3
400	20	20	18	15	10	3	3	3
600	15	14	9	7	4	3	3	2
800		3	1					

RCP4-RA6R Lead 16

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	50	50	40	35	30	8	8	8
140	50	50	40	35	30	8	8	8
280	50	50	35	25	20	8	7	7
420	50	25	18	14	10	4.5	4.5	4
560	12	10	5	3	2	2	1	1

RCP4-RA6R Lead 8

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	60	60	50	45	40	18	18	18
70	60	60	50	45	40	18	18	18
140	60	60	50	45	40	16	16	12
210	60	60	40	31	26	10	10	9
280	60	26	16	10	8	8	5	3
350	30	3				3	1	
420	2							

RCP4-RA6R Lead 4

Orientation	Horizontal					Vertical		
Speed (mm/s)	Acceleration (G)							
	0.1	0.3	0.5	0.7	1	0.1	0.3	0.5
0	80	80	70	65	60	28	28	28
35	80	80	70	65	60	28	28	28
70	80	80	70	65	60	28	28	28
105	80	80	60	50	40	22	20	18
140	80	50	10	6	6	13	8	3
175	40	5				4		

RCP4 Series | Slider type, Side-mounted motor + MSEP

RCP4-SA5R Lead 20

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0	5	4	3	3	0.5	0.5
160	5	4	3	3	0.5	0.5
320	5	4	3	3	0.5	0.5
480	4.5	4	3	3	0.5	0.5
640	4	3.5	2	2	0.5	0.5
800	3	2.5	1	1	0.5	0.5
960	2	2	1	0.5		

RCP4-SA5R Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	8	6	5.5	5	2	2	2
100	8	6	5.5	5	2	2	2
200	8	6	5.5	5	2	2	2
300	8	6	5.5	5	2	2	2
400	8	6	4	3.5	2	2	1.5
500	7	5	2	1.5	1.5	1.5	1
600	5	4	2	1.5	1	0.5	0.5

RCP4-SA5R Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	13	13	13	12	5	5	5
50	13	13	13	12	5	5	5
100	13	13	13	12	5	5	5
150	13	13	13	12	5	5	5
200	13	13	13	12	5	4.5	4
250	13	10	8	7	4	4	3
300	13	9	5	4	2.5	2	1.5

RCP4-SA5R Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	16	16	16	16	10	10	10
25	16	16	16	16	10	10	10
50	16	16	16	16	10	10	10
75	16	16	16	14	10	10	10
100	16	16	14	12	10	9	8
125	16	13	11	10	7	6	6
150	16	10	9	8	5	4.5	3

RCP4-SA6R Lead 20

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0	6	6	4	4	0.5	0.5
160	6	6	4	4	0.5	0.5
320	6	6	4	4	0.5	0.5
480	5	5	3	3	0.5	0.5
640	4	4	2	2	0.5	0.5
800	3	3	1	1	0.5	0.5
960	2	1.5	0.5			

RCP4-SA6R Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	8.5	8.5	7	6	2	2	2
100	8.5	8.5	7	6	2	2	2
200	8.5	8.5	7	6	2	2	2
300	8.5	8.5	7	6	2	2	2
400	8	7	4	3.5	2	2	1.5
500	7	6	3	2	1.5	1.5	1
600	6	6	2	1.5	1	0.5	0.5

RCP4-SA6R Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	16	15	13	12	5	5	5
50	16	15	13	12	5	5	5
100	16	15	13	12	5	5	5
150	16	15	13	12	5	5	5
200	16	15	13	12	5	4.5	4
250	15	12	10	7	4	4	3
300	13	12	6	4	2.5	2	1.5

RCP4-SA6R Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	19	19	19	19	10	10	10
25	19	19	19	19	10	10	10
50	19	19	19	16	10	10	10
75	19	19	19	19	10	10	10
100	19	16	14	12	10	9	8
125	18	14	11	10	7	6	6
150	16	13	10	9	5	4.5	3

RCP4-SA7R Lead 24

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.1	0.3	0.5	0.7	0.1	0.2
0		18				2
200		18				2
400		18				2
600		10				1.5
800		1				

RCP4-SA7R Lead 16

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0		35				5	
140		35				5	
280		25				3	
420		15				1.5	
560		4				0.5	

RCP4-SA7R Lead 8

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0		40				10	
70		40				10	
140		40				7	
210		25				4	
280		6				1	

RCP4-SA7R Lead 4

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					15	
35	40					15	
70	40					15	
105	40					10	
140	22					3	

Selection Guideline (Table of Payload by Speed/Acceleration)

RCP4 Series | Rod type, Side-mounted motor + MSEP

RCP4-RA5R Lead 20

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0		6				1.5
160		6				1.5
320		6				1.5
480		4				1
640		3				0.5

RCP4-RA5R Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	25					4	
100	25					4	
200	25					4	
300	20					3	
400	10					2	
500	5					1	

RCP4-RA5R Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					10	
50	40					10	
100	40					10	
150	40					8	
200	35					5	
250	10					3	

RCP4-RA5R Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					20	
25	40					20	
50	40					16	
75	40					12	
100	40					9	
125	40					5	

RCP4-RA6R Lead 24

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.2	0.3	0.5	0.7	0.1	0.2
0		18				3
200		18				3
400		10				2
600		1				

RCP4-RA6R Lead 16

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	40					5	
140	40					5	
280	30					3	
420	6					0.5	

RCP4-RA6R Lead 8

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	50					17.5	
70	50					17.5	
140	50					7	
210	30					2	

RCP4-RA6R Lead 4

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	55					26	
35	55					26	
70	55					15	
105	55					4	
140	5					0.5	

RCP3 Series — Slider type

RCP3-SA4C Lead 10

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	9	7.5	6.5	5.5	1.5	1.5	1.5
83	9	7.5	6.5	5.5	1.5	1.5	1.5
167	9	7.5	6.5	5.5	1.5	1.5	1.5
250	7	6	5	4	1.5	1.5	1.5
333	6	5	4	3	1.5	1.5	1.5
417	5	4	3	2	1.5	1.5	1.5
500	4	3	2	1	1	0.5	0.5

RCP3-SA4C Lead 5

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	10	9	8	7	4	4	4
42	10	9	8	7	4	4	4
83	10	9	8	7	4	4	4
125	10	9	8	7	4	4	4
167	10	9	8	7	4	4	4
208	9	8	7	6	4	4	4
250	8	7	6	5	3	2.5	2

RCP3-SA4C Lead 2.5

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	11	10	9	8	8	8	8
21	11	10	9	8	8	8	8
42	11	10	9	8	8	8	8
63	11	10	9	8	8	8	8
83	9	8	7	6	8	8	8
104	9	8	7	6	8	6	6
125	9	8	7	6	5	4	4

RCP3-SA5C Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	8	6	4	3	2	2	2
100	8	6	4	3	2	2	2
200	8	6	4	3	2	2	2
300	6	6	4	3	2	2	2
400	5	4	3	2.5	2	2	2
500	4	3	2	1.5	1	1	1
600	3	2	1	0.5	0.5	0.5	0.5

RCP3-SA5C Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	12	10	8	6	5	5	5
50	12	10	8	6	5	5	5
100	12	10	8	6	5	5	5
150	12	10	8	6	5	5	5
200	12	10	8	6	5	4.5	3.5
250	10	8.5	6	4.5	3.5	3	2
300	7	6	3	1	2	1.5	0.5

RCP3-SA5C Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.2	0.3	0.5	0.7	0.1	0.2	0.3
0	19	14	9	7	10	10	10
25	19	14	9	7	10	10	10
50	19	14	9	7	10	10	10
75	19	14	9	7	10	10	10
100	19	14	9	7	10	9	8
125	16	11	7	5	7	6	5
150	12	8	5	3	4	3	2

RCP3-SA6C Lead 12

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.1	0.3	0.5	1	0.1	0.3	0.5
0	8	6	4	3	2	2	2
100	8	6	4	3	2	2	2
200	8	6	4	3	2	2	2
300	6	6	4	3	2	2	2
400	5	4	3	2.5	2	2	2
500	4	3	2	1.5	1	1	1
600	3	2	1	0.5	0.5	0.5	0.5

RCP3-SA6C Lead 6

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.1	0.3	0.5	1	0.1	0.3	0.5
0	12	10	8	6	5	5	5
50	12	10	8	6	5	5	5
100	12	10	8	6	5	5	5
150	12	10	8	6	5	5	5
200	12	10	8	6	5	4.5	3.5
250	10	8.5	6	4.5	3.5	3	2
300	7	6	3	1	2	1.5	0.5

RCP3-SA6C Lead 3

Orientation	Horizontal				Vertical		
Speed (mm/s)	Acceleration (G)						
	0.1	0.3	0.5	1	0.1	0.3	0.5
0	19	14	9	7	10	10	10
25	19	14	9	7	10	10	10
50	19	14	9	7	10	10	10
75	19	14	9	7	10	10	10
100	19	14	9	7	10	9	8
125	16	11	7	5	7	6	5
150	12	8	5	3	4	3	2

RCP4W Series — Rod type

RCP4W-RA6C Lead 12

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.3	0.5	0.7	1	0.3	0.5
560 <500>	20	15	12	10	3	3

RCP4W-RA6C Lead 6

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.3	0.5	0.7	1	0.3	0.5
360	40	35	25	20	8	8

RCP4W-RA6C Lead 3

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.3	0.5	0.7	1	0.3	0.5
180	50	45	40	35	16	16

RCP4W-RA7C Lead 16

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.3	0.5	0.7	1	0.3	0.5
560 <400>	40	35	30	25	7	7

RCP4W-RA7C Lead 8

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.3	0.5	0.7	1	0.3	0.5
360 <280>	50	45	40	35	15	15

RCP4W-RA7C Lead 4

Orientation	Horizontal				Vertical	
Speed (mm/s)	Acceleration (G)					
	0.3	0.5	0.7	1	0.3	0.5
170 <140>	70	60	50	45	25	25

RCS3 Series — Slider type

The list below applies commonly to all of the RCS3, RCS3P, RCS3CR and RCS3PCR series.

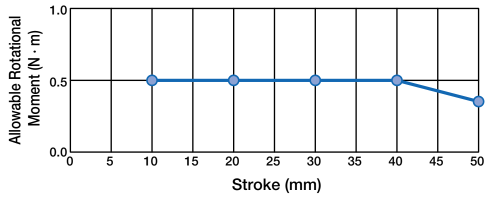
Type	Motor Wattage	Ball Screw Lead	Installation Orientaion	Payload by acceleration 0.2G	0.3G	0.5G	0.7G	1.0G
SA8C SS8C SA8R SS8R	100W	30	Horizontal	8	8	6	4	1
			Vertical	2	2	1.5	1	—
		20	Horizontal	20	20	10	5	—
			Vertical	4	4	2	1.5	—
		10	Horizontal	40	40	20	—	—
			Vertical	8	8	4	—	—
		5	Horizontal	80	65	—	—	—
			Vertical	16	12	—	—	—
	150W	30	Horizontal	12	12	10	6	2
			Vertical	3	3	2	1.5	—
		20	Horizontal	30	30	15	7.5	—
			Vertical	6	6	3	2	—
		10	Horizontal	60	60	30	—	—
			Vertical	12	12	6	—	—

Reference for Model Selection (Guide)

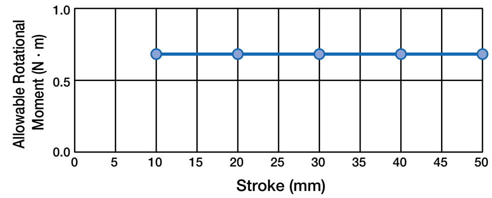
Allowable Rotating Torque

The allowable torque for each model is as shown below. When rotational torque is exerted, use within the range of the values below. Further, single-guide types cannot be subjected to rotational torque.

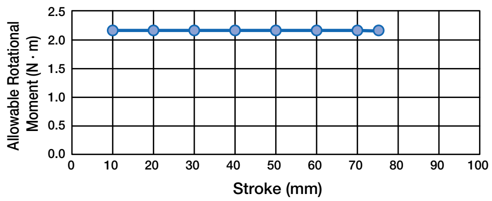
RCA2-GD3NA Type



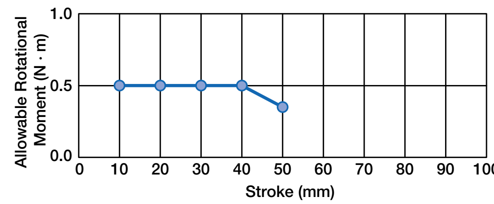
RCA2-GD4NA Type



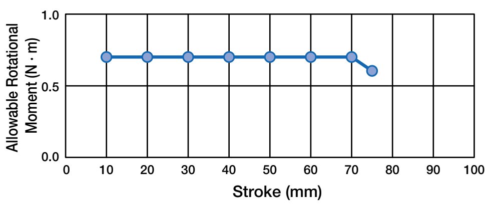
RCS2-GD5N Type



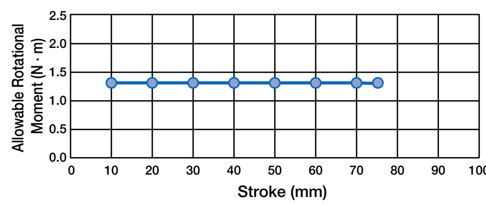
RCA2-SD3NA Type



RCA2-SD4NA Type

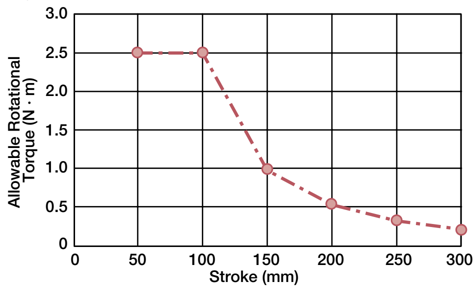


RCS2-SD5N Type



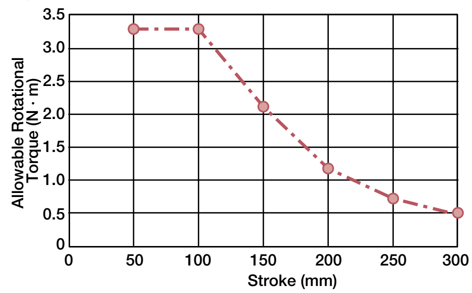
ERC2-RGD6C Type

■ **Double-guide**



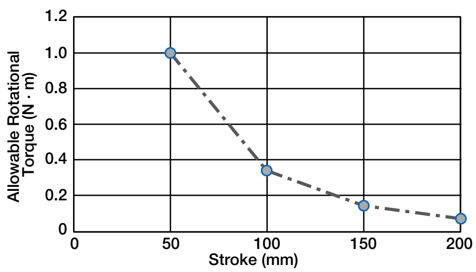
ERC2-RGD7C Type

■ **Double-guide**



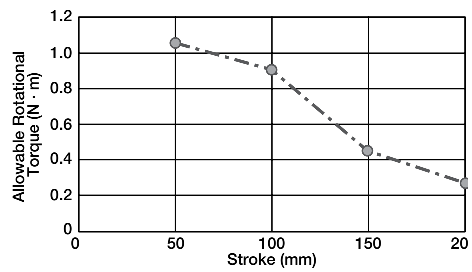
RCA / RCS2-RGD3□ Type

■ **Double-guide**



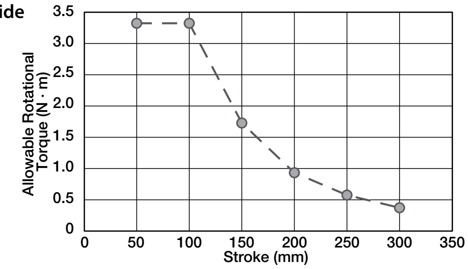
RCS2-RGD4□ Type

■ **Double-guide**



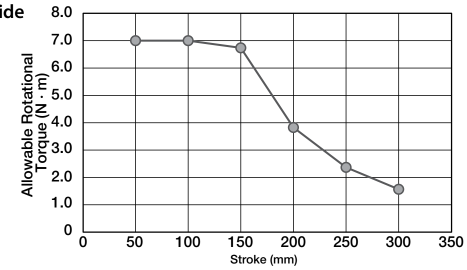
RCS2-RGD5C Type (Double-guide Specification)

■ Double-guide

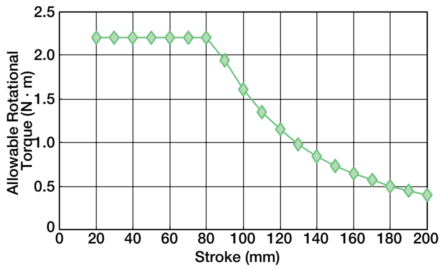


RCS2-SRGD7BD Type

■ Double-guide



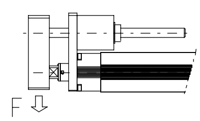
RCP2-SRGD4R Type



Relationship Between Allowable Load at Tip & Running Service Life

The greater the load at the guide tip, the shorter the running service life.
Select the appropriate model, considering balance between load and service life.

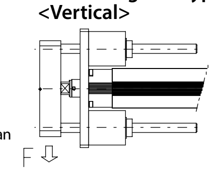
■ Single-guide type



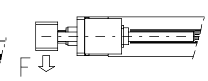
* The single-guide specification can only be used with vertical loads.

■ Double-guide type

<Vertical>

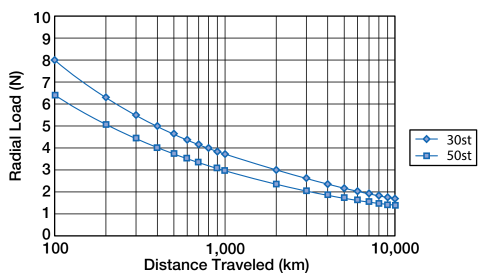


<Horizontal>

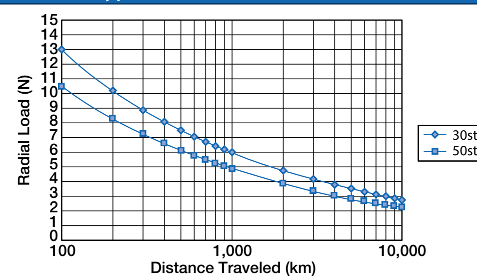


Single-guide

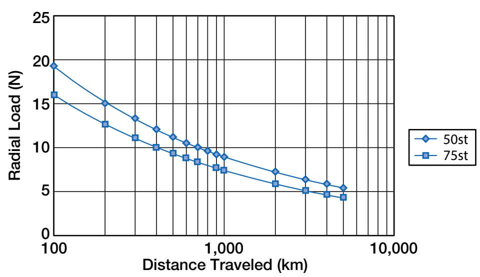
RCA2-GS3NA Type



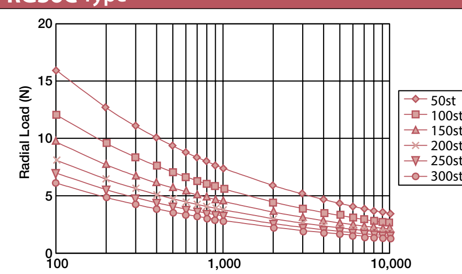
RCA2-GS4NA Type



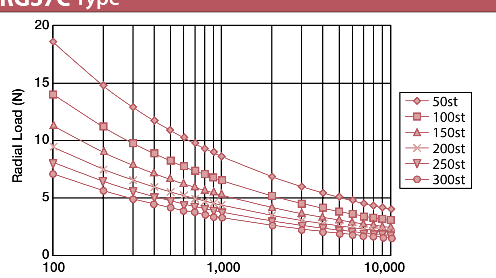
RCS2-GS5N Type



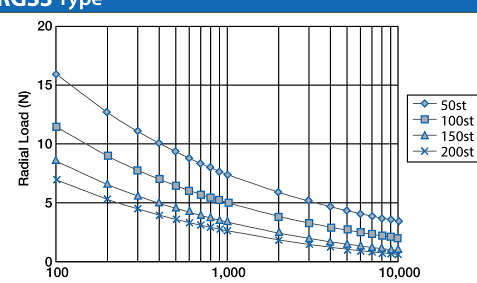
ERC2-RGS6C Type



ERC2-RGS7C Type

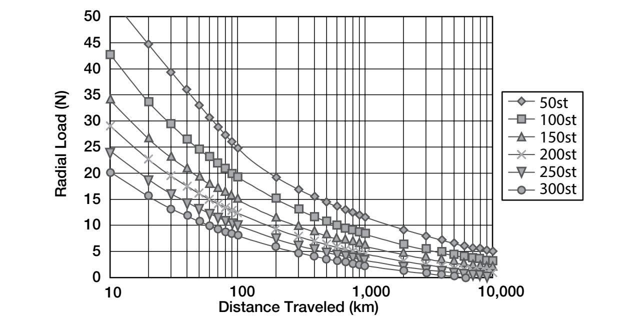


RCA-RGS3 Type

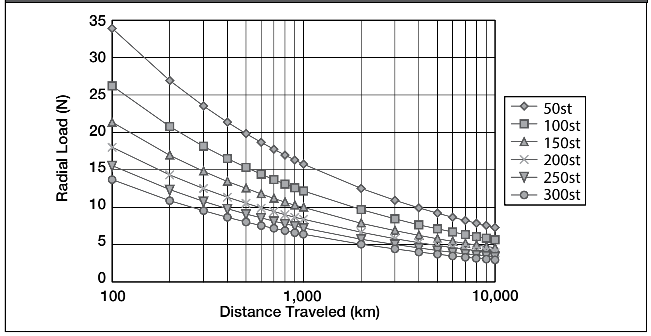


Reference for Model Selection (Guide)

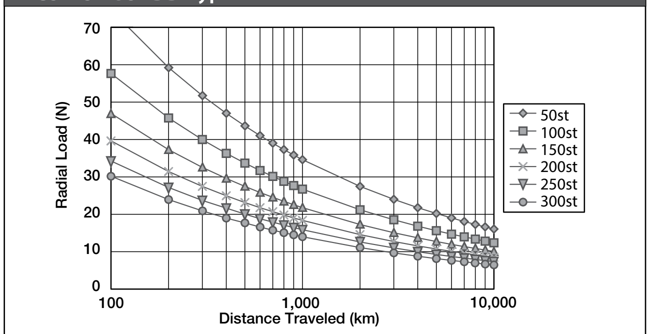
RCA / RCS2-RGS4□ Type



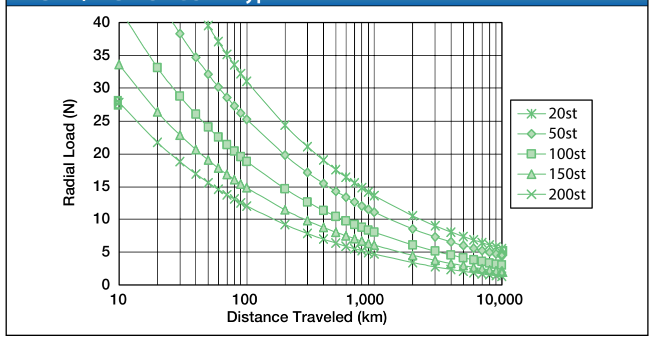
RCS2-RGS5C Type



RCS2-SRGS7BD Type

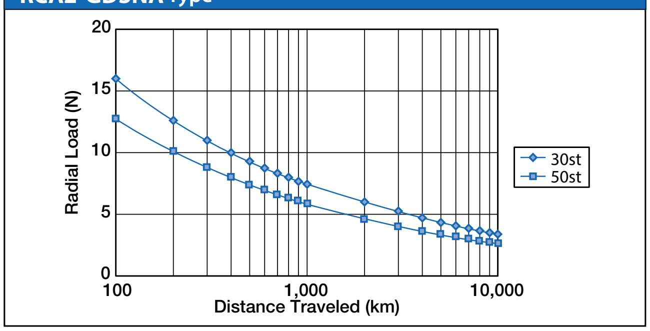


RCP2 / RCA-SRGS4R Type

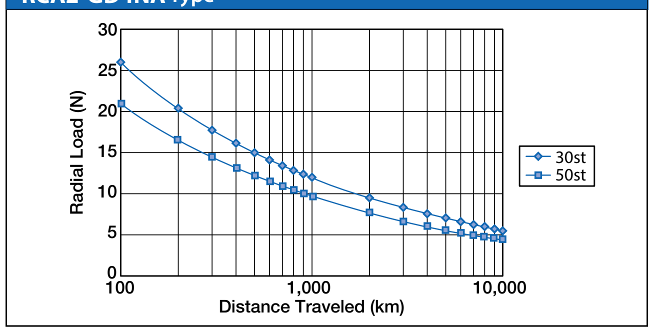


Double-guide

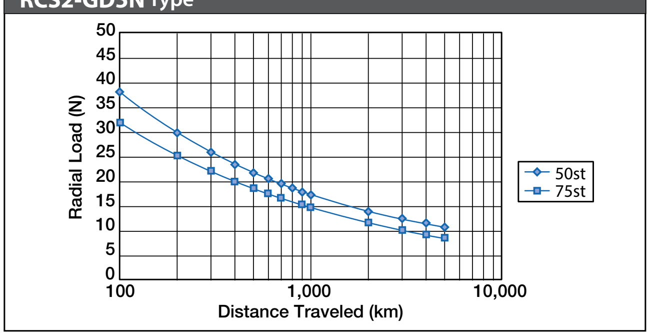
RCA2-GD3NA Type



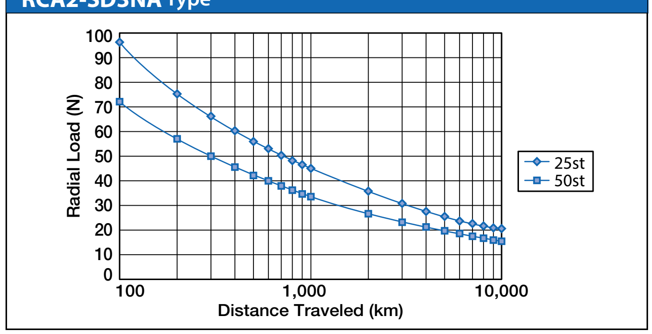
RCA2-GD4NA Type



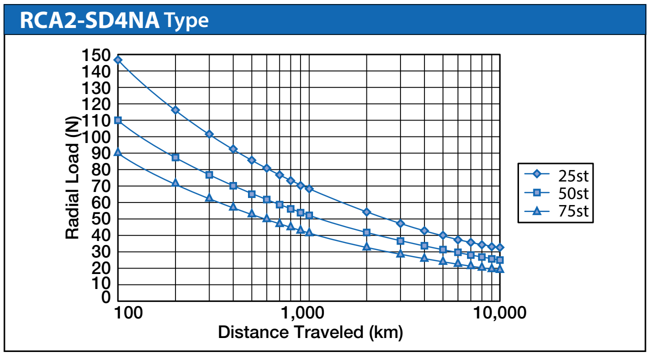
RCS2-GD5N Type



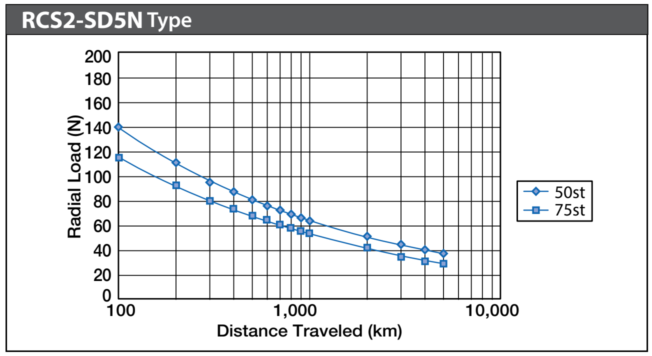
RCA2-SD3NA Type



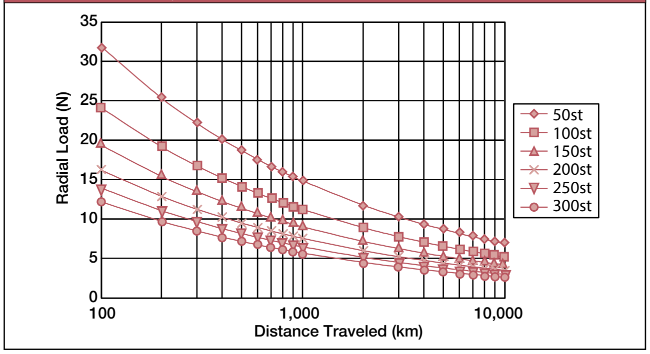
RCA2-SD4NA Type



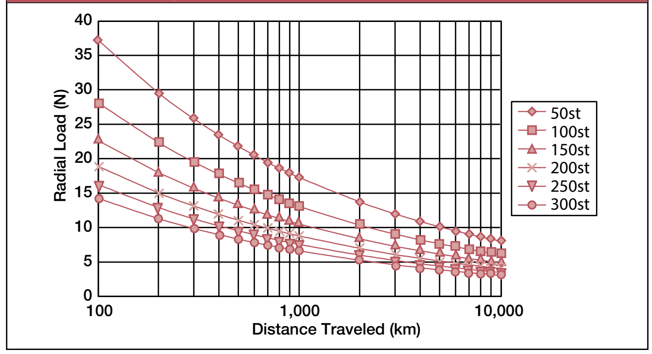
RCS2-SD5N Type



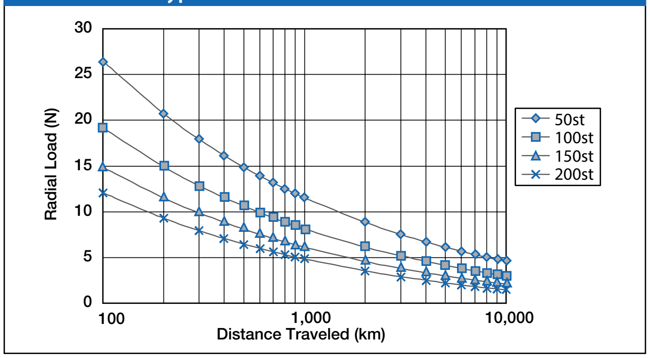
ERC2-RGD6C Type



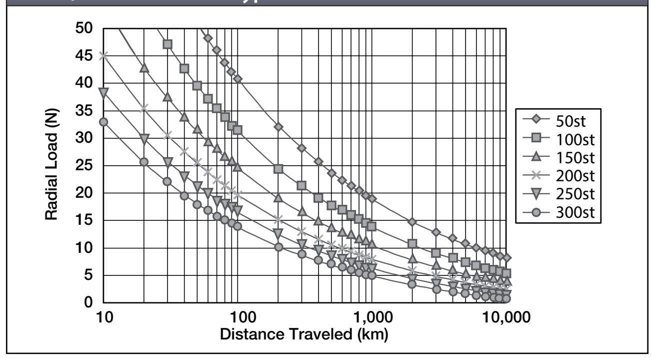
ERC2-RGD7C Type



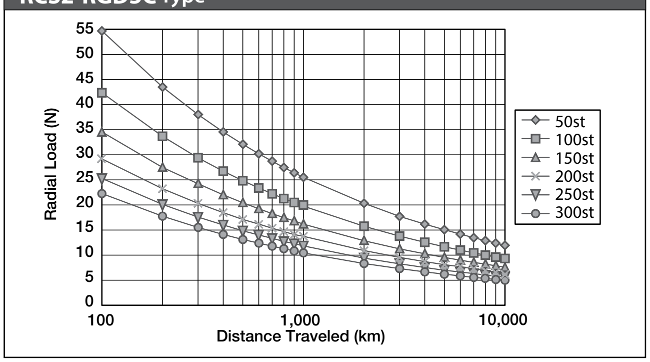
RCA-RGD3☐ Type



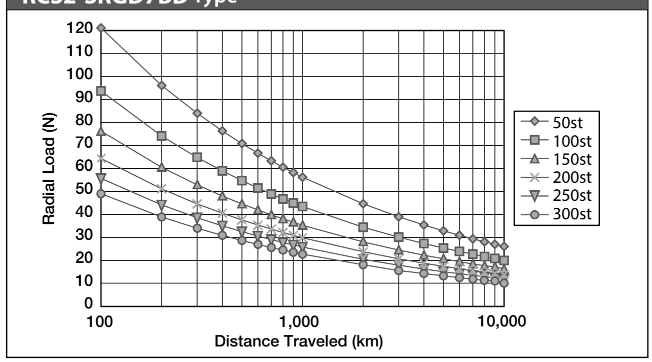
RCA / RCS2-RGD4☐ Type



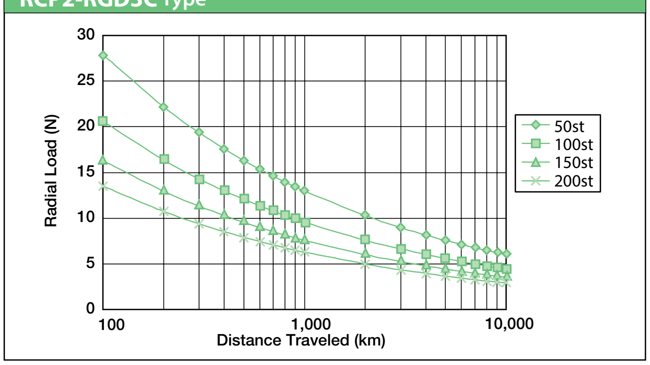
RCS2-RGD5C Type



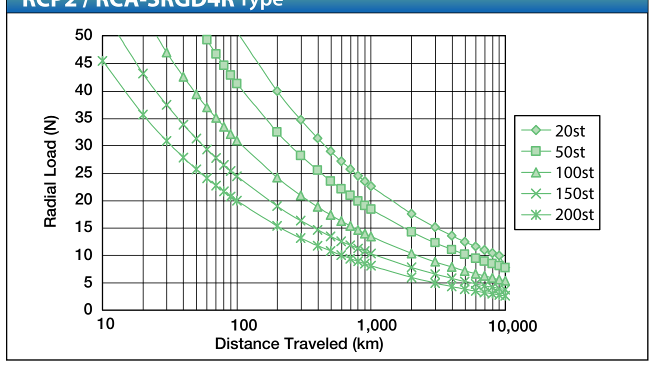
RCS2-SRGD7BD Type



RCP2-RGD3C Type



RCP2 / RCA-SRGD4R Type



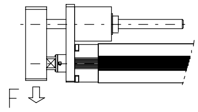
Reference for Model Selection (Guide)

Radial Load & Tip Deflection

The graph below shows the correlation between the load exerted at the guide tip and the amount of deflection generated.

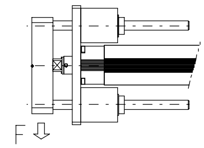
Note:
The load on the graph does not indicate the allowable load. Please check to see the "relationship between the allowable load at the guide tip and the service life" as the load increases, the service life drops dramatically.

■ Single-guide type

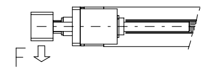


* The single-guide specification can only be used with vertical loads.

■ Double-guide type
<Vertical>

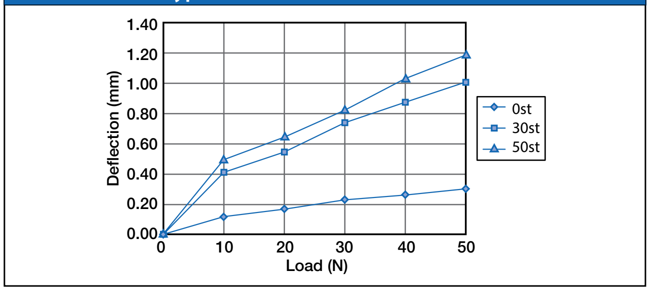


<Horizontal>

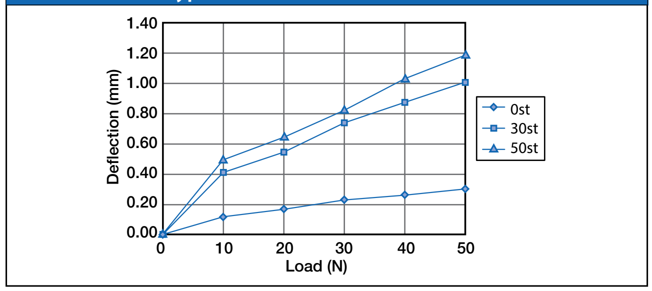


Single-guide

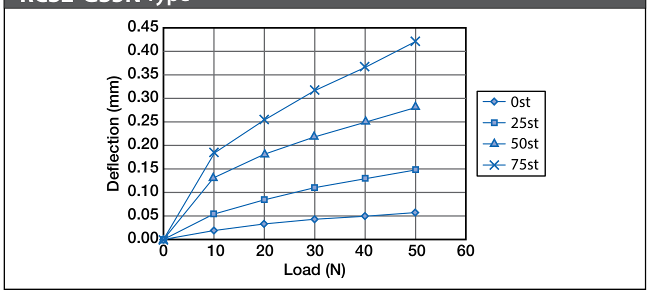
RCA2-GS3NA Type



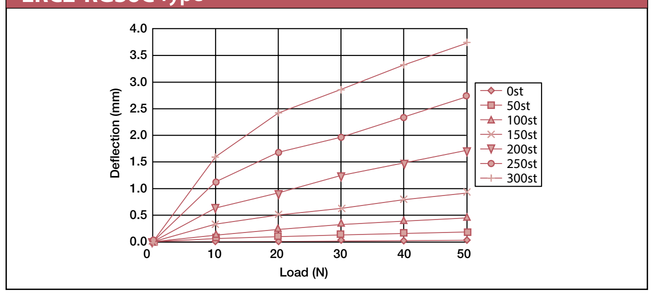
RCA2-GS4NA Type



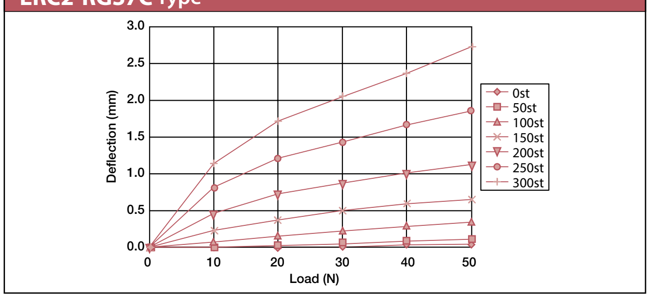
RCS2-GS5N Type



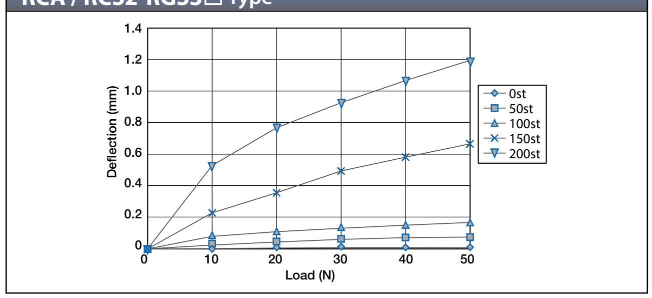
ERC2-RGS6C Type



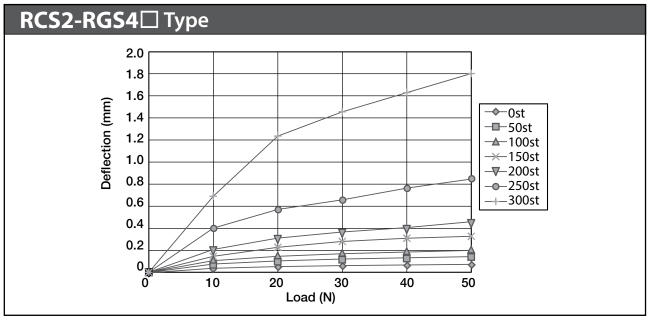
ERC2-RGS7C Type



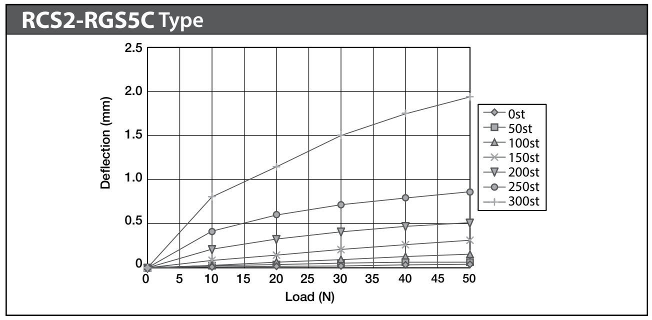
RCA / RCS2-RGS3☐ Type



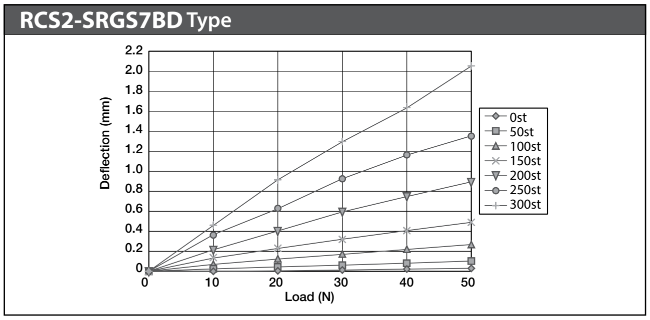
RCS2-RGS4☐ Type



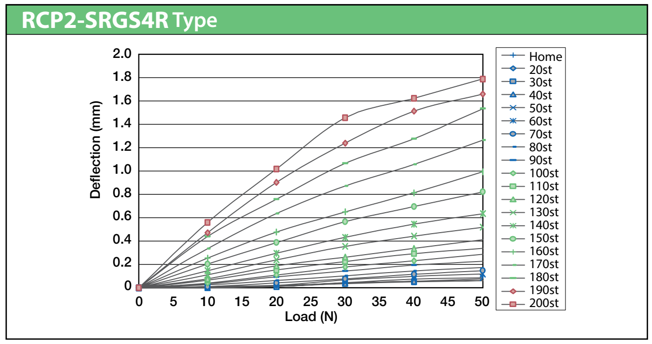
RCS2-RGS5C Type



RCS2-SRGS7BD Type



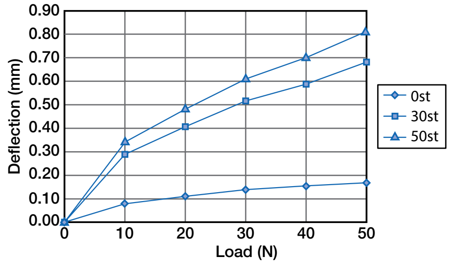
RCP2-SRGS4R Type



Double-guide

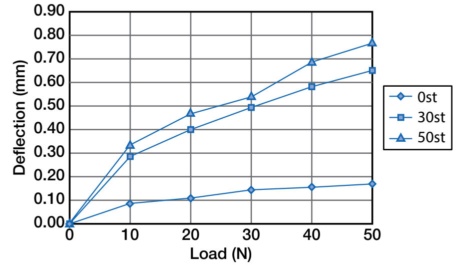
RCA2-GD3NA Type

■ Double-Guide‹Vertical›Specification



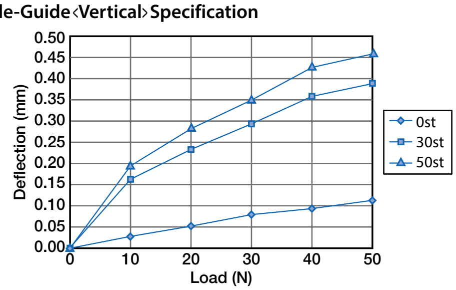
RCA2-GD3NA Type

■ Double-Guide‹Horizontal›Specification



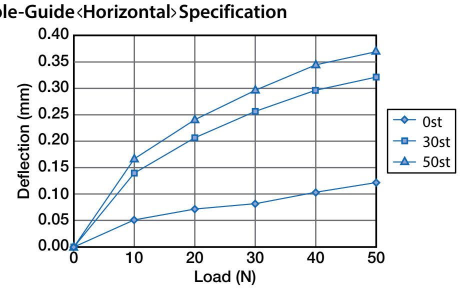
RCA2-GD4NA Type

■ Double-Guide‹Vertical›Specification



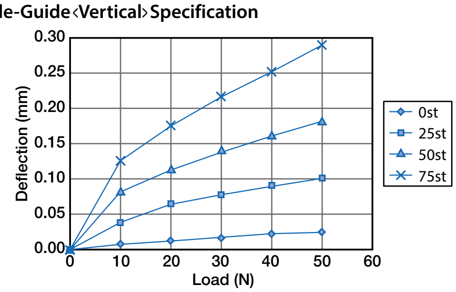
RCA2-GD4NA Type

■ Double-Guide‹Horizontal›Specification



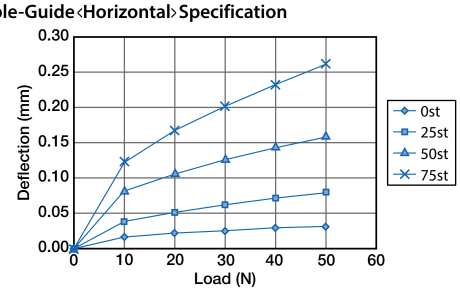
RCS2-GD5N Type

■ Double-Guide‹Vertical›Specification



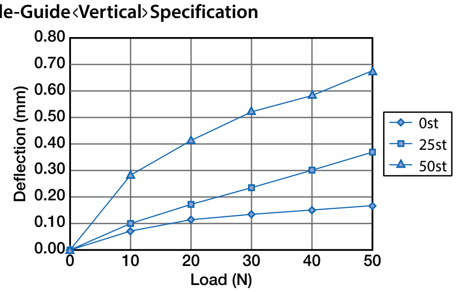
RCS2-GD5N Type

■ Double-Guide‹Horizontal›Specification



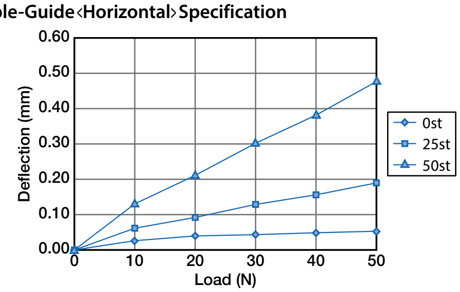
RCA2-SD3NA Type

■ Double-Guide‹Vertical›Specification



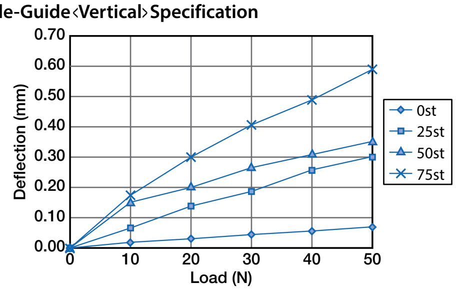
RCA2-SD3NA Type

■ Double-Guide‹Horizontal›Specification



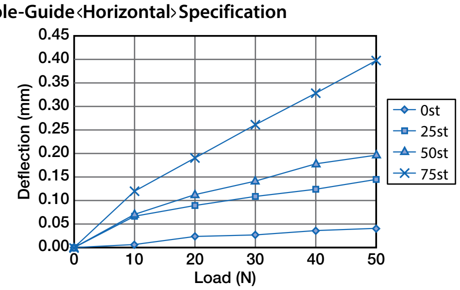
RCA2-SD4NA Type

■ Double-Guide‹Vertical›Specification



RCA2-SD4NA Type

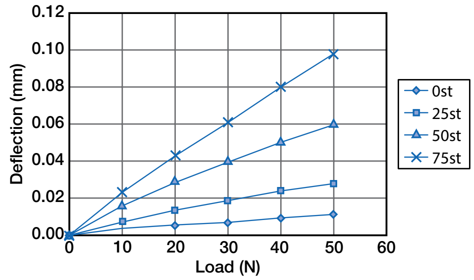
■ Double-Guide‹Horizontal›Specification



Reference for Model Selection (Guide)

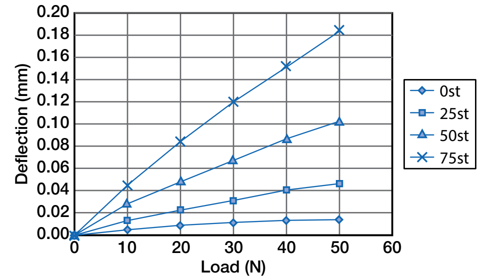
RCS2-SD5N Type

■ Double-Guide‹Vertical›Specification



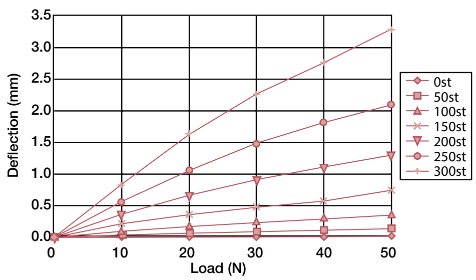
RCS2-SD5N Type

■ Double-Guide‹Horizontal›Specification



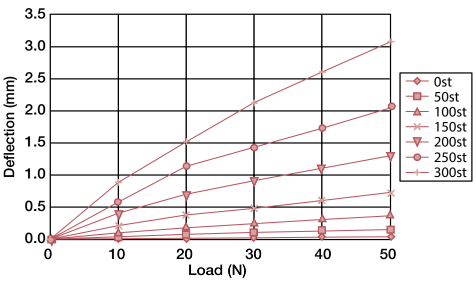
ERC2-RGD6C Type

■ Double-Guide‹Horizontal›Specification



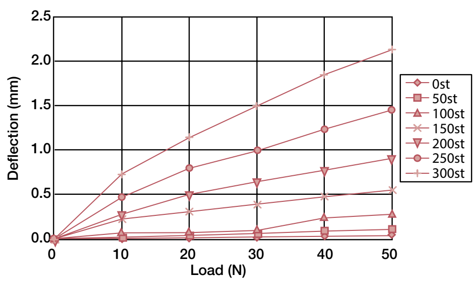
ERC2-RGD6C Type

■ Double-Guide‹Vertical›Specification



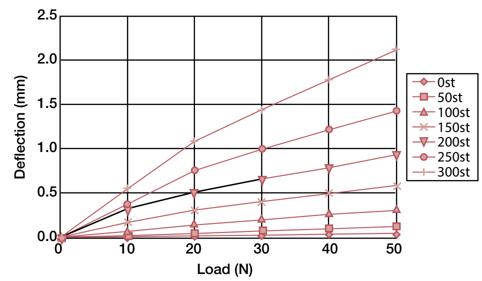
ERC2-RGD7C Type

■ Double-Guide‹Horizontal›Specification



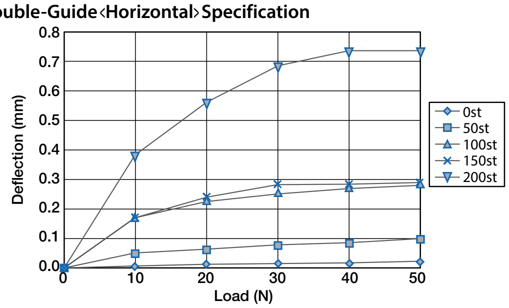
ERC2-RGD7C Type

■ Double-Guide‹Vertical›Specification



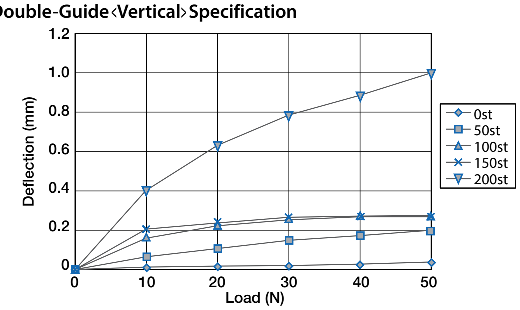
RCA / RCS-RGD3□ Type

■ Double-Guide‹Horizontal›Specification



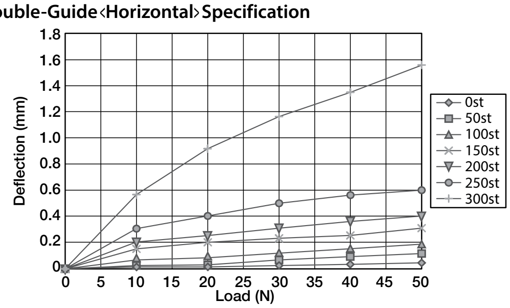
RCA / RCS-RGD3□ Type

■ Double-Guide‹Vertical›Specification



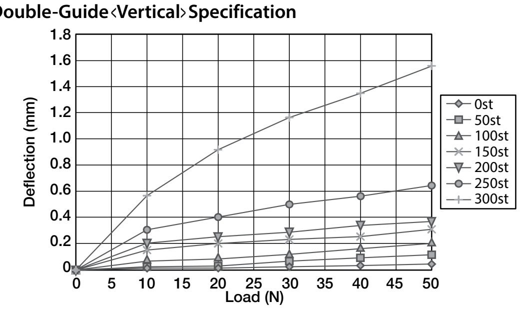
RCS2-RGD4□ Type

■ Double-Guide‹Horizontal›Specification



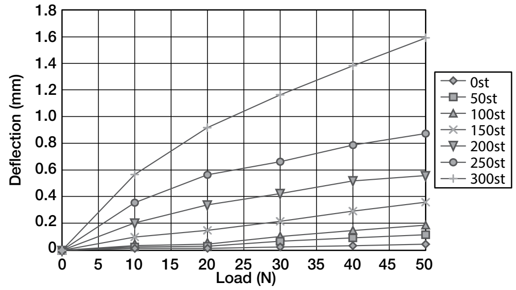
RCS2-RGD4□ Type

■ Double-Guide‹Vertical›Specification



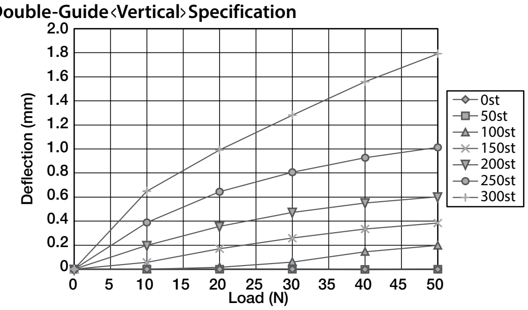
RCS2-RGD5C Type

■ Double-Guide‹Horizontal›Specification



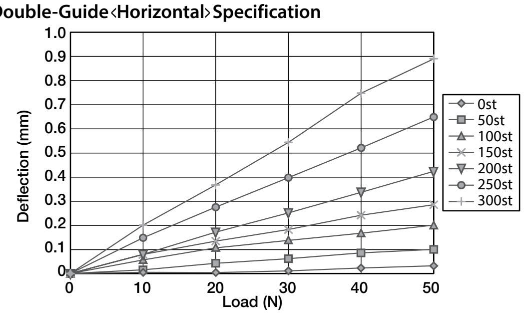
RCS2-RGD5C Type

■ Double-Guide‹Vertical›Specification



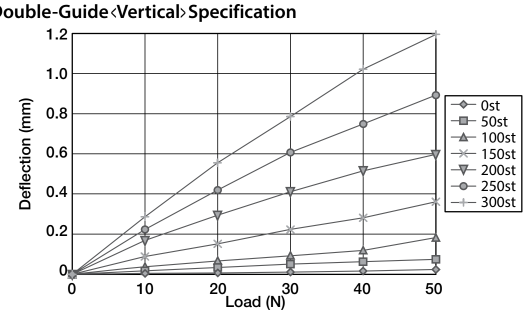
RCS2-SRGD7BD Type

■ Double-Guide‹Horizontal›Specification



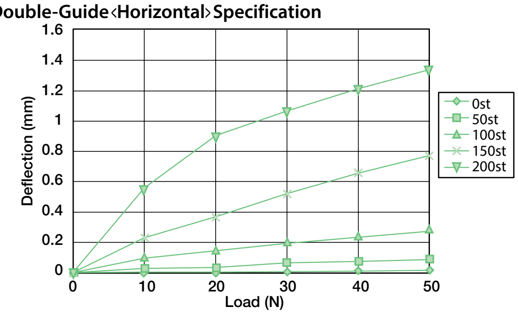
RCS2-SRGD7BD Type

■ Double-Guide‹Vertical›Specification



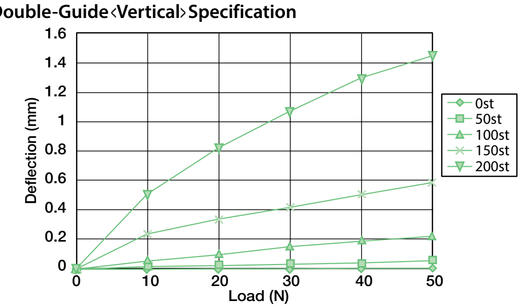
RCP2-RGD3C Type

■ Double-Guide‹Horizontal›Specification



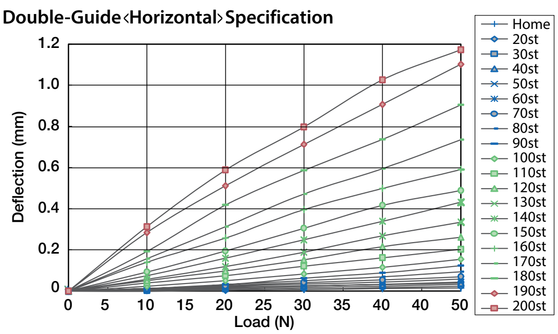
RCP2-RGD3C Type

■ Double-Guide‹Vertical›Specification



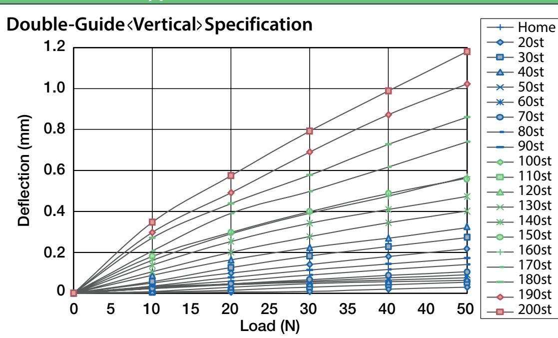
RCP2-SRGD4R Type

■ Double-Guide‹Horizontal›Specification



RCP2-SRGD4R Type

■ Double-Guide‹Vertical›Specification

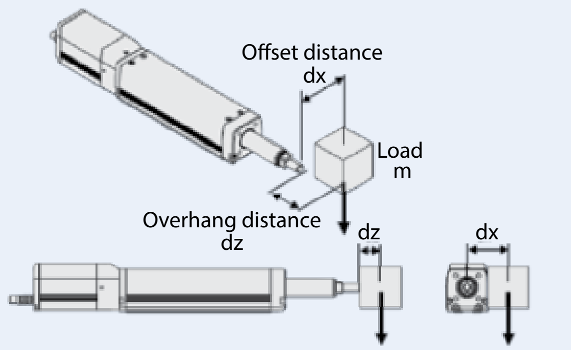


Selection References (Guide for Selecting Allowable Load for Radial Cylinder)

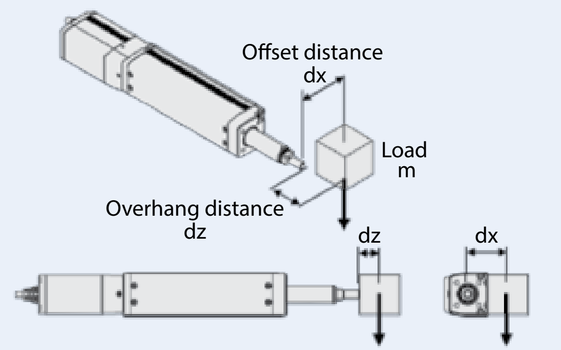
The radial cylinder has a built-in guide, so loads up to a certain level can be applied to the rod without using an external guide. Refer to the graphs below for the allowable load mass. If the allowable load will be exceeded under the required operating conditions, add an external guide.

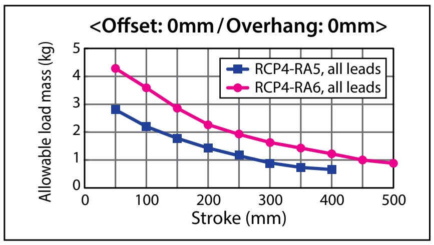
■Allowable load mass for RCP4-RA5□/6□, horizontally mounted

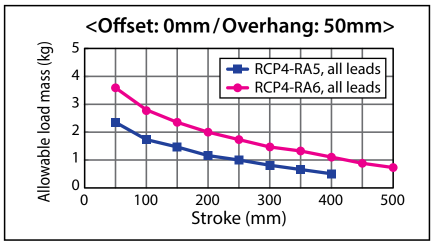
[Horizontally mounted, laid flat]

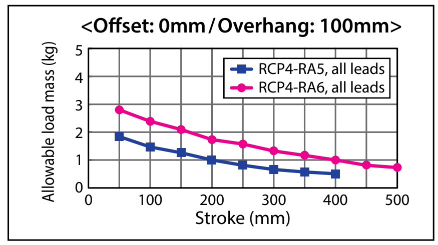


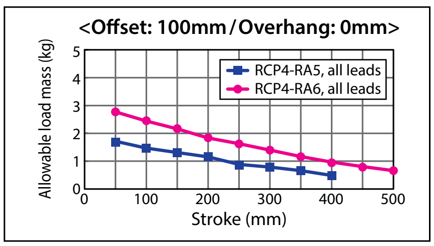
[Horizontally mounted, laid on its side]

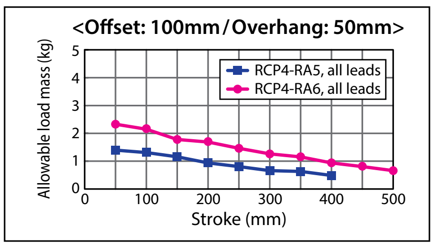


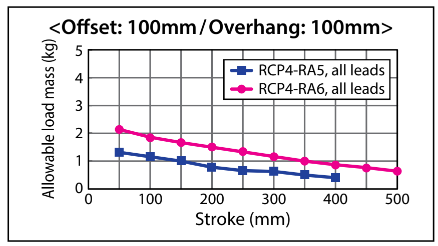








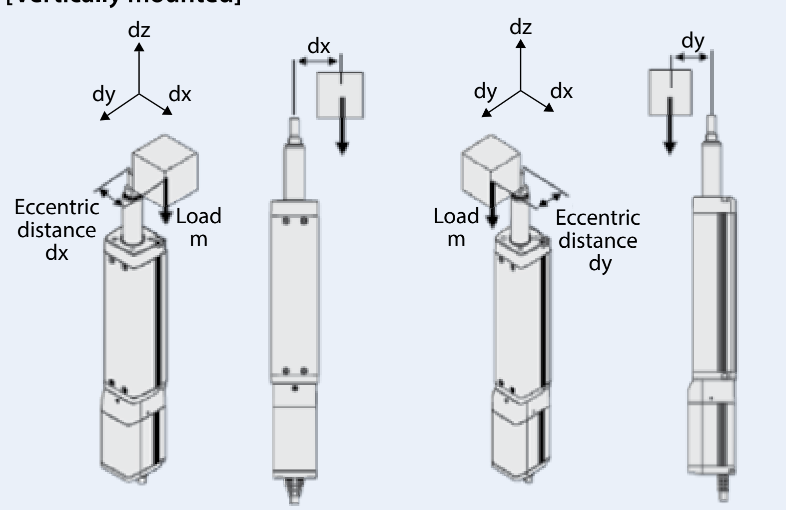


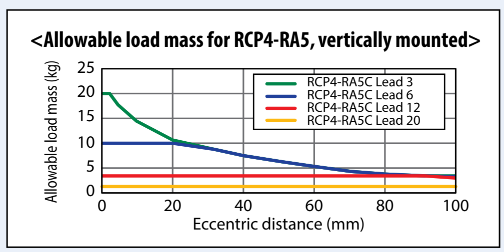


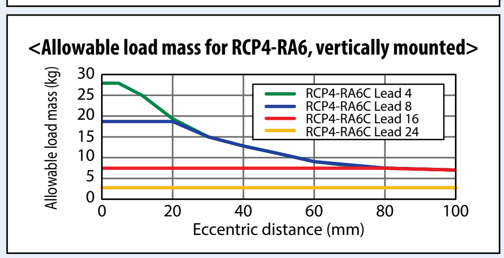
Allowable load calculation conditions Load mass corresponding to a guide traveling life of 5,000 km, considering moments generated by acceleration/deceleration. (Acceleration: 1 G / Speed: 500 mm/s)

■Allowable load mass for RCP4-RA5□/6□, vertically mounted

[Vertically mounted]



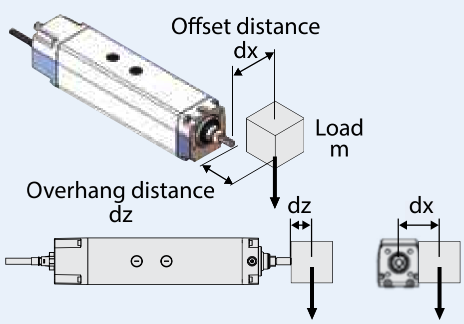




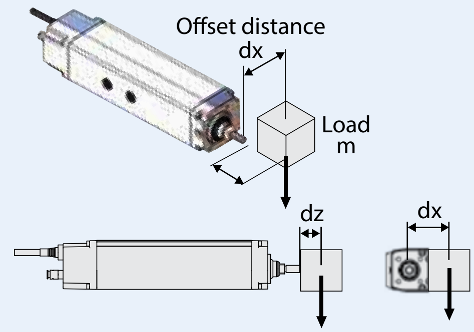
Allowable load calculation conditions
Load mass corresponding to a guide traveling life of 5,000 km, considering moments generated by acceleration/deceleration. (Acceleration: 0.5 G / Speed: 500 mm/s)

■Allowable load mass for RCP4W-RA6C/7C horizontally mounted

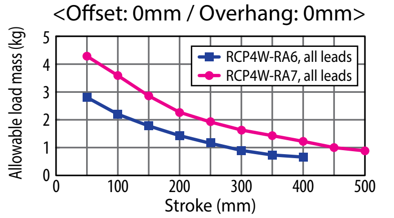
[Horizontally mounted, laid flat]



[Horizontally mounted, laid on its side]



<Offset: 0mm / Overhang: 0mm>



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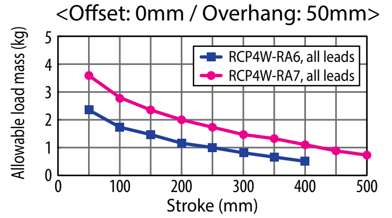

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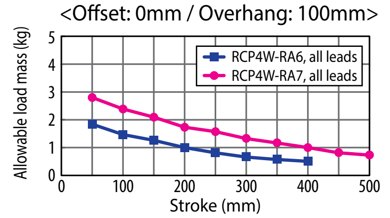

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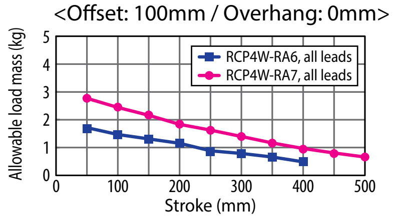

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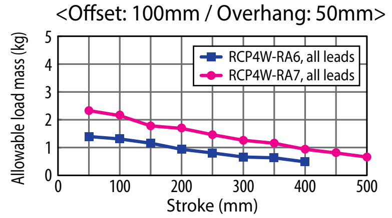

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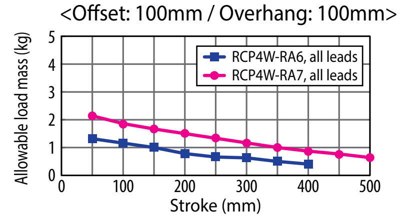
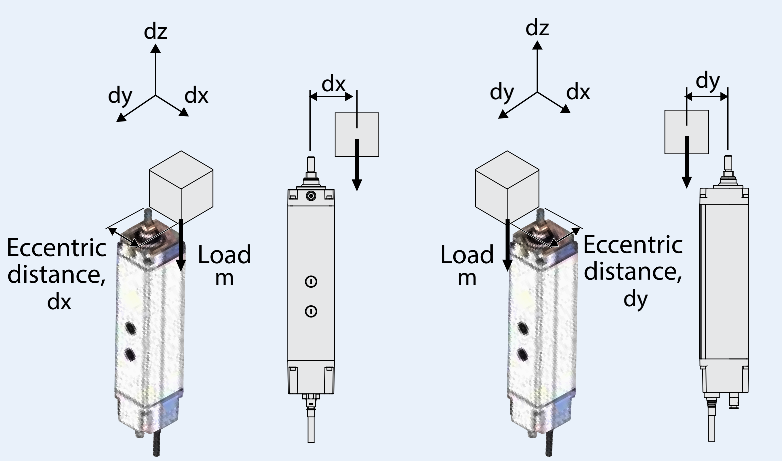


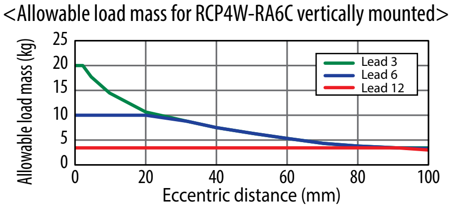
Allowable load calculation conditions: Load mass corresponding to a guide traveling life of 5,000 km, considering moments generated by acceleration/deceleration. (Acceleration: 1 G / Speed: 500mm/s)

■Allowable load mass for RCP4W-RA6C/7C vertically mounted

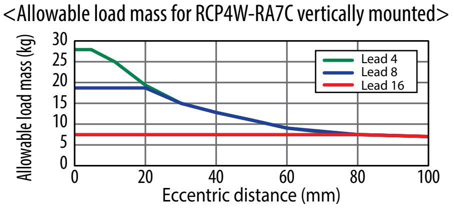
[Vertical mounted]



<Allowable load mass for RCP4W-RA6C vertically mounted>



<Allowable load mass for RCP4W-RA7C vertically mounted>

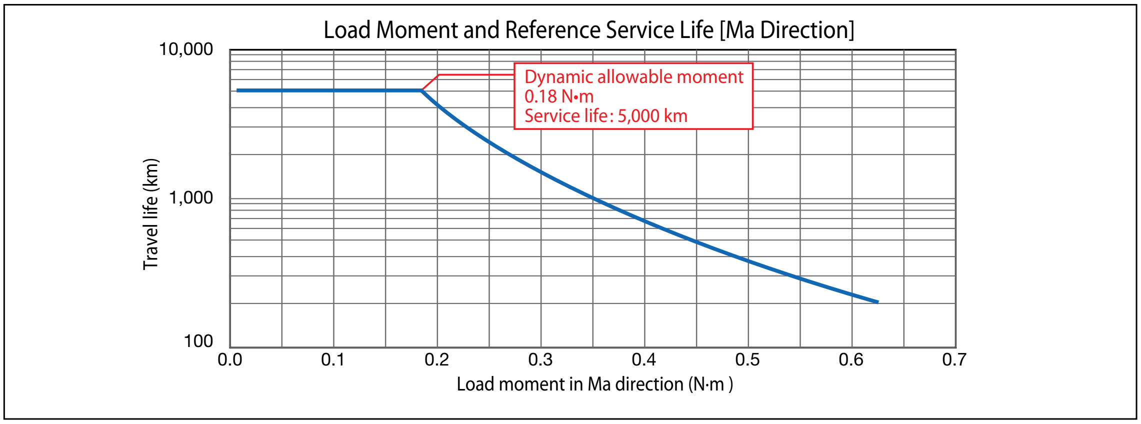


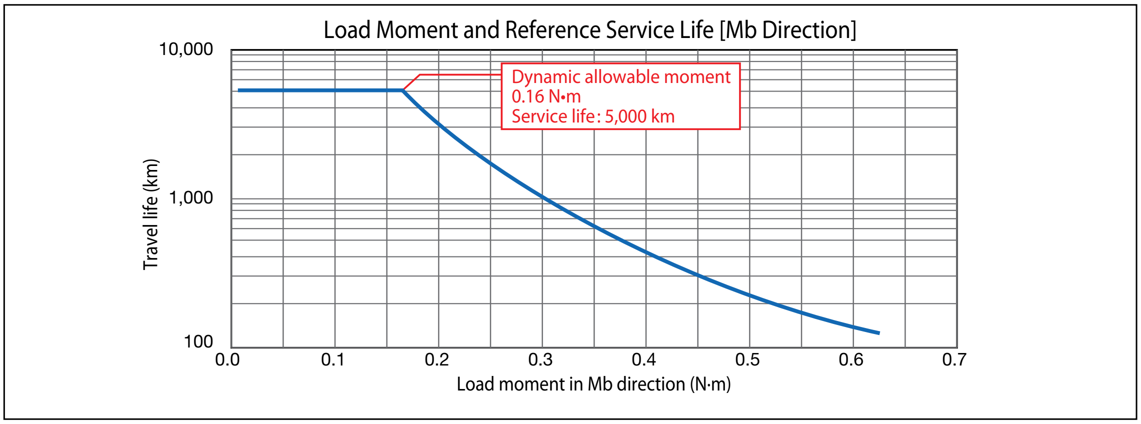
Allowable load calculation conditions:
Load mass corresponding to a guide traveling life of 5,000 km, considering moments generated by acceleration/deceleration. (Acceleration: 0.5 G / Speed: 500mm/s)

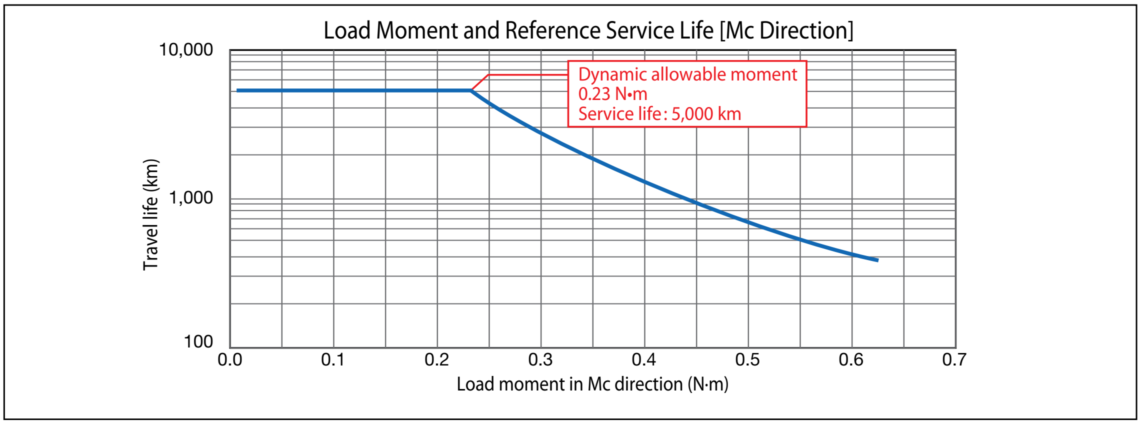
Selection Guide (Information on Guide Type)

Load Moment and Reference Service Life

Actuators of the mini slider type (RCA2-SA2AC/SA2AR) have a built-in guide, so they can receive a load overhanging from the slider.
Note, however, that the service life of the actuator will decrease if the specified dynamic allowable moment is exceeded.
(See the graphs below.)
When calculating this moment, use a point 25 mm below the top surface of the slider as the reference point. See the illustration at the bottom of this page.
Even when the allowable moment is not breached, keep the overhang length from the actuator (overhang length) within 40 mm.







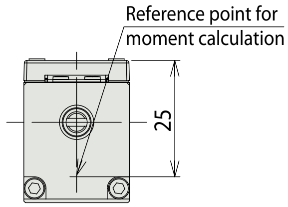
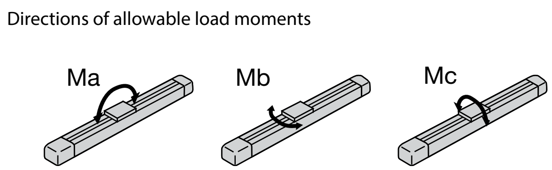
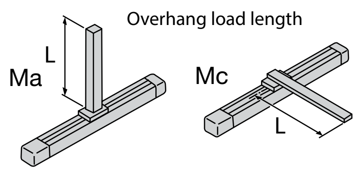


Chart A

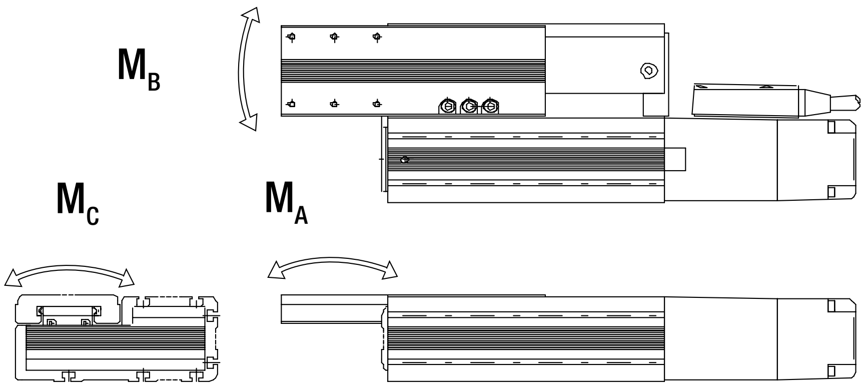




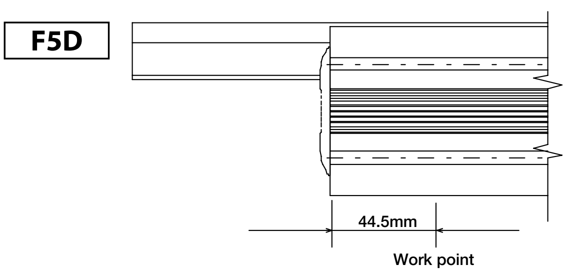
Flat Type F5D Technical Materials

Flat Type (F5D) Moment, load capacity

The direction of the moment in the flat type is as shown in the figure below.



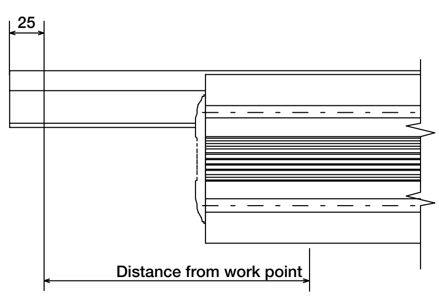
The points of moment application in the Ma and Mb directions are as shown below.

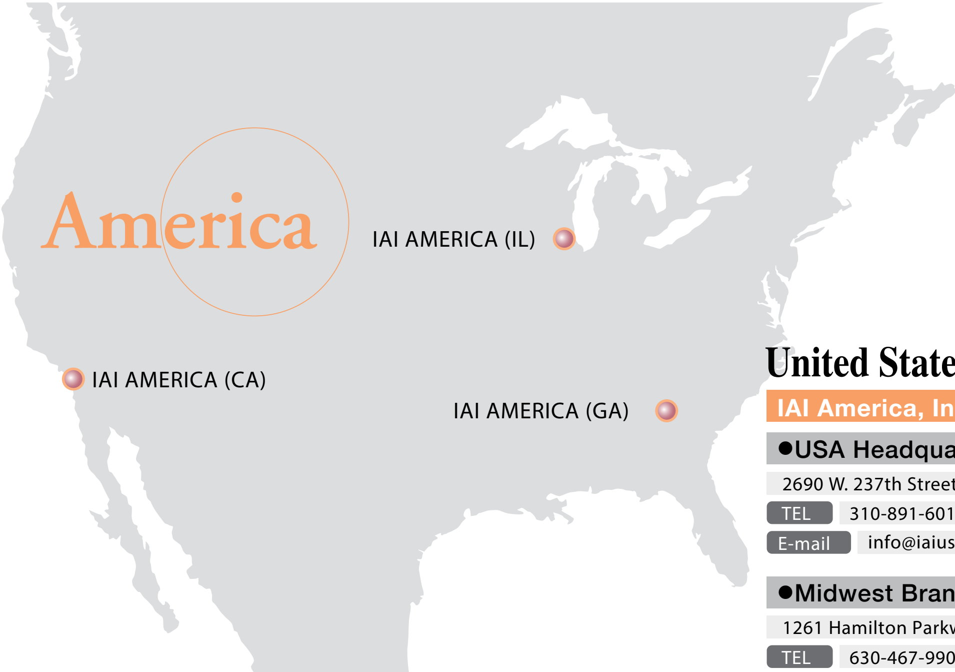


Be careful that the load exerted on the plate tip does not exceed the Ma moment when using a flat type horizontally.

Refer to the table below for the allowable tip loads calculated from the Ma moment for each stroke.

Stroke		50	100	150	200	250	300
F5D Type	Distance from point of action (m)	0.07	0.12	0.17	0.22	0.27	0.27
	N	64.3	37.5	26.5	20.5	16.7	14.1
	(kgf)	6.56	3.83	2.70	2.09	1.70	1.43





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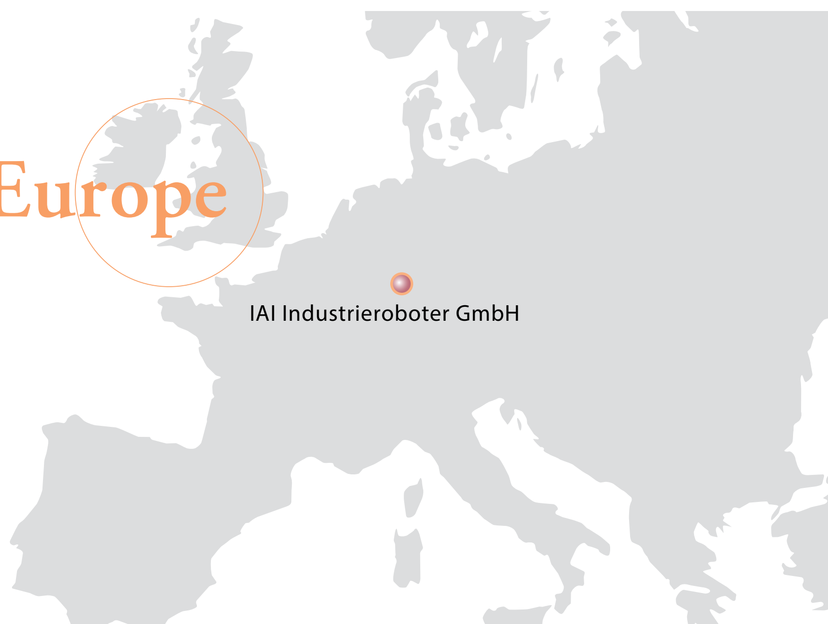

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