IAI
Quality and Innovation

ROBO CYLINDER

ROBO Cylinder ®

Wide Radial Cylinder

RCS4- WRA10C/WRA12C/WRA14C/WRA16C
WRA10R/WRA12R/WRA14R/WRA16R

Instruction Manual First Edition ME3772-1B

IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

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

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

The DVD enclosed with the product contains instruction manuals for IAI products.
When using the product, refer to the necessary sections of the applicable instruction manual by printing them out or displaying them on a PC.

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

[Important]

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
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RCS4 Wide Radial Cylinder Type Instruction Manual Configuration

Product name	Instruction manual name	Control number
RCS4	First Step Guide	ME3775
RCS4 Wide Radial Cylinder Type	Instruction Manual (this document)	ME3772
SCON-CB/CFB Controller	SCON-CB/CFB Controller Instruction Manual	ME0340
SCON-CAL/CGAL Controller	SCON-CAL/CGAL Controller Instruction Manual	ME0243
MSCON-C Controller	MSCON-C Controller Instruction Manual	ME0306
SSEL-CS Controller	SSEL-CS Controller Instruction Manual	ME0157
XSEL-P/Q Controller	XSEL-P/Q Controller Instruction Manual	ME0148
XSEL-R/S Controller	XSEL-R/S Controller Instruction Manual	ME0313
XSEL-RA/SA Controller	XSEL-RA/SA Controller Instruction Manual	ME0359
PC Compatible Software for RC/EC	RCM-101-MW/RCM-101-USB Instruction Manual	ME0155
PC Compatible Software for XSEL	IA-101-X-MW/IA-101-X-USBMW Instruction Manual	ME0154
Touch Panel Teaching Pendant	TB-01/01D/01DR Applicable for Position Controller Instruction Manual	ME0324
Touch Panel Teaching Pendant	TB-02/02D Applicable for Position Controller Instruction Manual	ME0355
Data Setter	TB-03 Applicable for Position Controller	ME0376
Touch Panel Teaching Pendant	TB-01/01D/01DR Applicable for Program Controller Instruction Manual	ME0325
Touch Panel Teaching Pendant	TB-02/02D Applicable for Program Controller Instruction Manual	ME0356
Data Setter	TB-03 Applicable for Program Controller	ME0377

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Safety Guide

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

Safety Precautions for Our Products

Common safety precautions for the use of robots in various operations are indicated here.

No.	Operation	Precautions
1	Model Selection	● This product is not intended or designed for applications where high levels of safety are required, and so cannot guarantee that human lives will be protected. Accordingly, do not use it in any of the following applications. (1) Medical equipment used to maintain, control or otherwise affect human life or physical health (2) Mechanisms or machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.) (3) Machinery components essential for safety (safety devices etc.) ● Do not use the product outside the range of the specifications. Otherwise, the product life may be drastically shortened, and product damage or facilities stoppage may occur. ● Do not use it in any of the following environments. (1) Locations with flammable gases, ignitable objects or explosives (2) Locations with potential exposure to radiation (3) Locations with ambient temperature or relative humidity exceeding the specifications range (4) Locations where radiant heat is applied by direct sunlight or other large heat source (5) Locations where condensation occurs due to abrupt temperature changes (6) Locations with corrosive gases (sulfuric acid, hydrochloric acid, etc.) (7) Locations exposed to significant amounts of dust, salt or iron powder (8) Locations subject to direct vibration or impact ● For an actuator used in vertical orientation, select a model which is equipped with a brake. If a model without brake is selected, the moving parts may fall when the power is turned OFF, causing accidents such as injury or workpiece damage.

No.	Operation	Precautions
2	Transportation	● When transporting heavy objects, do the work with two or more persons or utilize equipment such as a crane. ● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● During transportation, carefully consider the carrying positions, weight, and weight balance, and be careful to avoid collisions or dropping. ● Use appropriate transportation measures for transport. The actuators available for transportation with a crane have eyebolts attached or tapped holes to attach bolts. Follow the instructions in the instruction manual for each model. ● Do not climb onto the package. ● Do not put anything heavy that could deform the package on it. ● When using a crane with capacity of 1t or more, have an operator qualified for crane operation and sling work. ● When using a crane or equivalent equipment, make sure not to suspend loads exceeding the equipment's rated load. ● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. Also, check to make sure that the hook is free of damage. ● Do not climb on loads suspended from cranes. ● Do not leave loads suspended from cranes for long periods. ● Do not stand under loads suspended from cranes.
3	Storage and Preservation	● For the storage and preservation environment, see the installation environment. However, give especial consideration to the prevention of condensation. ● Store the products so as to prevent them from falling over or down in the case of natural disasters such as earthquakes.

No.	Operation	Precautions
4	Installation and Startup	(1) Installation of robot body and controller, etc. ● Be sure to securely hold and fix the product (including the workpiece). If the product falls over, is dropped, or operates abnormally, it may lead to damage and injury. Also, be equipped for falls over or down due to natural disasters such as earthquakes. ● Do not climb on or put anything on the product. Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life. ● When using the product in any of the places specified below, provide sufficient shielding. (1) Locations where electrical noise is generated (2) Locations with strong electrical or magnetic fields (3) Locations with mains or power lines passing nearby (4) Locations where the product may come in contact with water, oil or chemical spray
		(2) Cable wiring ● Use IAI genuine cables for connecting the actuator and controller, and for the teaching tools. ● Do not scratch cables, bend them forcibly, pull them, coil them, snag them, or place heavy objects on them. Otherwise, this may lead to fire, electric shock, or abnormal operation due to leakage or conduction malfunction. ● Perform the wiring for the product after turning OFF the power to the unit, and avoid miswiring. ● When wiring DC power (+24V), be careful with the positive/negative polarity. Incorrect connections may lead to fire, product breakdown or abnormal operation. ● Connect the cable connector securely so that there is no disconnection or looseness. Otherwise, this may lead to fire, electric shock, or abnormal operation of the product. ● Never cut or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Otherwise, this may lead to fire or abnormal operation of the product.
		(3) Grounding ● Grounding must be performed, in order to prevent electric shocks or electrostatic charge, enhance noise-resistant performance and control unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, be sure to use a twisted pair cable with wire thickness 0.5mm^2 (AWG20 or equivalent) or more for grounding work. For safeguard grounding, it is necessary to select an appropriate wire diameter for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). ● Perform Class D grounding (former Class 3 grounding, with ground resistance 100Ω or below).

No.	Operation	Precautions
4	Installation and Startup	(4) Safety measures ● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● When the product is operating or in the ready mode, take safety measures (such as the installation of safety/protection fences) so that nobody can enter the area within the robot's movable range. Contact with an operating robot may lead to death or serious injury. ● Be sure to install an emergency stop circuit so that the unit can be stopped immediately in an emergency during operation. ● Take safety measures such that turning the power ON alone will not start up the unit. Otherwise, this may cause the product to start unexpectedly, leading to injury or product damage. ● Take safety measures such that emergency stop cancel or recovery after power failure alone will not start up the unit. Otherwise, this may lead to injury or equipment damage. ● When installation or adjustment operation is to be performed, display signs such as "Operating: No Power ON!" etc. Sudden power input may cause electric shock or injury. ● Take measures to prevent workpieces, etc. from falling during power failures or emergency stop. ● Wear protection gloves, goggles and safety shoes, as necessary, to secure safety. ● Do not insert fingers or objects into the openings in the product. Otherwise, this may lead to injury, electric shock, product damage, or fire. ● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces.
5	Teaching	● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● Perform teaching operation from outside the safety/protection fence, if possible. If operation must be performed within the safety/protection fence, prepare "Work Regulations" and make sure that all the workers acknowledge and understand them well. ● When operation is to be performed inside the safety/protection fence, operators should have emergency stop switches available at hand so that the unit can be stopped at any time if abnormalities occur. ● When operation is to be performed inside the safety/protection fence, have a monitor standing by in addition to the operator(s) so that the unit can be stopped at any time if abnormalities occur. Also, keep watch on the operation so that a third party cannot operate the switches carelessly. ● Place a sign indicating "Operating" where it can be seen easily. ● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces. * Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.

No.	Operation	Precautions
6	Trial Operation	● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● After teaching or programming, carry out trial operation step by step before switching to automatic operation. ● When trial operation is to be performed inside the safety/protection fence, use the same work procedure, determined in advance, as teaching operation. ● Be sure to confirm program operation at safe speeds. Otherwise, this may lead to accidents due to unexpected motion caused by program error, etc. ● Do not touch the terminal block or any of the various setting switches while the equipment is live. Otherwise, this may lead to electric shock or abnormal operation.
7	Automatic Operation	● Check before starting automatic operation or restarting after operation stop that there is nobody within the safety/protection fence. ● Before starting automatic operation, make sure that all peripheral equipment is ready for automatic operation and that there is no alarm indication. ● Be sure to start automatic operation from outside the safety/protection fence. ● If the product produces abnormal heat, smoke, odor, or noise, immediately stop it and turn OFF the power switch. Otherwise, this may lead to fire or damage to the product. ● When a power failure occurs, turn OFF the power switch. Otherwise, this may lead to injury or product damage due to unexpected product motion during recovery from the power failure.
8	Maintenance and Inspection	● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety. ● Perform the work outside the safety/protection fence, if possible. If operation must be performed within the safety/protection fence, prepare "Work Regulations" and make sure that all the workers acknowledge and understand them well. ● When work is to be performed inside the safety/protection fence, turn OFF the power switch as a rule. ● When operation is to be performed inside the safety/protection fence, operators should have emergency stop switches available at hand so that the unit can be stopped at any time if abnormalities occur. ● When operation is to be performed inside the safety/protection fence, have a monitor standing by in addition to the operator(s) so that the unit can be stopped at any time if abnormalities occur. Also, keep watch on the operation so that a third party cannot operate the switches carelessly. ● Place a sign indicating "Operating" where it can be seen easily. ● For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model. ● Do not perform dielectric strength testing. Otherwise, this may lead to damage to the product.

No.	Operation	Precautions
8	Maintenance and Inspection	● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces. ● The slider or rod may be misaligned from the stop position if the servo is turned OFF. Avoid injury or damage due to unnecessary operation. ● Be careful not to lose the cover or any removed screws, and be sure to return the product to the original condition after maintenance and inspection work. Otherwise, this may lead to product damage or injury due to incomplete mounting. * Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.
9	Modification and Disassembly	● Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion.
10	Disposal	● When the product exceeds its useful life or is no longer needed, dispose of it properly as industrial waste. ● When removing the actuator for disposal, avoid dropping components when detaching screws. ● Do not put the product in a fire when disposing of it. The product may rupture or generate toxic gases.
11	Other	● If you are equipped with a medical device such as a pacemaker, do not approach the product or its wiring, as the device may be affected. ● See the Overseas Specifications Compliance Manual to check compliance with overseas standards if necessary. ● For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure safety.

Precaution Indications

The safety precautions are divided into "Danger", "Warning", "Caution" and "Notice" according to the warning level, as follows, and described in the Instruction Manual for each model.

Level	Degree of risk to persons and property	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates a situation in which, while injury is not a likely result, the precautions should be observed in order to use the product appropriately.	 Notice

Precautions for Handling

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

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

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

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

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

   Operation outside the warranty could cause decreased performance or product breakdown. Use within the allowable range for each item.

Item	**Cautions for use**	**Problems or breakdowns which may occur if the allowable range is exceeded**
Speed and acceleration/deceleration	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life.
Rod Tip Dynamic Allowable Load	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life. In extreme cases, flaking may occur on the guide or ball screw.
Load offset distance		Mounting a load with an overhang length greater than the allowable values may lead to vibration or abnormal noise.

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

   Continuous return operation within a distance less than 30mm may cause the grease film to degrade rapidly.
   As a guideline, in every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film. Continued use of the actuator in that state may lead to breakdown.
   In extreme cases, flaking may occur on the guide or ball screw.

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

   This may damage the coupling or other mechanical parts.

7. Grease has been applied to the outer periphery of the rod for the rod type. Protect the peripheral equipment if grease adhesion negatively affects them.

8. In some conditions of environment of use, postures of installation and conditions of operation, the base oil separated from the grease may come out of ROBO Cylinder.
   It is recommended to have a protection in case the peripheral devices could get influence of the base oil.

International Standard Compliance

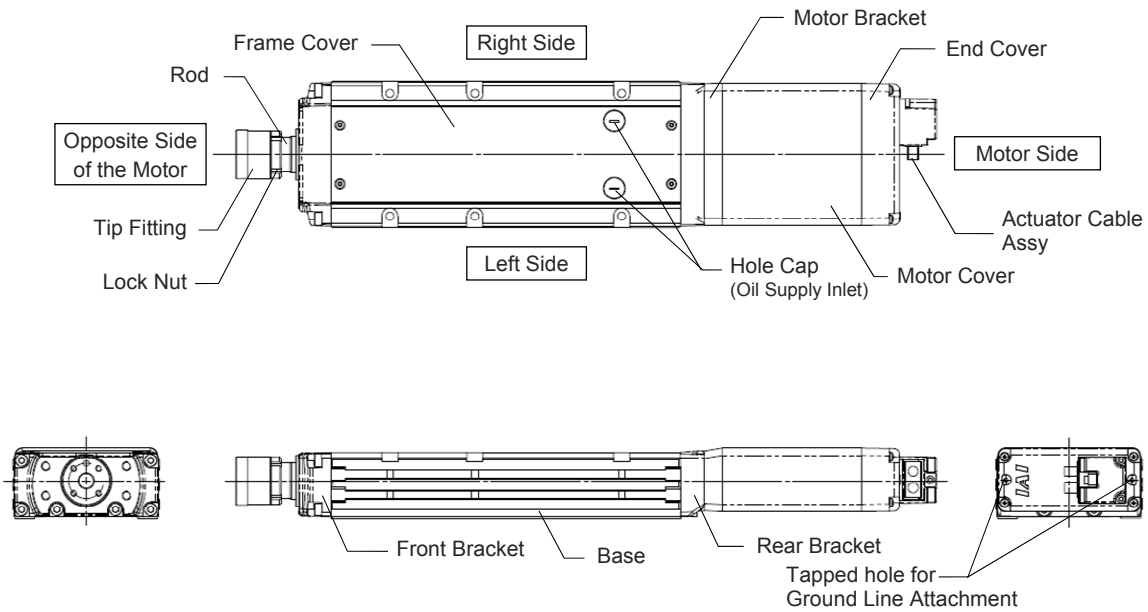
The ROBO Cylinder complies with the following overseas standards.
Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

CE Marking	RoHS Directive
○	○

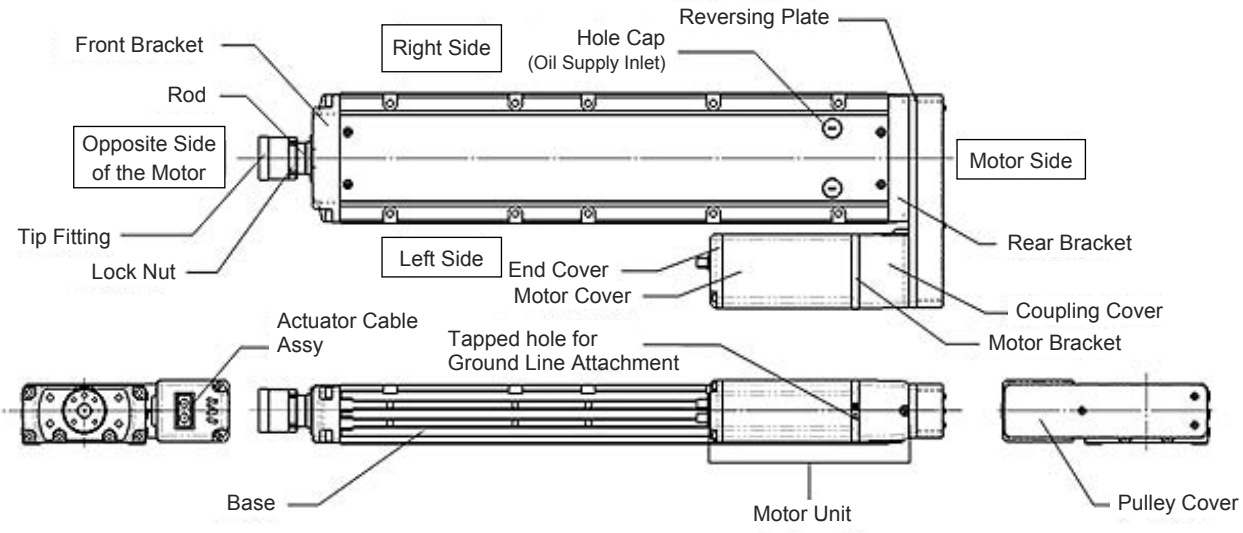
Names of the Parts

In this manual, the actuator left/right sides and motor/opposite sides are shown as in the figure below.

Motor Straight Type



Motor Reversing Type



ROBO Cylinder

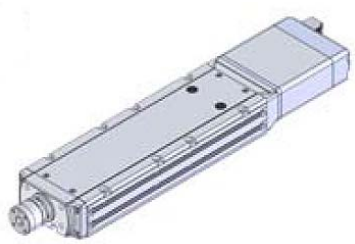
Chapter 1

Specifications

1.1 Checking the Product

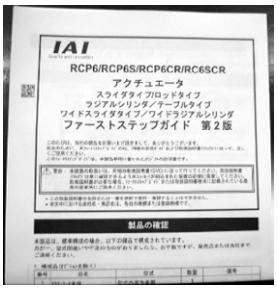
Parts

The following table shows the product configuration for the standard specification.
See the component list for the details of the enclosed components. If you find any fault or missing parts, contact your local IAI distributor.

<table>
<tr><th>Actuator</th><th colspan="2">Accessories</th></tr>
<tr><td>Actuator Quantity 1
  </td><td>Motor Cable Quantity 1
  </td><td>Encoder Cable Quantity 1
  </td></tr>
<tr><th colspan="3">Accessories</th></tr>
<tr><td colspan="2">Cross Recessed Pan Head Screw with Captive Washer M3×6
Quantity 2

For affixing ground cable
  </td><td>Cable Band Quantity 2

For clamping connector cover
 

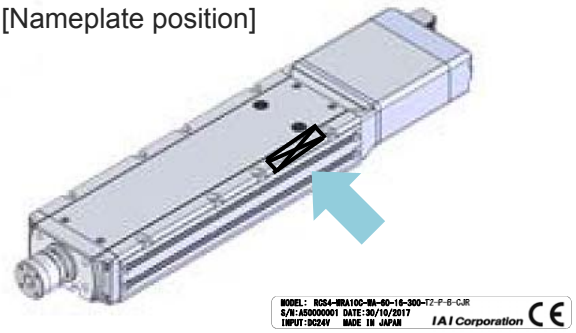
* Refer to International Application Manual (ME0287) for how to use it.</td></tr>
<tr><th colspan="3">Accessories (Documents/DVD)</th></tr>
<tr><td>First Step Guide
Quantity 1
 
</td><td>Safety Guide Quantity 1
 
</td><td>Instruction Manual (DVD)
Quantity 1
 
</td></tr>
</table>

How to Read the Model Nameplate

Model →
Serial number →

MODEL: RCS4-WRA10C-WA-60-16-300-T2-P-B-CJR
S/N:A50000001 DATE:30/10/2017
INPUT:DC24V MADE IN JAPAN
IAI Corporation CE

[Nameplate position]



How to Read the Model Number

RCS4 — [Type] — WA — [Motor Wattage] — [Ball Screw Lead] — [Stroke] — [Applicable Controller] — [Cable Length] — [Options]

Series: RCS4

Type

WRA10C	Body Width 100mm Coupling Type
WRA12C	Body Width 120mm Coupling Type
WRA14C	Body Width 140mm Coupling Type
WRA16C	Body Width 160mm Coupling Type
WRA10R	Body Width 100mm Motor-Reversed Type
WRA12R	Body Width 120mm Motor-Reversed Type
WRA14R	Body Width 140mm Motor-Reversed Type
WRA16R	Body Width 160mm Motor-Reversed Type

Encoder Type: WA

WA	Battery-less Absolute

Motor Wattage

60	60W
100	100W
200	200W
400	400W

Ball Screw Lead

2.5	Lead 2.5mm
3	Lead 3mm
4	Lead 4mm
5	Lead 5mm
6	Lead 6mm
8	Lead 8mm
10	Lead 10mm
12	Lead 12mm
16	Lead 16mm
20	Lead 20mm
24	Lead 24mm
30	Lead 30mm

Stroke

50	50mm
to	to
800	800mm

(Setting available in every 50mm for pitch)

Applicable Controller

T2	SCON MSCON SSEL XSEL-P/Q XSEL-RA/SA

Cable Length

N	None
P	1m
S	3m
M	5m
X□□	Length Specification
R□□	Robot Cable

Options

B	Brake Type
CJT	Cable Eject Direction Changed (Top)
CJR	Cable Eject Direction Changed (Right)
CJL	Cable Eject Direction Changed (Left)
CJO	Cable Eject Direction Changed (Outward)
CJB	Cable Eject Direction Changed (Bottom)
FL	Flange Bracket
ML	Motor Left Reversed Direction
MR	Motor Right Reversed Direction
NM	Reversed-home Specification
NTBL	T-Slot Nut Bar (Left)
NTBR	T-Slot Nut Bar (Right)

* Please note that the available range of ball screw lead, stroke and options will differ depending on the actuator type.

Product List

Category	Type	Appearance	Body Width (mm)	Motor Wattage (W)	Lead (mm)	Positioning Repeatability (mm)	Stroke (mm)	Max. Speed (mm/s)	Rated Thrust (N)	Max. Payload (kg)	
										Horizontal	Vertical
Motor Straight Type	WRA10C		 100mm	60	16	±0.01	50 to 500 (Every 50 st)	800	53	5	–
					10			600	85	16	3
					5			300	170	25	5
					2.5			150	340	40	10
	WRA12C		 120mm	100	20	±0.01	50 to 500 (Every 50 st)	1000	85	12	2
					12			720	142	25	6
					6			360	283	40	15
					3			180	566	60	20
	WRA14C		 140mm	200	24	±0.01	50 to 600 (Every 50 st)	1200	142	25	3
					16			800	214	50	8
					8			480	427	65	20
					4			240	855	85	30
	WRA16C		 160mm	400	30	±0.01	50 to 800 (Every 50 st)	1300	226	30	6
					20			1000	339	60	12
					10			500	678	80	35
					5			250	1357	100	50
Motor Reversing Type	WRA10R		 100mm	60	16	±0.01	50 to 500 (Every 50 st)	800	53	5	–
					10			600	85	13	2.5
					5			300	170	25	5
					2.5			150	340	40	10
	WRA12R		 120mm	100	20	±0.01	50 to 500 (Every 50 st)	1000	85	12	2
					12			720	142	25	6
					6			360	283	40	15
					3			180	566	60	20
	WRA14R		 140mm	200	24	±0.01	50 to 600 (Every 50 st)	1200	142	25	3
					16			800	214	50	8
					8			480	427	65	20
					4			240	855	85	30
	WRA16R		 160mm	400	30	±0.01	50 to 800 (Every 50 st)	1300	226	30	6
					20			1000	339	60	12
					10			500	678	80	35
					5			250	1357	100	50

1.2 Specifications

Specifications

[1] RCS4-WRA10C

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
16	5	–	53
10	16	3	85
5	25	5	170
2.5	40	10	340

[Stroke and Max Speed] Unit: mm/s

Lead (mm)	50 to 500 (Every 50mm)
16	800
10	600
5	300
2.5	150

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

(Note) For Lead 16, there is no setting of the maximum payload type against the speed and acceleration as the payload is low for vertical orientation. Use the radial cylinder.

Lead 16

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
5	5	4	3	2	–	–	–	–	–

Lead 10

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
16	16	12	10	8	3	3	2	2	1

Lead 5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
20	20	15	10	–	5	5	5	5	–

Lead 2.5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
40	35	25	–	–	10	8	8	–	–

Caution

Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

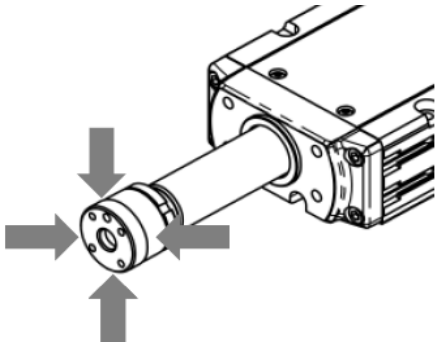
Item	Content
Drive system	Ball screw ϕ8mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ25mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	100mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

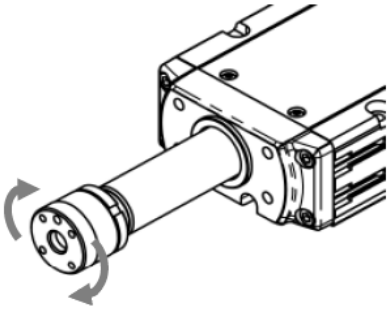
[Allowable Load and Torque on Rod Tip]

Caution

- Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



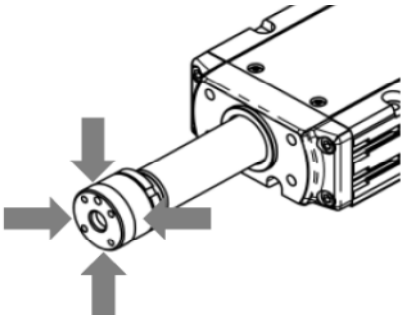
Should be below allowable torque

◎WRA10C

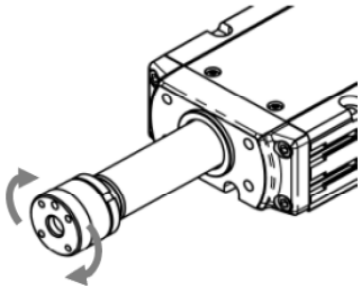
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Rod Tip Static Allowable Load (Note 1)	[N]		196	196	196	196	196	196	196	196	184	169
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	98	98	98	95	85	76	68	62	57	52
	[N]	Rod Tip Offset Distance 100mm	50	50	50	50	50	50	50	50	50	49
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	98	98	91	80	71	63	57	52	47	43
	[N]	Rod Tip Offset Distance 100mm	50	50	50	50	50	50	50	48	44	40
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less									
Rod Tip Overhang Distance	[mm]		100 or less									
Rod Tip Static Allowable Torque	[N•m]		10	10	10	10	10	10	10	10	10	10
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.9
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.8	4.4	4.0
Rod Non–Rotation Accuracy (Note 2)	[deg]		0									

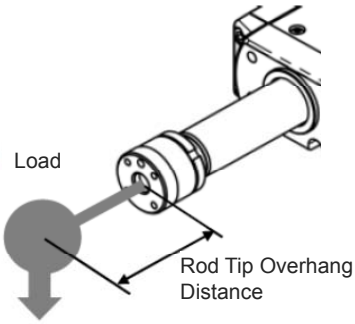
Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

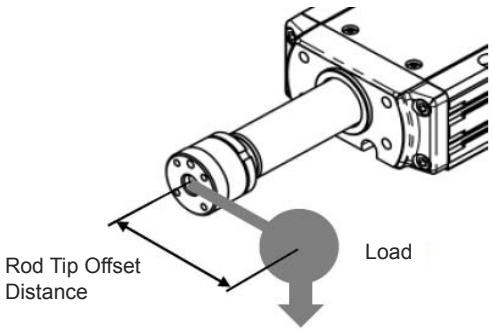
[Rod Tip Static Allowable Load]



[Rod Tip Allowable Torque]




Load
Rod Tip Overhang
Distance


Rod Tip Offset
Distance
Load

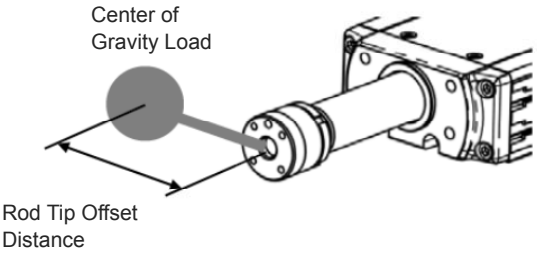
● WRA10C: Allowable Payload for 3,000km of Operational Life

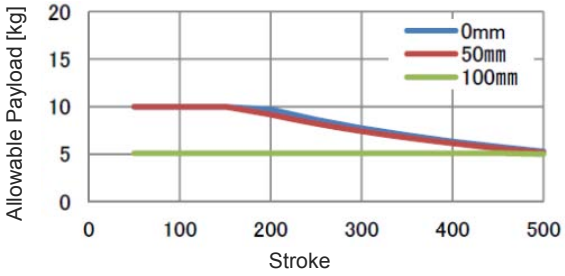
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [1] RCS4-WRA10C [Payload by Acceleration].

[Horizontal Installation]

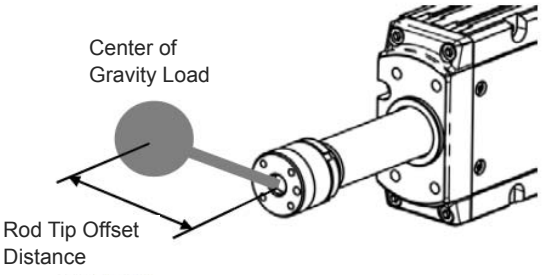
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	10.0	9.7	8.6	7.7	7.0	6.3	5.8	5.3
	[kg]	Rod Tip Offset Distance 50mm	10.0	10.0	10.0	9.2	8.2	7.4	6.7	6.1	5.6	5.1
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0

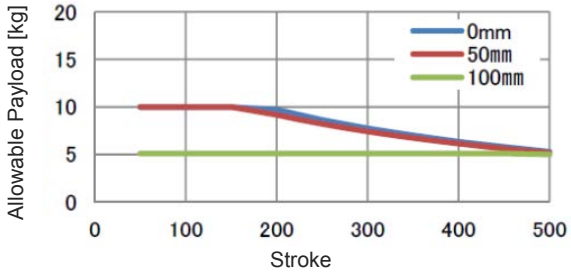




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	10.0	9.7	8.6	7.7	7.0	6.3	5.8	5.3
	[kg]	Rod Tip Offset Distance 50mm	10.0	10.0	10.0	9.2	8.2	7.4	6.7	6.1	5.6	5.1
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0

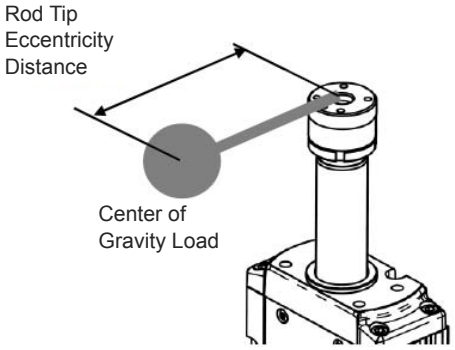


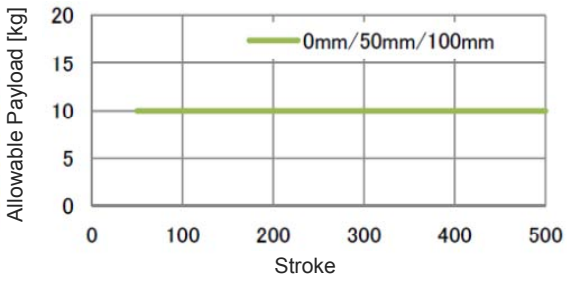


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 50mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 100mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0





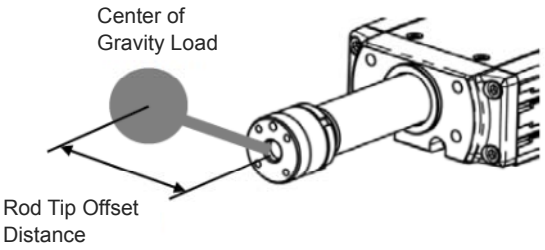
● WRA10C: Allowable Payload for 5,000km of Operational Life

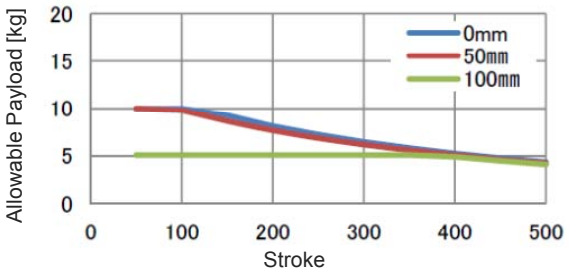
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [1] RCS4-WRA10C [Payload by Acceleration].

[Horizontal Installation]

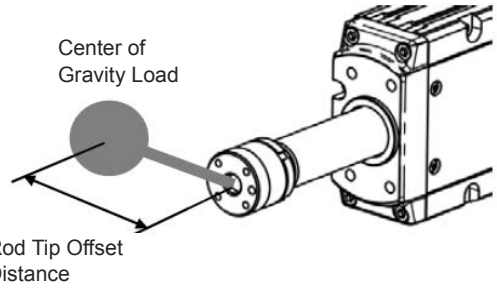
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	9.3	8.1	7.2	6.5	5.8	5.3	4.8	4.4
	[kg]	Rod Tip Offset Distance 50mm	10.0	9.8	8.6	7.7	6.9	6.2	5.6	5.1	4.6	4.2
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	4.9	4.5	4.1

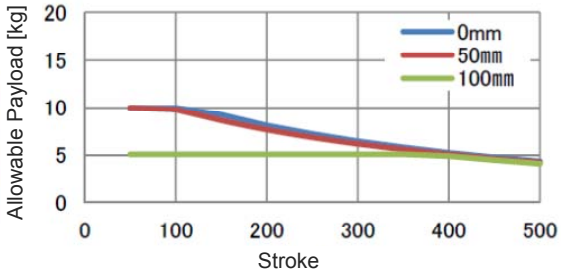




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	9.3	8.1	7.2	6.5	5.8	5.3	4.8	4.4
	[kg]	Rod Tip Offset Distance 50mm	10.0	9.8	8.6	7.7	6.9	6.2	5.6	5.1	4.6	4.2
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	4.9	4.5	4.1

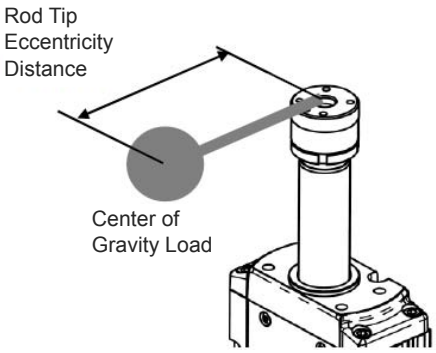


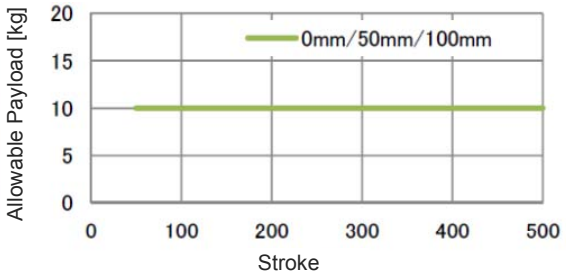


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 50mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 100mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

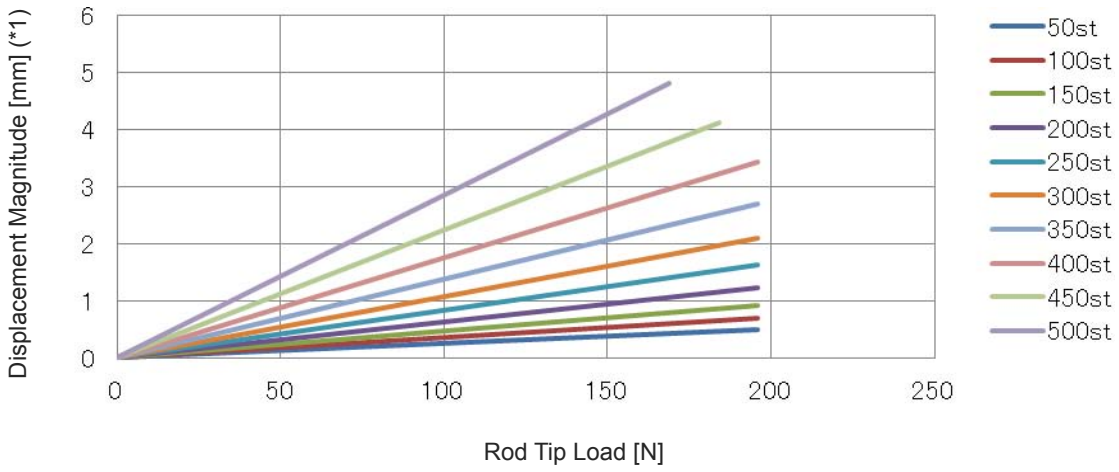




[Rod Flexure (Reference)]

(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



[2] RCS4-WRA12C

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
20	12	2	85
12	25	6	142
6	40	15	283
3	60	20	566

[Stroke and Max Speed] Unit: mm/s

Lead (mm)	50 to 500 (Every 50mm)
20	1000
12	720
6	360
3	180

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

Lead 20

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
12	10	8	6	4	2	2	1.5	1.5	1

Lead 12

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
25	25	20	15	15	6	6	6	5	5

Lead 6

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
40	40	30	25	–	15	15	12	12	–

Lead 3

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	50	40	–	–	20	20	20	–	–

Caution

Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

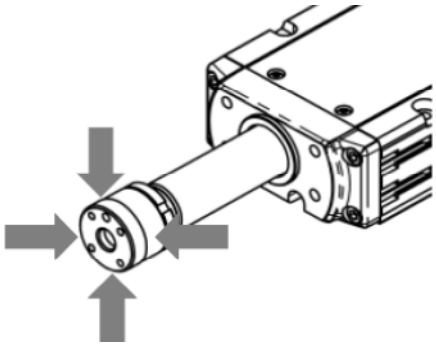
Item	Content
Drive system	Ball screw ϕ10mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ30mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	100mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

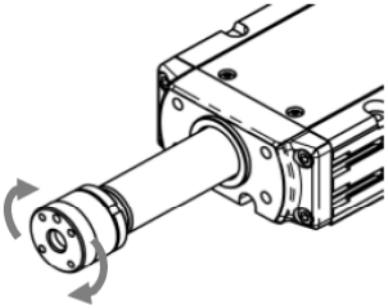
[Allowable Load and Torque on Rod Tip]

Caution

Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



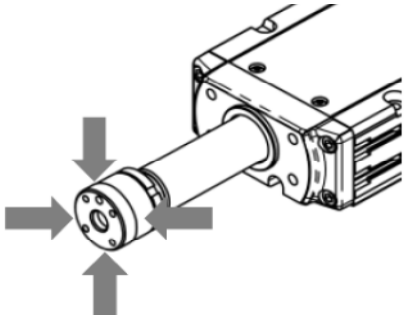
Should be below allowable torque

◎WRA12C

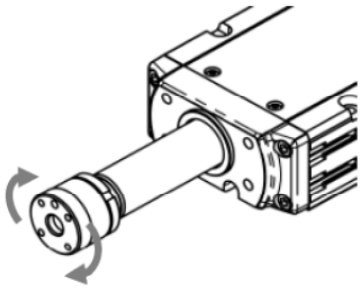
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Rod Tip Static Allowable Load (Note 1)	[N]		294	294	294	294	294	269	241	218	198	181
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	147	147	137	121	107	96	87	79	72	65
	[N]	Rod Tip Offset Distance 100mm	100	100	100	100	99	90	82	75	68	63
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	147	133	115	101	90	80	72	65	59	54
	[N]	Rod Tip Offset Distance 100mm	100	100	100	92	83	75	68	62	56	51
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less									
Rod Tip Overhang Distance	[mm]		100 or less									
Rod Tip Static Allowable Torque	[N•m]		20	20	20	20	20	20	20	20	20	20
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		10.0	10.0	10.0	10.0	9.9	9.0	8.2	7.5	6.8	6.3
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		10.0	10.0	10.0	9.2	8.3	7.5	6.8	6.2	5.6	5.1
Rod Non–Rotation Accuracy (Note 2)	[deg]		0									

Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

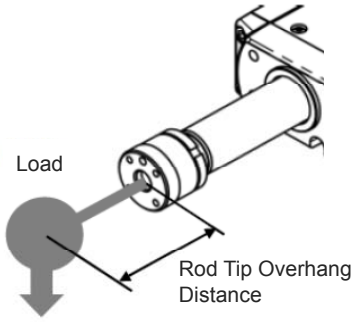
[Rod Tip Static Allowable Load]



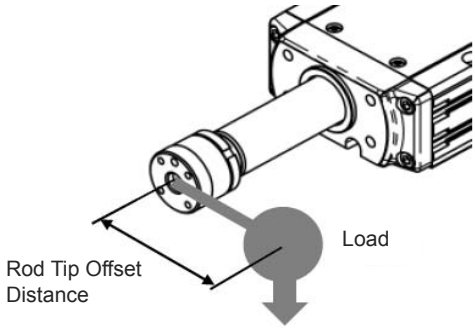
[Rod Tip Allowable Torque]



[Rod Tip Overhang Distance]



[Rod Tip Offset Distance]



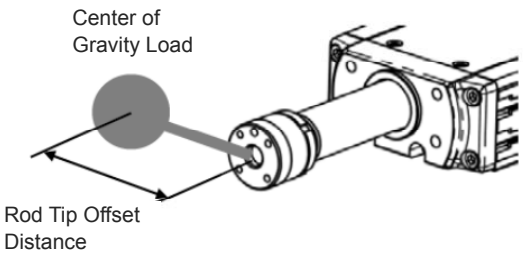
● WRA12C: Allowable Payload for 3,000km of Operational Life

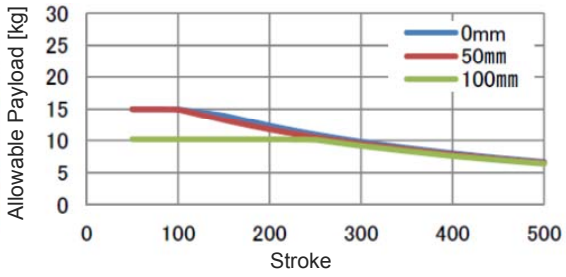
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [2] RCS4-WRA12C [Payload by Acceleration].

[Horizontal Installation]

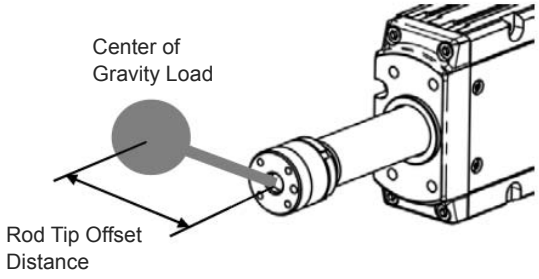
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	15.0	14.0	12.3	10.9	9.8	8.9	8.0	7.3	6.7
	[kg]	Rod Tip Offset Distance 50mm	15.0	14.9	13.2	11.7	10.5	9.5	8.6	7.8	7.1	6.5
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	10.2	10.1	9.2	8.3	7.6	7.0	6.4

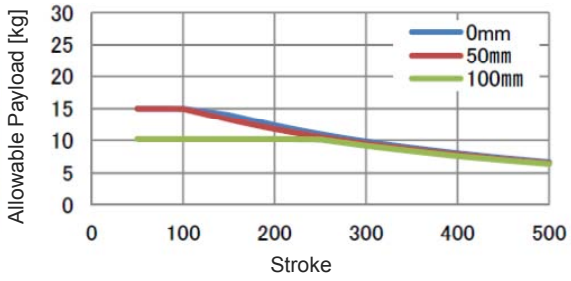




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	15.0	14.0	12.3	10.9	9.8	8.9	8.0	7.3	6.7
	[kg]	Rod Tip Offset Distance 50mm	15.0	15.0	13.2	11.8	10.5	9.5	8.6	7.8	7.1	6.5
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	10.2	10.1	9.2	8.3	7.6	7.0	6.4

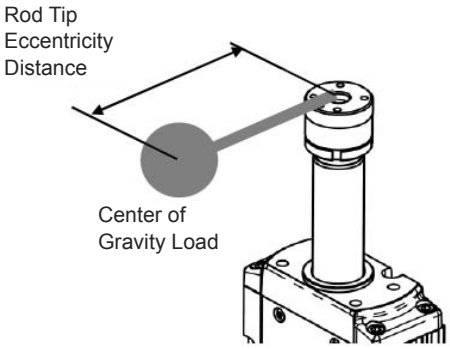


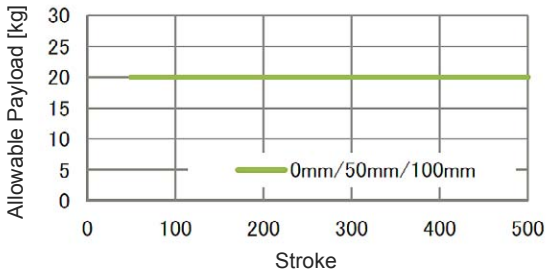


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 50mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 100mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0





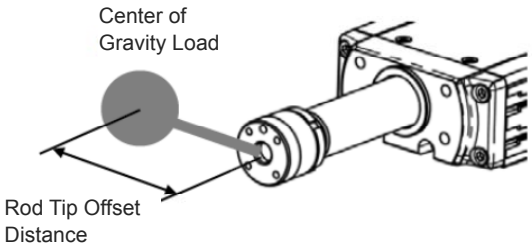
● WRA12C: Allowable Payload for 5,000km of Operational Life

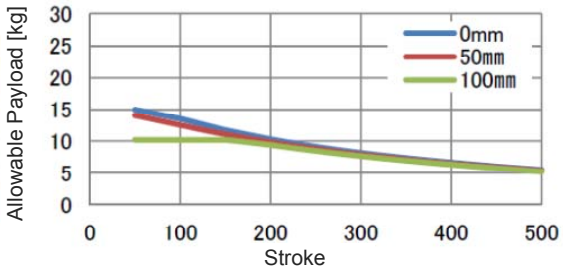
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [2] RCS4-WRA12C [Payload by Acceleration].

[Horizontal Installation]

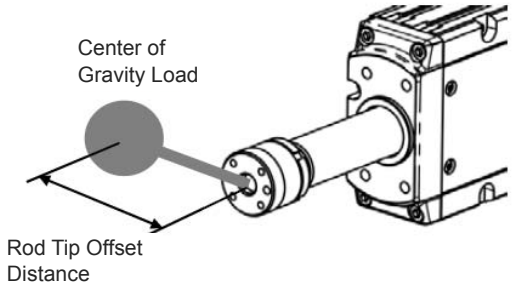
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	13.5	11.7	10.3	9.1	8.2	7.3	6.6	6.0	5.5
	[kg]	Rod Tip Offset Distance 50mm	14.1	12.5	11.1	9.8	8.8	7.9	7.1	6.5	5.9	5.3
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	9.4	8.4	7.6	6.9	6.3	5.7	5.2

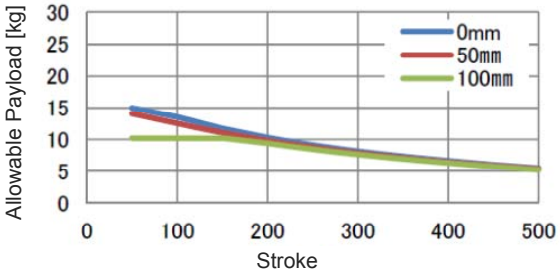




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	13.5	11.7	10.3	9.1	8.2	7.3	6.6	6.0	5.5
	[kg]	Rod Tip Offset Distance 50mm	14.2	12.6	11.1	9.8	8.8	7.9	7.1	6.5	5.9	5.3
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	9.4	8.5	7.6	6.9	6.3	5.7	5.2

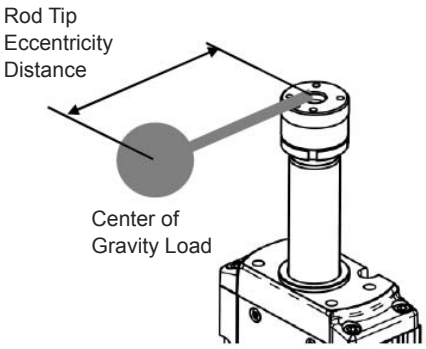


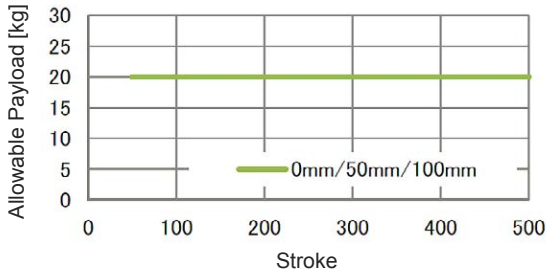


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 50mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 100mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

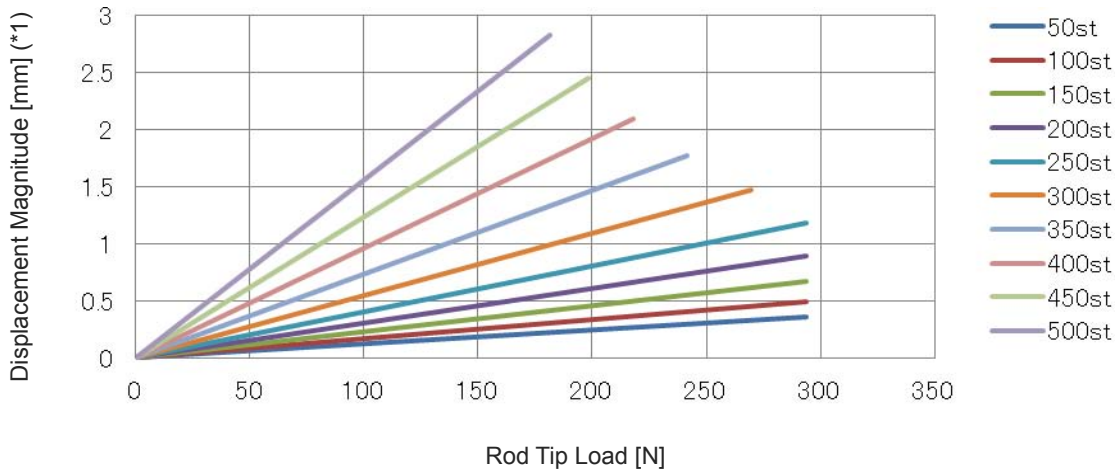




[Rod Flexure (Reference)]

(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



[3] RCS4-WRA14C

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
24	25	3	142
16	50	8	214
8	65	20	427
4	85	30	855

[Stroke and Max Speed] Unit: mm/s

Lead (mm)	50 to 600 (Every 50mm)
24	1200
16	800
8	480
4	240

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

Lead 24

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
25	15	10	6	4	3	3	2	2	2

Lead 16

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
50	30	25	20	15	8	6	6	6	5

Lead 8

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
65	50	40	40	–	20	20	20	20	–

Lead 4

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
85	70	60	–	–	30	30	30	–	–

Caution

Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

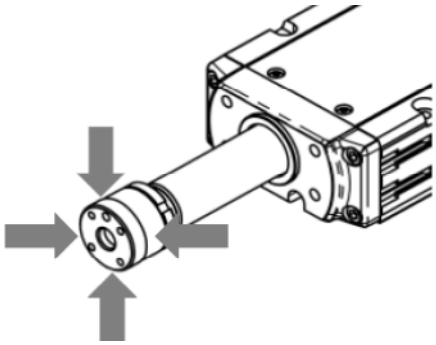
Item	Content
Drive system	Ball screw ϕ12mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ40mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	150mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

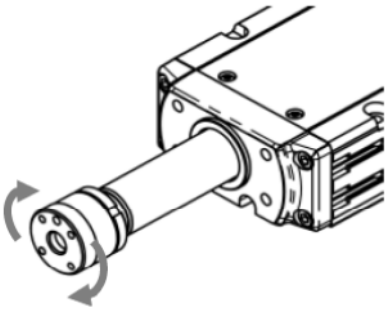
[Allowable Load and Torque on Rod Tip]

Caution

- Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



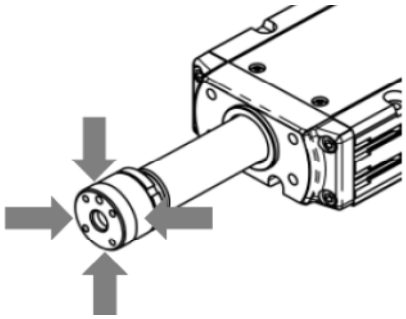
Should be below allowable torque

◎WRA14C

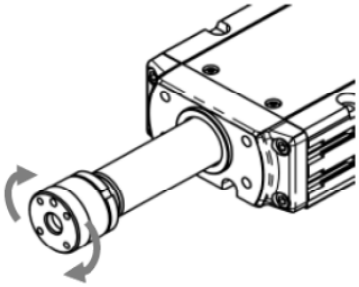
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Rod Tip Static Allowable Load (Note 1)	[N]		454	392	345	307	276	251	229	210	193	179	166	154
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	199	170	148	131	117	104	94	85	77	70	64	58
	[N]	Rod Tip Offset Distance 150mm	100	100	100	100	100	95	87	79	72	66	60	55
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	167	143	124	109	97	87	78	70	63	57	51	46
	[N]	Rod Tip Offset Distance 150mm	100	100	100	96	87	79	71	65	59	53	48	44
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less											
Rod Tip Overhang Distance	[mm]		150 or less											
Rod Tip Static Allowable Torque	[N•m]		30	30	30	30	30	30	30	30	30	30	30	30
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		15.0	15.0	15.0	15.0	15.0	14.3	13.0	11.8	10.8	9.9	9.0	8.2
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		15.0	15.0	15.0	14.4	13.0	11.8	10.7	9.7	8.8	8.0	7.3	6.6
Rod Non–Rotation Accuracy (Note 2)	[deg]		0											

Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

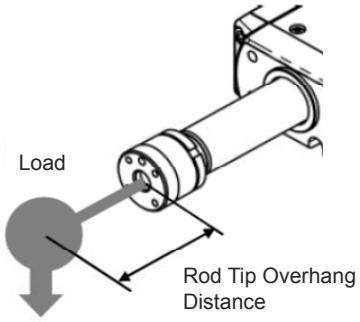
[Rod Tip Static Allowable Load]



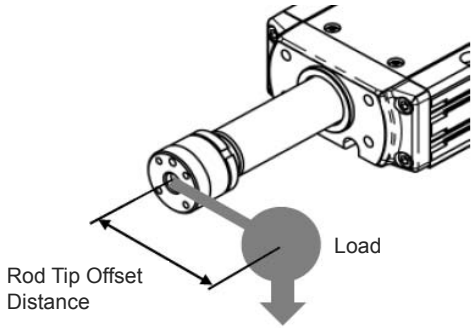
[Rod Tip Allowable Torque]



[Rod Tip Overhang Distance]



[Rod Tip Offset Distance]



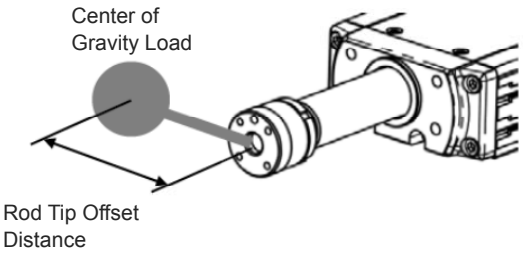
- WRA14C: Allowable Payload for 3,000km of Operational Life

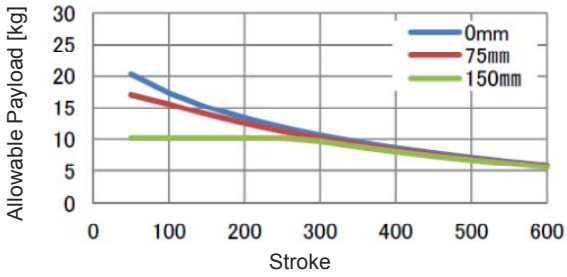
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [3] RCS4-WRA14C [Payload by Acceleration].

[Horizontal Installation]

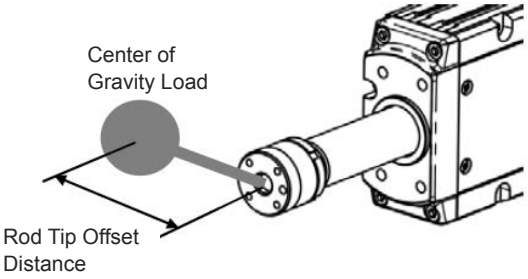
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	20.3	17.4	15.1	13.4	11.9	10.7	9.6	8.7	7.9	7.2	6.5	5.9
	[kg]	Rod Tip Offset Distance 75mm	17.1	15.6	14.0	12.5	11.3	10.2	9.2	8.4	7.6	6.9	6.3	5.8
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	10.2	10.2	9.7	8.8	8.1	7.4	6.7	6.1	5.6

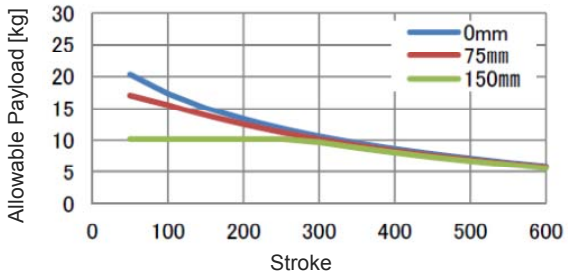




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	20.3	17.4	15.1	13.4	11.9	10.7	9.6	8.7	7.9	7.2	6.5	5.9
	[kg]	Rod Tip Offset Distance 75mm	17.4	15.8	14.1	12.6	11.3	10.2	9.2	8.4	7.6	6.9	6.3	5.8
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	10.2	10.2	9.7	8.8	8.1	7.4	6.7	6.1	5.6

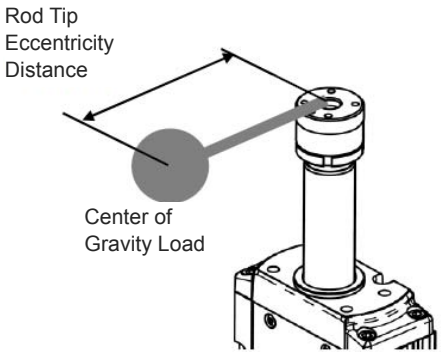


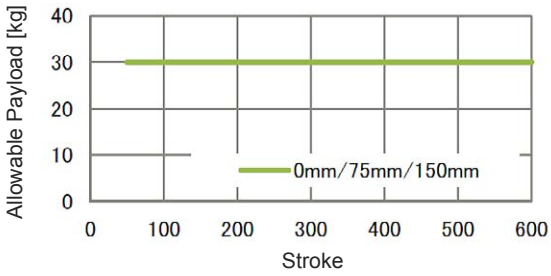


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 75mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 150mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0





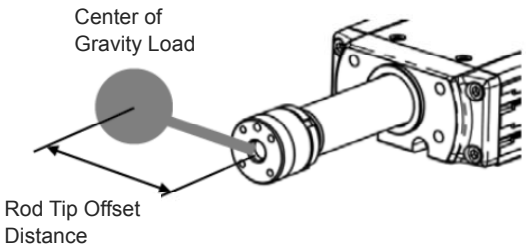
- WRA14C: Allowable Payload for 5,000km of Operational Life

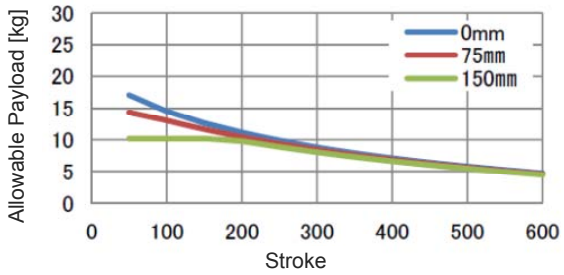
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [3] RCS4-WRA14C [Payload by Acceleration].

[Horizontal Installation]

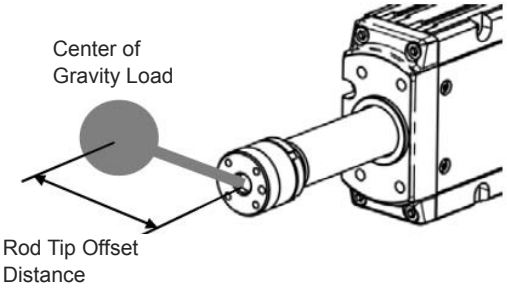
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	17.1	14.6	12.7	11.1	9.9	8.8	7.9	7.1	6.4	5.8	5.2	4.7
	[kg]	Rod Tip Offset Distance 75mm	14.3	13.1	11.7	10.5	9.4	8.4	7.6	6.9	6.2	5.6	5.1	4.6
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	9.8	8.9	8.0	7.3	6.6	6.0	5.4	4.9	4.5

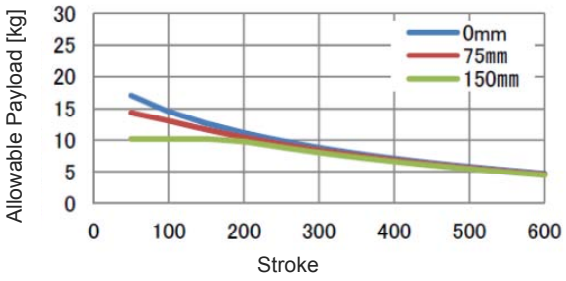




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	17.1	14.6	12.7	11.1	9.9	8.8	7.9	7.1	6.4	5.8	5.2	4.7
	[kg]	Rod Tip Offset Distance 75mm	14.6	13.2	11.8	10.5	9.4	8.4	7.6	6.9	6.2	5.6	5.1	4.6
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	9.8	8.9	8.1	7.3	6.6	6.0	5.5	4.9	4.5

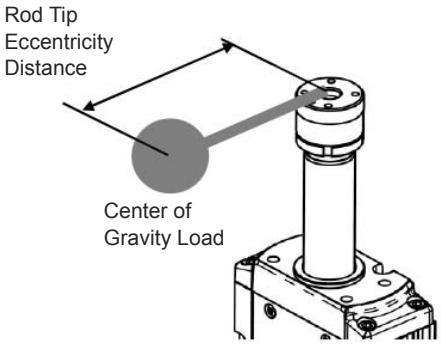


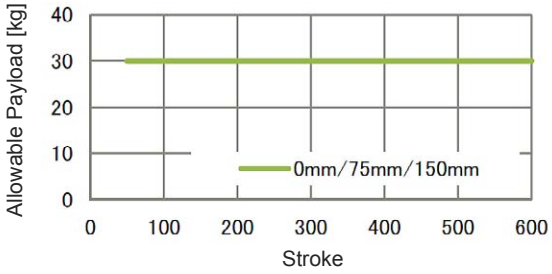


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 75mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 150mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

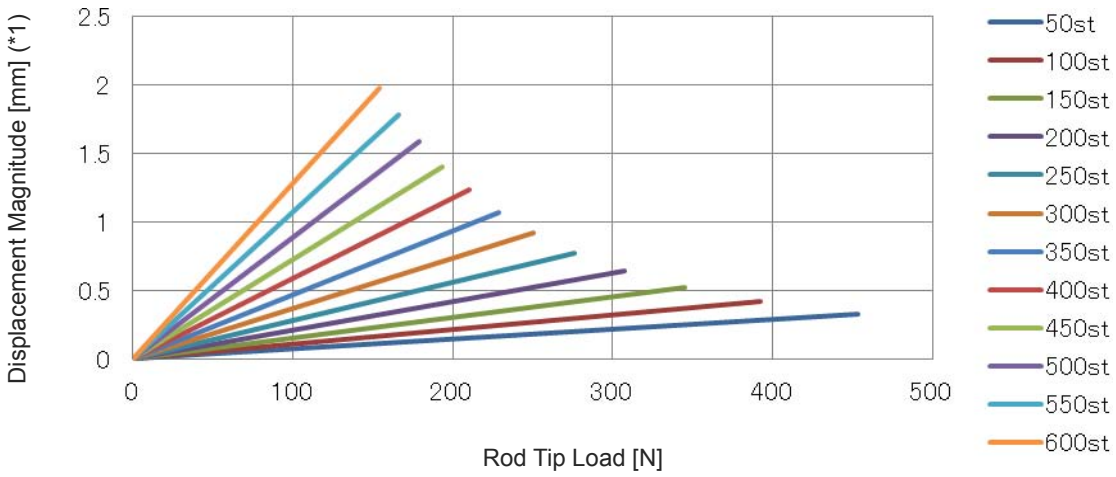




[Rod Flexure (Reference)]

(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



[4] RCS4-WRA16C

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
30	30	6	226
20	60	12	339
10	80	35	678
5	100	50	1357

[Stroke and Max Speed]

Unit: mm/s

Lead (mm)	50 to 250 (Every 50mm)	300 (mm)	350 (mm)	400 (mm)	450 (mm)	500 (mm)	550 (mm)	600 (mm)	650 (mm)	700 (mm)	750 (mm)	800 (mm)
30	1300		1050	860	710	600	510	440	390	340	300	270
20	1000	880	700	570	470	400	340	295	260	225	200	180
10	500	430	340	280	230	195	165	145	125	110	100	90
5	250	210	170	130	115	95	80	70	60	55	50	45

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

Lead 30

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
30	20	15	8	6	6	5	4	3	1.5

Lead 20

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	40	25	20	15	12	12	10	10	8

Lead 10

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
80	80	70	60	–	35	35	35	20	–

Lead 5

Horizontal					Vertical				
0.2	0.3	0.5	0.7	1.0	0.2	0.3	0.5	0.7	1.0
100	80	60	–	–	50	30	25	–	–

Caution

Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

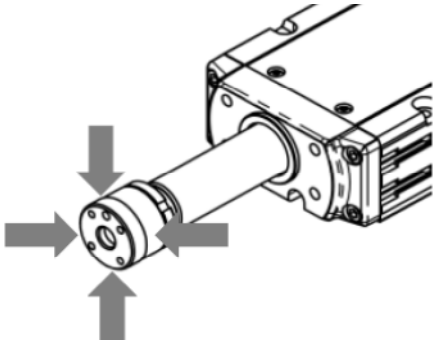
Item	Content
Drive system	Ball screw ϕ16mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ45mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	150mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85%RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

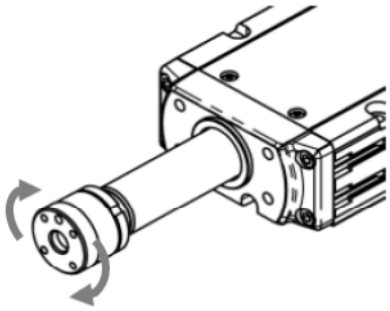
[Allowable Load and Torque on Rod Tip]

Caution

Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



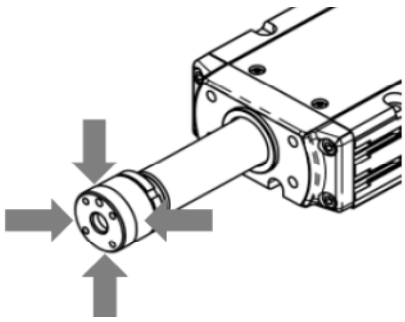
Should be below allowable torque

◎WRA16C

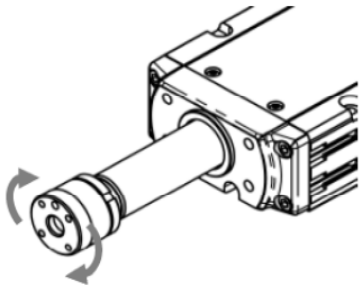
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Rod Tip Static Allowable Load (Note 1)	[N]		588	588	588	511	451	402	362	329	300	275	254	235	217	202	188	176
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	255	220	191	168	149	134	120	109	99	90	81	74	67	61	55	50
	[N]	Rod Tip Offset Distance 150mm	133	133	133	133	133	122	111	101	92	84	77	70	64	58	53	48
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	214	184	160	140	124	111	99	89	80	72	65	59	53	47	42	37
	[N]	Rod Tip Offset Distance 150mm	133	133	133	124	112	101	91	83	75	68	62	56	50	45	40	36
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less															
Rod Tip Overhang Distance	[mm]		150 or less															
Rod Tip Static Allowable Torque	[N•m]		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		20.0	20.0	20.0	20.0	20.0	18.3	16.7	15.2	13.8	12.6	11.5	10.5	9.6	8.7	7.9	7.1
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		20.0	20.0	20.0	18.6	16.8	15.2	13.7	12.4	11.3	10.2	9.2	8.4	7.5	6.8	6.0	5.3
Rod Non–Rotation Accuracy (Note 2)	[deg]		0															

Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

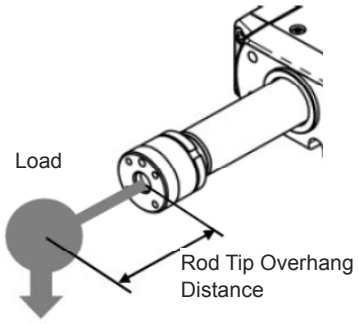
[Rod Tip Static Allowable Load]



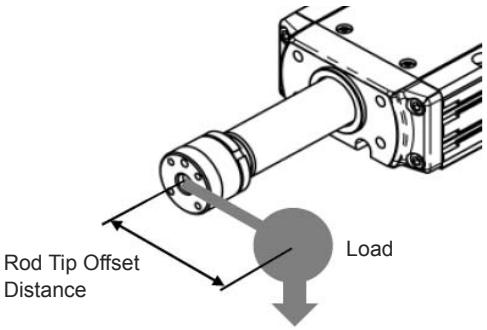
[Rod Tip Allowable Torque]



[Rod Tip Overhang Distance]



[Rod Tip Offset Distance]



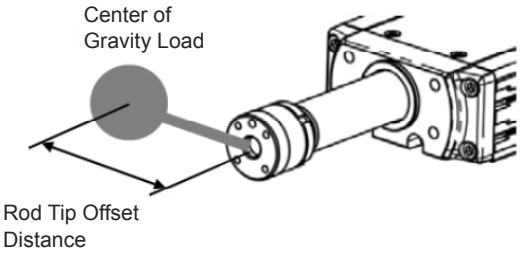
● WRA16C: Allowable Payload for 3,000km of Operational Life

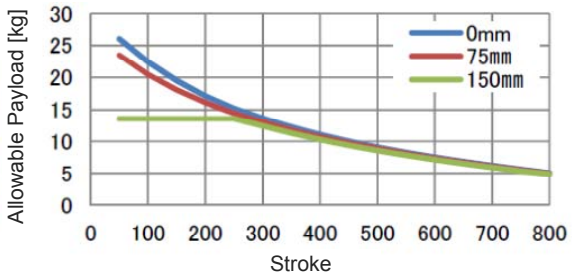
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [4] RCS4-WRA16C [Payload by Acceleration].

[Horizontal Installation]

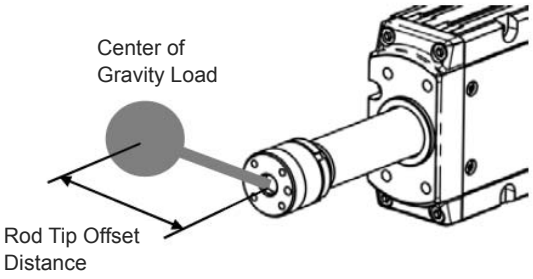
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	26.0	22.4	19.5	17.1	15.2	13.6	12.3	11.1	10.1	9.1	8.3	7.5	6.9	6.2	5.6	5.1
	[kg]	Rod Tip Offset Distance 75mm	23.5	20.5	18.1	16.1	14.4	13.0	11.8	10.7	9.7	8.9	8.1	7.3	6.7	6.1	5.5	5.0
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	13.6	13.6	12.5	11.3	10.3	9.4	8.6	7.8	7.2	6.5	5.9	5.4	4.9

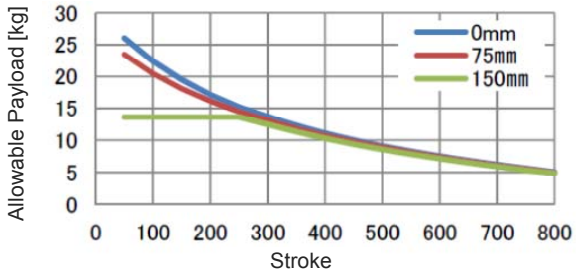




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	26.0	22.4	19.5	17.1	15.2	13.6	12.3	11.1	10.1	9.1	8.3	7.5	6.9	6.2	5.6	5.1
	[kg]	Rod Tip Offset Distance 75mm	23.6	20.6	18.2	16.2	14.5	13.0	11.8	10.7	9.7	8.9	8.1	7.3	6.7	6.1	5.5	5.0
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	13.6	13.6	12.5	11.3	10.3	9.4	8.6	7.8	7.2	6.5	5.9	5.4	4.9

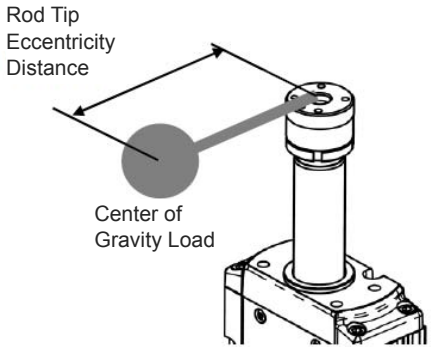


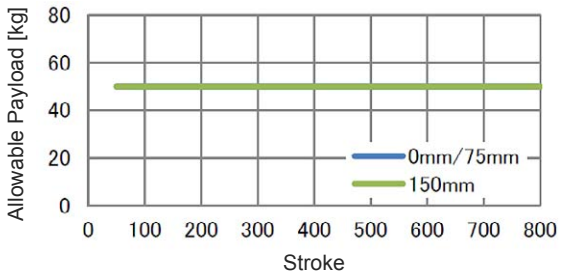


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 75mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 150mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0





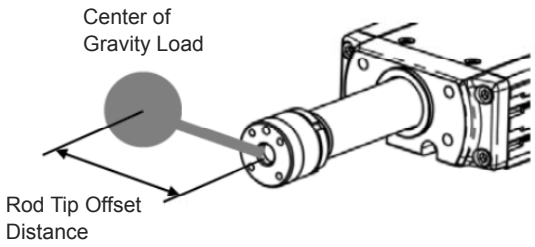
● WRA16C: Allowable Payload for 5,000km of Operational Life

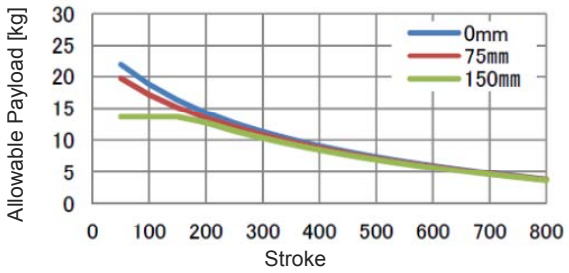
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [4] RCS4-WRA16C [Payload by Acceleration].

[Horizontal Installation]

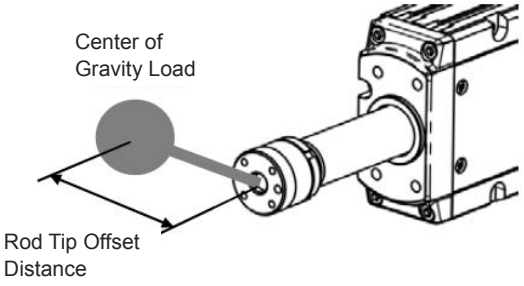
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	21.9	18.8	16.3	14.3	12.6	11.3	10.1	9.1	8.2	7.4	6.7	6.0	5.4	4.8	4.3	3.8
	[kg]	Rod Tip Offset Distance 75mm	19.7	17.2	15.1	13.4	12.0	10.8	9.7	8.8	7.9	7.2	6.5	5.8	5.2	4.7	4.2	3.7
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	12.7	11.4	10.3	9.3	8.5	7.7	6.9	6.3	5.7	5.1	4.6	4.1	3.6

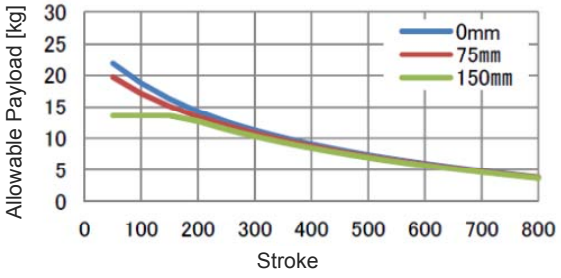




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	21.9	18.8	16.3	14.3	12.6	11.3	10.1	9.1	8.2	7.4	6.7	6.0	5.4	4.8	4.3	3.8
	[kg]	Rod Tip Offset Distance 75mm	19.9	17.3	15.2	13.5	12.0	10.8	9.7	8.8	7.9	7.2	6.5	5.8	5.3	4.7	4.2	3.7
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	12.7	11.4	10.3	9.3	8.5	7.7	7.0	6.3	5.7	5.1	4.6	4.1	3.6

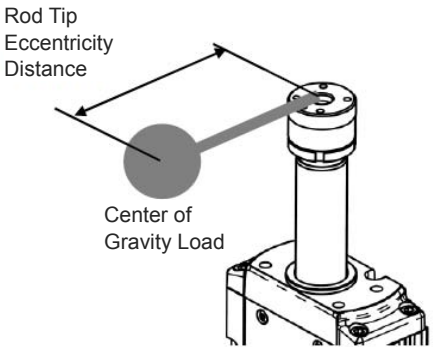


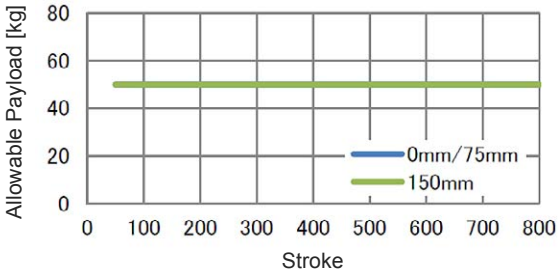


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 75mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 150mm	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1

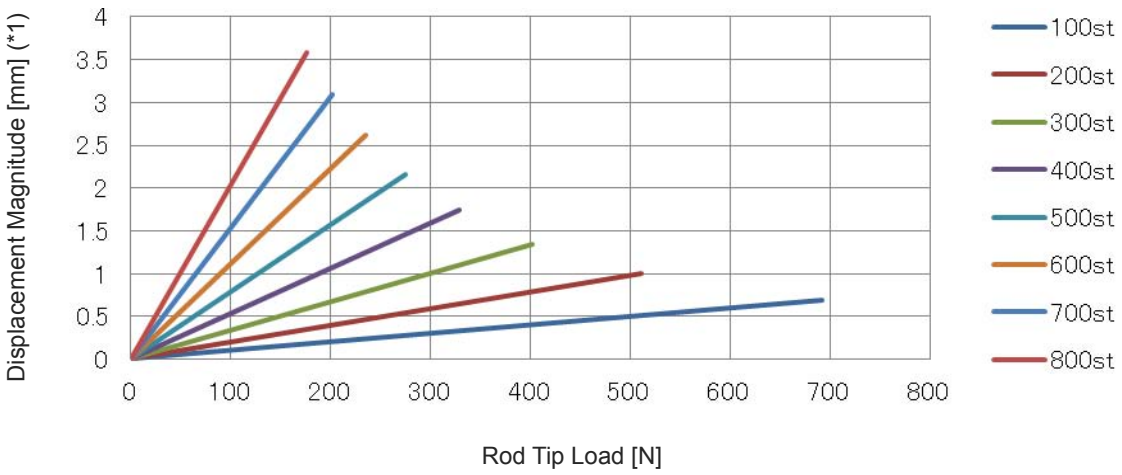




[Rod Flexure (Reference)]

(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



[5] RCS4-WRA10R

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
16	5	–	53
10	13	2.5	85
5	25	5	170
2.5	40	10	340

[Stroke and Max Speed] Unit: mm/s

Lead (mm)	50 to 500 (Every 50mm)
16	800
10	600
5	300
2.5	150

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

(Note) For Lead 16, there is no setting of the maximum payload type against the speed and acceleration as the payload is low for vertical orientation. Use the radial cylinder.

Lead 16

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
5	5	4	3	–	–	–	–	–	–

Lead 10

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
13	13	9	6	–	2.5	2.5	2	2	–

Lead 5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
25	20	15	10	–	5	5	5	5	–

Lead 2.5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
40	35	25	–	–	10	8	8	–	–

Caution

Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

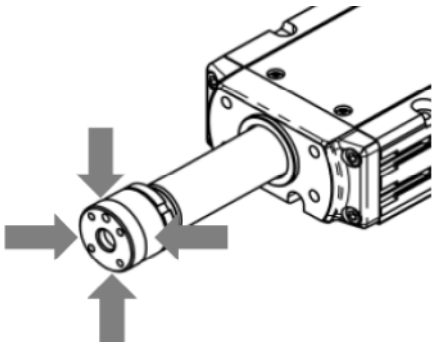
Item	Content
Drive system	Ball screw ϕ8mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ25mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	100mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

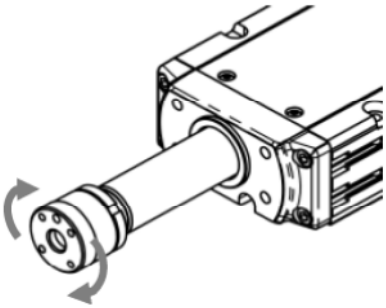
[Allowable Load and Torque on Rod Tip]

Caution

- Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



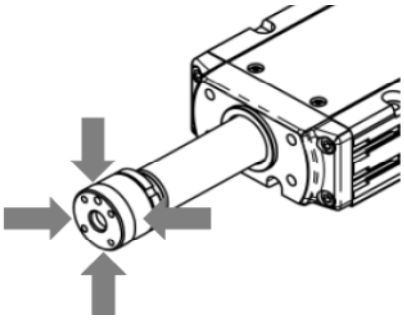
Should be below allowable torque

◎WRA10R

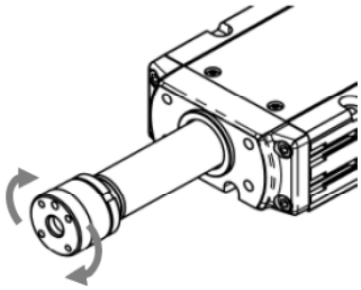
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Rod Tip Static Allowable Load (Note 1)	[N]		196	196	196	196	196	196	196	196	184	169
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	98	98	98	95	85	76	68	62	57	52
	[N]	Rod Tip Offset Distance 100mm	50	50	50	50	50	50	50	50	50	49
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	98	98	91	80	71	63	57	52	47	43
	[N]	Rod Tip Offset Distance 100mm	50	50	50	50	50	50	50	48	44	40
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less									
Rod Tip Overhang Distance	[mm]		100 or less									
Rod Tip Static Allowable Torque	[N•m]		10	10	10	10	10	10	10	10	10	10
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.9
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.8	4.4	4.0
Rod Non–Rotation Accuracy (Note 2)	[deg]		0									

Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

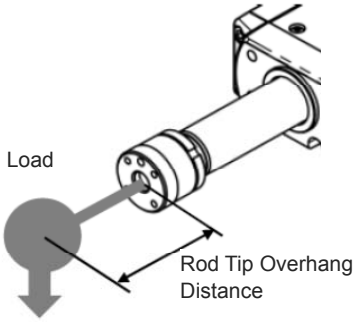
[Rod Tip Static Allowable Load]



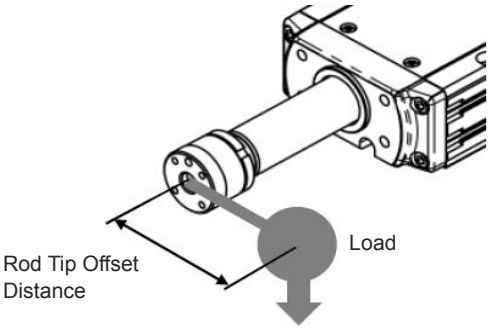
[Rod Tip Allowable Torque]



[Rod Tip Overhang Distance]



[Rod Tip Offset Distance]



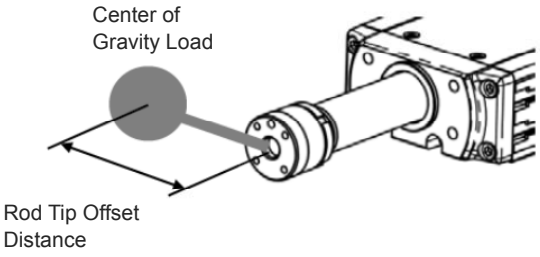
● WRA10R: Allowable Payload for 3,000km of Operational Life

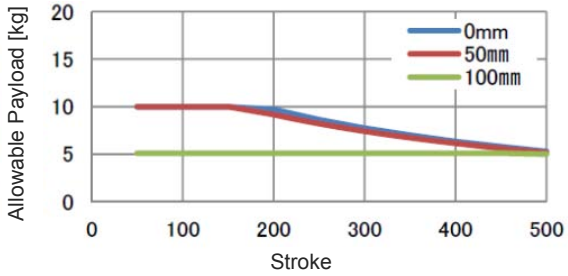
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [5] RCS4-WRA10R [Payload by Acceleration].

[Horizontal Installation]

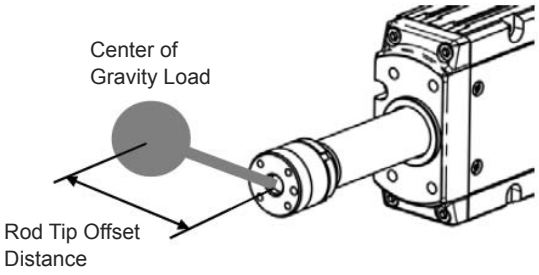
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	10.0	9.7	8.6	7.7	7.0	6.3	5.8	5.3
	[kg]	Rod Tip Offset Distance 50mm	10.0	10.0	10.0	9.2	8.2	7.4	6.7	6.1	5.6	5.1
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0

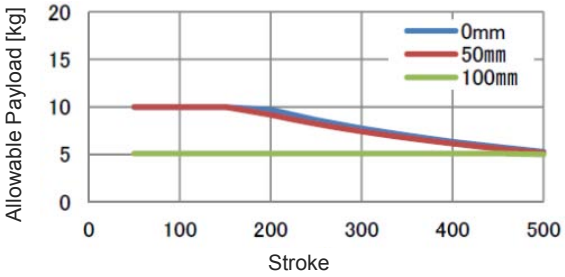




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	10.0	9.7	8.6	7.7	7.0	6.3	5.8	5.3
	[kg]	Rod Tip Offset Distance 50mm	10.0	10.0	10.0	9.2	8.2	7.4	6.7	6.1	5.6	5.1
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0

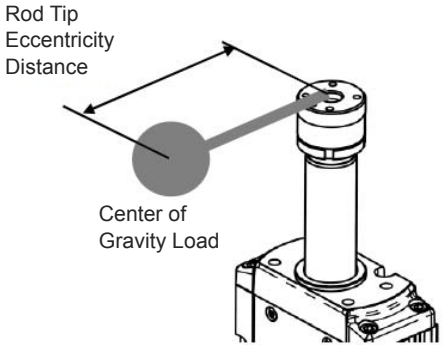


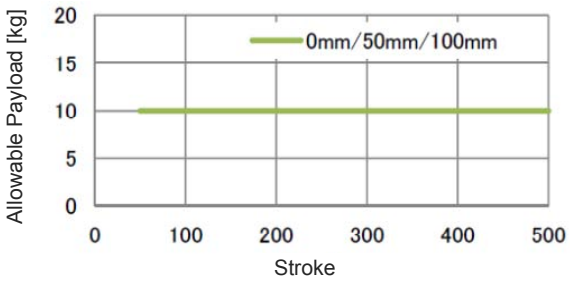


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 50mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 100mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0





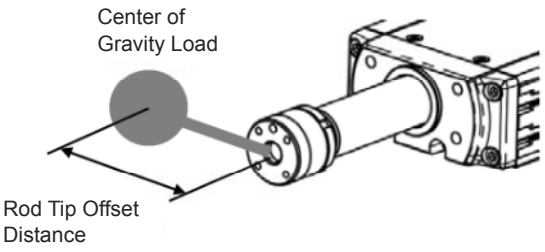
● WRA10R: Allowable Payload for 5,000km of Operational Life

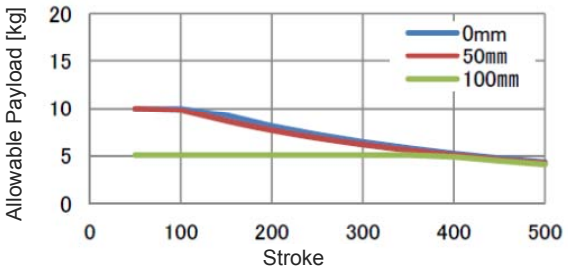
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [5] RCS4-WRA10R [Payload by Acceleration].

[Horizontal Installation]

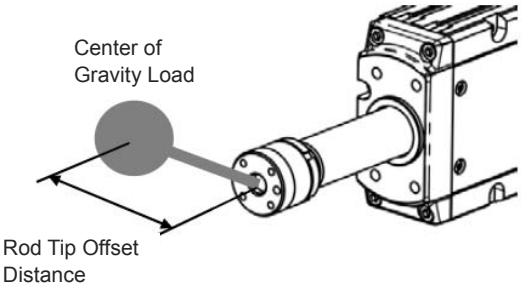
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	9.3	8.1	7.2	6.5	5.8	5.3	4.8	4.4
	[kg]	Rod Tip Offset Distance 50mm	10.0	9.8	8.6	7.7	6.9	6.2	5.6	5.1	4.6	4.2
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	4.9	4.5	4.1

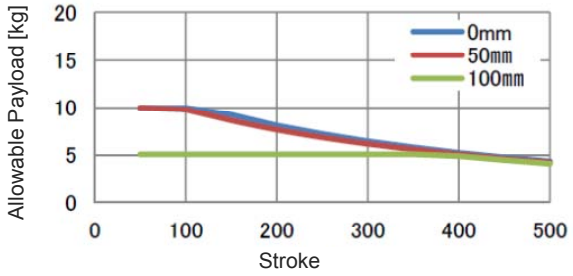




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	10.0	10.0	9.3	8.1	7.2	6.5	5.8	5.3	4.8	4.4
	[kg]	Rod Tip Offset Distance 50mm	10.0	9.8	8.6	7.7	6.9	6.2	5.6	5.1	4.6	4.2
	[kg]	Rod Tip Offset Distance 100mm	5.1	5.1	5.1	5.1	5.1	5.1	5.1	4.9	4.5	4.1

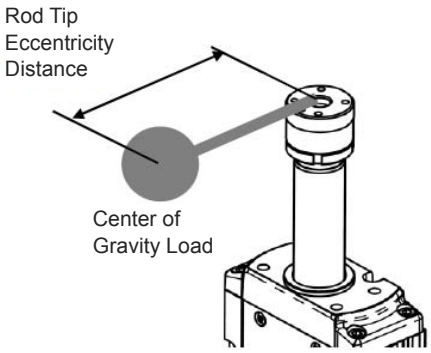


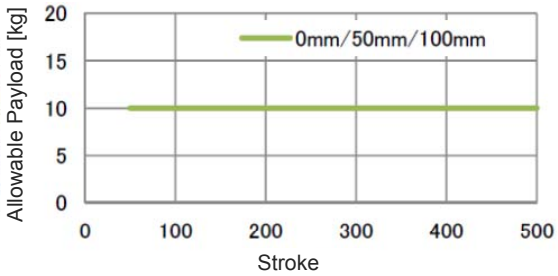


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 50mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	[kg]	Rod Tip Eccentricity Distance 100mm	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

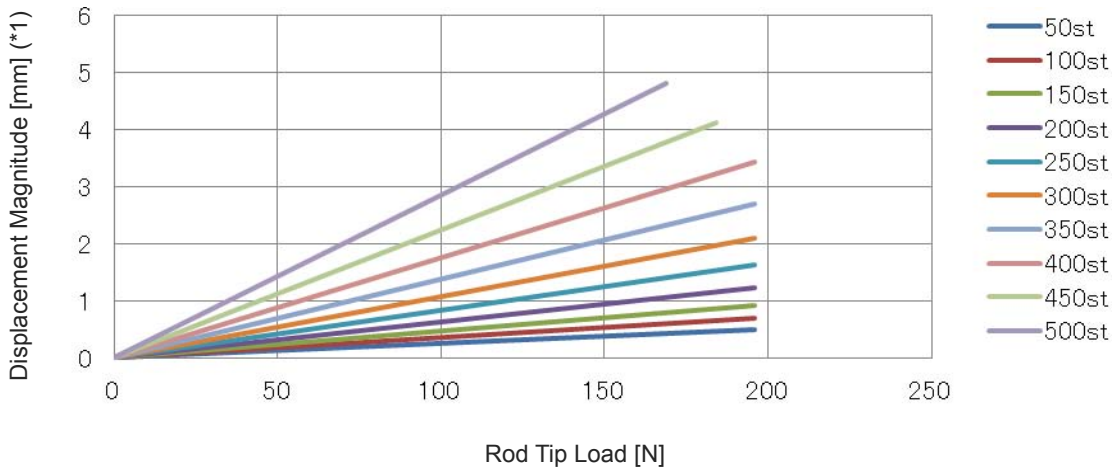




[Rod Flexure (Reference)]

(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



[6] RCS4-WRA12R

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
20	12	2	85
12	25	6	142
6	40	15	283
3	60	20	566

[Stroke and Max Speed] Unit: mm/s

Lead (mm)	50 to 500 (Every 50mm)
20	1000
12	720
6	360
3	180

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

Lead 20

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
12	10	8	6	–	2	2	1.5	1.5	–

Lead 12

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
25	25	20	15	–	6	6	6	5	–

Lead 6

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
40	40	30	25	–	15	15	12	12	–

Lead 3

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	50	40	–	–	20	20	20	–	–

Caution

Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

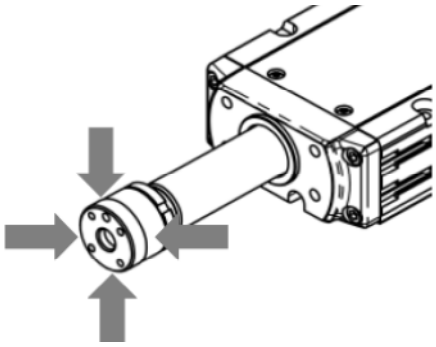
Item	Content
Drive system	Ball screw ϕ10mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ30mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	100mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

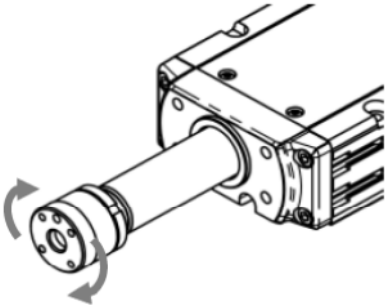
[Allowable Load and Torque on Rod Tip]

Caution

Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



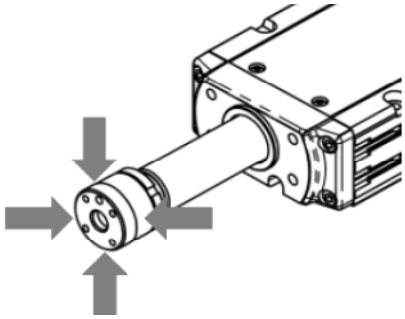
Should be below allowable torque

◎WRA12R

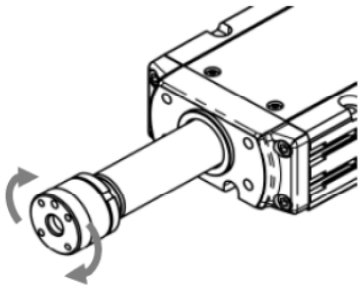
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Rod Tip Static Allowable Load (Note 1)	[N]		294	294	294	294	294	269	241	218	198	181
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	147	147	137	121	107	96	87	79	72	65
	[N]	Rod Tip Offset Distance 100mm	100	100	100	100	99	90	82	75	68	63
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	147	133	115	101	90	80	72	65	59	54
	[N]	Rod Tip Offset Distance 100mm	100	100	100	92	83	75	68	62	56	51
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less									
Rod Tip Overhang Distance	[mm]		100 or less									
Rod Tip Static Allowable Torque	[N•m]		20	20	20	20	20	20	20	20	20	20
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		10.0	10.0	10.0	10.0	9.9	9.0	8.2	7.5	6.8	6.3
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		10.0	10.0	10.0	9.2	8.3	7.5	6.8	6.2	5.6	5.1
Rod Non–Rotation Accuracy (Note 2)	[deg]		0									

Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

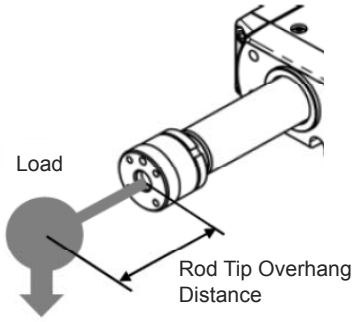
[Rod Tip Static Allowable Load]



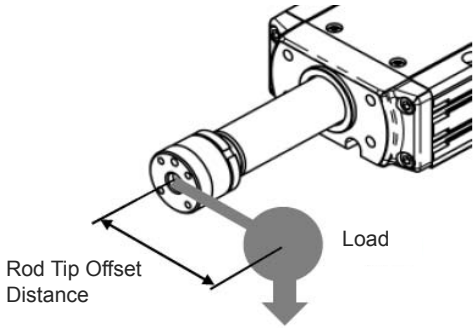
[Rod Tip Allowable Torque]



[Rod Tip Overhang Distance]



[Rod Tip Offset Distance]



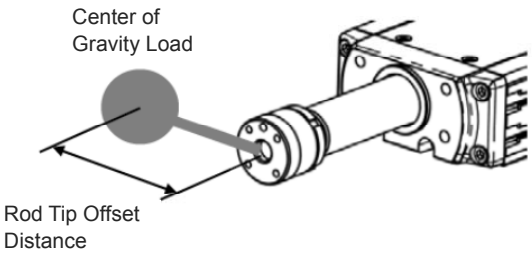
● WRA12R: Allowable Payload for 3,000km of Operational Life

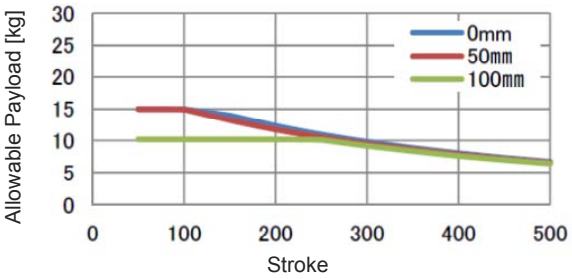
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [6] RCS4-WRA12R [Payload by Acceleration].

[Horizontal Installation]

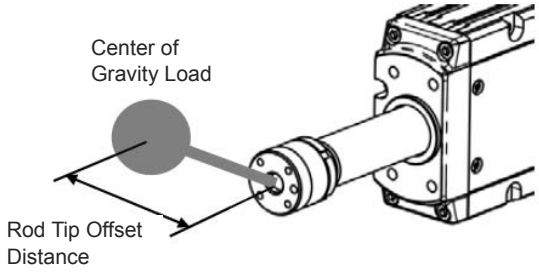
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	15.0	14.0	12.3	10.9	9.8	8.9	8.0	7.3	6.7
	[kg]	Rod Tip Offset Distance 50mm	15.0	14.9	13.2	11.7	10.5	9.5	8.6	7.8	7.1	6.5
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	10.2	10.1	9.2	8.3	7.6	7.0	6.4

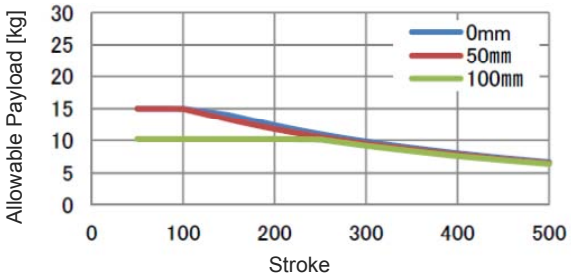




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	15.0	14.0	12.3	10.9	9.8	8.9	8.0	7.3	6.7
	[kg]	Rod Tip Offset Distance 50mm	15.0	15.0	13.2	11.8	10.5	9.5	8.6	7.8	7.1	6.5
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	10.2	10.1	9.2	8.3	7.6	7.0	6.4

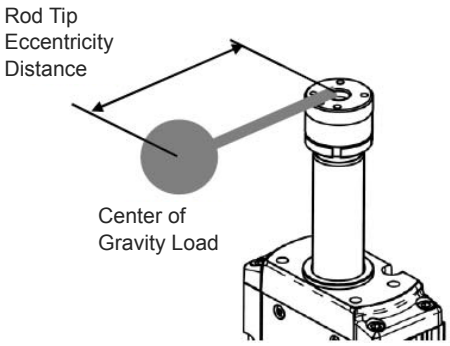


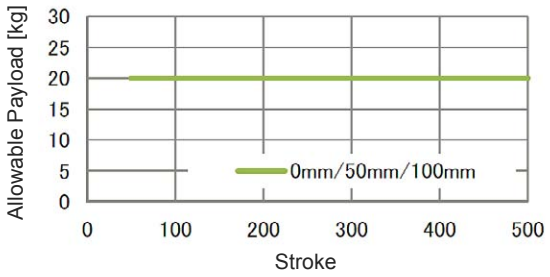


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 50mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 100mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0





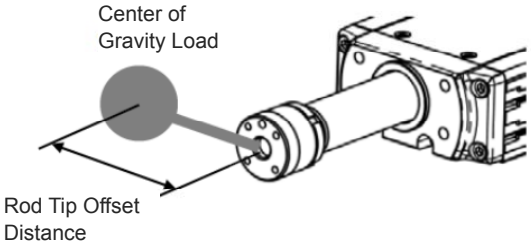
● WRA12R: Allowable Payload for 5,000km of Operational Life

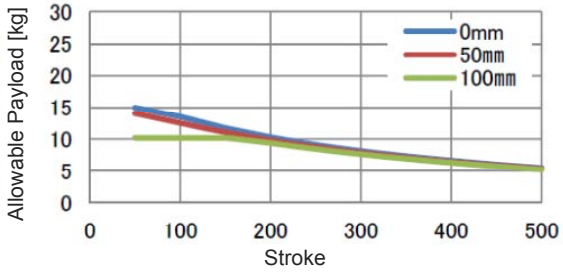
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [6] RCS4-WRA12R [Payload by Acceleration].

[Horizontal Installation]

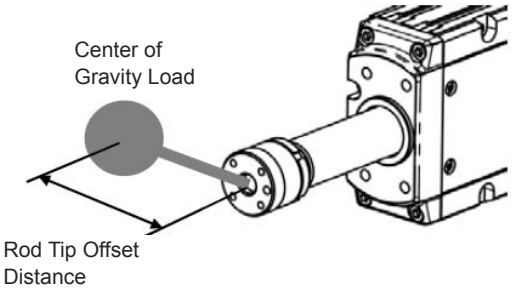
Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	13.5	11.7	10.3	9.1	8.2	7.3	6.6	6.0	5.5
	[kg]	Rod Tip Offset Distance 50mm	14.1	12.5	11.1	9.8	8.8	7.9	7.1	6.5	5.9	5.3
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	9.4	8.4	7.6	6.9	6.3	5.7	5.2

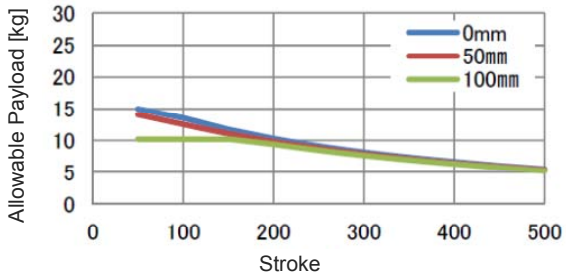




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	15.0	13.5	11.7	10.3	9.1	8.2	7.3	6.6	6.0	5.5
	[kg]	Rod Tip Offset Distance 50mm	14.2	12.6	11.1	9.8	8.8	7.9	7.1	6.5	5.9	5.3
	[kg]	Rod Tip Offset Distance 100mm	10.2	10.2	10.2	9.4	8.5	7.6	6.9	6.3	5.7	5.2

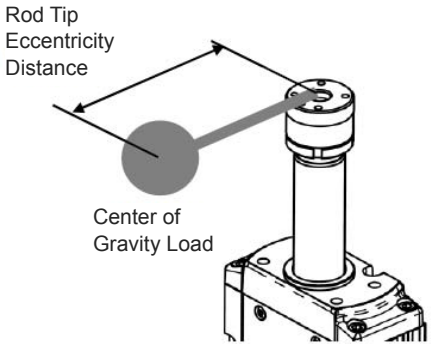


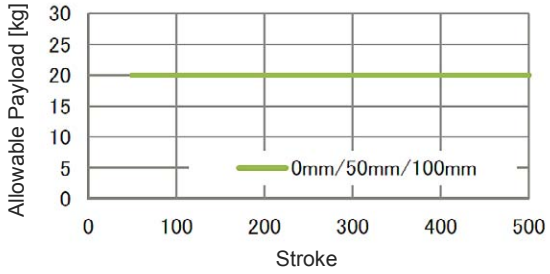


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 50mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	[kg]	Rod Tip Eccentricity Distance 100mm	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

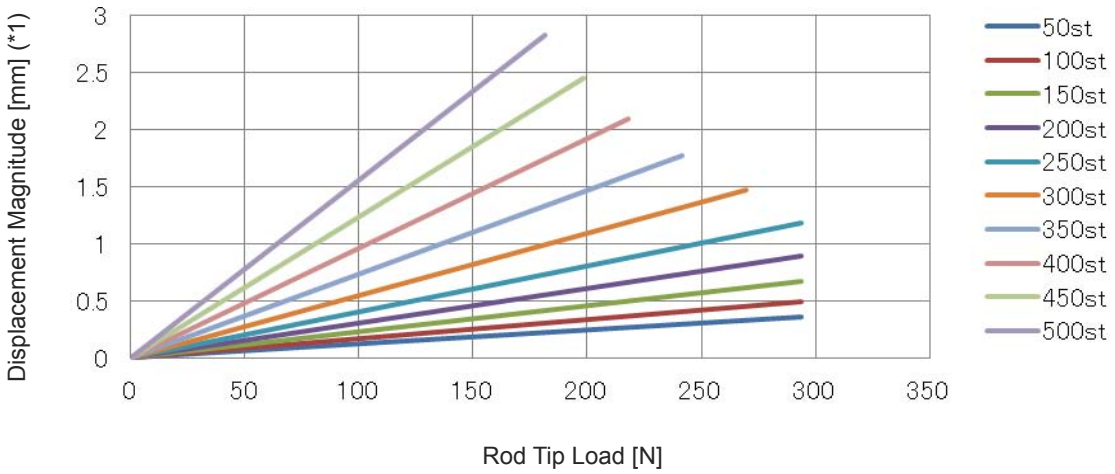




[Rod Flexure (Reference)]

(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



[7] RCS4-WRA14R

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
24	25	3	142
16	50	8	214
8	65	20	427
4	85	30	855

[Stroke and Max Speed] Unit: mm/s

Lead (mm)	50 to 600 (Every 50mm)
24	1200
16	800
8	480
4	240

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

Lead 24

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
25	15	10	6	–	3	3	2	2	–

Lead 16

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
50	30	25	20	–	8	6	6	6	–

Lead 8

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
65	50	40	40	–	20	20	20	20	–

Lead 4

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
85	70	60	–	–	30	30	30	–	–

Caution

- Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

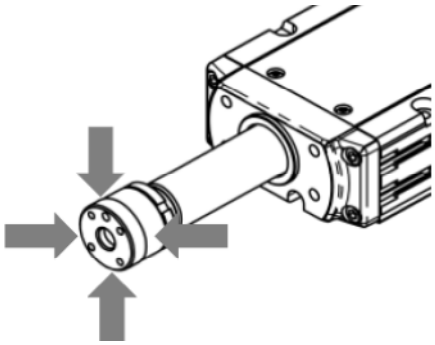
Item	Content
Drive system	Ball screw ϕ12mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ40mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	150 mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

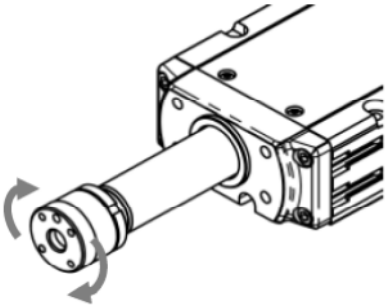
[Allowable Load and Torque on Rod Tip]

Caution

- Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



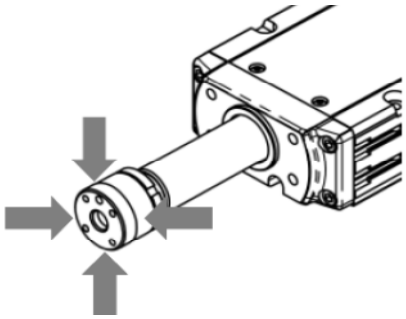
Should be below allowable torque

◎WRA14R

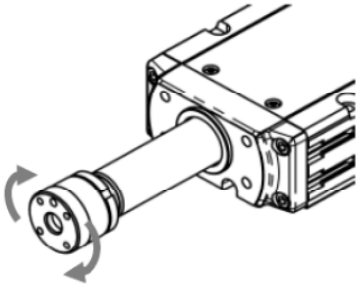
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Rod Tip Static Allowable Load (Note 1)	[N]		454	392	345	307	276	251	229	210	193	179	166	154
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	199	170	148	131	117	104	94	85	77	70	64	58
	[N]	Rod Tip Offset Distance 150mm	100	100	100	100	100	95	87	79	72	66	60	55
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	167	143	124	109	97	87	78	70	63	57	51	46
	[N]	Rod Tip Offset Distance 150mm	100	100	100	96	87	79	71	65	59	53	48	44
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less											
Rod Tip Overhang Distance	[mm]		150 or less											
Rod Tip Static Allowable Torque	[N•m]		30	30	30	30	30	30	30	30	30	30	30	30
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		15.0	15.0	15.0	15.0	15.0	14.3	13.0	11.8	10.8	9.9	9.0	8.2
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		15.0	15.0	15.0	14.4	13.0	11.8	10.7	9.7	8.8	8.0	7.3	6.6
Rod Non–Rotation Accuracy (Note 2)	[deg]		0											

Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

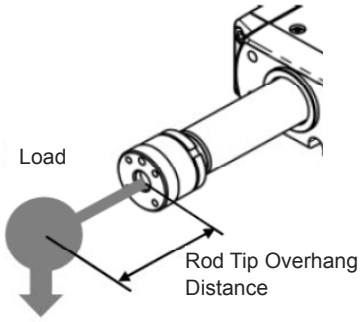
[Rod Tip Static Allowable Load]



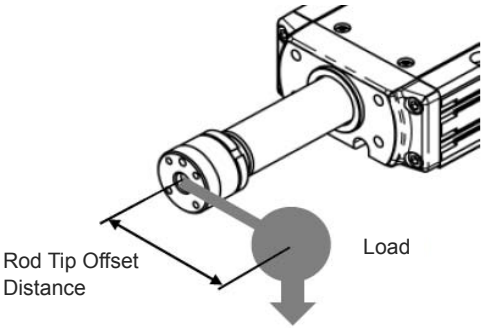
[Rod Tip Allowable Torque]



[Rod Tip Overhang Distance]



[Rod Tip Offset Distance]



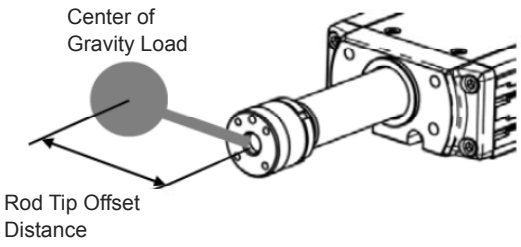
● WRA14R: Allowable Payload for 3,000km of Operational Life

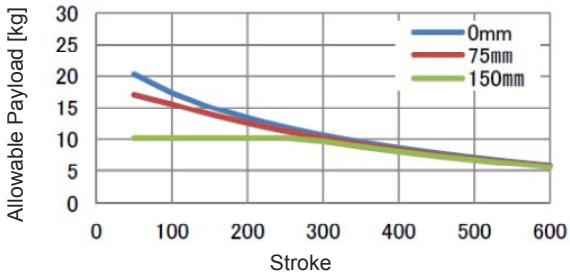
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [7] RCS4-WRA14R [Payload by Acceleration].

[Horizontal Installation]

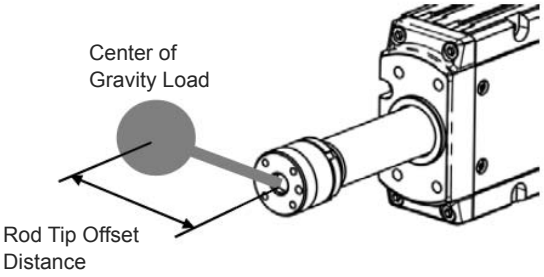
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	20.3	17.4	15.1	13.4	11.9	10.7	9.6	8.7	7.9	7.2	6.5	5.9
	[kg]	Rod Tip Offset Distance 75mm	17.1	15.6	14.0	12.5	11.3	10.2	9.2	8.4	7.6	6.9	6.3	5.8
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	10.2	10.2	9.7	8.8	8.1	7.4	6.7	6.1	5.6

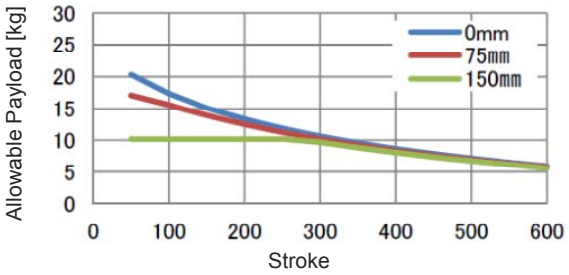




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	20.3	17.4	15.1	13.4	11.9	10.7	9.6	8.7	7.9	7.2	6.5	5.9
	[kg]	Rod Tip Offset Distance 75mm	17.4	15.8	14.1	12.6	11.3	10.2	9.2	8.4	7.6	6.9	6.3	5.8
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	10.2	10.2	9.7	8.8	8.1	7.4	6.7	6.1	5.6

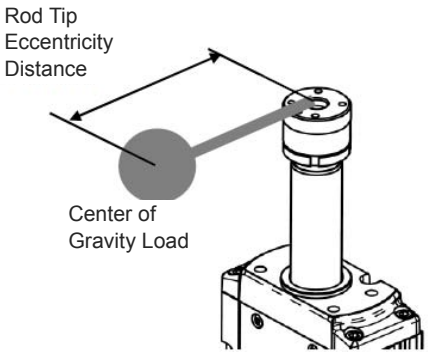


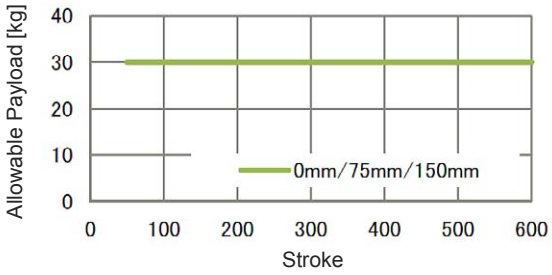


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 75mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 150mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0





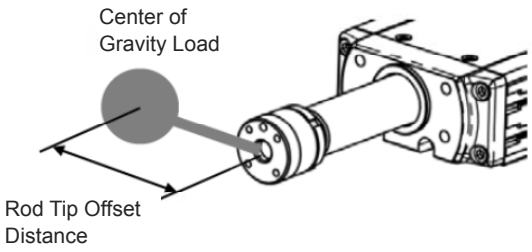
- WRA14R: Allowable Payload for 5,000km of Operational Life

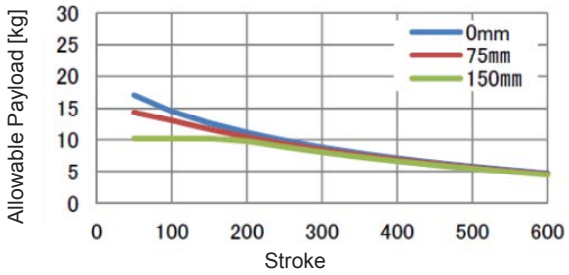
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 1G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [7] RCS4-WRA14R [Payload by Acceleration].

[Horizontal Installation]

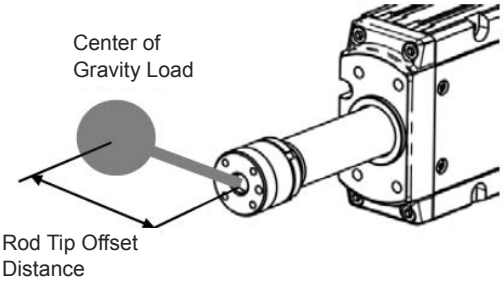
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	17.1	14.6	12.7	11.1	9.9	8.8	7.9	7.1	6.4	5.8	5.2	4.7
	[kg]	Rod Tip Offset Distance 75mm	14.3	13.1	11.7	10.5	9.4	8.4	7.6	6.9	6.2	5.6	5.1	4.6
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	9.8	8.9	8.0	7.3	6.6	6.0	5.4	4.9	4.5

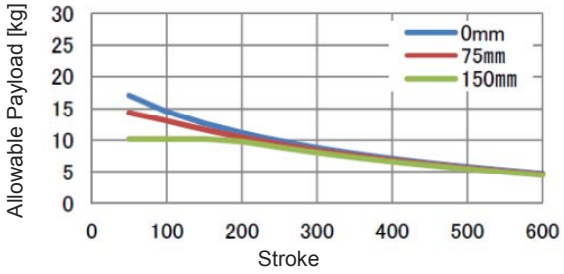




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	17.1	14.6	12.7	11.1	9.9	8.8	7.9	7.1	6.4	5.8	5.2	4.7
	[kg]	Rod Tip Offset Distance 75mm	14.6	13.2	11.8	10.5	9.4	8.4	7.6	6.9	6.2	5.6	5.1	4.6
	[kg]	Rod Tip Offset Distance 150mm	10.2	10.2	10.2	9.8	8.9	8.1	7.3	6.6	6.0	5.5	4.9	4.5

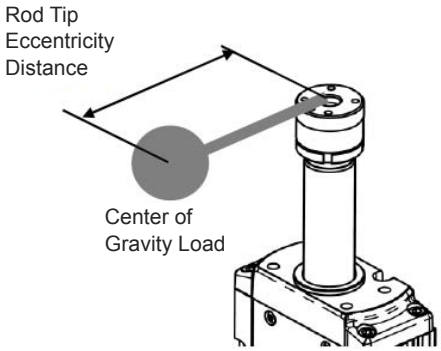


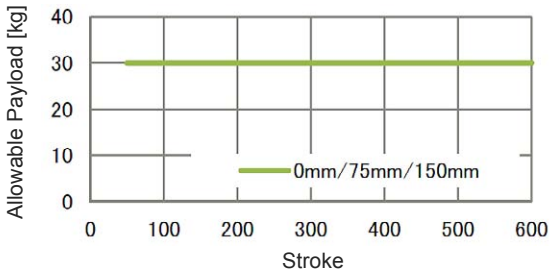


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.5G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 75mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	[kg]	Rod Tip Eccentricity Distance 150mm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

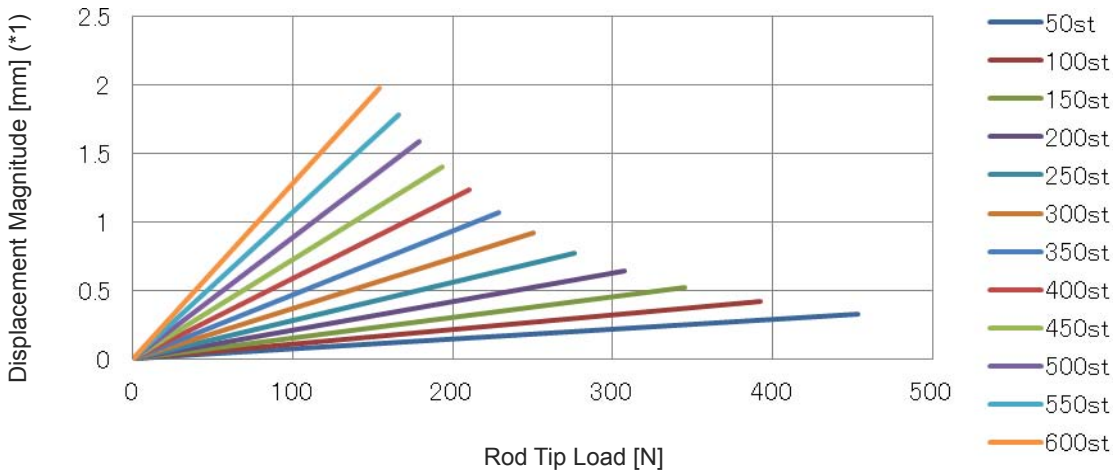




[Rod Flexure (Reference)]

(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



[8] RCS4-WRA16R

[Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
30	30	6	226
20	60	12	339
10	80	35	678
5	100	50	1357

[Stroke and Max Speed]

Unit: mm/s

Lead (mm)	50 to 250 (Every 50mm)	300 (mm)	350 (mm)	400 (mm)	450 (mm)	500 (mm)	550 (mm)	600 (mm)	650 (mm)	700 (mm)	750 (mm)	800 (mm)
30	1300		1050	860	710	600	510	440	390	340	300	270
20	1000	880	700	570	470	400	340	295	260	225	200	180
10	500	430	340	280	230	195	165	145	125	110	100	90
5	250	210	170	130	115	95	80	70	60	55	50	45

Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.

  Minimum speed [mm/s] = ball screw lead [mm/r] ÷ 16384 [p/r] x 1000 [1/s]

  (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

[Payload by Acceleration]

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

Lead 30

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
30	20	15	8	–	6	5	4	3	–

Lead 20

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	40	25	20	–	12	12	10	10	–

Lead 10

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
80	80	70	60	–	35	35	35	20	–

Lead 5

Horizontal					Vertical				
0.2	0.3	0.5	0.7	1.0	0.2	0.3	0.5	0.7	1.0
100	80	60	–	–	50	30	25	–	–

Caution

- Do not attempt to configure settings for acceleration/deceleration above the specifications. Doing so may result in vibration, failure or shorter life.

[Actuator Specifications]

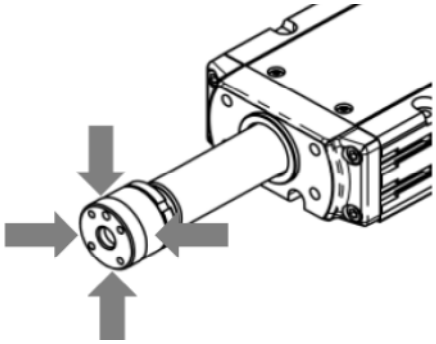
Item	Content
Drive system	Ball screw ϕ16mm, Rolled C10
Positioning repeatability	±0.01mm
Lost motion	0.1mm or less
Rod	ϕ45mm Stainless steel
Rod non–rotation accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip]
Rod tip overhang distance	150mm or less
No. of encoder pulses	16384
Ambient operating temperature/ humidity	0 to 40°C, 85% RH or less (Non-condensing)

(*) It shows the displacement angle in the rod rotational direction at no load.

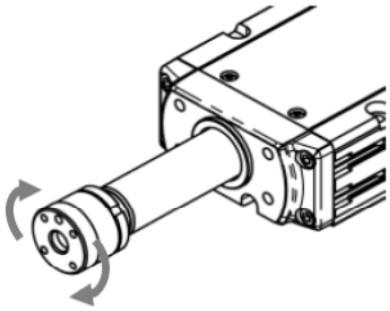
[Allowable Load and Torque on Rod Tip]

Caution

Actuator possesses a built–in guide structure that enables it to apply a side–way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



Should be below allowable load
Do not attempt to apply impact load



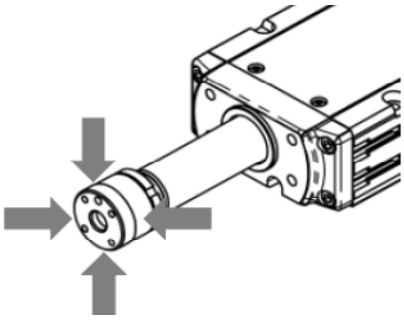
Should be below allowable torque

◎WRA16R

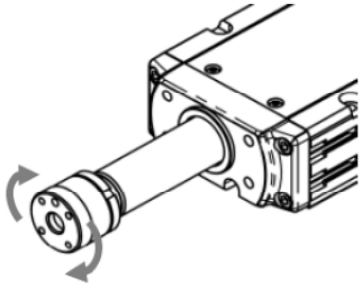
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Rod Tip Static Allowable Load (Note 1)	[N]		588	588	588	511	451	402	362	329	300	275	254	235	217	202	188	176
Rod Tip Dynamic Allowable Load (Operating life 3,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	255	220	191	168	149	134	120	109	99	90	81	74	67	61	55	50
	[N]	Rod Tip Offset Distance 150mm	133	133	133	133	133	122	111	101	92	84	77	70	64	58	53	48
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Rod Tip Offset Distance 0mm	214	184	160	140	124	111	99	89	80	72	65	59	53	47	42	37
	[N]	Rod Tip Offset Distance 150mm	133	133	133	124	112	101	91	83	75	68	62	56	50	45	40	36
Rod Tip Offset Distance (Center of overhang load gravity)	[mm]		100 or less															
Rod Tip Overhang Distance	[mm]		150 or less															
Rod Tip Static Allowable Torque	[N•m]		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Rod Tip Dynamic Allowable Torque (Operating life 3,000km Remaining Probability 90%)	[N•m]		20.0	20.0	20.0	20.0	20.0	18.3	16.7	15.2	13.8	12.6	11.5	10.5	9.6	8.7	7.9	7.1
Rod Tip Dynamic Allowable Torque (Operating life 5,000km Remaining Probability 90%)	[N•m]		20.0	20.0	20.0	18.6	16.8	15.2	13.7	12.4	11.3	10.2	9.2	8.4	7.5	6.8	6.0	5.3
Rod Non–Rotation Accuracy (Note 2)	[deg]		0															

Note 1 It is the value for when the rod tip offset distance is 0mm and also the rod tip overhang distance is 0mm.
Note 2 It shows the displacement angle in the rod rotational direction at no load.

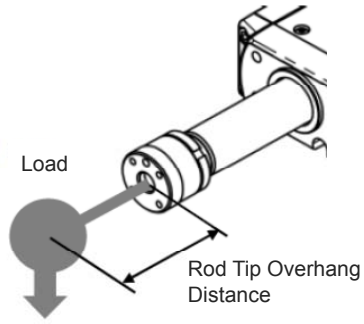
[Rod Tip Static Allowable Load]



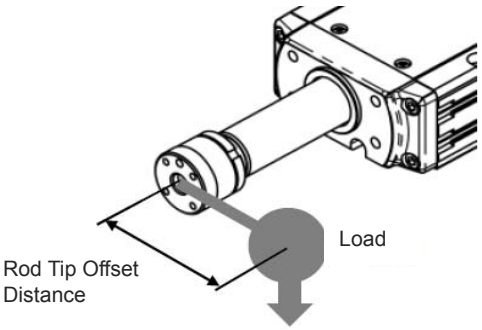
[Rod Tip Allowable Torque]



[Rod Tip Overhang Distance]



[Rod Tip Offset Distance]



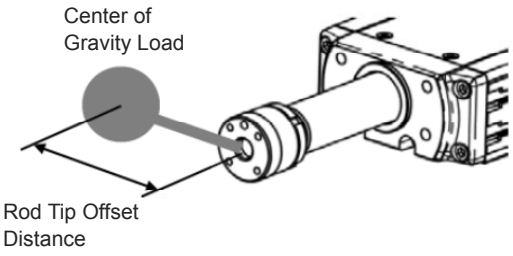
● WRA16R: Allowable Payload for 3,000km of Operational Life

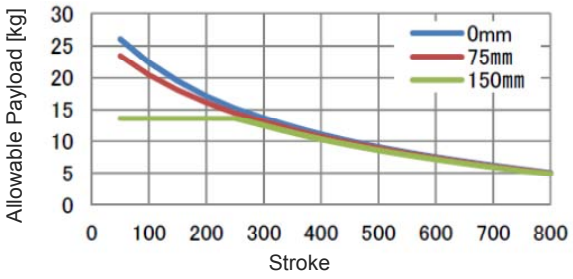
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [8] RCS4-WRA16R [Payload by Acceleration].

[Horizontal Installation]

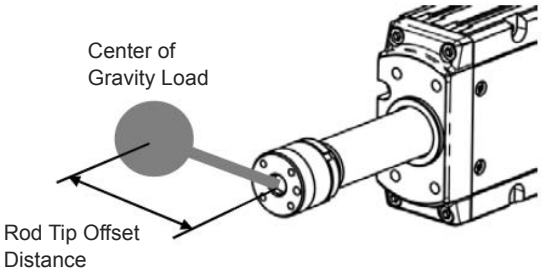
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	26.0	22.4	19.5	17.1	15.2	13.6	12.3	11.1	10.1	9.1	8.3	7.5	6.9	6.2	5.6	5.1
	[kg]	Rod Tip Offset Distance 75mm	23.5	20.5	18.1	16.1	14.4	13.0	11.8	10.7	9.7	8.9	8.1	7.3	6.7	6.1	5.5	5.0
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	13.6	13.6	12.5	11.3	10.3	9.4	8.6	7.8	7.2	6.5	5.9	5.4	4.9

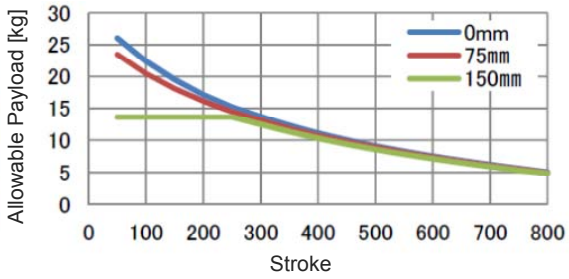




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	26.0	22.4	19.5	17.1	15.2	13.6	12.3	11.1	10.1	9.1	8.3	7.5	6.9	6.2	5.6	5.1
	[kg]	Rod Tip Offset Distance 75mm	23.6	20.6	18.2	16.2	14.5	13.0	11.8	10.7	9.7	8.9	8.1	7.3	6.7	6.1	5.5	5.0
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	13.6	13.6	12.5	11.3	10.3	9.4	8.6	7.8	7.2	6.5	5.9	5.4	4.9

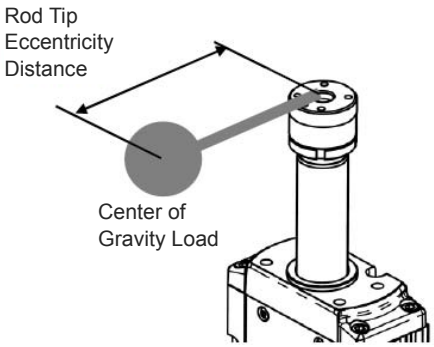


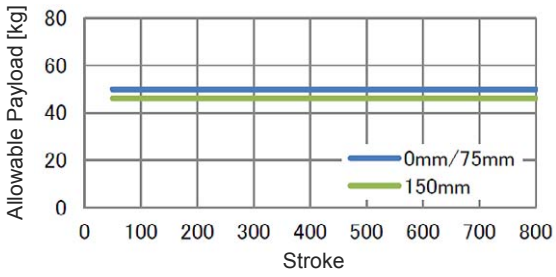


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 3,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 75mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 150mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0





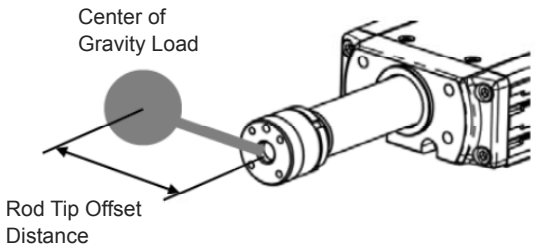
● WRA16R: Allowable Payload for 5,000km of Operational Life

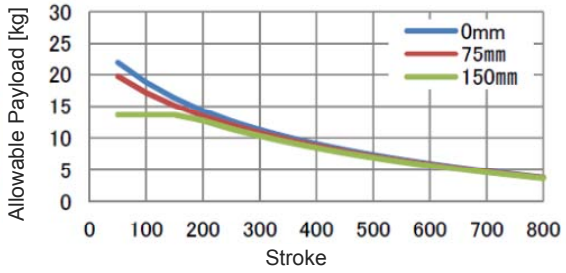
(Note) It is the value for when the rod tip overhang distance is 100mm or less for horizontal orientation and horizontally oriented wall mount.
The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range.

(Note) Transportation above the maximum payload is not allowed. Check in 1.2 Specifications [8] RCS4-WRA16R [Payload by Acceleration].

[Horizontal Installation]

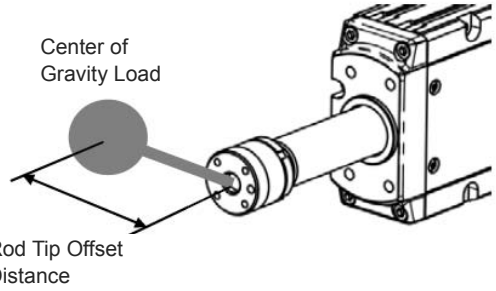
Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	21.9	18.8	16.3	14.3	12.6	11.3	10.1	9.1	8.2	7.4	6.7	6.0	5.4	4.8	4.3	3.8
	[kg]	Rod Tip Offset Distance 75mm	19.7	17.2	15.1	13.4	12.0	10.8	9.7	8.8	7.9	7.2	6.5	5.8	5.2	4.7	4.2	3.7
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	12.7	11.4	10.3	9.3	8.5	7.7	6.9	6.3	5.7	5.1	4.6	4.1	3.6

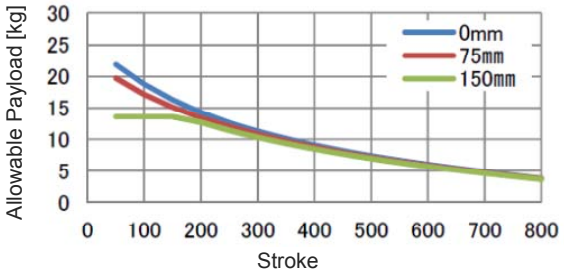




[Sideways Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Offset Distance 0mm	21.9	18.8	16.3	14.3	12.6	11.3	10.1	9.1	8.2	7.4	6.7	6.0	5.4	4.8	4.3	3.8
	[kg]	Rod Tip Offset Distance 75mm	19.9	17.3	15.2	13.5	12.0	10.8	9.7	8.8	7.9	7.2	6.5	5.8	5.3	4.7	4.2	3.7
	[kg]	Rod Tip Offset Distance 150mm	13.6	13.6	13.6	12.7	11.4	10.3	9.3	8.5	7.7	7.0	6.3	5.7	5.1	4.6	4.1	3.6

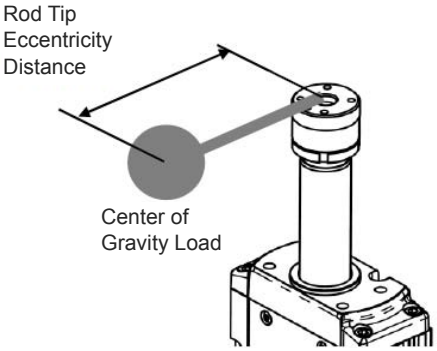


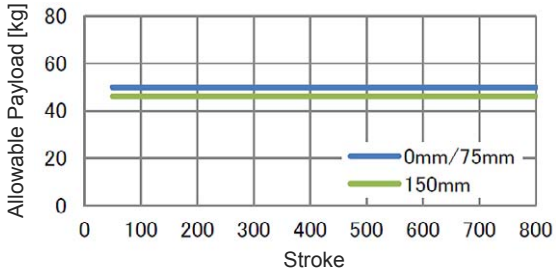


(Note) The calculation was conducted under the condition that the actuator drives continuously at 500mm/s of velocity and 0.2G of acceleration / deceleration in the whole stroke range for vertical installation.

[Vertical Installation]

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Allowable Payload (Operating life 5,000km Remaining Probability 90%)	[kg]	Rod Tip Eccentricity Distance 0mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 75mm	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	[kg]	Rod Tip Eccentricity Distance 150mm	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1	46.1

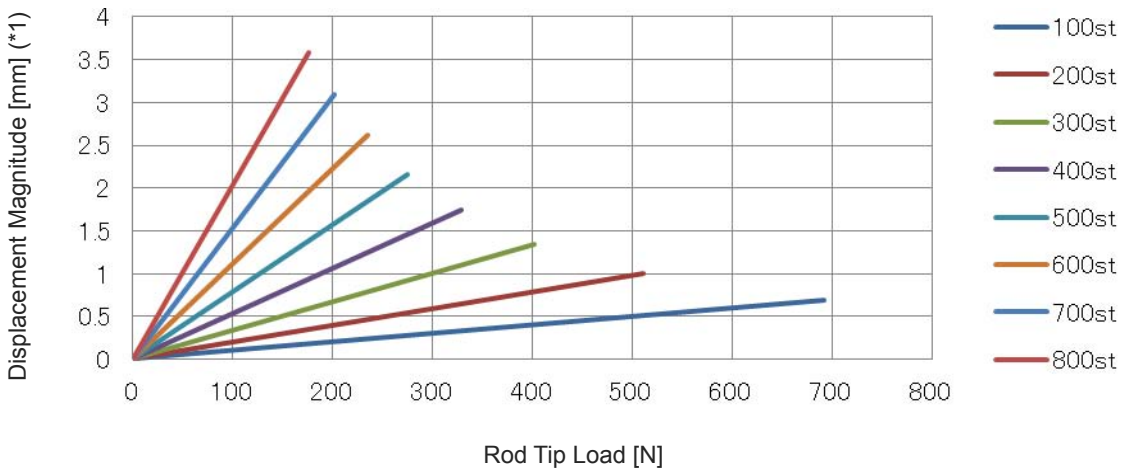




[Rod Flexure (Reference)]

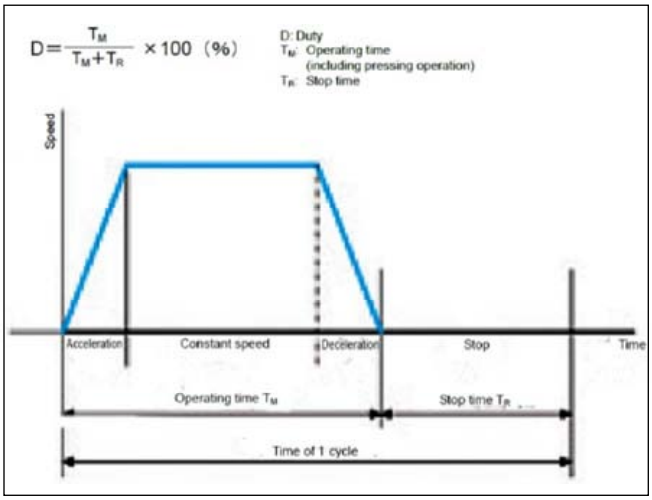
(Note) This is the flexure of the rod when the actuator is installed holizontally.

It does not include the flexure caused by the weight of itself.



Duty ratio

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



As the reference for duty available to use may differ depending on the operation conditions (payload, acceleration / deceleration, etc.), it is necessary to figure out the load factor LF and acceleration / deceleration time ratio t_{od} using the calculation formulae below and find it out from the graph.

1) Figure out the load factor LF using the calculation formulae below.

Maximum payload at the acceleration 0.3G is described in 1.2 Specifications.

[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or below]

Load Factor: $LF = \frac{M \times \alpha}{M_r \times 0.3}$ [%]

Max. Payload at Acceleration 0.3G : M_r [kg]
Acceleration / Deceleration 0.3G : 0.3 [G]
Payload during Operation : M [kg]
Acceleration during Operation : α [G]

[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or above]

Load Factor: $LF = \frac{M \times \alpha}{M_d \times \alpha} = \frac{M}{M_d}$ [%]

Payload at Indicated Acceleration : M_d [kg]
Payload during Operation : M [kg]
Acceleration during Operation : α [G]

2) Figure out the acceleration / deceleration time ratio t_{od} using the calculation formulae below.

Acceleration / Deceleration Time Ratio t_{od} =

$$\frac{\text{Acceleration Time during Operation + Deceleration Time during Operation}}{\text{Duration of Operation}} \text{ [\%]}$$

$$\text{Acceleration Time} = \frac{\text{Velocity during Operation [mm/s]}}{\text{Acceleration during Operation [mm/s}^2\text{] [sec]}}$$

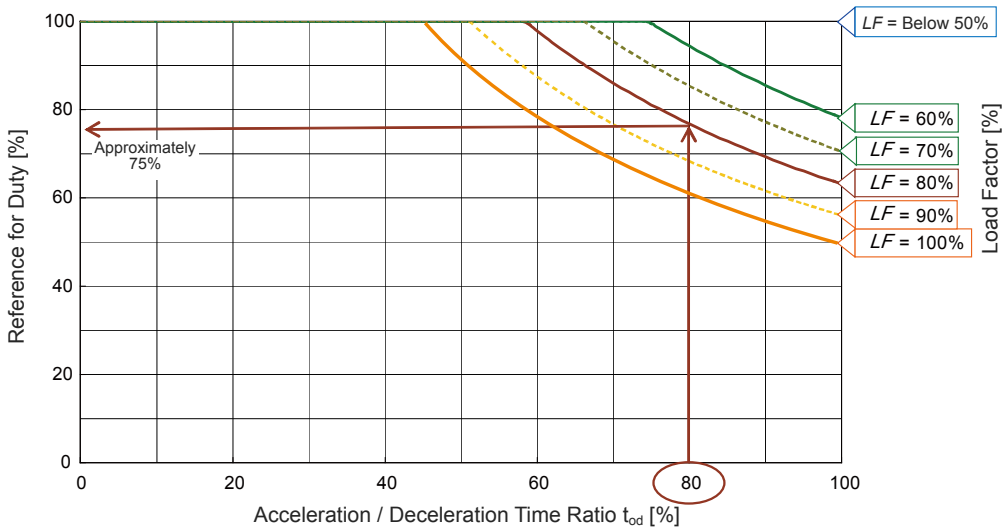
$$\text{Acceleration [mm/s}^2\text{]} = \text{Acceleration [G]} \times 9{,}800\text{mm/s}^2$$

$$\text{Deceleration Time} = \frac{\text{Velocity during Operation [mm/s]}}{\text{Deceleration during Operation [mm/s}^2\text{] [sec]}}$$

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

3) Read a reference for duty with the figured out "Load Factor" and "Acceleration / Deceleration Time Ratio".

e.g.) The reference for duty when the load factor LF is 80% and the acceleration / deceleration time ratio t_{od} is 80% should be approximately 75%.



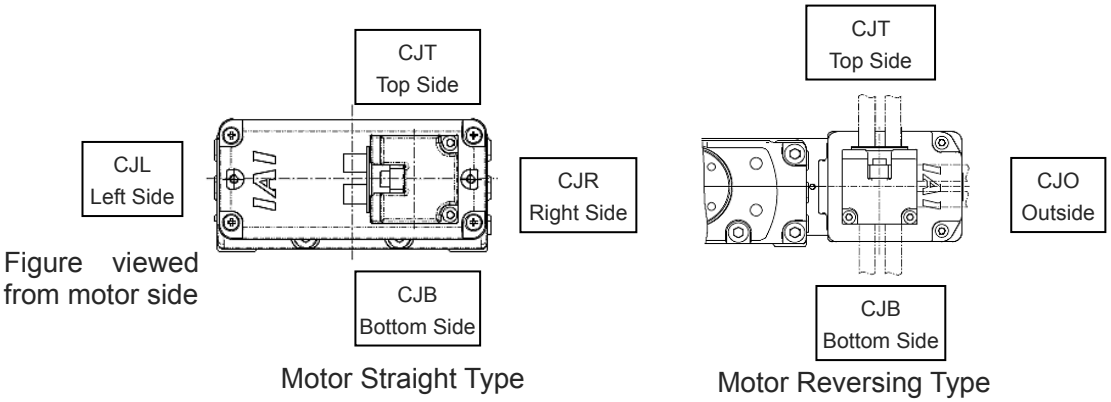
1.3 Options

Brake Type (Model Code: B)

This is used to prevent the rod from moving during power outages or when the servo is OFF.
It can also be used to prevent the rod from falling when mounted vertically.

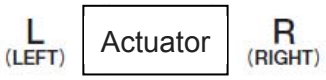
Cable Eject Direction Changed (Model Code: CJT, CJR, CJL, CJB and CJO)

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



Motor Reversed Direction (Model Code: ML, MR)

It is the code to indicate the direction of motor reversed when selecting the motor reversed type.
ML shows reversed to left and MR to right.

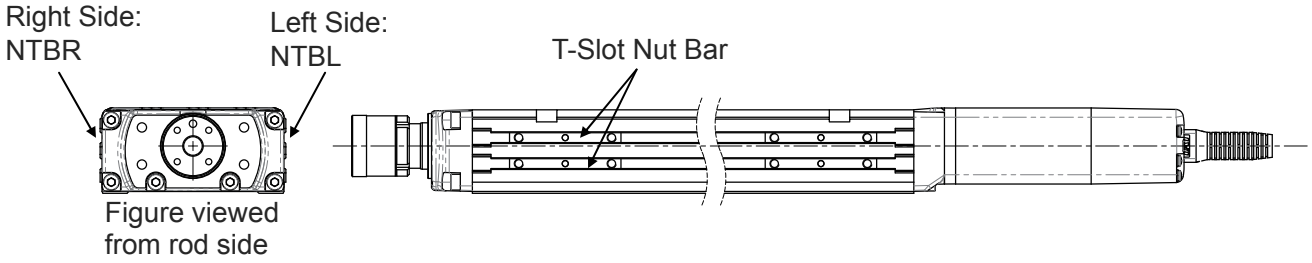


Reversed-home Specification (Model Code: NM)

The standard home position is on the motor side.
However, the opposite side specification is selected if the home position direction is reversed in accordance with equipment layout or assembly direction.

T-Slot Nut Bar (Model Code: NTBL, NTBR)

It is a bar-shaped component to put into the T-slot on the actuator.
For T-Slot Nut Bar (Right) NTBR, it is to be inserted on the right side if you look from the motor end.
For T-Slot Nut Bar (Left) NTBL, it is to be inserted on the left side if you look from the motor end.
On the T-slot nut bar, there are nut holes at the determined points
[Refer to When Using T-Slot on Side for the dimensions]



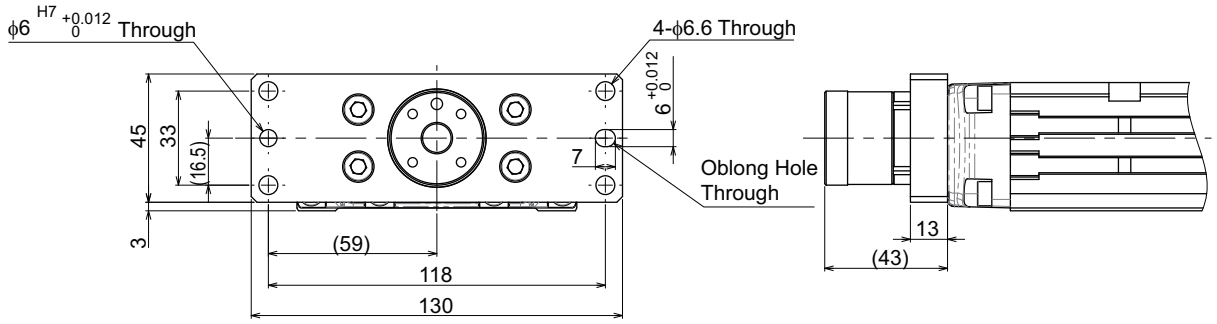
Model Code of Single Product	
WRA10C, WRA10R	RCP6-NTB-WRA10
WRA12C, WRA12R	RCP6-NTB-WRA12
WRA14C, WRA14R	RCP6-NTB-WRA14
WRA16C, WRA16R	RCP6-NTB-WRA16

(Note) The installation hole on the top of the base, which crosses T-slot nut bar, cannot be used.

Flange Bracket (Model Code: FL)

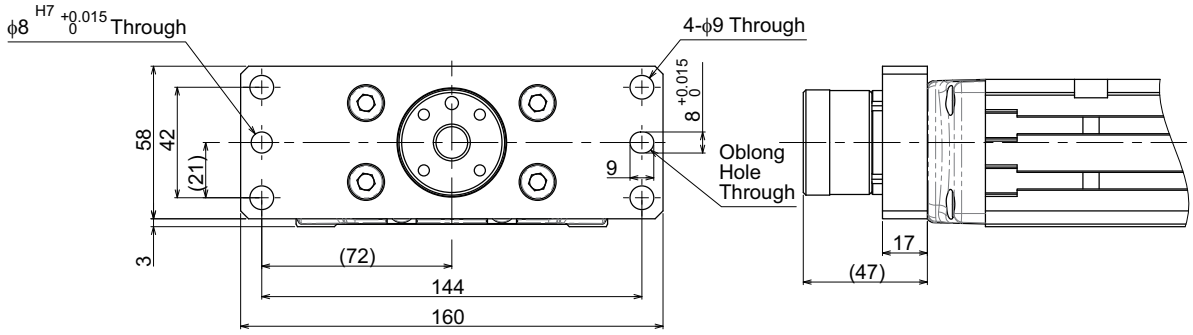
It is a bracket to affix the actuator from the main body side with screws.

[Model code of single product: RCP6-FL-WRA10]



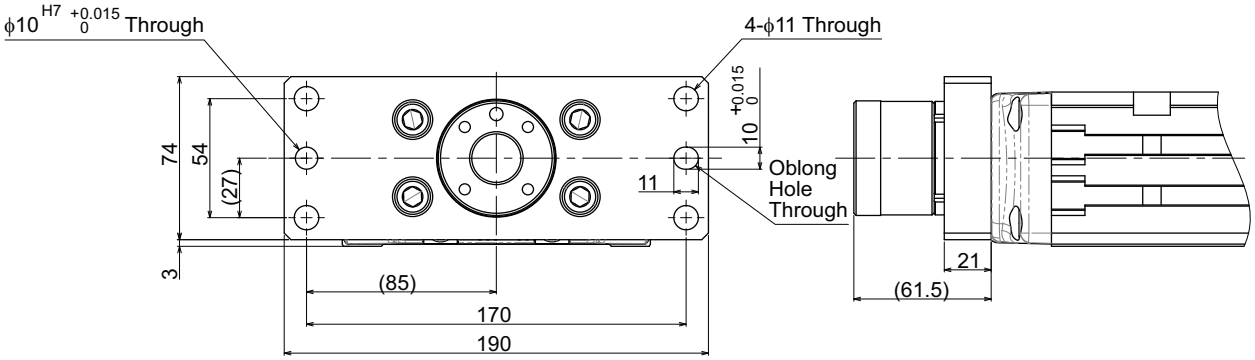
RCS4-WRA10C and WRA10R

[Model code of single product: RCP6-FL-WRA12]



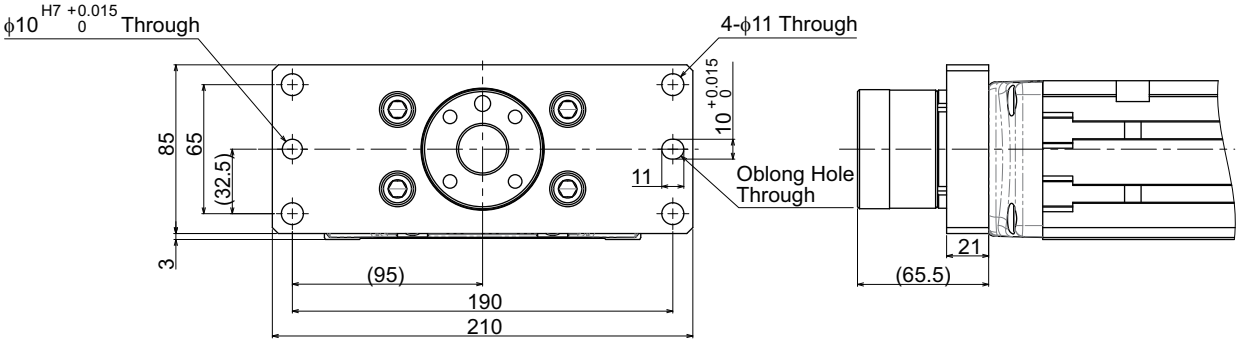
RCS4-WRA12C and WRA12R

[Model code of single product: RCP6-FL-WRA14]



RCS4-WRA14C and WRA14R

[Model code of single product: RCP6-FL-WRA16]

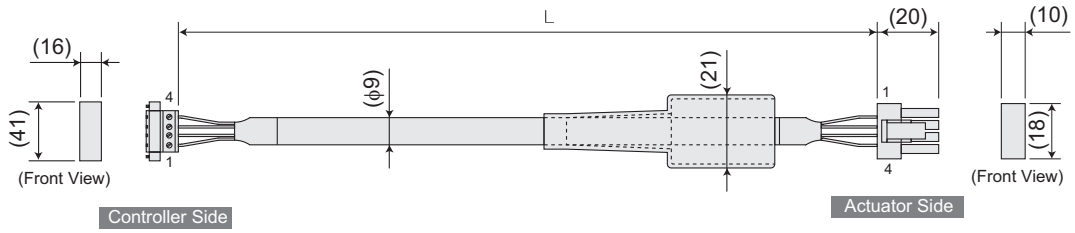


RCS4-WRA16C and WRA16R

1.4 Accessories

Motor Cable

Model code: CB-RCC-MA□□□/ CB-RCC-MA□□□-RB



Minimum bending radius r = 51mm or more (for movable use)
* It is only robot cable available to use inside the cable track

Wire Size	Color	Signal	No.
0.75sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

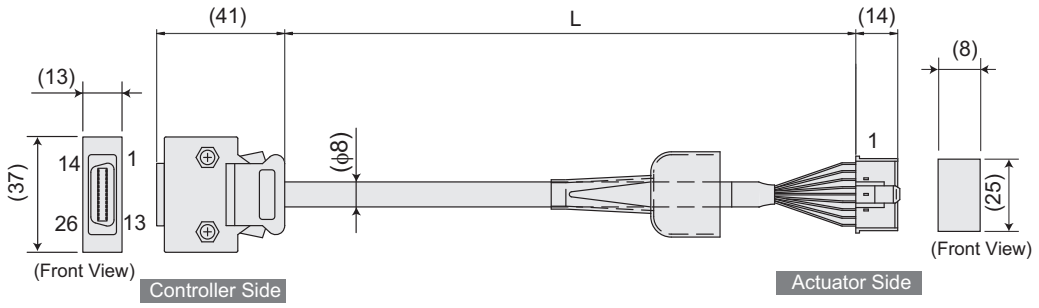
No.	Signal	Color	Wire Size
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

- The cable length should be 1m at minimum and 20m at maximum.
  Order can be make in unit of 1m long.
- An example for model codes is as shown below.

  Cable length **1**m → CB-RCC-MA**010** (-RB)
  Cable length **3**m → CB-RCC-MA**030** (-RB)
  Cable length **10**m → CB-RCC-MA**100** (-RB)

Encoder Cable

Model code: CB-X1-PA□□□



Minimum bending radius r = 44mm or more (for movable use)
*Robot cable is standard for this model.

Wire Size	Color	Signal	No.
AWG26 (Soldered)	—	—	10
	—	—	11
	—	E24V	12
	—	0V	13
	—	LS	26
	—	CREEP	25
	—	OT	24
	—	RSV	23
	—	—	9
	—	—	18
	—	—	19
	—	A+	1
	—	A−	2
	—	B+	3
	—	B−	4
	—	Z+	5
	—	Z−	6
	Orange	SRD+	7
	Green	SRD−	8
	Purple	BAT+	14
	Gray	BAT−	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR−	20
	Yellow	BKR+	21
	—	—	22
Clamp the shield to the hood.			

No.	Signal	Color	Wire Size
1	BAT+	Purple	AWG26 (Crimped)
2	BAT−	Gray	
3	SD	Orange	
4	SD	Green	
5	VCC	Red	
6	GND	Black	
7	FG	Drain	
8	BK−	Blue	
9	BK+	Yellow	

Ground wire or braided shield wire

- The cable length should be 1m at minimum and 20m at maximum.
  Order can be make in unit of 1m long.
- An example for model codes is as shown below.

Cable length **1**m → CB-X1-PA**010**
Cable length **3**m → CB-X1-PA**030**
Cable length **10**m → CB-X1-PA**100**

ROBO Cylinder

Chapter 2

Installation

2.1 Precautions for Transportation

[Handling the package]

- Do not damage or drop the package.
  The package is not specially designed to withstand dropping or shock due to collision.
- Keep the unit in horizontal orientation when placing it on the ground or transporting.
- Do not step or sit on the package.
- Do not put any load that may cause a deformation or breakage of the package.

[Handling after unpacking]

- Hold the base part when you carry the unit.
- Do not carry the unit by its motor cover.
- Do not damage or drop the package during transportation.
- Do not apply an excessive force to each part of the actuator.

→For the names of each part, refer to "Names of the Parts " on page Intro-11.

[Handling when assembled into machinery (system)]

- Fix the rod so that it would not move during transportation.
- If the tip of an actuator is overhanging, have an appropriate way to fix it to avoid shake due to the external vibration. In the transportation without the tip being fixed, do not apply any impact with 0.3G or more.
- When suspending machinery (system) with ropes, be careful not to catch the rope on the actuator or cable.

2.2 Installation and Storage / Preservation Environment

Usage is possible in environments of pollution degree 2 or equivalent.

Pollution degree 2:	Environment in which generally only nonconductive pollution occurs, but temporary conductive pollution may occur due to condensation (IEC 60664-1)

Installation Environment

The actuator should be installed in a location other than those specified below.
In general, the installation environment should be one in which an operator can work without protective gear.

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

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

- Space to replenish grease
- Space to replace the motor

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

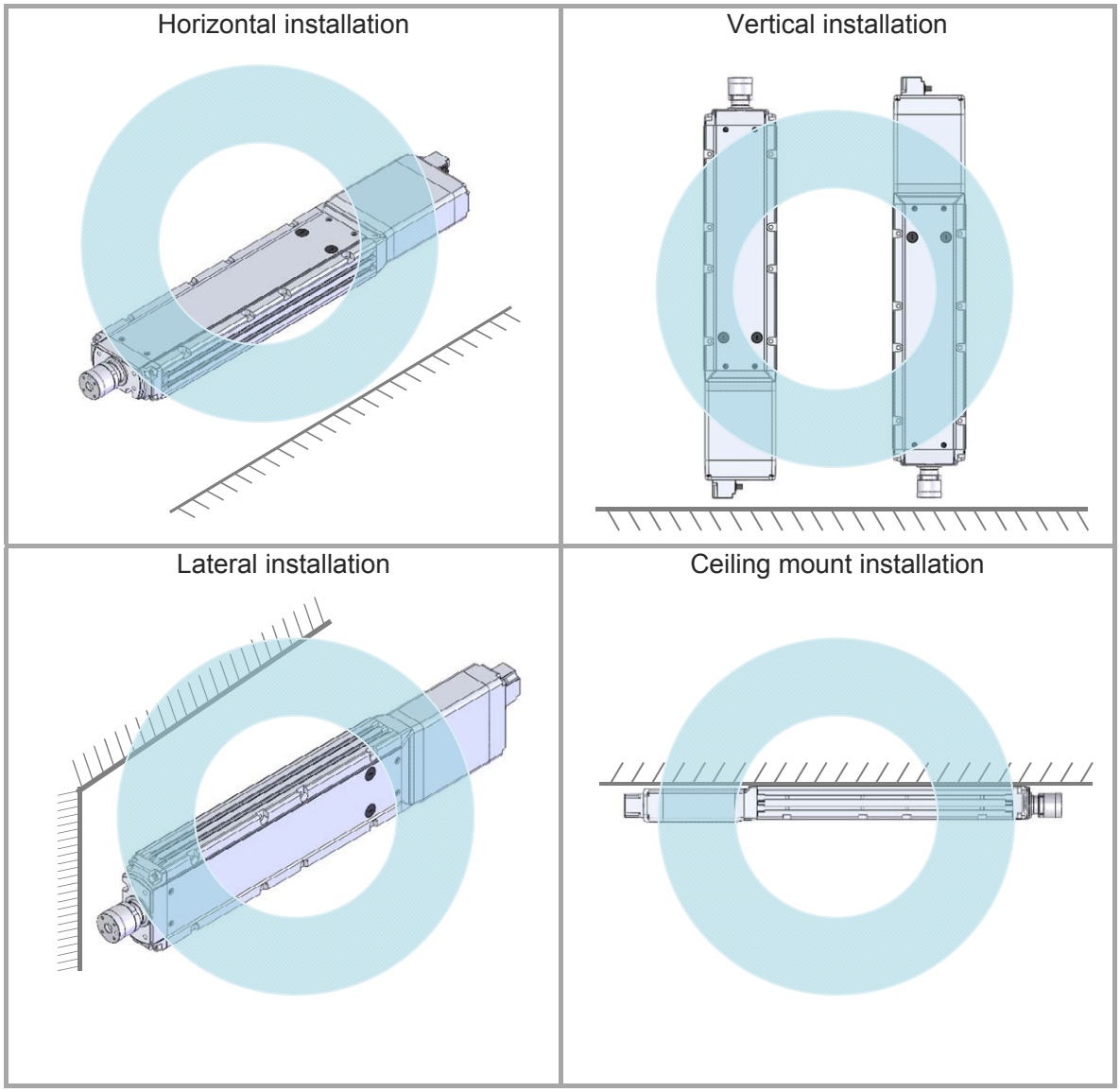
- Where noise generates due to static electricity, etc.
- Where the actuator is subject to a strong electric or magnetic field
- Where the actuator is subject to ultraviolet ray or radiation

Storage/ Preservation Environment

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

2.3 How to Install

Installation Orientation Type: RCS4 –WRA10/WRA12/WRA14/WRA16

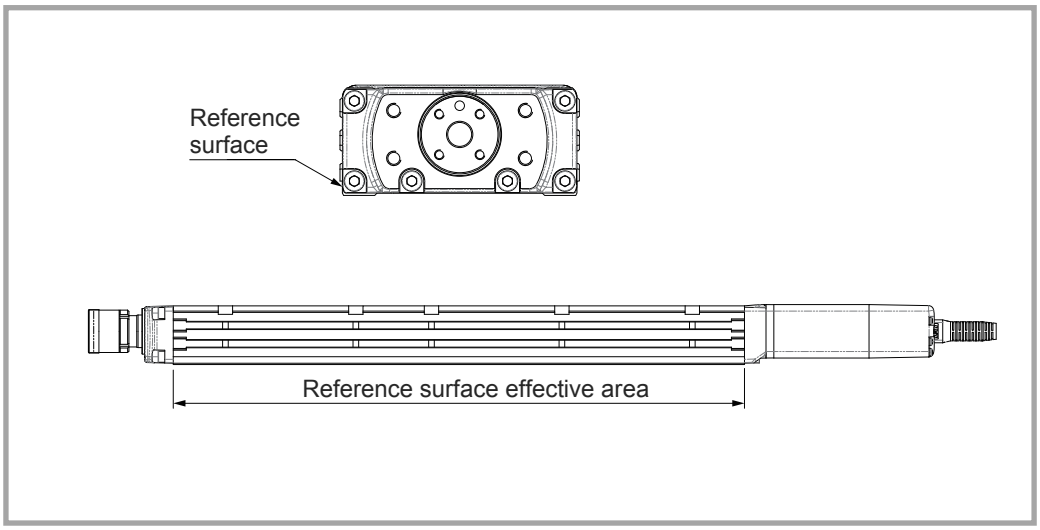


Caution

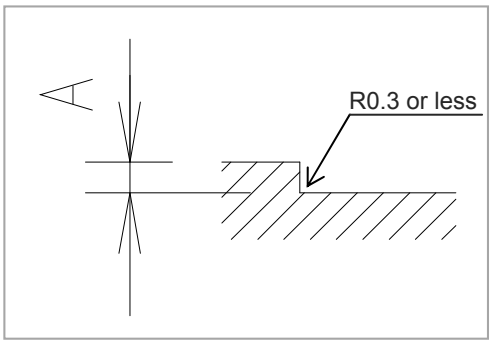
When installing the unit vertically, keep the motor on top to the greatest extent possible. If the motor is installed on the bottom, the grease may separate due to long-term disuse, causing the base oil to flow into the motor part. The controller and motor/encoder may break down due to the entry of the base oil.

Installation Surface

- The surface to mount the main unit should be a machined surface or a plane that possesses an equivalent accuracy and the flatness should be within 0.05mm/m.
- The platform to install the actuator should possess a structure that ensures enough stiffness, and should be free from vibration.
- Also, consider enough space necessary for maintenance work such as actuator replacement and inspection.



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

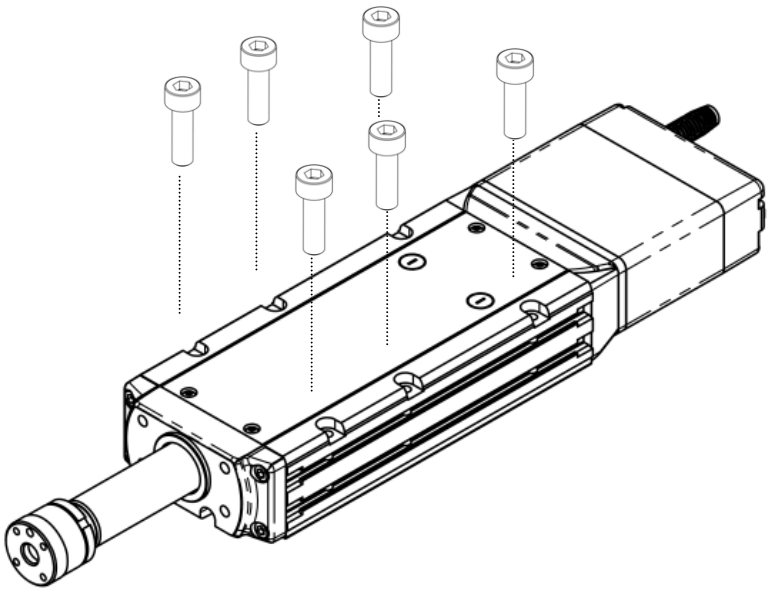


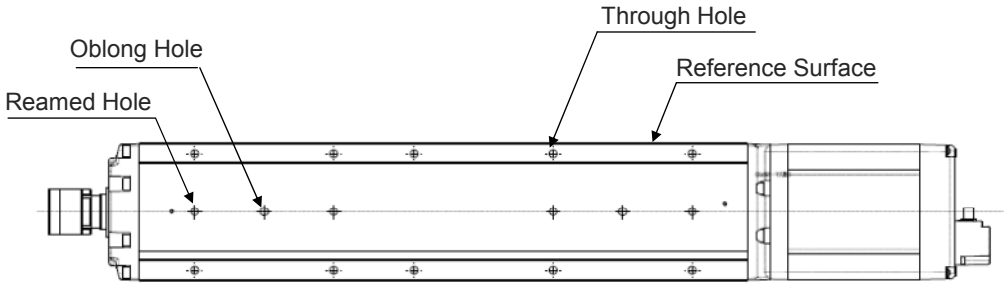
A Dimensions	
WRA10, WRA12, WRA14, WRA16	3 to 5mm

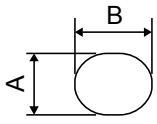
Installation of the Main Unit

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

This actuator has through holes for mounting so it can be fixed from the top of the base.
There are reamed holes and a oblong hole for positioning pins.
(Note) There are no oblong holes on Stroke 50mm and 100mm.







Oblong Hole

Apply the socket head cap screw indicated in the table below suitable for the platform material.

Model Name	Through Holes	Mounting Screw	Tightening Torque
WRA10C **WRA10R**	ϕ5.5 through hole, ϕ11 counterbore	M5	3.42N•m (0.35kgf•m)
WRA12C **WRA12R**	ϕ6.6 through hole, ϕ12.5 counterbore	M6	5.36N•m (0.55kgf•m)
WRA14C **WRA14R**	ϕ9 through hole, ϕ16.5 counterbore	M8	11.48N•m (1.17kgf•m)
WRA16C **WRA16R**	ϕ9 through hole, ϕ16.5 counterbore	M8	11.48N•m (1.17kgf•m)

Model Name	Reamed Hole	Oblong Hole
WRA10C **WRA10R**	ϕ5H7 depth 5	A:$5^{+0.012}_{0}$ B:6 depth 5mm or less
WRA12C **WRA12R**	ϕ6H7 depth 6	A:$6^{+0.012}_{0}$ B:7 depth 6mm or less
WRA14C **WRA14R**	ϕ8H7 depth 9	A:$8^{+0.015}_{0}$ B:9 depth 9mm or less
WRA16C **WRA16R**	ϕ8H7 depth 9	A:$8^{+0.015}_{0}$ B:9 depth 9mm or less

Notice

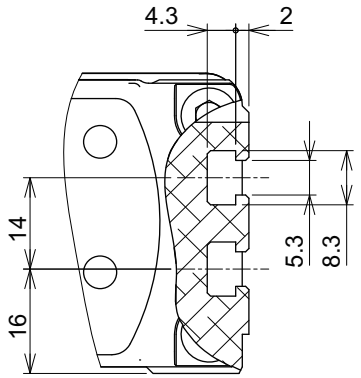
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to ensure the same length as the nominal diameter for the effective length of thread engagement between a screw and a threaded hole when the threaded when the threaded hole is made of steel and length 1.8 times of the nominal diameter when the threaded hole is made of aluminum.

[When Using T-Slot on Side]

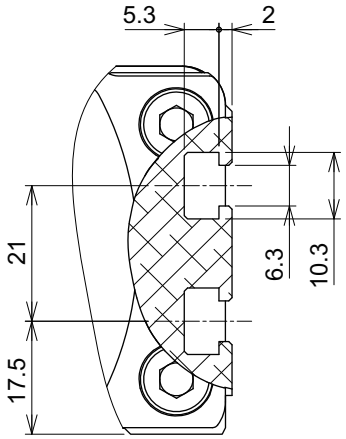
On this actuator, there are T-slots equipped on sides for installation so the actuator can be mounted on the sides.
There are two ways to install the actuator by using the T-slot, one with using a square nut to attach, and the other with using a T-slot nut bar (model code: NTBL or NTBR).
(Note) The installation hole on the top of the base, which crosses a square nut or T-slot nut bar, cannot be used.

(1) Dimensions for T-Slot

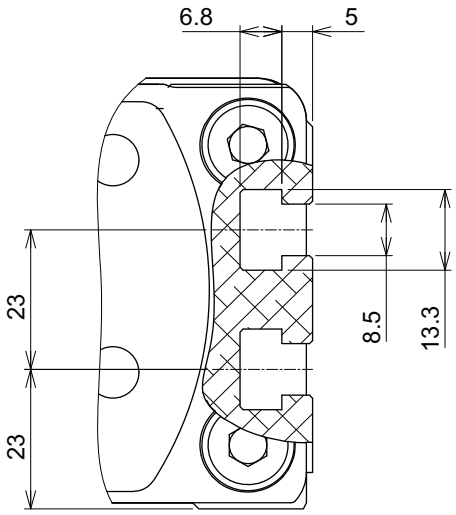
[WRA10]



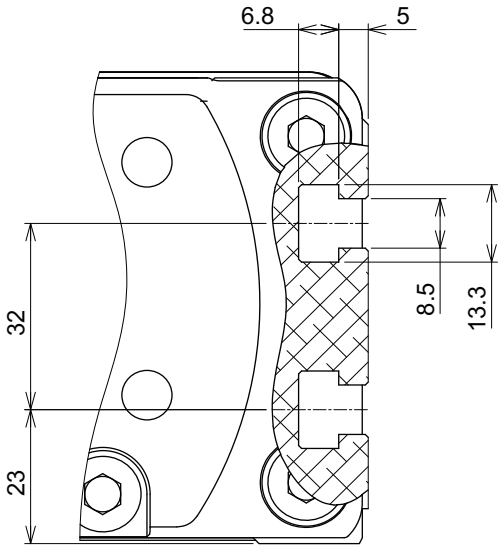
[WRA12]



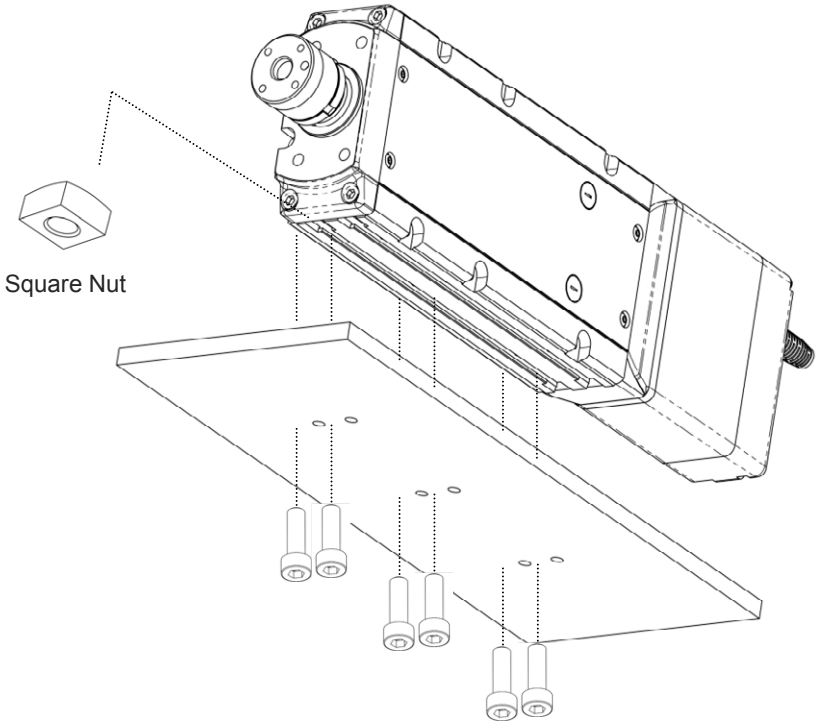
[WRA14]



[WRA16]



(2) Installation Using Square Nut



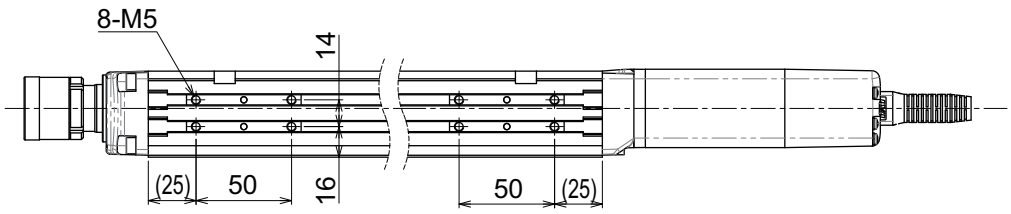
On the T-slot, square nuts specified in JIS B 1163 are available to use.
Also, it is available to use the optional T-slot nut bar (model code: NTBL or NTBR) instead of square nuts for installation.
Follow the minimum number of fixing bolts and tightening torque specified in the table below for installation.

	WRA10	WRA12	WRA14	WRA16
Min. Number of Fixing Bolt [pieces]	6	6	6	6
Tightening Torque [N•m]	3.42	5.36	11.5	11.5

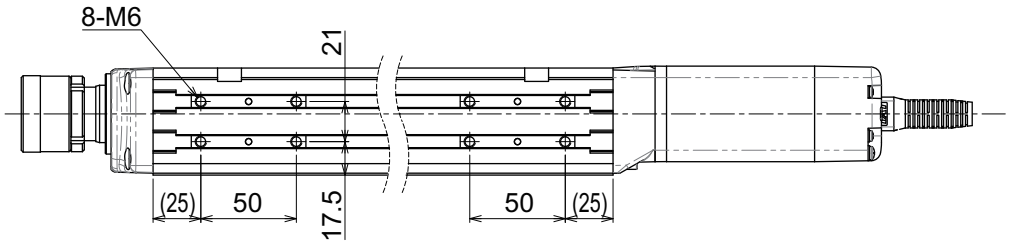
Caution

Pay attention when choosing the screw length. In case that insufficient length of screws is chosen, it may cause such problems as the strength not being enough on the actuator attachment, interference with driving part, drop in accuracy performance and unexpected accidents.

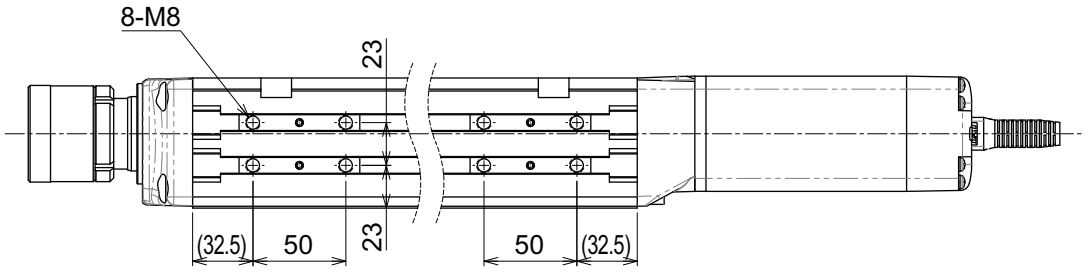
The equipment is delivered under the condition that the T-slot nut bar is fixed at the positions shown below.
When installing the actuator, adjust the T-slot nut bar positions.
(Note) The installation hole on the top of the base, which crosses T-slot nut bar, cannot be used.



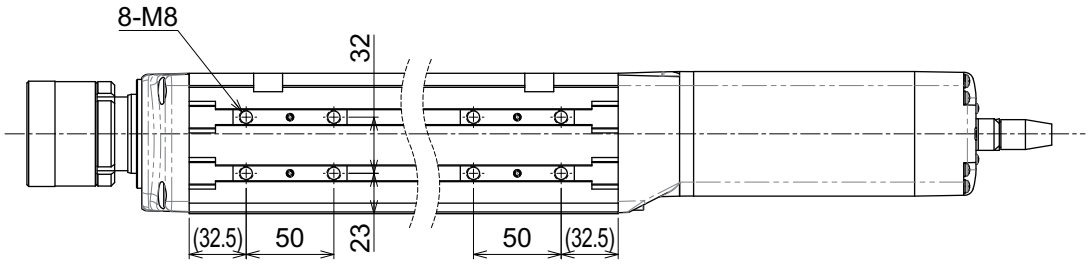
WRA10



WRA12



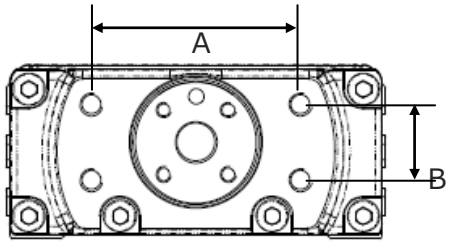
WRA14

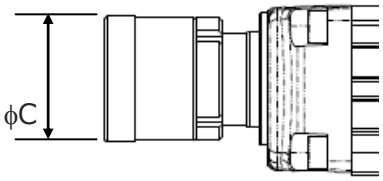


WRA16

[When using Tapped Holes on Front Bracket]

There are tapped holes equipped on the front bracket.
Utilize these tapped holes for installation.





Model Name	Tapped Hole Size	A	B	Screw Effective Depth	ϕC
WRA10C WRA10R	M6	55	20	12	ϕ35h7
WRA12C WRA12R	M8	65	30	12	ϕ42h7
WRA14C WRA14R	M10	75	35	15	ϕ54 h 7
WRA16C WRA16R	M10	85	40	15	ϕ62 h 7

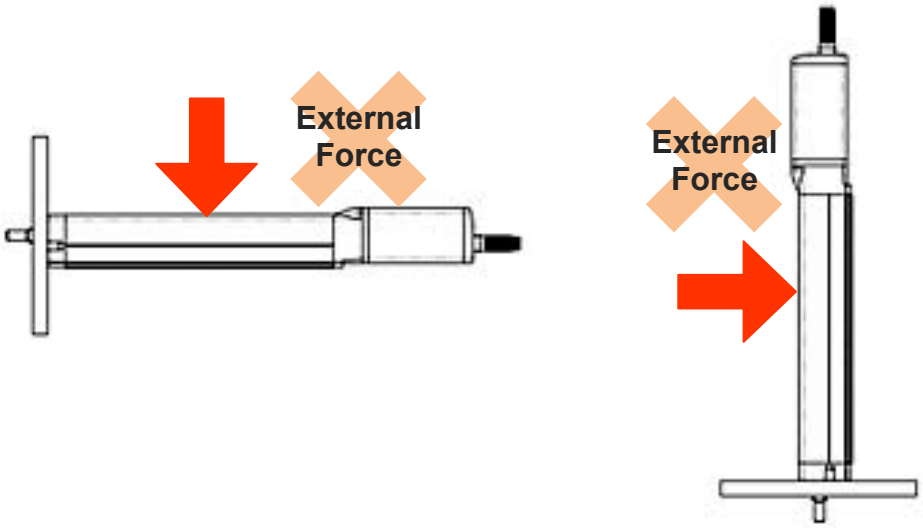
Model Name	Tightening Torque	
	In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
WRA10C WRA10R	12.3N•m (1.26kgf•m)	5.36N•m (0.55kgf•m)
WRA12C WRA12R	29.97N•m (3.06kgf•m)	11.48N•m (1.17kgf•m)
WRA14C WRA14R	59.37N•m (6.06kgf•m)	23.3N•m (2.4kgf•m)
WRA16C WRA16R	59.37N•m (6.06kgf•m)	23.3N•m (2.4kgf•m)

Notice

- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to ensure the same length as the nominal diameter for the effective length of thread engagement between a screw and a threaded hole when the threaded when the threaded hole is made of steel and length 1.2 times of the nominal diameter when the threaded hole is made of aluminum.

[Caution for Installation using Front Bracket]

● Do not attempt to apply any external force to the body when installing with front bracket.

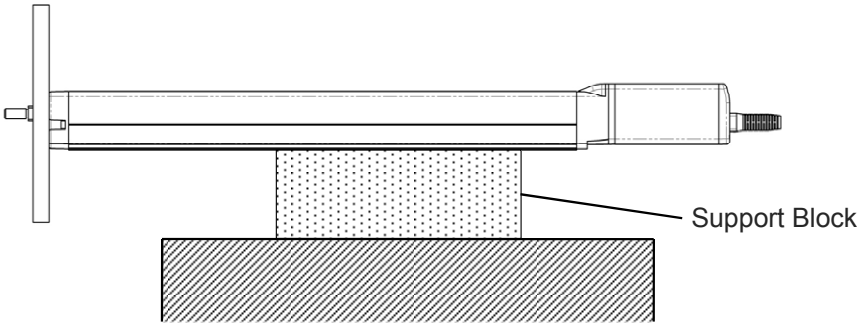


Caution

Do not apply external force to the actuator body after installation.
External force may cause an operation failure or parts malfunction.

[Precautions for horizontal mounting using Front Bracket]

- Prepare a support block for the body, as shown in the figure below.



Caution

Operation of the actuator with attachment only on the front bracket applies the external force of the acceleration/deceleration multiplied by the weight of the actuator to the unit body.

Control the acceleration/deceleration at 0.05G or less (for reference) when the actuator is moved with attachment only on the front bracket.

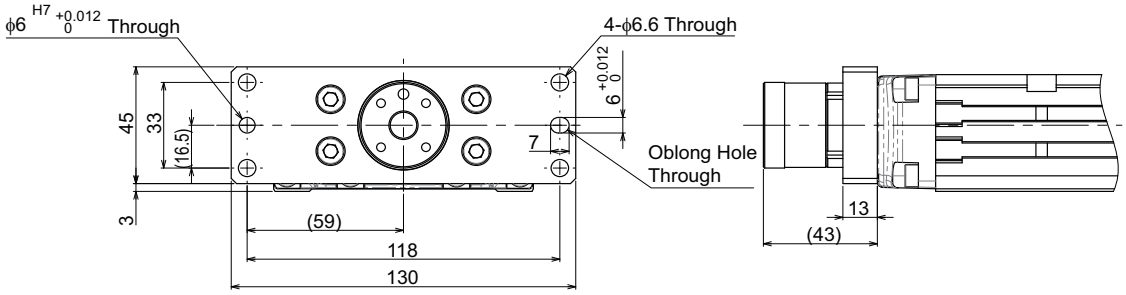
[When using Front Flange (Option)]

There are tapped holes equipped on the front housing (Option).
Utilize these holes for the installation.

WRA10C and WRA10R

(Note) In the delivery of IAI, the flatness is secured in the way described in the figure.

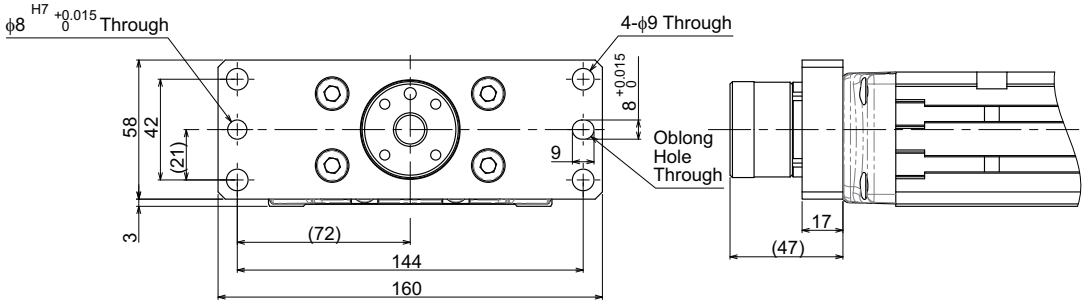
(Note) It is not available to have WRA10R Stroke 50mm installed as it interferes with the motor unit.



WRA12C and WRA12R

(Note) In the delivery of IAI, the flatness is secured in the way described in the figure.

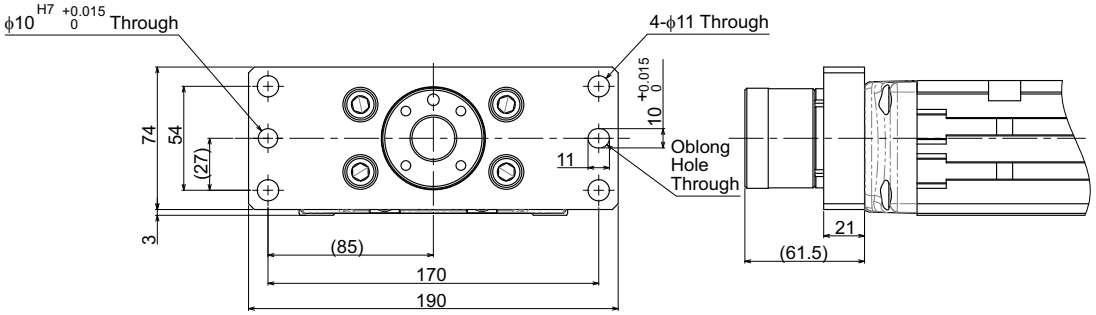
(Note) It is not available to have WRA12R Stroke 50mm installed as it interferes with the motor unit.



WRA14C and WRA14R

(Note) In the delivery of IAI, the flatness is secured in the way described in the figure.

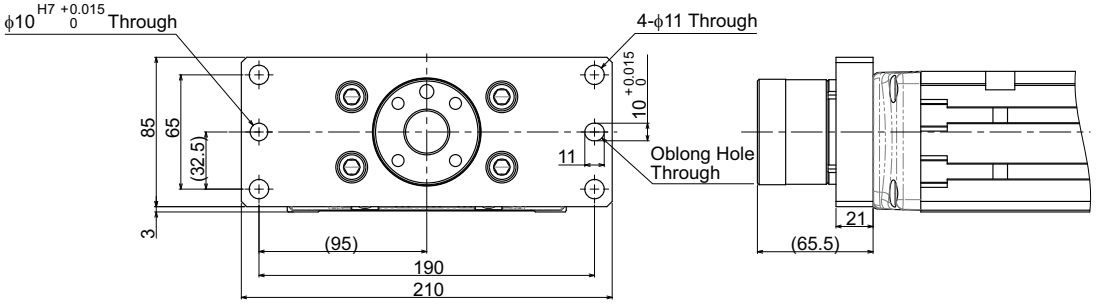
(Note) It is not available to have WRA14R Stroke 50mm installed as it interferes with the motor unit.



WRA16C and WRA16R

(Note) In the delivery of IAI, the flatness is secured in the way described in the figure.

(Note) It is not available to have WRA16R Stroke 50mm installed as it interferes with the motor unit.

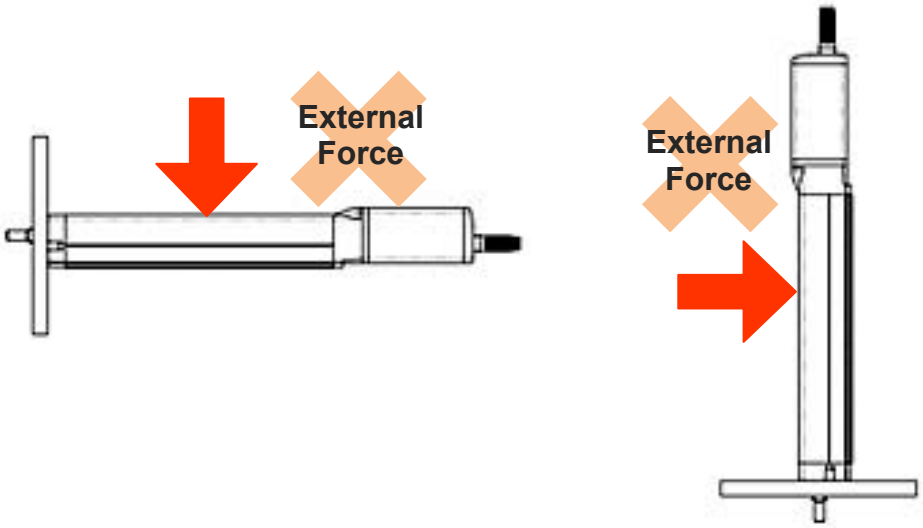


Notice

- Use of high–tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to ensure the same length as the nominal diameter for the effective length of thread engagement between a screw and a threaded hole when the threaded when the threaded hole is made of steel and length 1.8 times of the nominal diameter when the threaded hole is made of aluminum.

[Precautions when using Front Flange]

● Do not apply external force to the actuator body.

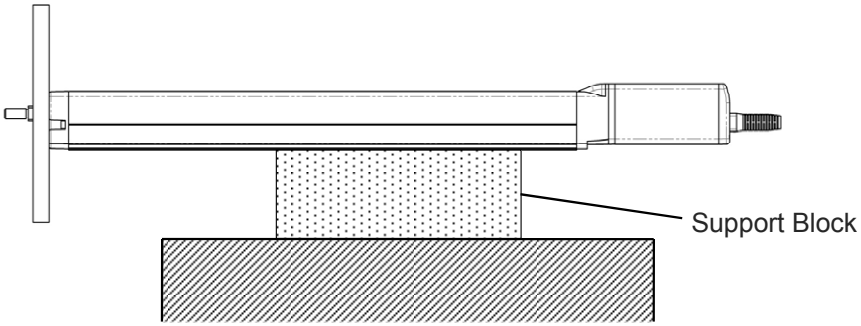


Caution

Do not apply external force to the actuator body after installation.
External force may cause an operation failure or parts malfunction.

[Precautions for horizontal mounting using Front Flange]

- Prepare a support block for the body, as shown in the figure below.



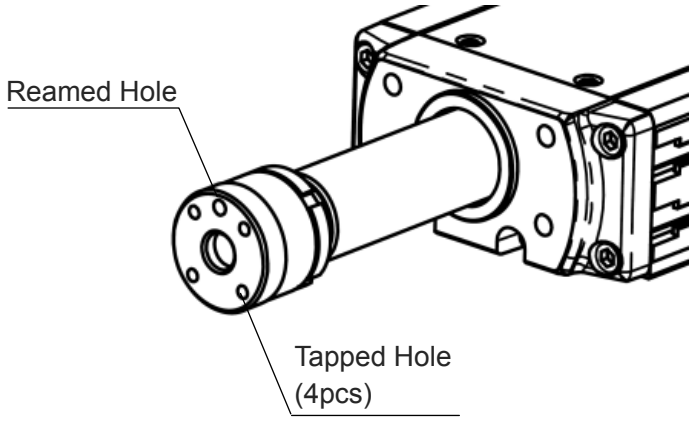
Caution

Operation of the actuator with attachment only on the front bracket applies the external force of the acceleration/deceleration multiplied by the weight of the actuator to the unit body.

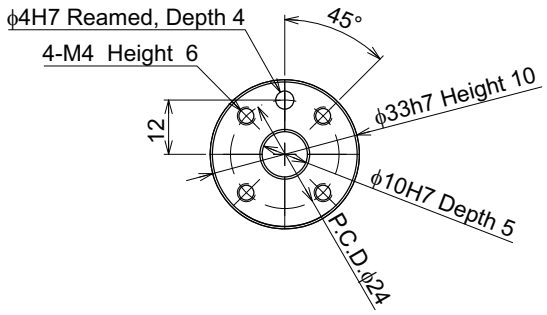
Control the acceleration/deceleration at 0.05G or less (for reference) when the actuator is moved with attachment only on the front bracket.

Attachment of Transported Object

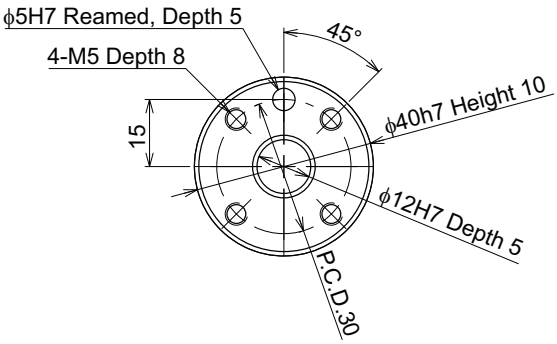
There are tapped holes equipped on the tip bracket on the rod. Utilize them to attach a transported object.
Also, use the reamed hole when it is necessary to ensure the repeatability when attached repeatedly.



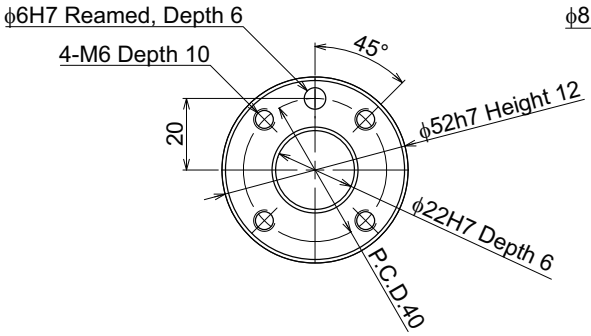
[WRA10]



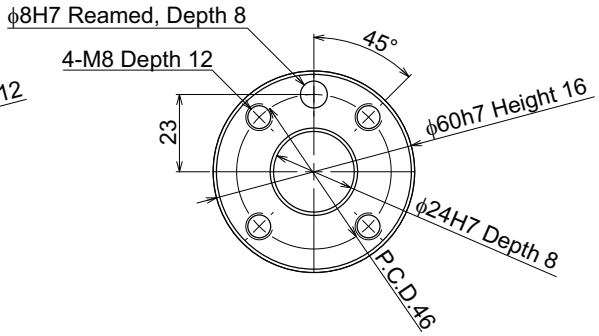
[WRA12]



[WRA14]



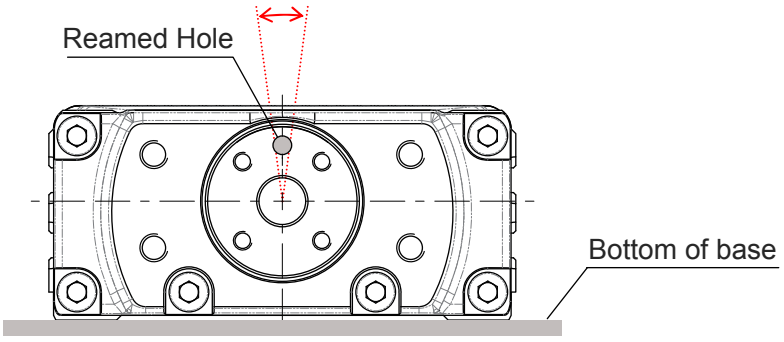
[WRA16]



Model Name	Attachment Holes	Attachment Hole Depth	Tightening Torque	
			In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
WRA10C WRA10R	M4	6mm	3.59N•m (0.37kgf•m)	1.76N•m (0.18kgf•m)
WRA12C WRA12R	M5	8mm	7.27N•m (0.74kgf•m)	3.42N•m (0.35kgf•m)
WRA14C WRA14R	M6	10mm	12.3N•m (1.26kgf•m)	5.36N•m (0.55kgf•m)
WRA16C WRA16R	M8	12mm	29.97N•m (3.06kgf•m)	11.48N•m (1.17kgf•m)

Caution

- Do not attempt to apply torque above the allowable static torque on the rod.
- The variation in angle for the reamed hole on the tip bracket against the bottom of the base is ±1° at the maximum.
  When the overhang of a transported object is large or when severe angle tuning is required, do not use the reamed hole for installation of the transported object.

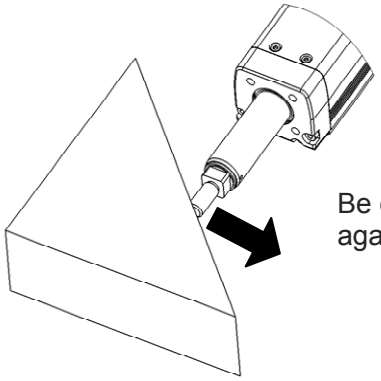


Notice

- Use of high–tension bolts meeting at least ISO 10.9 is recommended.
- Make sure to ensure the same length as the nominal diameter for the effective length of thread engagement between a screw and a threaded hole when the threaded when the threaded hole is made of steel and length 1 times of the nominal diameter when the threaded hole is made of aluminum.

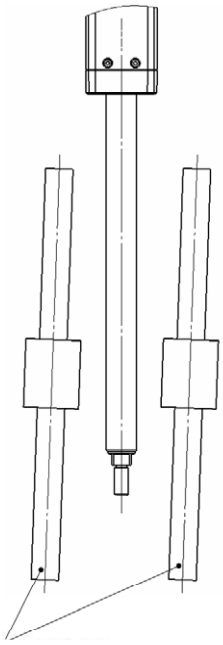
Precautions Regarding the Rod

- When the reaction force against the pressing operation is the side-way force, make sure it would not exceed the allowable load.



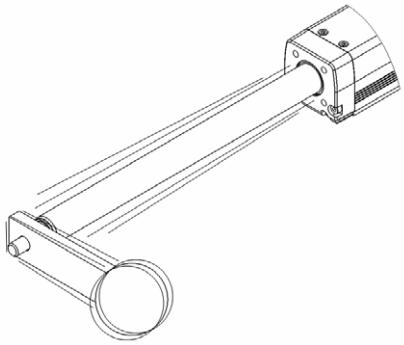
Be careful on the direction of the reaction force against the pressing. operation.

- When connecting the rod to external guides, be careful on the parallelism of the guides to the rod. When connecting and fixing the rod to external guides, be careful not to apply excess side–way load to the rod because of the assembly variation. For the connection of the rod and guides, have a component such as a free joint to accept the assembly variation.



External Guide

- The rod may generate vibration in some operation conditions. Apply guides to control the vibration.



ROBO Cylinder

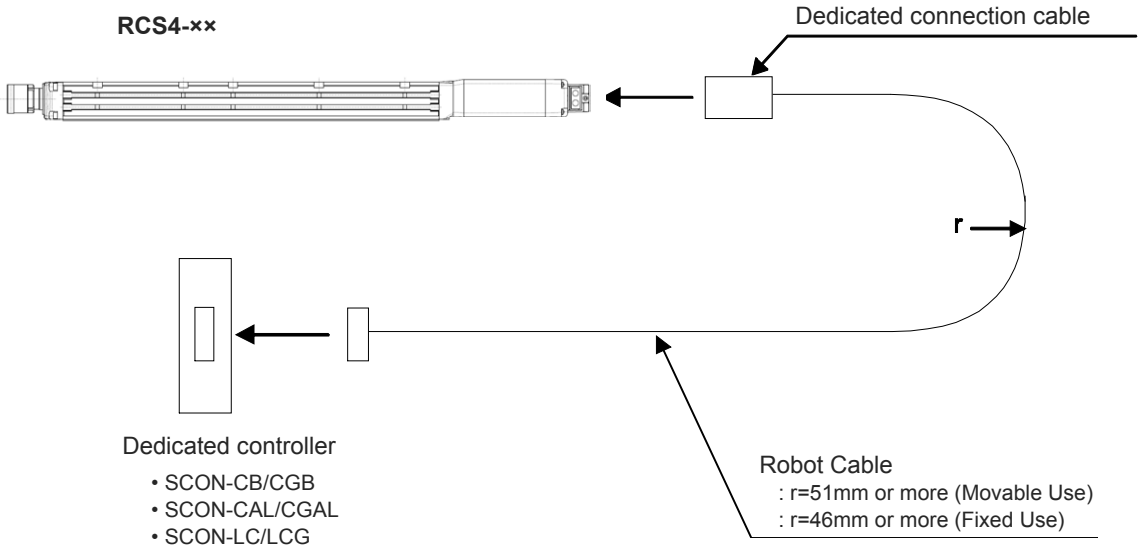
Chapter 3

Connecting with the Controller

3.1 Connecting with the Controller

As the connection cable for the controller and the actuator, use the IAI-dedicated connection cable. Please consult with IAI if you require a different kind of cable than the one supplied.

- If the dedicated connection cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Do not cut and reconnect the dedicated connection cable for extension or shorten the cable.
- Do not pull on the dedicated connection cable or bend it forcibly.
- The actuator cable coming out of the motor unit is not meant to be bent. Fix the cable so it would not be bent repeatedly.



Dedicated connection cable

- Motor cable : CB-RCC-MA□□□
- Motor robot cable : CB-RCC-MA□□□-RB
- Encoder Robot cable : CB-X1 -PA□□□

* □□□indicates the cable length. Up to 20m can be specified.
Example) 080 = 8m

Caution

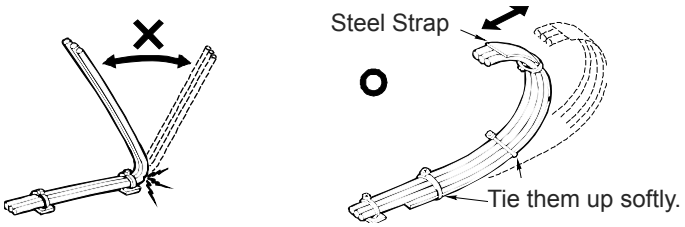
- For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure, or an operation error, but also electric shock or electric leakage, or may even cause a fire.
- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.

  Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or re-joint it.
- Hold the dedicated cable to avoid mechanical force being applied to the terminals and connectors.

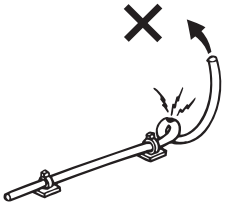
  Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
- In case a dedicated cable is to be used at a moving part, make sure to lay out the cable without applying any force to pull the connector or extreme bend on the cable. Do not attempt to use the cable with a bending radius below the allowable value.
- Make certain that the connectors are plugged properly. Insufficient connection may cause an operation error, thus it is extremely risky.
- Do not lay out the cables to where the machine runs over them.
- Pay attention to the cable layout so it would not hit peripherals during an operation. In case it does, have an appropriate protection such as a cable track.
- When a cable is used hanging on the ceiling, prevent an environment that the cable swings with acceleration or wind velocity.
- Make sure there is not too much friction inside the cable storage equipment.
- Do not apply radiated heat to power line or cables.

Caution

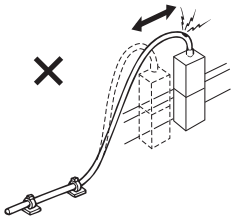
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



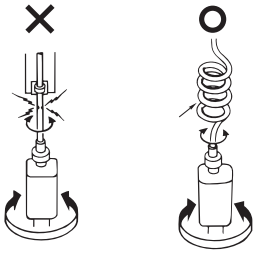
- Do not let the cable bend, kink or twist.



- Do not pull the cable with a strong force.

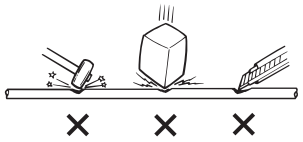


- Pay attention not to concentrate the twisting force to one point on a cable.

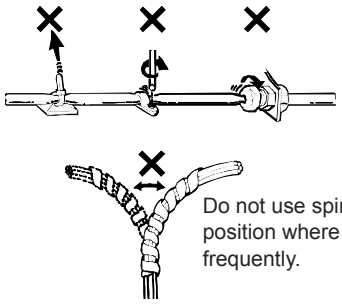


Caution

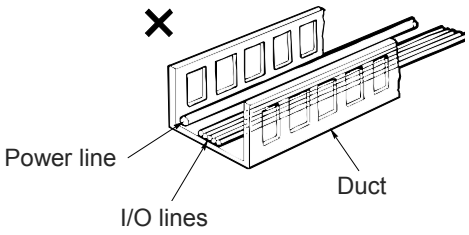
- Do not pinch, drop a heavy object onto or cut the cable.



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



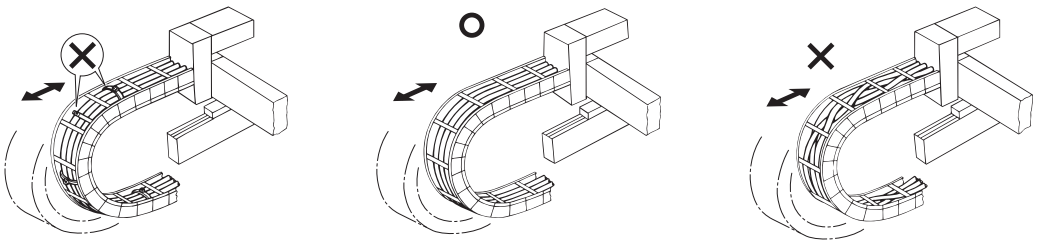
- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



Caution

Follow the instructions below when using a cable track.

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



ROBO Cylinder

Chapter 4

Maintenance and Inspection

4.1 Precautions for Maintenance and Inspection Work

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

Caution

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

Caution

- Check that the power to the actuator is OFF before conducting any maintenance or inspections.
- Be careful not to lose the cover or any removed screws.
  Be sure to return the product to the original condition after maintenance and inspection work.
  Mounting in an incomplete state may cause injuries or damage to the product.
- Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion under any circumstances.

Caution

The grease film may run out if the actuator performs return operation continuously over a distance of 30mm or less. As a guideline, every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film.
The ball screw or guide may be damaged if the oil film runs out.

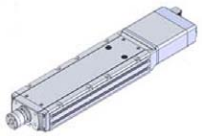
Notice

- First, be sure to wipe off the old grease, and then supply new grease.
- The degradation speed of grease may differ depending on the operating environment (temperature, humidity and ambient atmosphere).
  It is recommended to shorten the grease supply period if the actuator is used under poor environmental conditions such as high temperatures, high humidity or dusty atmospheres.
- Also, it is recommended to improve the environmental conditions in case the grease changes color notably due to poor operating conditions.
- Base oil may separate from the grease due to the mounting orientation or operating conditions.
  Base oil may also leak from the inside of the actuator to the exterior through gaps.
  Check visually for oil drips when supplying grease.
- An actuator stored for 6 months or more may suffer from grease degradation.
  Supply grease before the start of use.
  → For details, refer to "4.5 Greasing Method".

4.2 Inspection Items and Schedule

Follow the maintenance inspection schedule below.
It is assumed that the equipment is operating 8 hours per day.
If the equipment is running continuously night and day or otherwise running at a high operating rate, inspect more often as needed.

Wide Radial Cylinder



Inspection Period	External Inspection	Internal Inspection	Greasing	
			Rod sliding surface	Ball screw and guide
Start of work inspection	○	–	–	–
1 month inspection	○	–	–	–
3 month inspection	–	–	○	○
Every 3 months thereafter	○	–	○	–
3 months after starting operation	–	–	–	Grease supply timing (Reference) dependent
6 month inspection	○	○		
Every 6 months thereafter	○	○		

Grease Supply Timing (Reference)

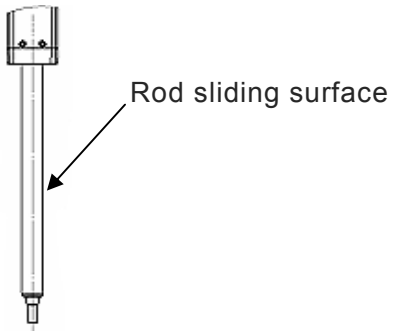
Maximum Speed of Use [mm/s]	Grease Supply Timing (Reference)	
	Operated distance	Months
0 to 750 or less	1,250 km	12 month
750 to 1300 or less	2,500 km	

4.3 Visual Inspection Items

Refer to "4.6 How to Replace Components" for detailed information about specific component replacement and adjustment methods.

External Visual Inspection

Inspection Items	Maintenance Work
Is abnormal noise or vibration generated?	Take an action by referring to “Troubleshooting in Controller Instruction Manual”.
Are actuator mounting bolts loose?	Tighten them further.
Is the cable scratched?	Replace if the damage is severe.
Is the connector loose?	Re-insert correctly.
Is the rod sliding surface grease not lubricating well? **(Even if the grease is brown, lubrication is adequate if the running surface is shiny)**	Wipe away the old grease, then replenish with new grease.
Is there foreign matter or dust adhered to the rod sliding surface?	Replenish with new grease after cleaning.
Is grease dripping out? **(especially if vertically mounted)**	Clean up any drips. Replenish the grease.



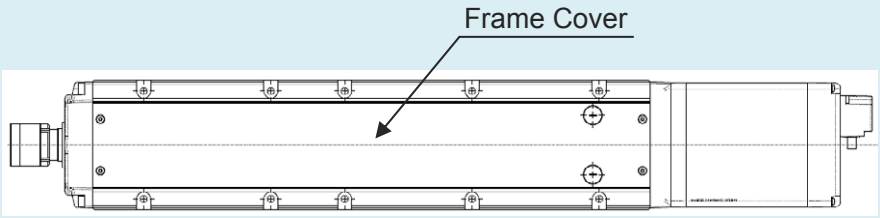
Refer to "4.6 How to Replace Components" for detailed information about specific component replacement and adjustment methods.

Internal Visual Inspection

Inspection Items	Maintenance Work
Are actuator mounting bolts loose?	Tighten them further.
Is the ball screw or guide grease not lubricating well? (Even if the grease is brown, lubrication is adequate if the running surface is shiny)	Wipe away the old grease, then replenish with new grease.
Is dust or foreign matter adhered to the ball screw or guide?	Replenish with new grease after cleaning.

How to Internal Inspection

1) With 1.5mm (WRA10C, WRA10R) or with 2.5mm (WRA12C, WRA12R, WRA14C, WRA14R, WRA16C and WRA16R) hex wrench, loosen the bolts holding the frame cover, and detach the frame cover.
2) Check inside.
   Extend the rod when checking the ball screw.
   The ball screw will appear. Slide the rod manually with hand or move it with JOG operation of the controller.
3) After finishing the inspection, assemble back in the reverse order.



Model Name	Bolt Diameter	Tightening Torque
WRA10C **WRA10R**	M3	0.62N•m
WRA12C **WRA12R**	M4	1.76 N•m
WRA14C **WRA14R**	M4	1.76 N•m
WRA16C **WRA16R**	M4	1.76 N•m

4.4 Cleaning

External Cleaning

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

Internal Cleaning

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

4.5 Greasing Method

[1] Grease used: Use an equivalent product

Application Location	**During maintenance** (recommended product)	Default (reference)
Ball Screw	Kyodo Yushi/Multemp PS No.2	Kyodo Yushi/Multemp PS No.2
Guide		

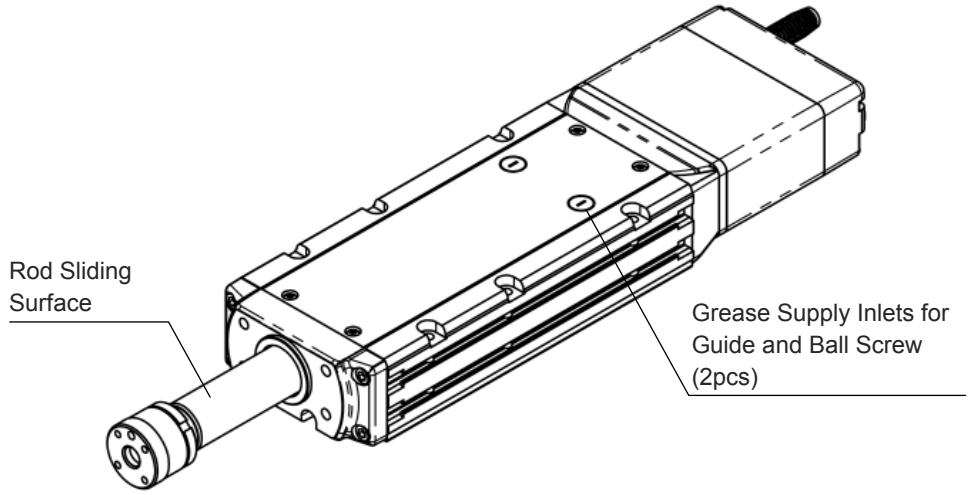
Caution

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

[2] Greasing method: Ball screw and guide

Greasing method

1) Detach the caps on the front side.

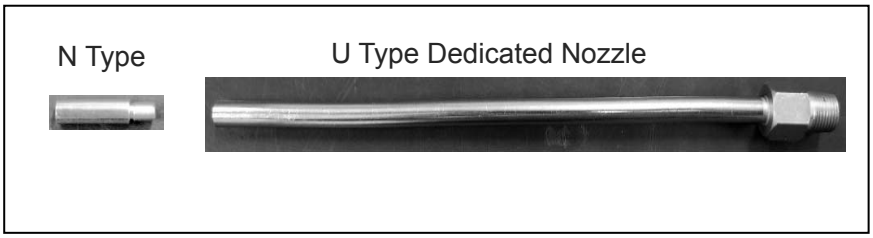
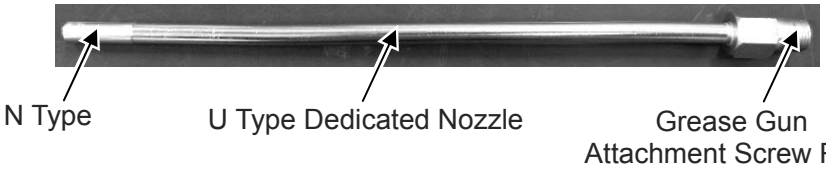


2) Move the rod to the home position manually or with JOG operation of the controller.
3) Insert a grease gun to the supply hole (ϕ11) on the top of the frame, hold the gun on the grease nipple and supply grease.
   By supplying grease only to this grease nipple, grease can be supplied to both the ball screw and guide.

(Note) Prepare a grease gun suitable for the diameter of the grease nipples stated below.

Model	Grease Nipple Diameter
WRA10C, WRA10R	ϕ3.5
WRA12C, WRA12R WRA14C, WRA14R WRA16C, WRA16R	ϕ6.0

Grease Gun Attachment Screw R1/8	Supplier
(e.g.) GC-57K	Yamada

Nozzle	Supplier
N Type + U Type Dedicated Nozzle  ⊙ Connect N type to the tip of U type dedicated nozzle, and attach it on the grease gun to use.  	THK

Model	Amount of Grease Supply (Reference)
WRA10C, WRA10R	1.5 cc to 2.0 cc
WRA12C, WRA12R	2.0 cc to 2.5 cc
WRA14C, WRA14R	2.0 cc to 2.5 cc
WRA16C, WRA16R	3.5 cc to 4.0 cc

Caution

- Supplying too much grease may increase sliding resistance and load to the motor, resulting in a drop of performance.
  Also, there is a concern that the excess grease applied to the ball screw may splash around and dirt the peripheral.

4) Cleanup the rod (sliding surface) and apply the grease with hands.
5) Slide the rod back and forth manually with hand or by the controller with JOG operation to spread out the grease evenly.
6) Attach the caps.

Caution

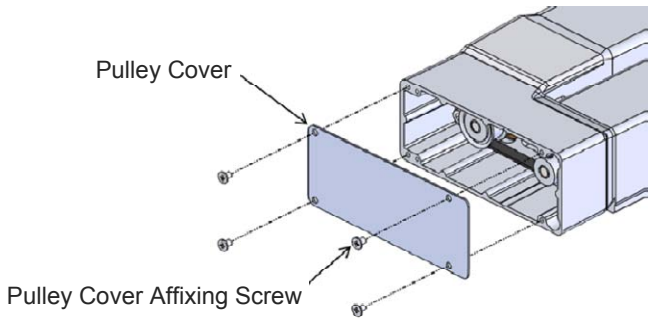
- In case the grease got into your eye, wash it with clean water for 15 minutes and immediately go see the doctor to get appropriate care.
- After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease OFF.

4.6 How to Replace Components

Belt Replacement and Tuning

[Belt Inspection]

1) Detach the pulley cover affixing screws and take off the pulley cover.



2) Check the condition of the belt visually.

Judgment

- In generally speaking, it possesses bending life of several million times. However, the period of replacement for the belt cannot be clearly defined as the durability of it is impacted so much by the operational conditions.
- The timing belt gets worn away as the time passes, and it is necessary to have replacement at regular intervals with the following conditions as reference.
  - When the gear and belt area show obvious friction.
  - When swelling occurs as a result of oil adhesion.
  - When damages such as a crack occurs on the belt gear and back side.
- For the toothed belt, it is recommended to set the interval of regular replacement cycle when in use under high wire fatigue condition in high acceleration and deceleration because it is difficult to judge the right timing for replacement by checking appearance or looseness of the wires strengthening the belt.

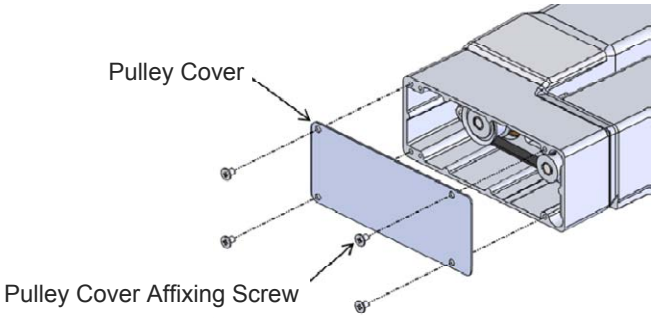
[Belts to be Used]

IAI uses the following belt in our plant.

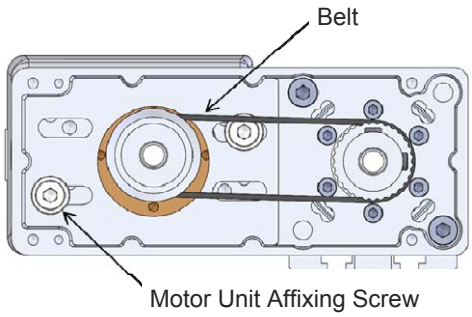
Model	Belts to be Used	Supplier
WRA10R	60S2M222R	Bando Chemical Industries, Ltd.
WRA12R	60S3M261GB	Mitsuboshi belting Ltd.
WRA14R	100S3M315GB	Mitsuboshi belting Ltd.
WRA16R	365-EV5GT-15	Gates Unitta Asia Ltd.

[Replacement of the Belt: WRA10R, WRA12R, WRA14R]

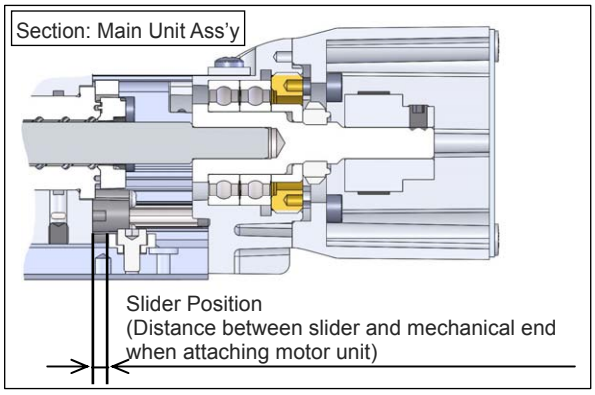
1) Detach the pulley cover affixing screws and take off the pulley cover.



2) Loosen the motor unit affixing screw and take off the belt.



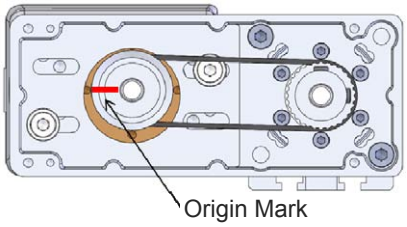
3) Keep the rod at the distance shown in the table below from the mechanical end.



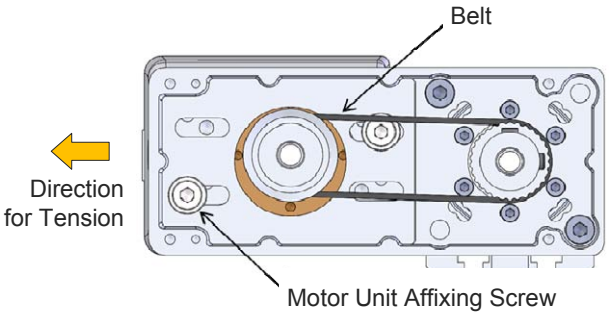
Rod Position

Model	Rod Position [mm]
WRA10R, WRA14R	2
WRA12R	2.5

4) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



5) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



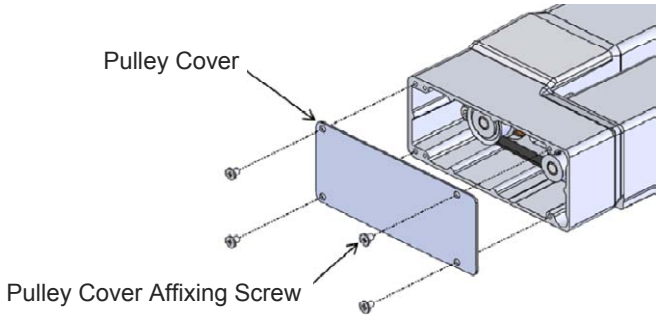
Tensile Force when Attaching Motor Unit

Model	Tension Force [N]
WRA10R	20 to 25
WRA12R	40 to 45
WRA14R	70 to 80

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
WRA10R, WRA12R	2.1
WRA14R	4.1

6) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.

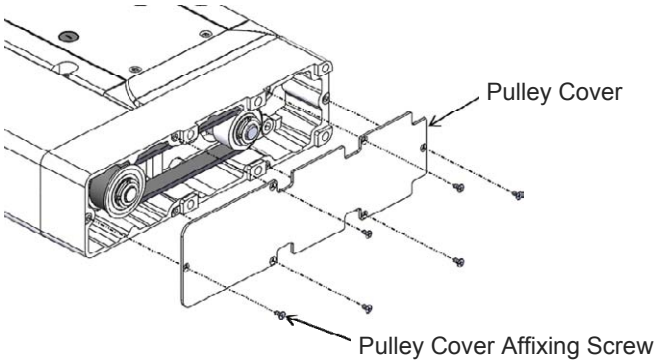


Pulley Cover Affixing Screw Tightening Torque

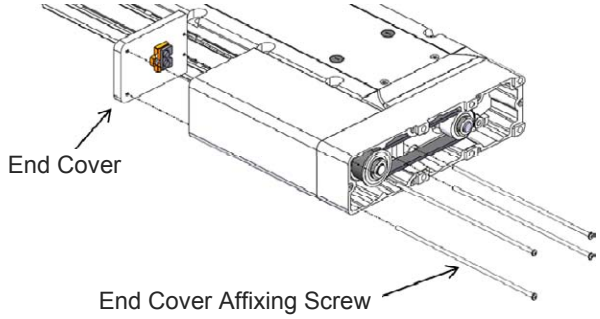
Model	Type of Screws	Tightening Torque [N•m]
WRA10R WRA12R WRA14R	Cross-recessed Button Head Screw (SUS): M3	0.9

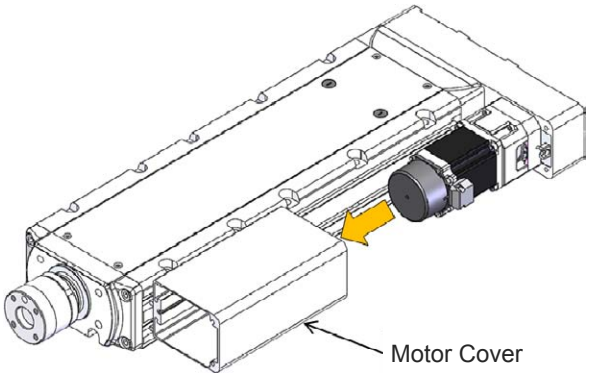
[Replacement of the Belt: WRA16R]

1) Detach the pulley cover affixing screws and take off the pulley cover.

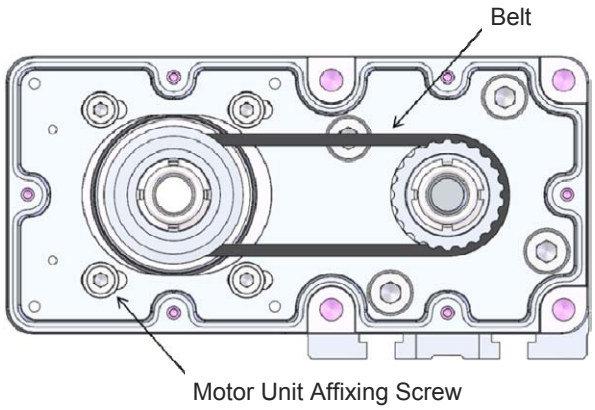


2) Loosen the end cover affixing screws and take off the end cover and motor cover.

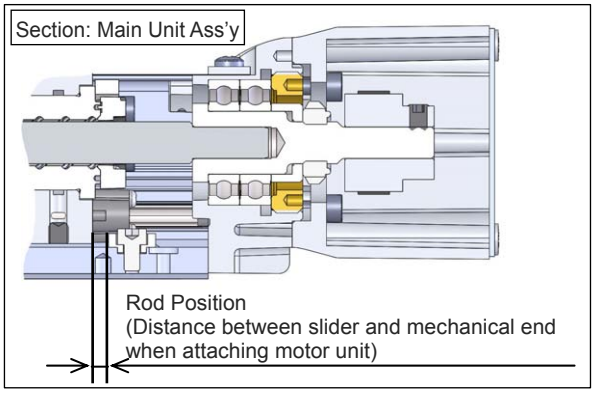




3) Loosen the motor unit affixing screw and take off the belt.



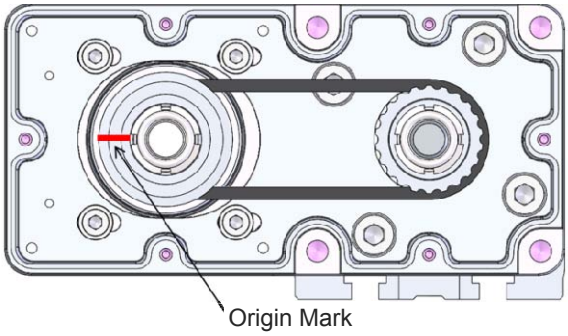
4) Keep the rod at the distance shown in the table below from the mechanical end.



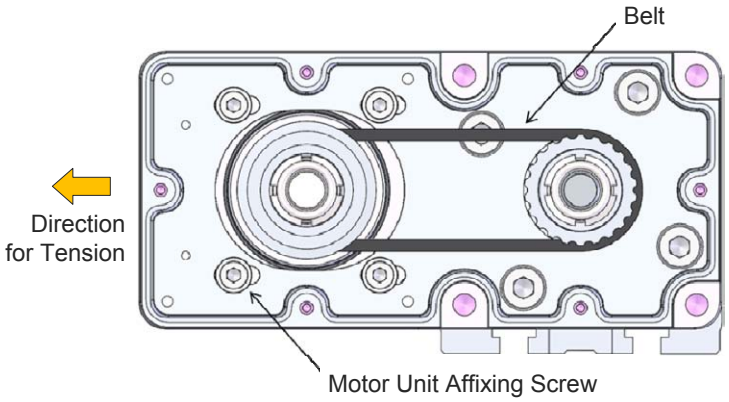
Rod Position

Model	Rod Position [mm]
WRA16R	2

5) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



6) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



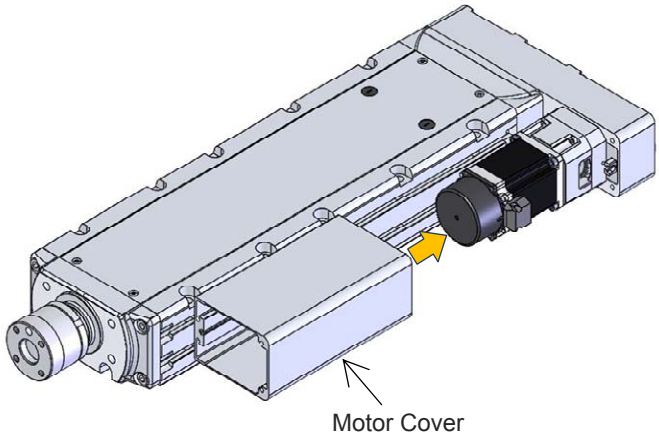
Tensile Force when Attaching Motor Unit

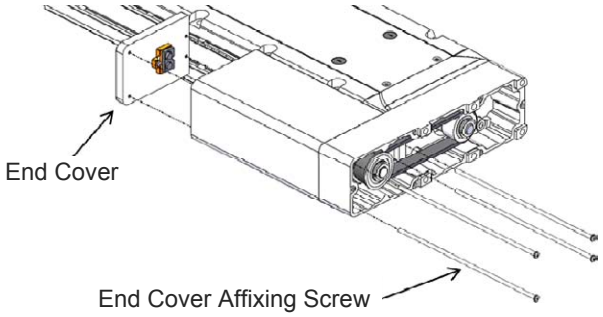
Model	Tension Force [N]
WRA16R	180 to 200

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
WRA16R	4.1

7) Tighten up the end cover and motor cover with the end cover affixing screws in the specified torque.

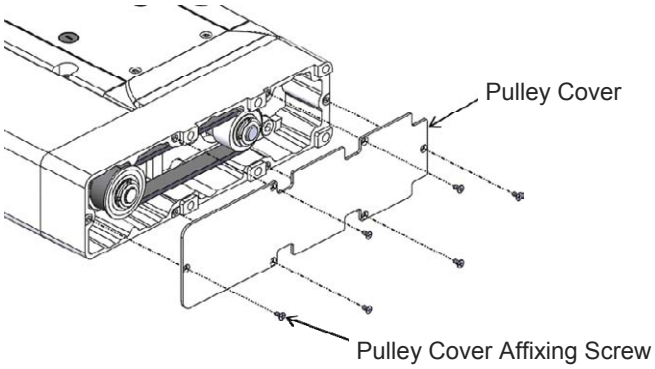




End Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
WRA16R	Set of Cross Recessed Pan Head Machine Screw: M4	1.0

8) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.



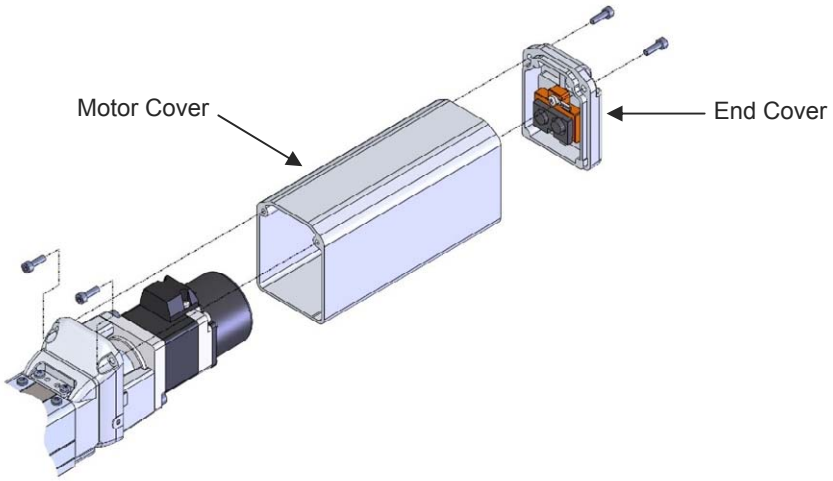
Pulley Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
WRA16R	Hex Socket Button Head Screw: M3	0.4

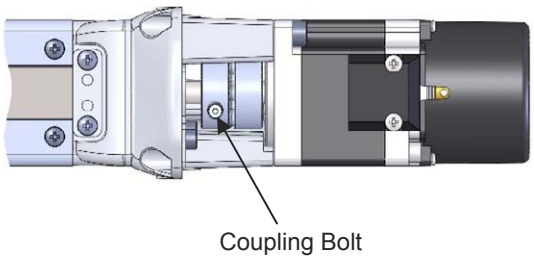
Motor Replacement

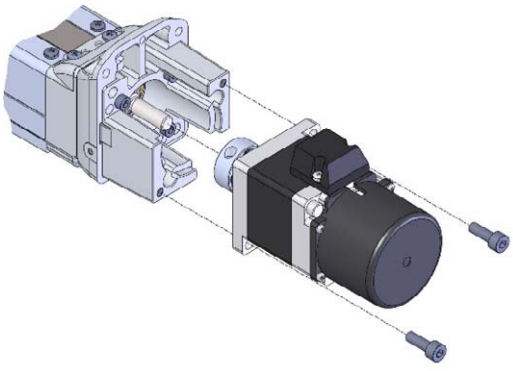
[Motor Straight Type]

1) Detach the motor cover affixing screws.
2) Take off the end cover and motor cover.

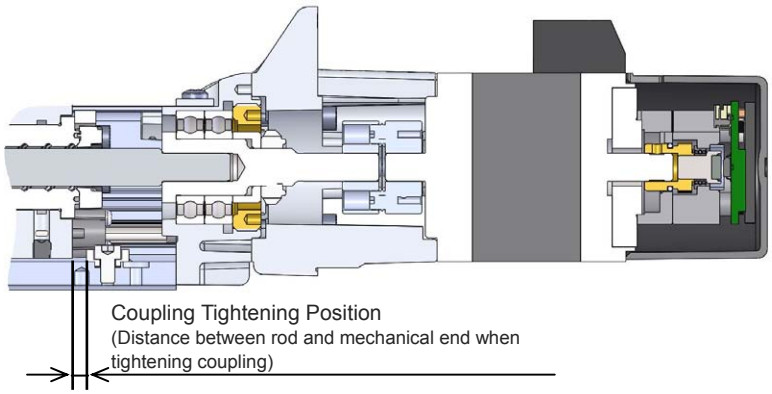


3) Move the rod to the position where the coupling screw on the actuator side can be seen.
4) Loosen the coupling screw, detach the motor affixing screws and take off the motor.



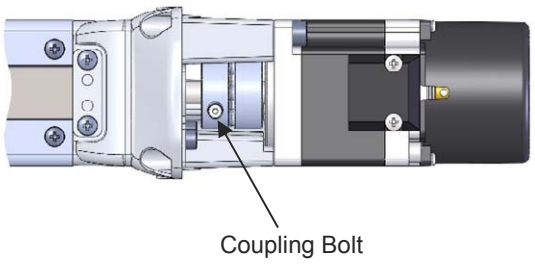


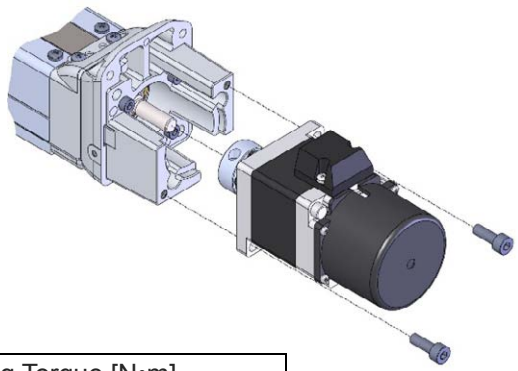
5) Keep the rod at the distance shown in the table below from the mechanical end.



Model	Coupling Tightening Position [mm] (Distance between rod and Mechanical End)
WRA10C	2
WRA12C	2.5
WRA14C	2
WRA16C	2

6) Hold the motor for replacement loosely with the motor affixing screws, and then tighten the coupling screw in the tightening torque shown in the table.



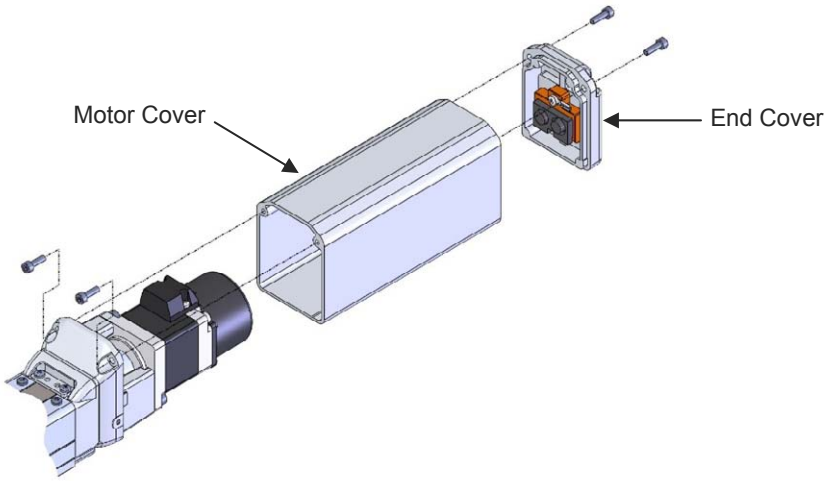


Model	Tightening Torque [N•m]
WRA10C	0.4
WRA12C	0.9
WRA14C	1.5
WRA16C	1.5

7) Fully tighten the motor affixing screws in the tightening torque shown in the table.

Model	Tightening Torque [N•m]
WRA10C	2.1
WRA12C	2.1
WRA14C	4.1
WRA16C	4.1

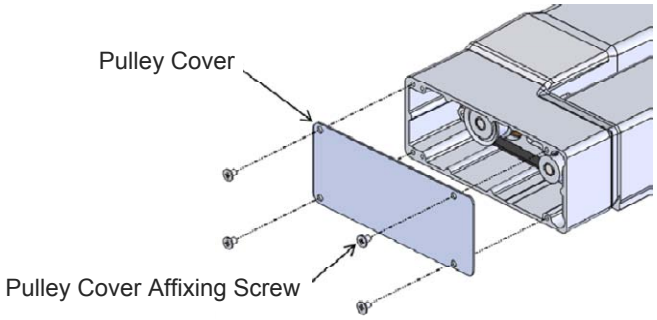
8) Attach the motor cover and end cover.
Tighten the motor cover affixing screws in the tightening torque shown in the table.
Pay attention not to get the cable pinched.



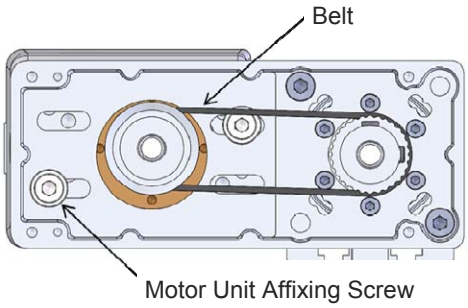
Model	Type of Screws	Tightening Torque [N•m]
WRA10C	Cross Recessed Pan Head Machine Screws: M3	0.4
WRA12C	Hex Socket Pan Head Screw: M4	1.0
WRA14C	Hex Socket Pan Head Screw: M4	1.0
WRA16C	Hex Socket Pan Head Screw: M4	1.0

[Motor Reversing Type: WRA10R, WRA12R, WRA14R When Replacing Motor Unit]

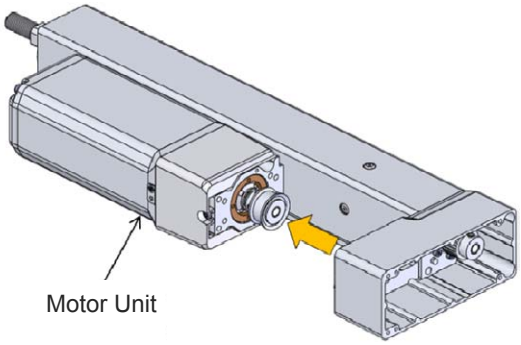
1) Detach the pulley cover affixing screws and take off the pulley cover.



2) Detach the motor unit affixing screw and take off the belt.

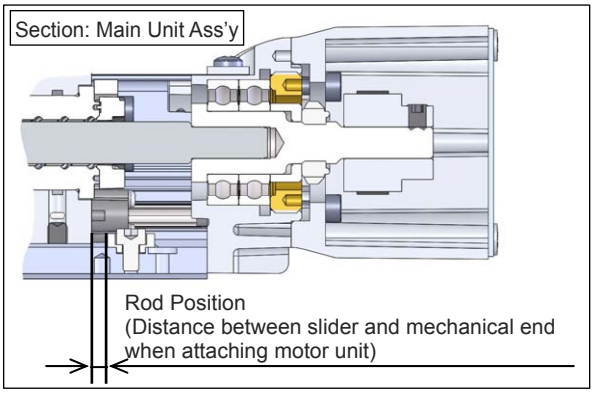


3) Detach the motor unit.



4) Attach the motor unit for replacement.

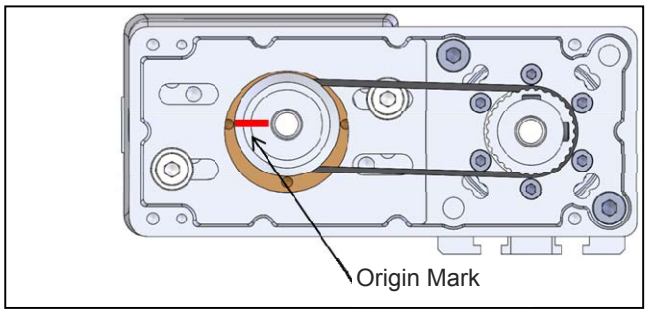
5) Keep the rod at the distance shown in the table below from the mechanical end.



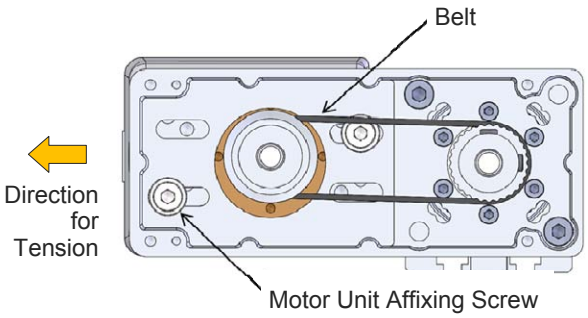
Rod Position

Model	Rod Position [mm]
WRA10R, WRA14R	2
WRA12R	2.5

6) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



7) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



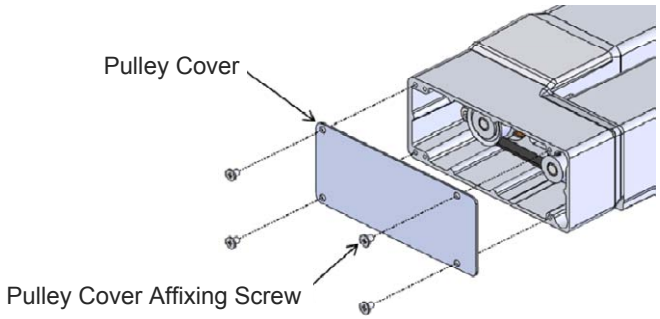
Tensile Force when Attaching Motor Unit

Model	Tension Force [N]
WRA10R	20 to 25
WRA12R	40 to 45
WRA14R	70 to 80

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
WRA10R, WRA12R	2.1
WRA14R	4.1

8) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.

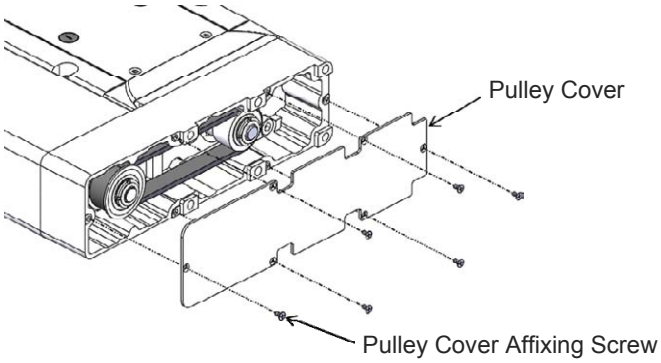


Pulley Cover Affixing Screw Tightening Torque

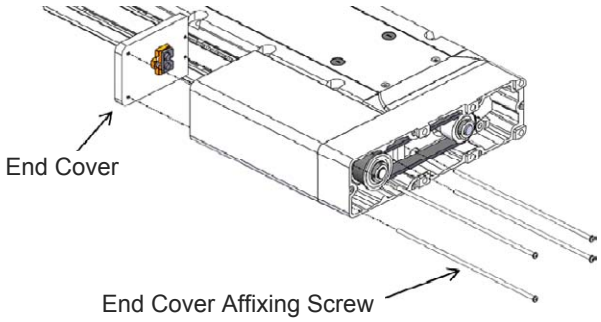
Model	Type of Screws	Tightening Torque [N•m]
WRA10R, WRA12R WRA14R	Cross-recessed Button Head Screw (SUS): M3	0.9

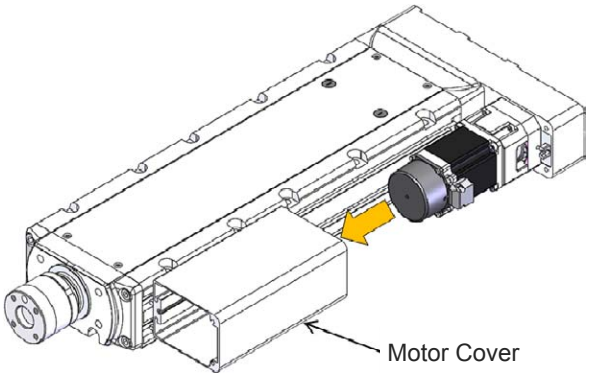
[Motor Reversing Type: WRA16R
When Replacing Motor Equipped with Pulley]

1) Detach the pulley cover affixing screws and take off the pulley cover.

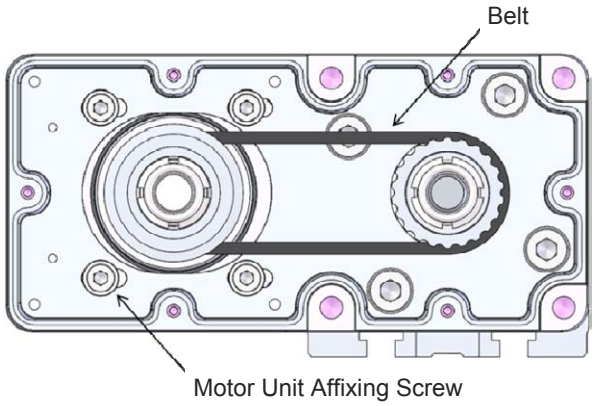


2) Detach the end cover affixing screws and take off the end cover and motor cover.

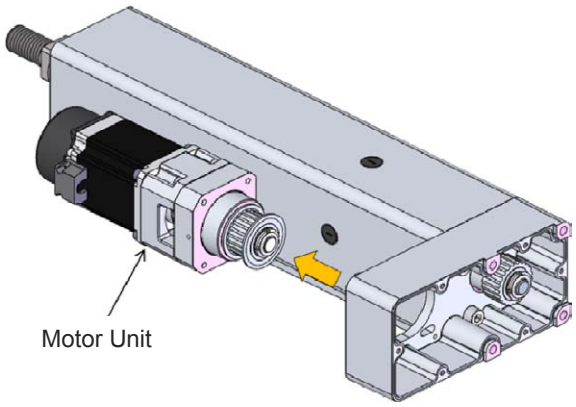




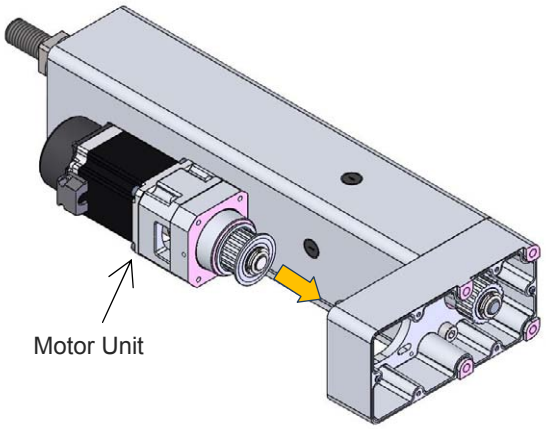
3) Detach the motor unit affixing screw and take off the belt.



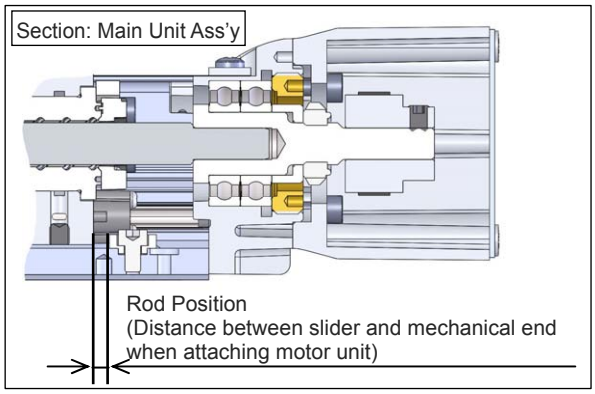
4) Detach the motor unit.



5) Attach the motor unit for replacement and hang the belt.



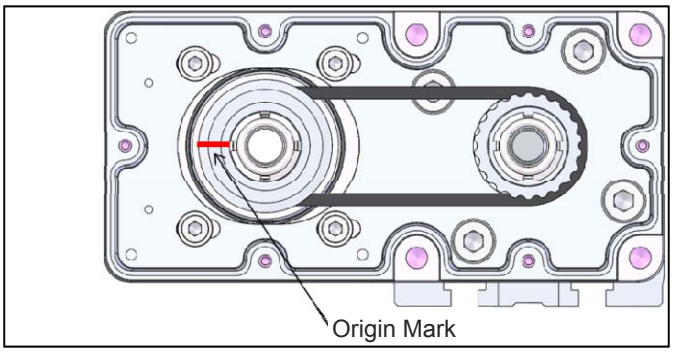
6) Keep the rod at the distance shown in the table below from the mechanical end.



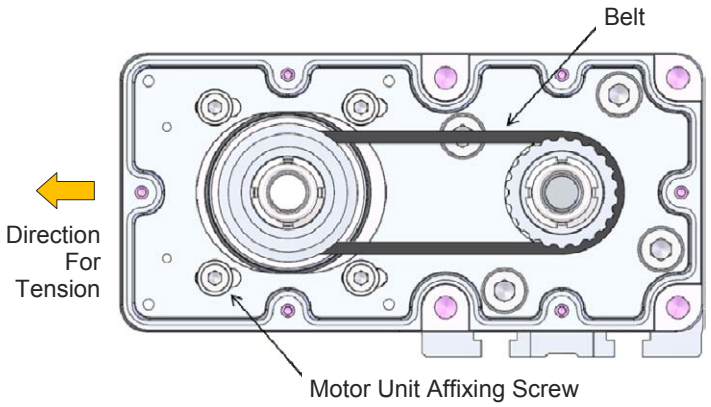
Rod Position

Model	Rod Position [mm]
WRA16R	2

7) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



8) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



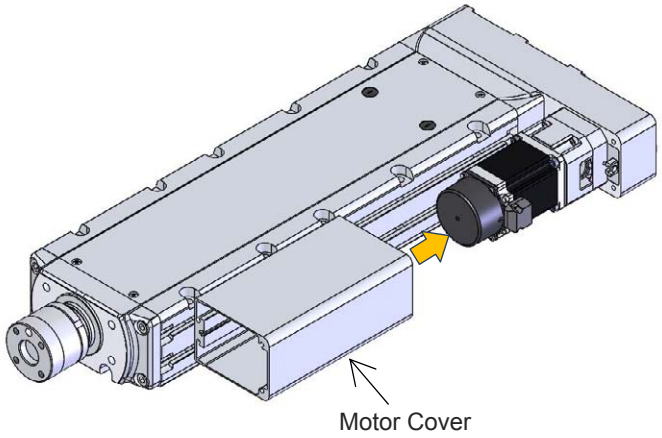
Tensile Force when Attaching Motor Unit

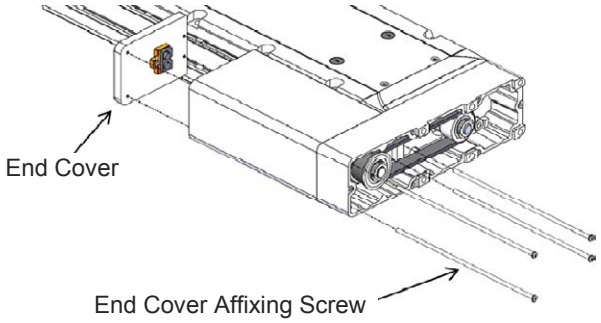
Model	Tension Force [N]
WRA16R	180 to 200

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
WRA16R	4.1

9) Tighten up the end cover and motor cover with the end cover affixing screws in the specified torque.

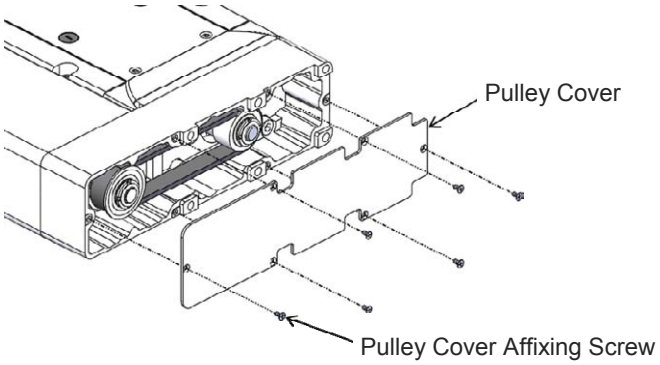




End Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
WRA16R	Cross-recessed pan screws: M4	1.0

10) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.



Pulley Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
WRA16R	Hex Socket Button Head Screw: M3	0.4

Caution

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

Notice

- Pay attention not to get the cable pinched when attaching the motor cover and end cover.
- When the actuator is not equipped with a brake, make sure that the motor is magnetized when attaching it so the shaft and the origin point get aligned.

ROBO Cylinder

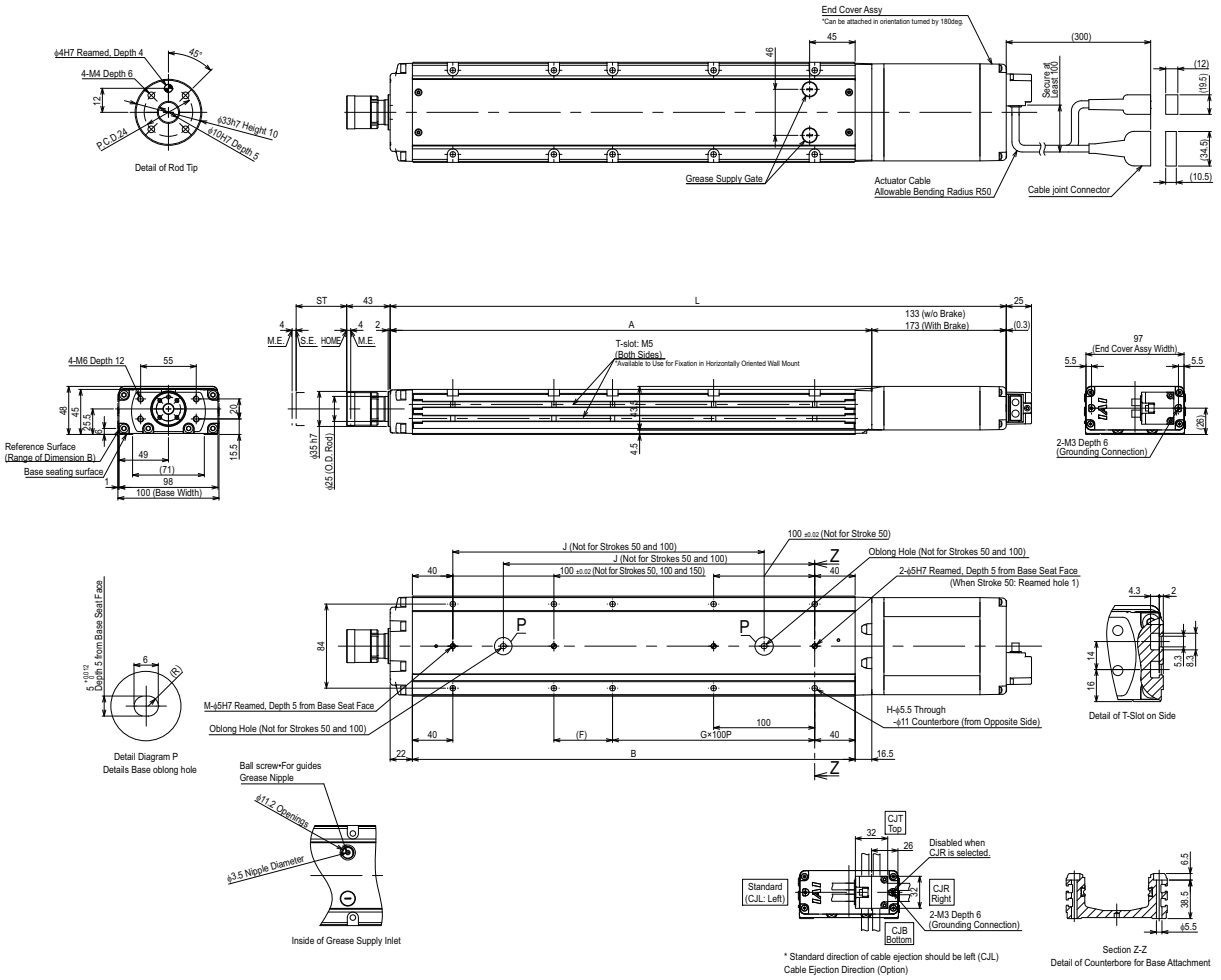
Chapter 5

External Dimensions

5.1 External Dimensions

RCS4-WRA10C

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

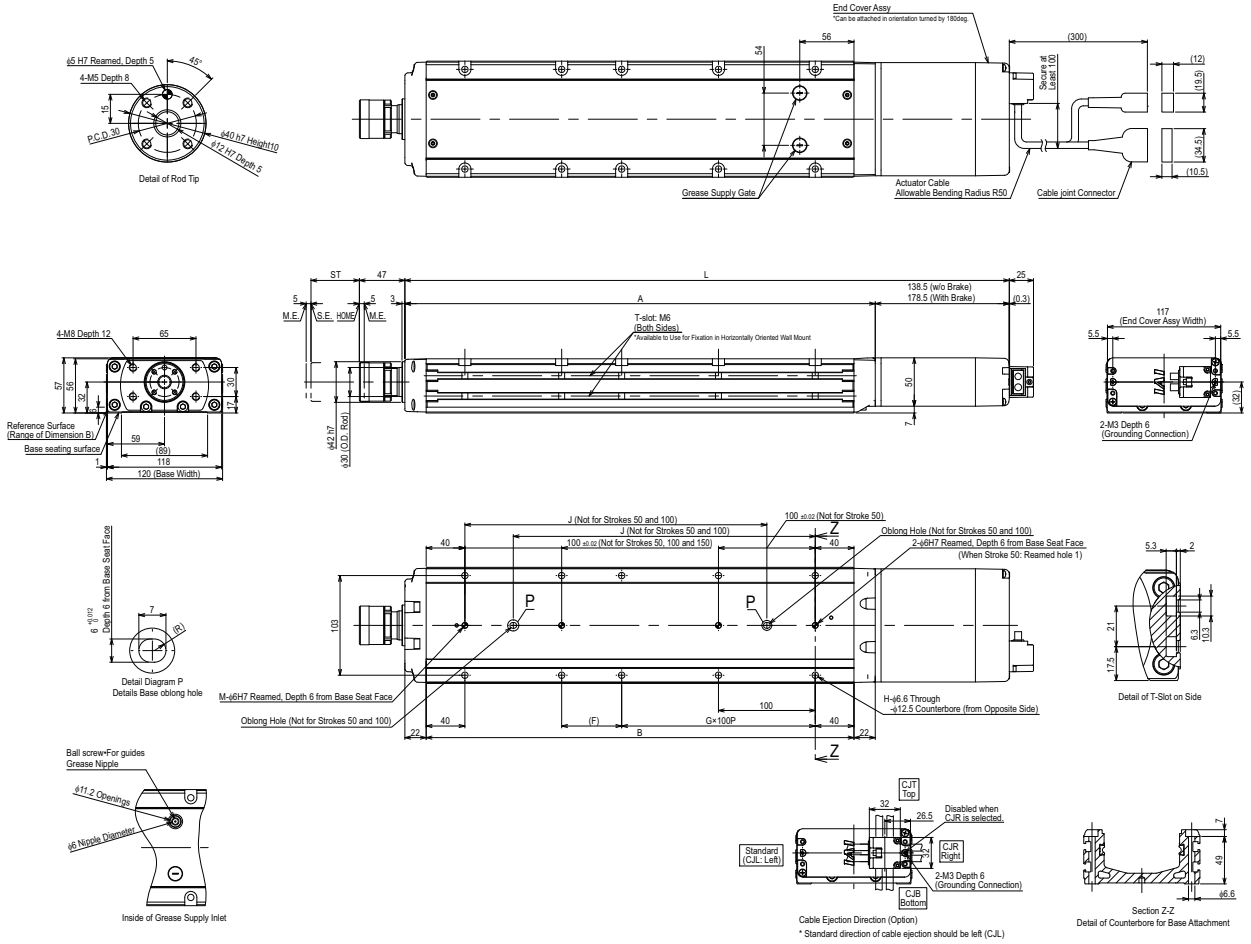


■ Dimensions and Mass by Stroke Unit: mm

Stroke	L		A	B	F	G	H	J	M	Mass [kg]	
	w/o Brake	With Brake								w/o Brake	With Brake
50	359.5	399.5	226.5	188	108	0	4	-	1	3.3	3.6
100	409.5	449.5	276.5	238	58	1	6	-	1	3.8	4.1
150	459.5	499.5	326.5	288	108	1	6	158	1	4.2	4.5
200	509.5	549.5	376.5	338	58	1	8	208	2	4.7	5.0
250	559.5	599.5	426.5	388	108	1	8	258	2	5.1	5.4
300	609.5	649.5	476.5	438	58	2	10	308	2	5.6	5.9
350	659.5	699.5	526.5	488	108	2	10	358	2	6.0	6.3
400	709.5	749.5	576.5	538	58	3	12	408	2	6.5	6.8
450	759.5	799.5	626.5	588	108	3	12	458	2	6.9	7.2
500	809.5	849.5	676.5	638	58	4	14	508	2	7.4	7.7

RCS4-WRA12C

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

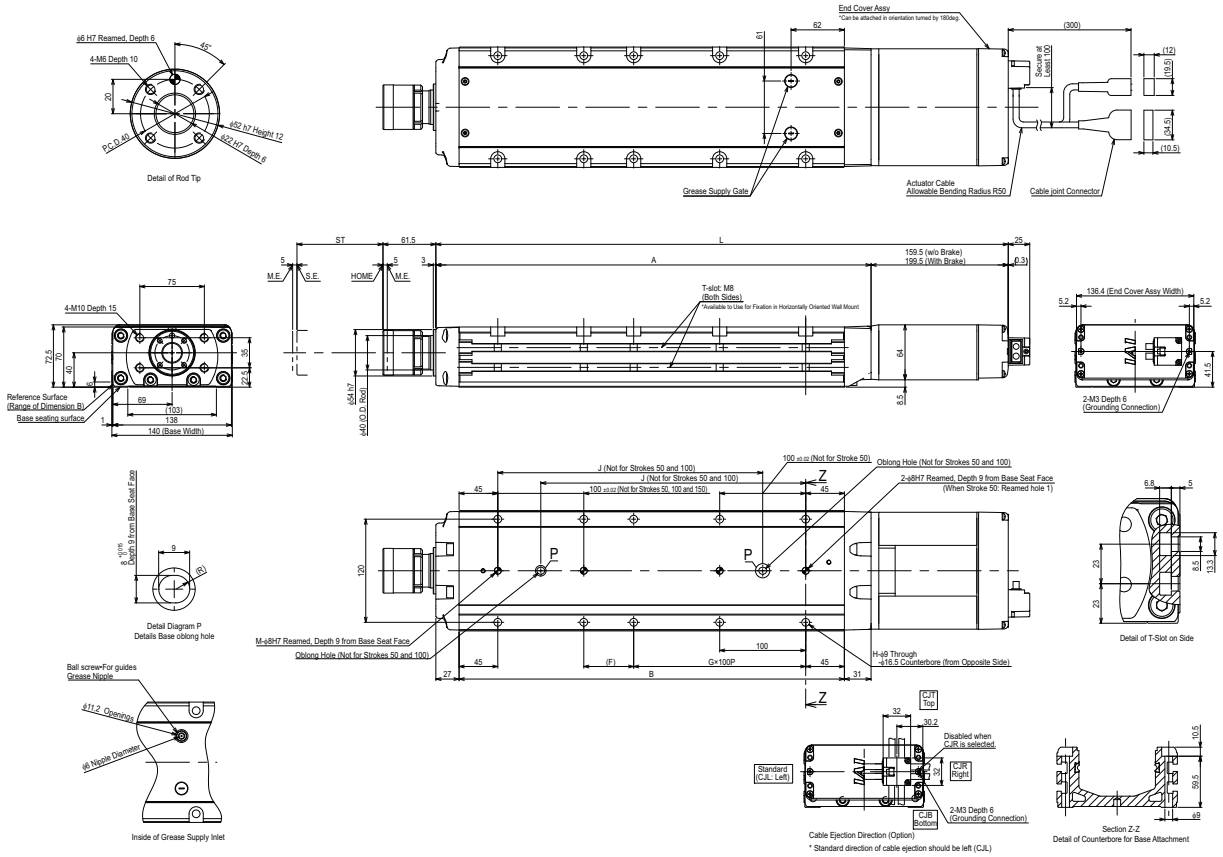


■ Dimensions and Mass by Stroke Unit: mm

Stroke	L		A	B	F	G	H	J	M	Mass [kg]	
	w/o Brake	With Brake								w/o Brake	With Brake
50	374.5	414.5	236	192	112	0	4	-	1	4.8	5.1
100	424.5	464.5	286	242	62	1	6	-	1	5.5	5.8
150	474.5	514.5	336	292	112	1	6	162	1	6.1	6.4
200	524.5	564.5	386	342	62	1	8	212	2	6.8	7.1
250	574.5	614.5	436	392	112	1	8	262	2	7.4	7.7
300	624.5	664.5	486	442	62	2	10	312	2	8.1	8.4
350	674.5	714.5	536	492	112	2	10	362	2	8.7	9.0
400	724.5	764.5	586	542	62	3	12	412	2	9.4	9.7
450	774.5	814.5	636	592	112	3	12	462	2	10.0	10.3
500	824.5	864.5	686	642	62	4	14	512	2	10.7	11.0

RCS4-WRA14C

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

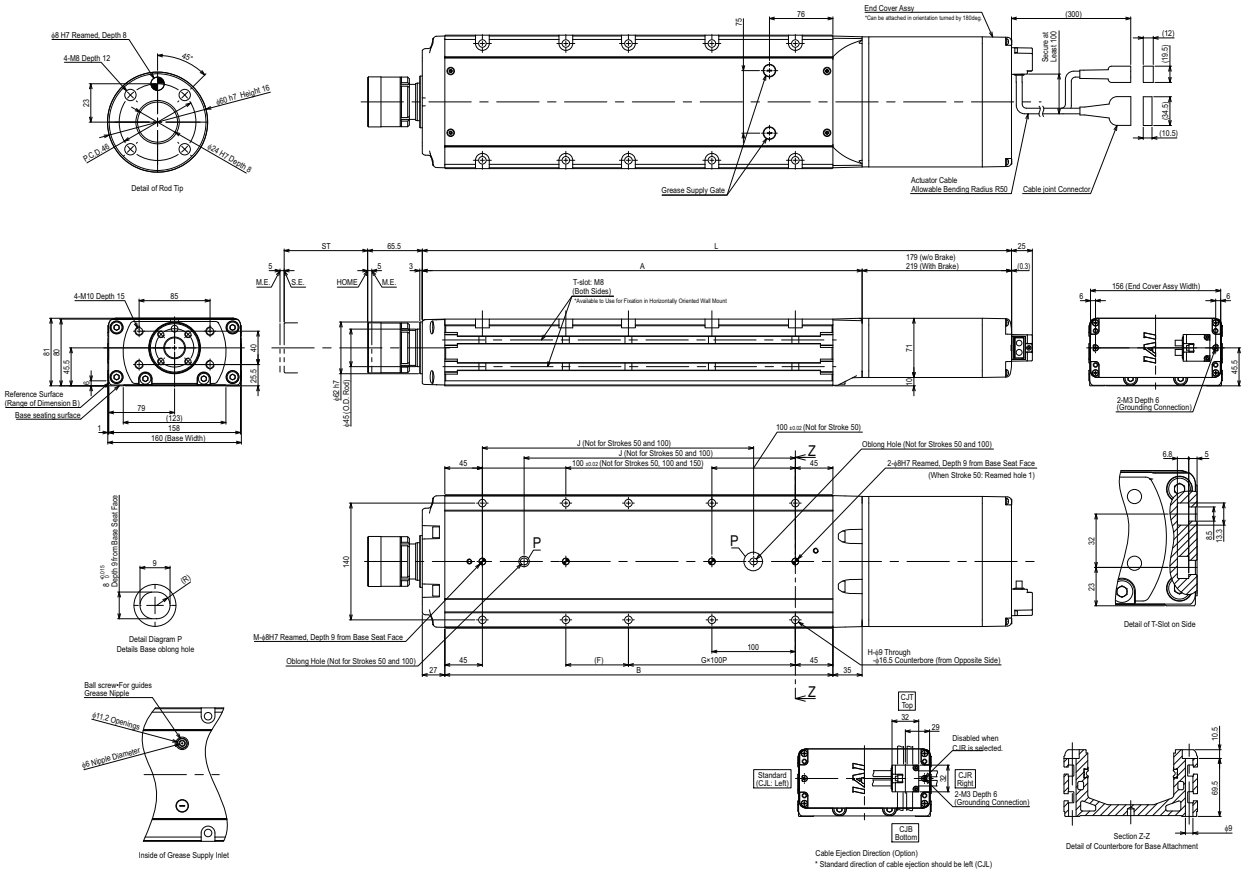


■ Dimensions and Mass by Stroke Unit: mm

Stroke	L		A	B	F	G	H	J	M	Mass [kg]	
	w/o Brake	With Brake								w/o Brake	With Brake
50	415.5	455.5	256	198	108	0	4	-	1	8.0	8.6
100	465.5	505.5	306	246	58	1	6	-	1	8.8	9.4
150	515.5	555.5	356	298	108	1	6	158	1	9.8	10.4
200	565.5	605.5	406	348	58	1	8	208	2	10.6	11.2
250	615.5	655.5	456	398	108	1	8	258	2	11.6	12.2
300	665.5	705.5	506	448	58	2	10	308	2	12.4	13.0
350	715.5	755.5	556	498	108	2	10	358	2	13.3	13.9
400	765.5	805.5	606	548	58	3	12	408	2	14.2	14.8
450	815.5	855.5	656	598	108	3	12	458	2	15.1	15.7
500	865.5	905.5	706	648	58	4	14	508	2	16.0	16.6
550	915.5	955.5	756	698	108	4	14	558	2	16.9	17.5
600	965.5	1005.5	806	748	58	5	16	608	2	17.8	18.4

RCS4-WRA16C

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

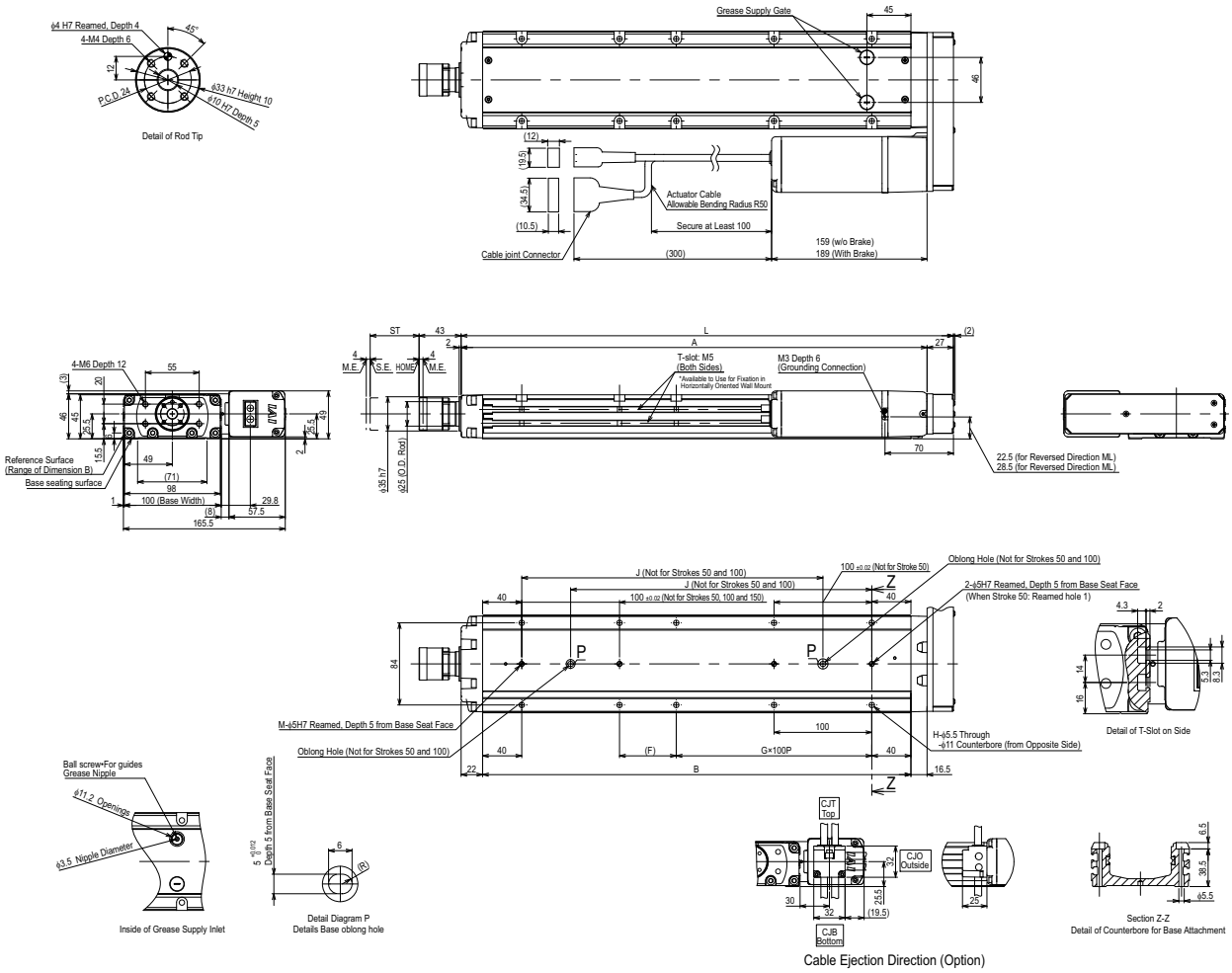


■ Dimensions and Mass by Stroke Unit: mm

Stroke	L		A	B	F	G	H	J	M	Mass [kg]	
	w/o Brake	With Brake								w/o Brake	With Brake
50	456	496	277	215	125	0	4	-	1	11.4	12.0
100	506	546	327	265	75	1	6	-	1	12.5	13.1
150	556	596	377	315	125	1	6	175	1	13.6	14.2
200	606	646	427	365	75	1	8	225	2	14.8	15.4
250	656	696	477	415	125	1	8	275	2	15.9	16.5
300	706	746	527	465	75	2	10	325	2	17.1	17.7
350	756	796	577	515	125	2	10	375	2	18.2	18.8
400	806	846	627	565	75	3	12	425	2	19.4	20.0
450	856	896	677	615	125	3	12	475	2	20.5	21.1
500	906	946	727	665	75	4	14	525	2	21.7	22.3
550	956	996	777	715	125	4	14	575	2	22.8	23.4
600	1006	1046	827	765	75	5	16	625	2	24.0	24.6
650	1056	1096	877	815	125	5	16	675	2	25.1	25.7
700	1106	1146	927	865	75	6	18	725	2	26.3	26.9
750	1156	1196	977	915	125	6	18	775	2	27.4	28.0
800	1206	1246	1027	965	75	7	20	825	2	28.6	29.2

RCS4-WRA10R

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

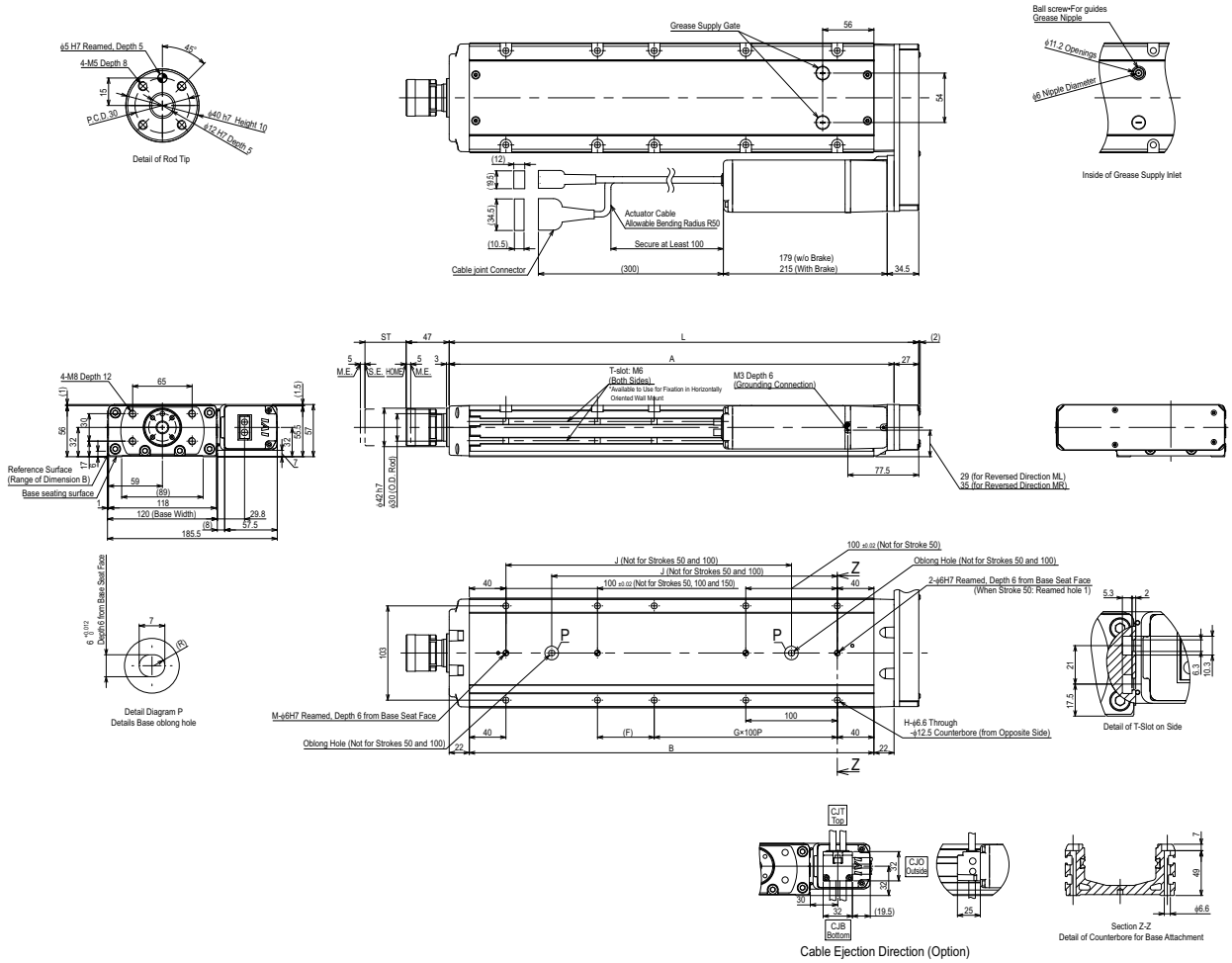


■ Dimensions and Mass by Stroke Unit: mm

Stroke	L	A	B	F	G	H	J	M	Mass [kg]	
									w/o Brake	With Brake
50	253.5	226.5	188	108	0	4	-	1	3.7	4.0
100	303.5	276.5	238	58	1	6	-	1	4.2	4.5
150	353.5	326.5	288	108	1	6	158	1	4.6	4.9
200	403.5	376.5	338	58	1	8	208	2	5.1	5.4
250	453.5	426.5	388	108	1	8	258	2	5.6	5.9
300	503.5	476.5	438	58	2	10	308	2	6.0	6.3
350	553.5	526.5	488	108	2	10	358	2	6.5	6.8
400	603.5	576.5	538	58	3	12	408	2	6.9	7.2
450	653.5	626.5	588	108	3	12	458	2	7.4	7.7
500	703.5	676.5	638	58	4	14	508	2	7.8	8.1

RCS4-WRA12R

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

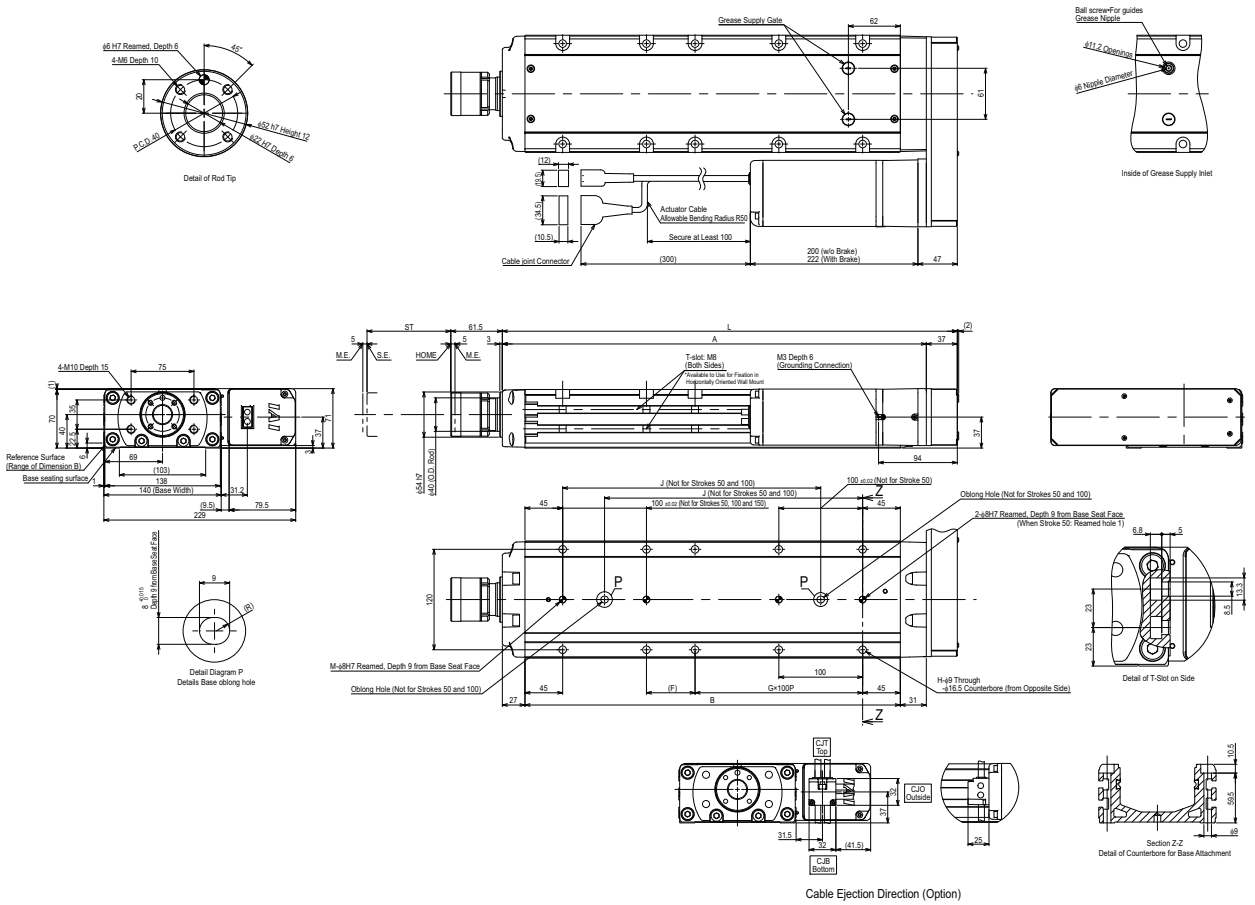


■ Dimensions and Mass by Stroke Unit: mm

Stroke	L	A	B	F	G	H	J	M	Mass [kg]	
									w/o Brake	With Brake
50	263	236	192	112	0	4	-	1	5.2	5.5
100	313	286	242	62	1	6	-	1	5.9	6.2
150	363	336	292	112	1	6	162	1	6.5	6.8
200	413	386	342	62	1	8	212	2	7.2	7.5
250	463	436	392	112	1	8	262	2	7.8	8.1
300	513	486	442	62	2	10	312	2	8.5	8.8
350	563	536	492	112	2	10	362	2	9.1	9.4
400	613	586	542	62	3	12	412	2	9.8	10.1
450	663	636	592	112	3	12	462	2	10.4	11.7
500	713	686	642	62	4	14	512	2	11.1	11.4

RCS4-WRA14R

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

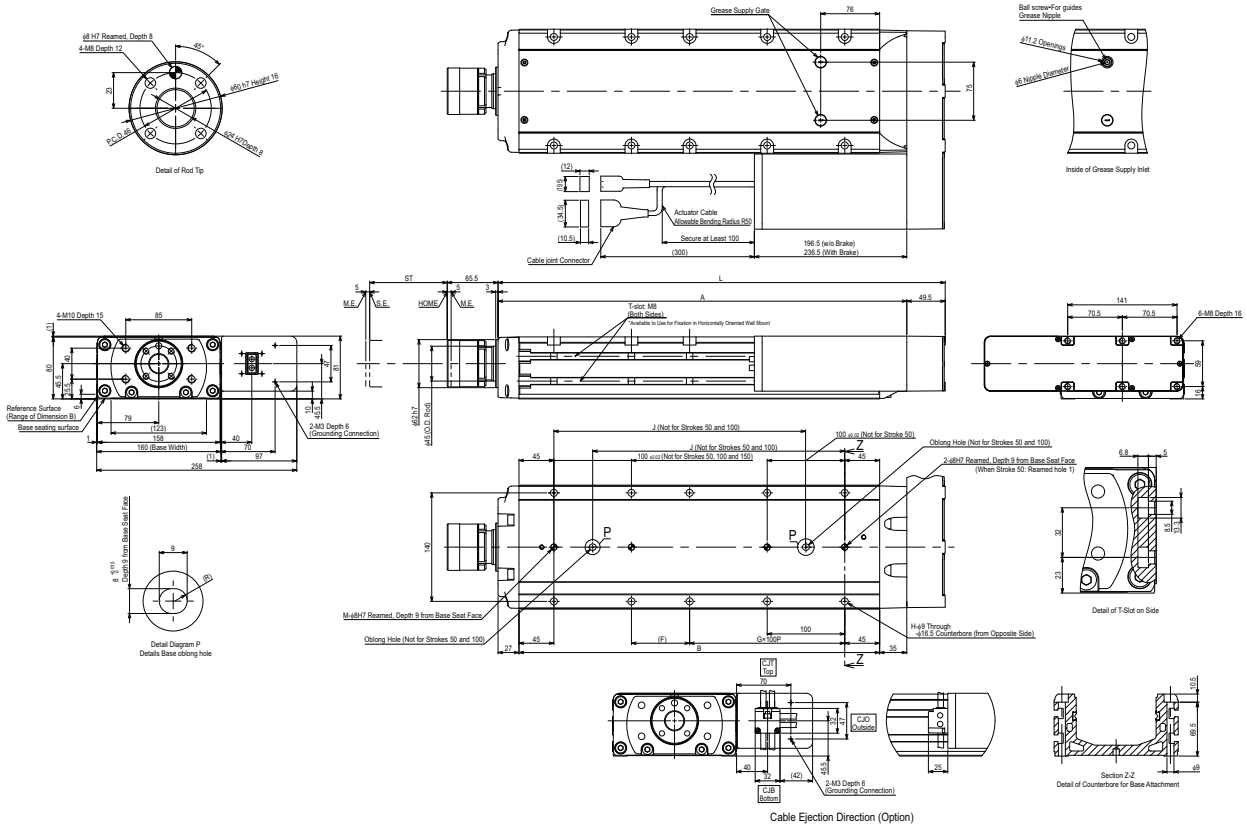


■ Dimensions and Mass by Stroke Unit: mm

Stroke	L	A	B	F	G	H	J	M	Mass [kg]	
									w/o Brake	With Brake
50	293	256	198	108	0	4	-	1	8.9	9.5
100	343	306	248	58	1	6	-	1	9.8	10.4
150	393	356	298	108	1	6	158	1	10.7	11.3
200	443	406	348	58	1	8	208	2	11.6	12.2
250	493	456	398	108	1	8	258	2	12.5	13.1
300	543	506	448	58	2	10	308	2	13.4	14.0
350	593	556	498	108	2	10	358	2	14.3	14.9
400	643	606	548	58	3	12	408	2	15.2	15.8
450	693	656	598	108	3	12	458	2	16.1	16.7
500	743	706	648	58	4	14	508	2	17.0	17.6
550	793	756	698	108	4	14	558	2	17.9	18.5
600	843	806	748	58	5	16	608	2	18.8	19.4

RCS4-WRA16R

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



■ Dimensions and Mass by Stroke Unit: mm

Stroke	L	A	B	F	G	H	J	M	Mass [kg]	
									w/o Brake	With Brake
50	326.5	277	215	125	0	4	-	1	12.8	13.4
100	376.5	327	265	75	1	6	-	1	13.9	14.5
150	426.5	377	315	125	1	6	158	1	15.1	15.7
200	476.5	427	365	75	1	8	208	2	16.2	16.8
250	526.5	477	415	125	1	8	258	2	17.4	18.0
300	576.5	527	465	75	2	10	308	2	18.5	19.1
350	626.5	577	515	125	2	10	358	2	19.7	20.3
400	676.5	627	565	75	3	12	408	2	20.8	21.4
450	726.5	677	615	125	3	12	458	2	22.0	22.6
500	776.5	727	665	75	4	14	508	2	23.1	23.7
550	826.5	777	715	125	4	14	558	2	24.3	24.9
600	876.5	827	765	75	5	16	608	2	25.4	26.0
650	926.5	877	815	125	5	16	658	2	26.6	27.2
700	976.5	927	865	75	6	18	708	2	27.7	28.3
750	1026.5	977	915	125	6	18	758	2	28.9	29.5
800	1076.5	1027	965	75	7	20	808	2	30.0	30.6

ROBO Cylinder

Chapter 6

Life

6.1 Concept of Life

The life is assumed under condition of operation with maximum payload and maximum acceleration/deceleration, and it is 3,000km or 5,000km (reference).
The operation life, whether it is 3,000km or 5,000km (reference), depends on the allowable load weight and the allowable torque of each.
[Refer to 1.2 Specifications for each type of "Allowable Load and Torque on Rod Tip"]

ROBO Cylinder

Chapter 7

Warranty

7.1 Warranty period

Whichever of the following periods is shorter:

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

7.2 Scope of the warranty

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

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

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

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

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

7.3 Honoring the warranty

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

7.4 Limited liability

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

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

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

7.6 Other Items excluded from warranty

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

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

ROBO Cylinder

Chapter 8

Appendix

8.1 Index

8.2 Revision history

Revision date	Revised content
2017.10	First edition
2018.04	1B edition Pg. 2-5 Installation posture: Horizontally Oriented Wall Mount and Ceiling Mount △→ ○

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