

# ROBO Cylinder®

Radial Cylinder

Dust proof/Splash proof Type

RCP6W/RCP6SW-WRA10C, WRA12C,  
WRA14C, WRA16C  
WRA10R, WRA12R,  
WRA14R, WRA16R

**Instruction Manual** Second edition ME3760-2B



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## Please Read Before Use

Thank you for purchasing our product.

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

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

Please download the user's manual from our website.

You can download it free of charge. User registration is required for the first time downloading.

URL : [www.iai-robot.co.jp/data\\_dl/CAD\\_MANUAL/](http://www.iai-robot.co.jp/data_dl/CAD_MANUAL/)

When using the product, print out of the necessary portions of the relevant manual, or please display it on your computer, tablet terminal, etc. so that you can check it immediately.

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

### [Important]

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
- Use or reproduction of this instruction manual in full or in part without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the text are registered trademarks.

This instruction manual does not include an explanation for the controller part of RCP6SW. Refer to the instruction manual provided separately for the controller part of RCP6SW.

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## Safety Guide

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

### Safety Precautions for Our Products

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

| No. | Operation Description | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Model Selection       | <ul style="list-style-type: none"> <li>This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible.<br/>Accordingly, do not use it in any of the following applications.               <ol style="list-style-type: none"> <li>1) Medical equipment used to maintain, control or otherwise affect human life or physical health.</li> <li>2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)</li> <li>3) Important safety parts of machinery (Safety device, etc.)</li> </ol> </li> <li>Do not use the product outside the specifications.<br/>Failure to do so may considerably shorten the life of the product.</li> <li>Do not use it in any of the following environments.               <ol style="list-style-type: none"> <li>1) Location where there is any inflammable gas, inflammable object or explosive</li> <li>2) Place with potential exposure to radiation</li> <li>3) Location with the ambient temperature or relative humidity exceeding the specification range</li> <li>4) Location where radiant heat is added from direct sunlight or other large heat source</li> <li>5) Location where condensation occurs due to abrupt temperature changes</li> <li>6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)</li> <li>7) Location exposed to significant amount of dust, salt or iron powder</li> <li>8) Location subject to direct vibration or impact</li> </ol> </li> <li>For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.</li> </ul> |

| No. | Operation Description    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2   | Transportation           | <ul style="list-style-type: none"> <li>• When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane.</li> <li>• When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers.</li> <li>• When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped.</li> <li>• Transport it using an appropriate transportation measure.<br/>The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model.</li> <li>• Do not step or sit on the package.</li> <li>• Do not put any heavy thing that can deform the package, on it.</li> <li>• When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work.</li> <li>• When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment’s capability limit.</li> <li>• Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength.</li> <li>• Do not get on the load that is hung on a crane.</li> <li>• Do not leave a load hung up with a crane.</li> <li>• Do not stand under the load that is hung up with a crane.</li> </ul> |
| 3   | Storage and Preservation | <ul style="list-style-type: none"> <li>• The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.</li> <li>• Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4   | Installation and Start   | <p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> <li>• Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake.</li> <li>• Do not get on or put anything on the product.<br/>Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life.</li> <li>• When using the product in any of the places specified below, provide a sufficient shield.               <ol style="list-style-type: none"> <li>1) Location where electric noise is generated</li> <li>2) Location where high electrical or magnetic field is present</li> <li>3) Location with the mains or power lines passing nearby</li> <li>4) Location where the product may come in contact with water, oil or chemical droplets</li> </ol> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| No. | Operation Description  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4   | Installation and Start | <p>(2) Cable Wiring</p> <ul style="list-style-type: none"> <li>● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool.</li> <li>● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it.<br/>Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error.</li> <li>● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error.</li> <li>● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction.</li> <li>● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product.</li> <li>● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.</li> </ul> <p>(3) Grounding</p> <ul style="list-style-type: none"> <li>● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation.</li> <li>● For the ground terminal (PE) on the AC power cable of the controller and the grounding plate in the control panel, make sure for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load.<br/>Perform wiring that satisfies the specifications (electrical equipment standards and criteria).<br/>For detail, follow the description in [an instruction manual of each controller or controller built-in actuator].</li> <li>● Conduct functional grounding on the FG terminal for a controller supplying 24V DC or a controller built-in type actuator. In order to minimize influence to mechanical operation given by electromagnetic interference (noise) to an electrical device or insulation failure, conduct grounding on a terminal or a conductor that is electrically stable. The reference impedance should be Type D (Former Class 3, ground resistance 100Ω or less).</li> </ul> |

| No. | Operation Description  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4   | Installation and Start | <p>(4) Safety Measures</p> <ul style="list-style-type: none"> <li>• When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers.</li> <li>• When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot’s movable range.<br/>When the robot under operation is touched, it may result in death or serious injury.</li> <li>• Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation.</li> <li>• Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product.</li> <li>• Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input.</li> <li>• When the installation or adjustment operation is to be performed, give clear warnings such as “Under Operation; Do not turn ON the power!” etc. Sudden power input may cause an electric shock or injury.</li> <li>• Take the measure so that the work part is not dropped in power failure or emergency stop.</li> <li>• Wear protection gloves, goggle or safety shoes, as necessary, to secure safety.</li> <li>• Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire.</li> <li>• When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> </ul> |
| 5   | Teaching               | <ul style="list-style-type: none"> <li>• When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers.</li> <li>• Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well.</li> <li>• When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>• When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>• Place a sign “Under Operation” at the position easy to see.</li> <li>• When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> </ul> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| No. | Operation Description | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6   | Trial Operation       | <ul style="list-style-type: none"> <li>• When the work is carried out with 2 or more persons, make it clear who is to be the “leader” and who to be the “follower(s)” and communicate well with each other to ensure the safety of the workers.</li> <li>• After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation.</li> <li>• When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation.</li> <li>• Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc.</li> <li>• Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.</li> </ul> |
| 7   | Automatic Operation   | <ul style="list-style-type: none"> <li>• Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence.</li> <li>• Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication.</li> <li>• Make sure to operate automatic operation start from outside of the safety protection fence.</li> <li>• In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product.</li> <li>• When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.</li> </ul>                                     |

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

## Alert Indication

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

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

## Caution in Handling

**1. Make sure to follow the usage condition, environment and specification range of the product.**

In case it is not secured, it may cause a drop in performance or malfunction of the product.

**2. Do not attempt to have any handling or operation that is not stated in this Instruction manual.**

**3. It is recommended to apply our products for the wiring between the actuator and the controller.**

**4. Do not attempt to establish the settings for the speed and acceleration/deceleration above the allowable range.**

An operation with speed and acceleration/deceleration beyond the allowable range may cause an abnormal noise, vibration, malfunction or shortened life.

**5. Set the allowable load of the move on rod tip within the allowable range.**

An operation with the load beyond the allowable load of the move on rod tip may cause an abnormal noise, vibration, malfunction or shortened life. If it is extreme, flaking may occur on the guide.

**6. Set the load offset distance within the allowable range.**

Attaching a load with an load offset distance above the allowable range may cause vibration and abnormal noise.

**7. Back and forth operation continuously in short distance may wear out the grease on the surface.**

It may wear out the grease on the surface if back and forth operation is held continuously in the distance of 30mm or less.

As a reference, have approximately 5 cycles of back and forth operation in a distance more than 50mm in every 5,000 to 10,000 cycles to regenerate the oil film. Keep using the actuator with the grease worn out may cause malfunction. If it is extreme, flaking may occur on the guide, ball screw.

**8. Do not attempt to hit the rod against an abstacle with high speed.**

It may destroy the coupling.

**9. Make sure to attach the actuator properly by following this instruction manual.**

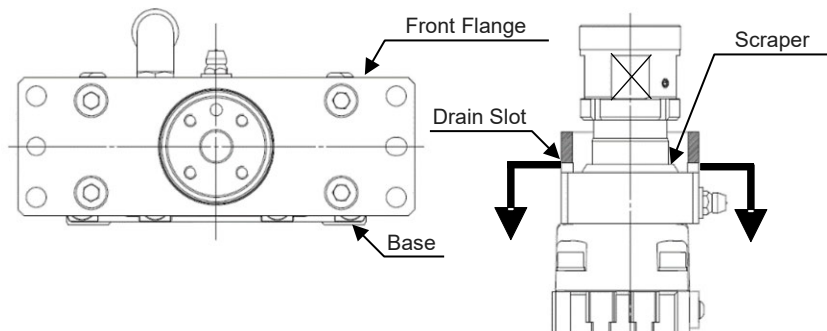
Using the product with the actuator not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.

**10. Avoid liquid with its temperature lower than the ambient temperature of where installed from getting applied on the unit.**

An actuator may get condensed inside in some environments of operation and it could be damaged.

**11. When the actuator installed on the front bracket end and the orientation of the rod is upwards, have a drain slot in order to prevent liquid staying at the scraper.**

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



**12. Grease can flow out gradually from the rod.**

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

**13. The Degree of Protection should be IP65 (Dust tight, Water jets).**

“Water jets” means there is no liquid ingress harmful to the normal operation and the safety of a device after receiving direct water jet for three minutes in the specified method. Consider appropriate protection in the condition with water jet always being applied on the device as it may cause damage.

**14. The high output setting should be available to use only when it is activated.**

**15. There is no port for a teaching tool to be connected on RCP6SW equipped with a built-in controller.**

Connect a teaching tool to the gateway unit, and establish settings such as the position data via the gateway unit.

## International Standards Compliances

This actuator complies with the following overseas standard.

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

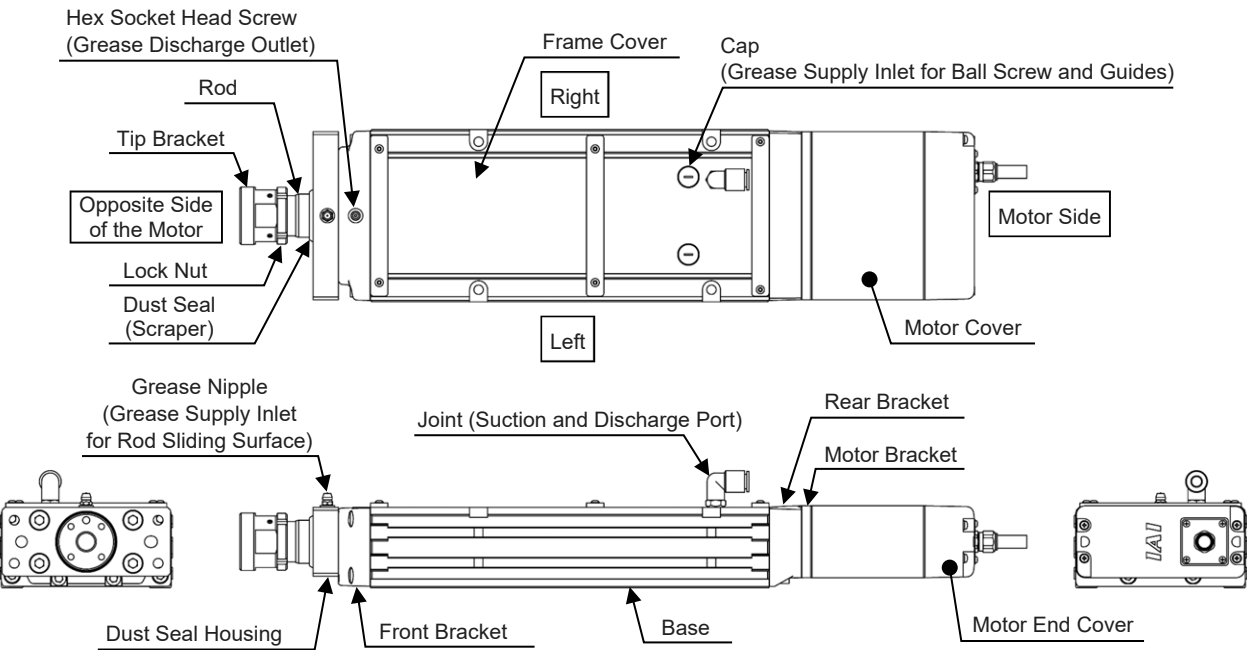
| RoHS3 Directive       | CE Marking            |
|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> |

# Names of the Parts

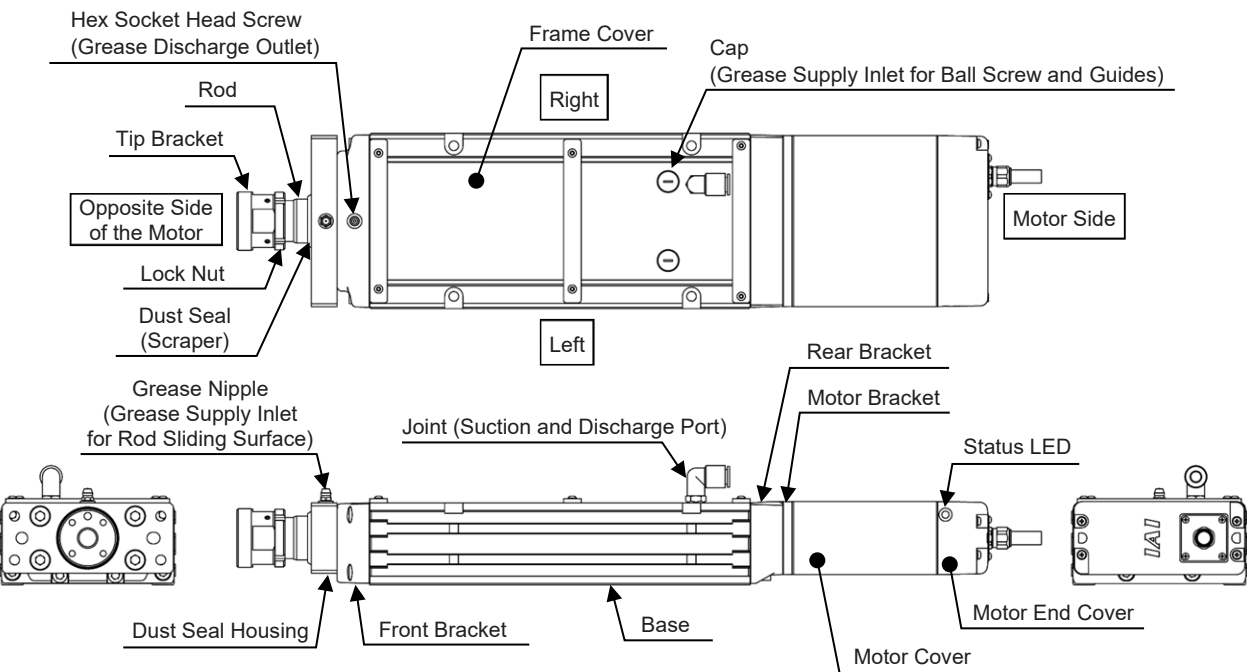
In this Instruction Manual, the left and right sides are indicated by looking at the actuator from the motor end, with the actuator placed horizontally, as shown in the figure below.

## Motor Straight Type

### ◆ Standard Specification RCP6W-WRA10C, WRA12C, WRA14C, WRA16C



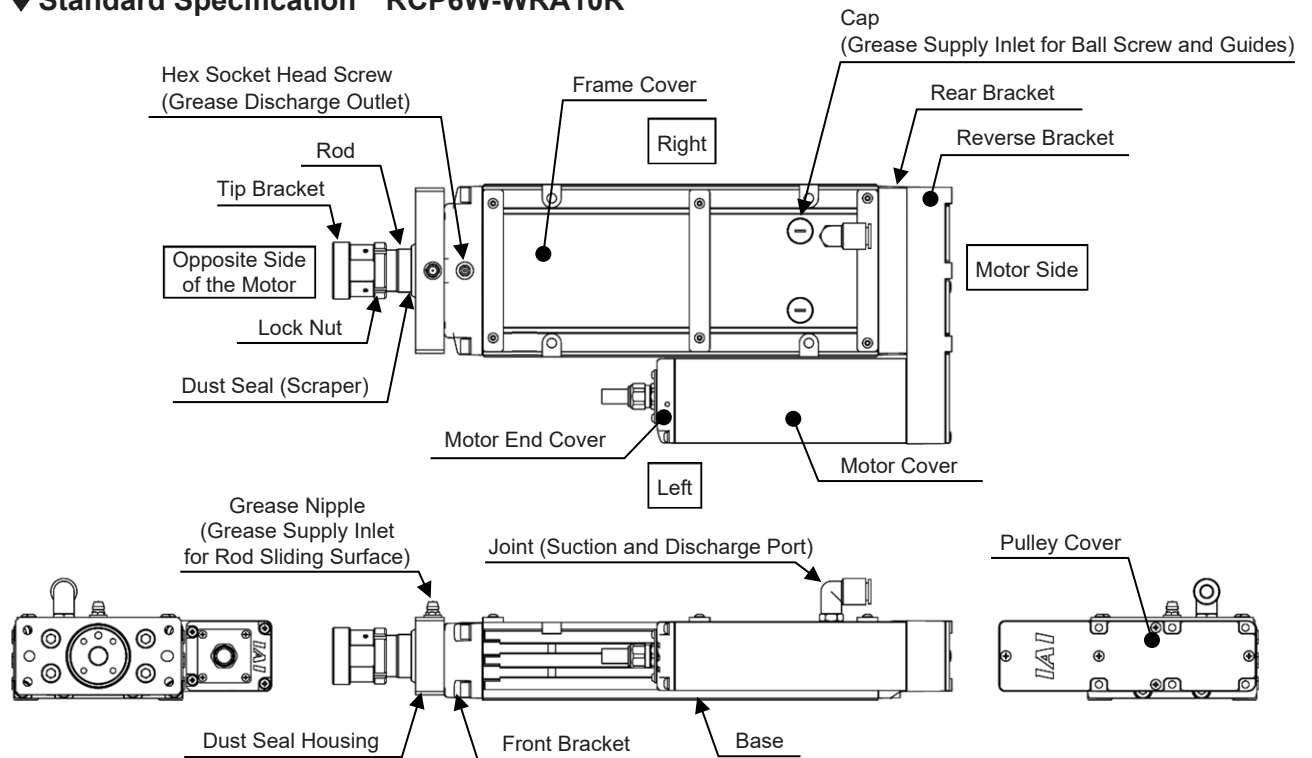
### ◆ Built-in Controller Specification RCP6SW-WRA10C, WRA12C, WRA14C, WRA16C



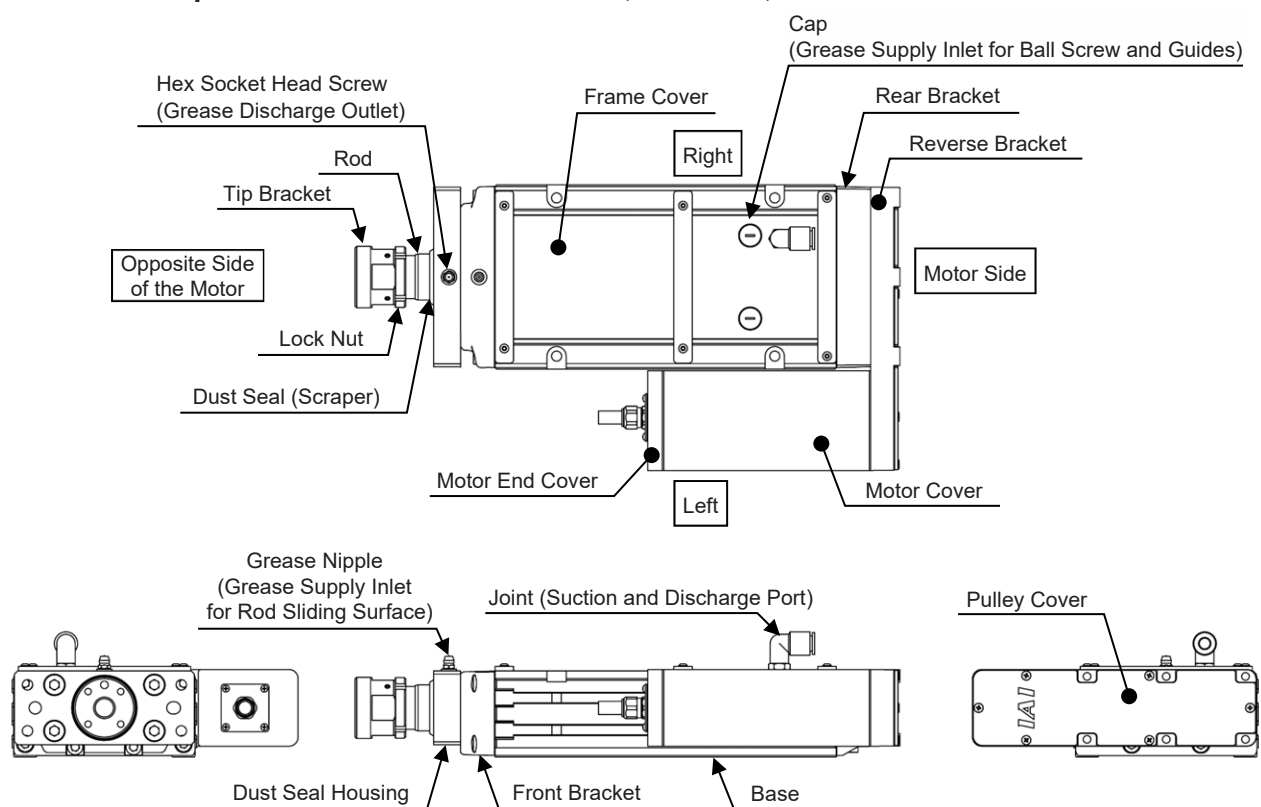
## Motor Reversing Type

\* The image shows the motor left reversed type.

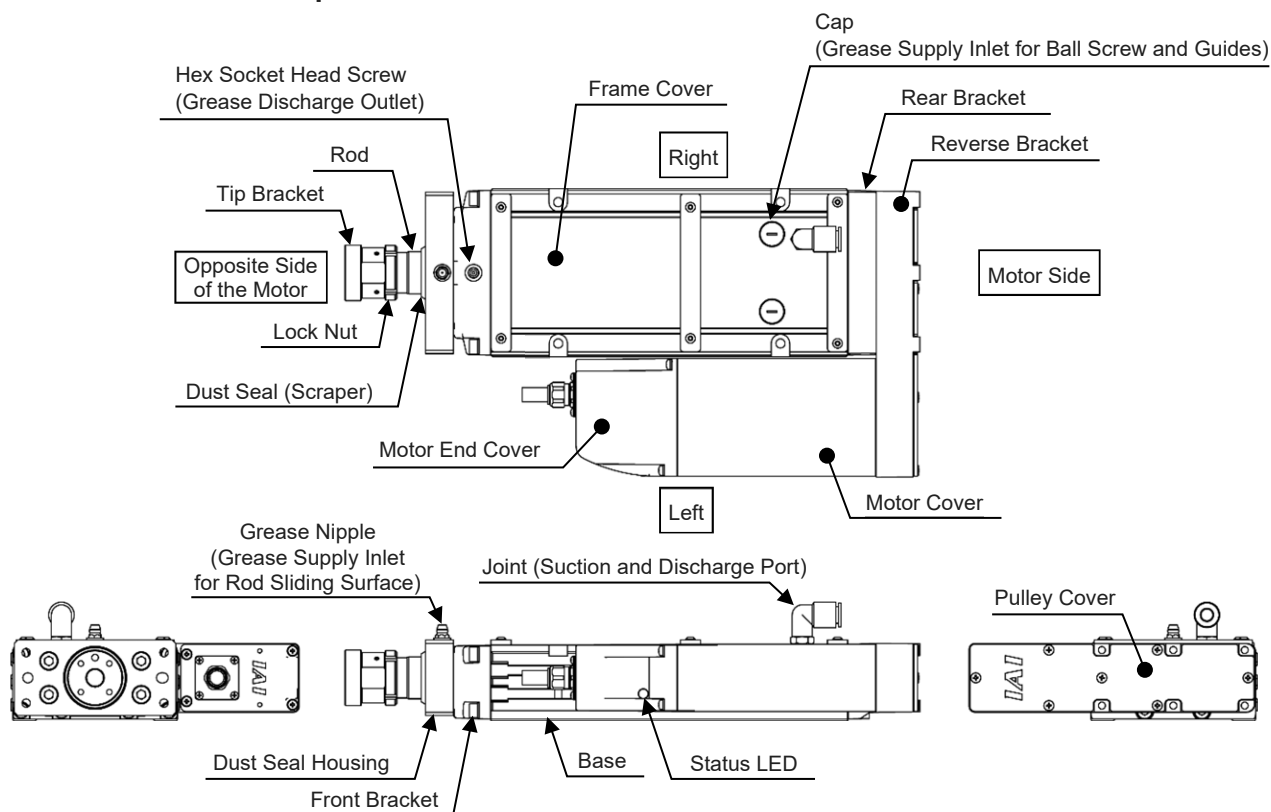
### ◆ Standard Specification RCP6W-WRA10R



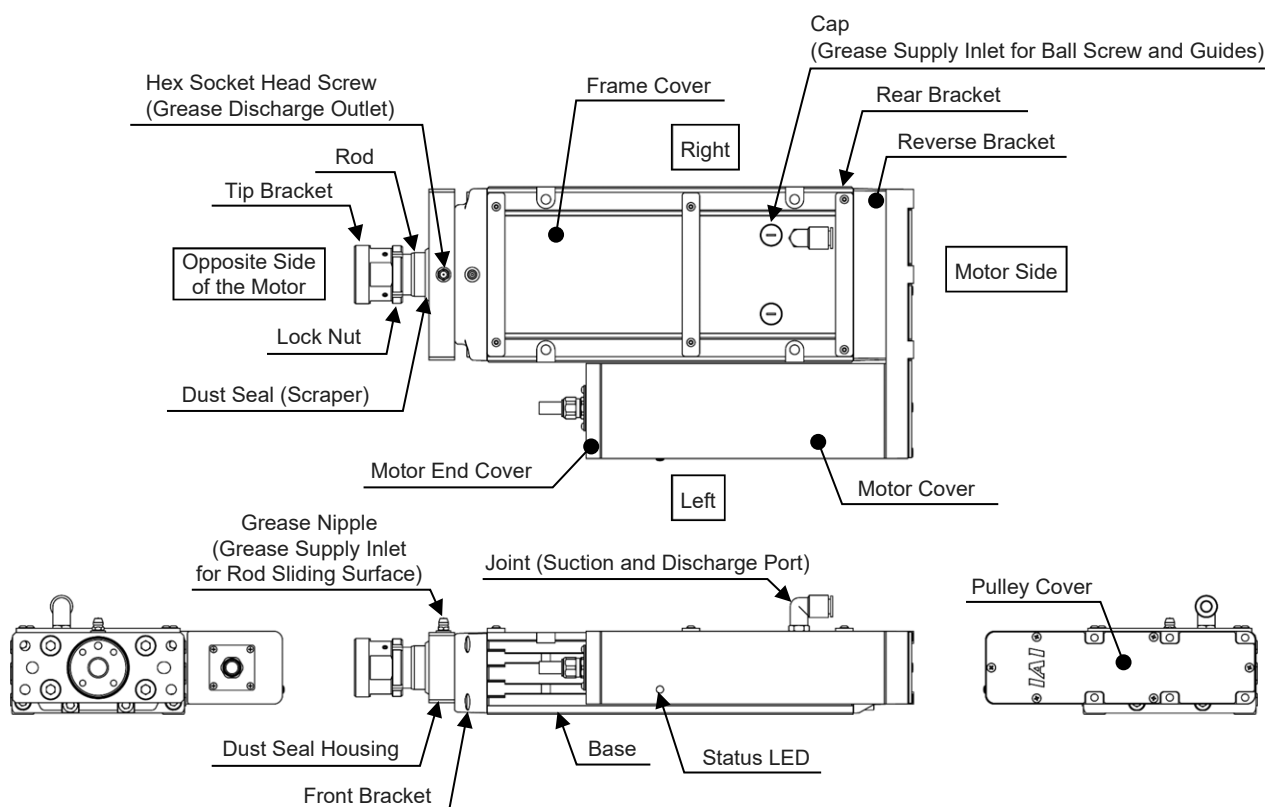
### ◆ Standard Specification RCP6W-WRA12R, WRA14R, WRA16R



### ◆ Built-in Controller Specification RCP6SW-WRA10R



### ◆ Built-in Controller Specification RCP6SW-WRA12R, WRA14R, WRA16R





# ROBO Cylinder

## Chapter 1

# Specifications

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## 1.1 Checking the Product

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

See the component list for the details of the enclosed components. If you find any fault or missing parts, contact your local IAI distributor.

### 1.1.1 Components

| Name                                                                         | Profile                                                                             | Quantity | Remarks |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------|---------|
| ROBO Cylinder Main Unit                                                      |    | 1        |         |
| Motor Encoder Integrated Cable<br>or<br>Motor Encoder Integrated Robot Cable |  | 1        |         |
| Safety Guide                                                                 |  | 1        | M0194   |

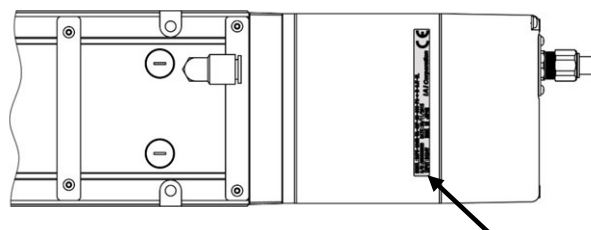
\* Download instruction manual in our homepage.

### 1.1.2 Related Instruction Manuals for the Each Controller Supported by This Product

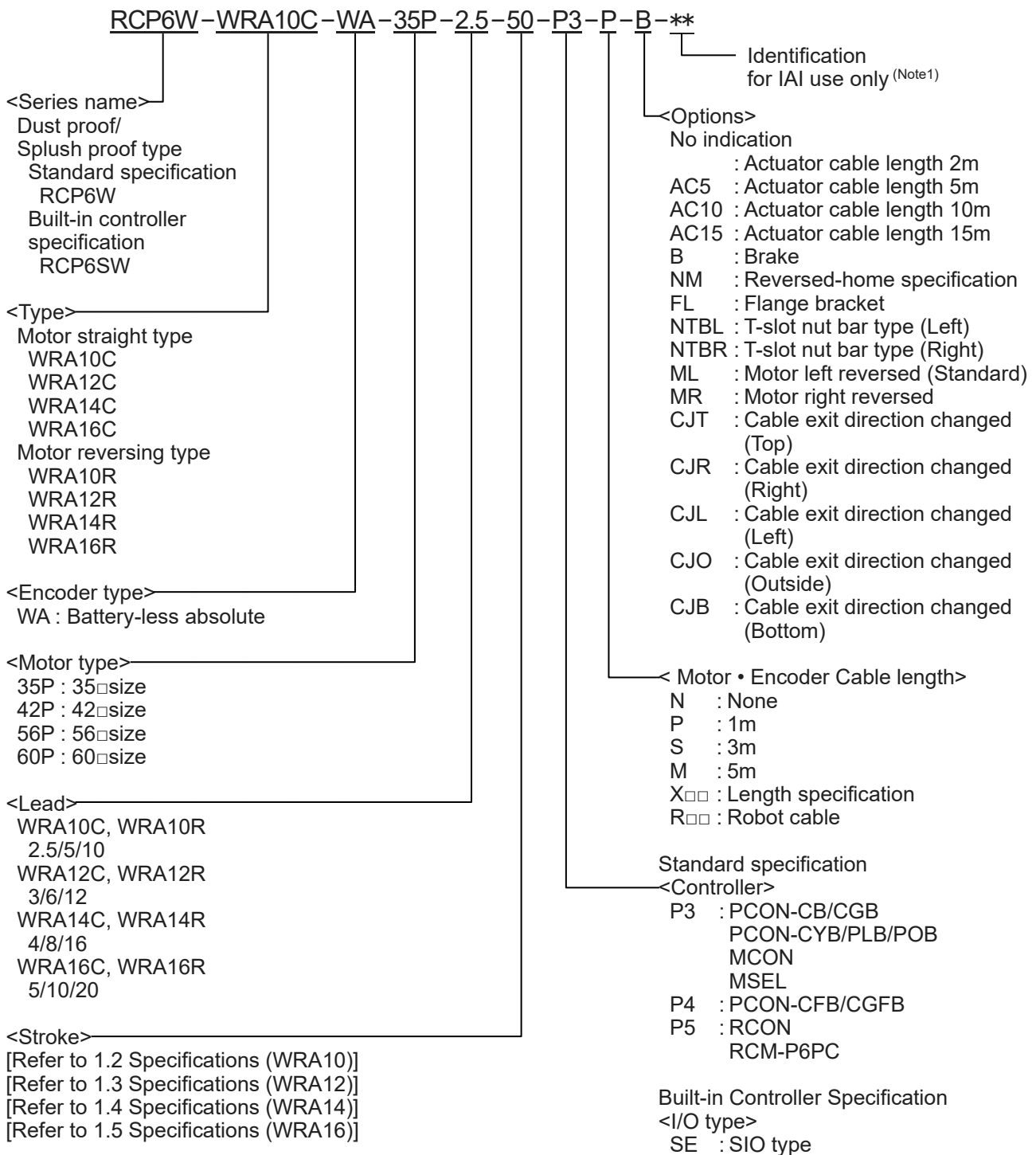
| No. | Name                                                                                                 | Control No. |
|-----|------------------------------------------------------------------------------------------------------|-------------|
| 1   | PCON-CB/CFB Controller Instruction Manual                                                            | ME0342      |
| 2   | PCON-CYB/PLB/POB Controller Instruction Manual                                                       | ME0353      |
| 3   | MCON-C/CG Controller Instruction Manual                                                              | ME0341      |
| 4   | MSEL-PC/PG Controller Instruction Manual                                                             | ME0336      |
| 5   | RCON System Instruction Manual                                                                       | ME0384      |
| 6   | RSEL System Instruction Manual                                                                       | ME0392      |
| 7   | PC Software for XSEL<br>IA-101-X-MW/IA-101-X-USBMW Instruction Manual                                | ME0154      |
| 8   | PC Software for RC/EC<br>RCM-101-MW/RCM-101-USB Instruction Manual                                   | ME0155      |
| 9   | PC Teaching Software<br>IA-OS First Step Guide                                                       | ME0391      |
| 10  | Touch Panel Teaching Pendant CON-PTA/PDA/PGA Instruction Manual                                      | ME0295      |
| 11  | Touch Panel Teaching Pendant TB-01/01D/01DR Instruction Manual<br>Applicable for Position Controller | ME0324      |
| 12  | Touch Panel Teaching Pendant TB-01/01D/01DR Instruction Manual<br>Applicable for Program Controller  | ME0325      |
| 13  | Touch Panel Teaching Pendant TB-02/02D Instruction Manual<br>Applicable for Position Controller      | ME0355      |
| 14  | Touch Panel Teaching Pendant TB-02/02D Instruction Manual<br>Applicable for Program Controller       | ME0356      |
| 15  | Touch Panel Teaching Pendant TB-03 Instruction Manual<br>Applicable for Position Controller          | ME0376      |
| 16  | Touch Panel Teaching Pendant TB-03 Instruction Manual<br>Applicable for Program Controller           | ME0377      |

### 1.1.3 How to Read the Model Nameplate

Model → **MODEL : RCP6W-WRA10C-WA-35P-2.5-50-P3-P-B**  
 Serial number → **S/N: B01234500 DATE: 15/04/2022**  
**INPUT: DC24V MADE IN JAPAN IAI Corporation** 



### 1.1.4 How to Read the Model Number



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

## 1.2 Mechanical Specifications (WRA10)

### 1.2.1 RCP6(S)W-WRA10C: Motor Straight Type



#### Caution

- Lead 10 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.  
Figure out the minimum speed using the following formula.  
Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)
- The high output setting should be available to use only when it is activated.

#### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\Phi 8\text{mm}$ , rolled C10                        |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\Phi 25\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | 4.9m/s <sup>2</sup> 100Hz or less                                |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 10 (Unit: kg)

| Orientation     | Horizontal       |      |     |     |     |
|-----------------|------------------|------|-----|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |      |     |     |     |
|                 | 0.1              | 0.3  | 0.5 | 0.7 | 1   |
| 0               | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 85              | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 175             | 11.5             | 11.5 | 8.5 | 8.5 | 3.5 |
| 260             | 11.5             | 11.5 | 8.5 | 6   | 2.5 |
| 350             | 11.5             | 11.5 | 8.5 | 5   | 2   |
| 435             | 11.5             | 8.5  | 6   | 3.5 | 1.5 |
| 525             | 10.5             | 4    |     |     |     |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       |      |      |      |      | Vertical |     |     |
|-----------------|------------------|------|------|------|------|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |      |      |      |      |          |     |     |
|                 | 0.1              | 0.3  | 0.5  | 0.7  | 1    | 0.1      | 0.3 | 0.5 |
| 0               | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 40              | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 85              | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 130             | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 175             | 28               | 25   | 22   | 20   | 18   | 3        | 3   | 3   |
| 215             | 28               | 25   | 22   | 18   | 13.5 | 2        | 2   | 2   |
| 260             | 28               | 25   | 20.5 | 15.5 | 11   |          |     |     |
| 305             | 28               | 17.5 | 12.5 | 10   | 7.5  |          |     |     |
| 350             | 28               | 9.5  | 5.5  | 3.5  |      |          |     |     |

Lead 2.5 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 20              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 40              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 65              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 85              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 105             | 40               | 35  | 35  | 35  | 30 | 10       | 10  | 10  |
| 130             | 40               | 35  | 35  | 30  | 30 | 3.5      | 3.5 | 3.5 |
| 150             | 40               | 35  | 35  | 28  | 24 | 1.5      | 1.5 | 1.5 |
| 175             | 40               | 28  | 26  | 18  | 11 |          |     |     |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 10 (Unit: kg)

| Orientation     | Horizontal       |      |     |     |     |
|-----------------|------------------|------|-----|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |      |     |     |     |
|                 | 0.1              | 0.3  | 0.5 | 0.7 | 1   |
| 0               | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 85              | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 175             | 11.5             | 11.5 | 8.5 | 8.5 | 3.5 |
| 260             | 11.5             | 11.5 | 8.5 | 6   | 2.5 |
| 350             | 11.5             | 11.5 | 8.5 | 5   | 2   |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |      | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|------|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |      |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1    | 0.1      | 0.3 | 0.5 |
| 0               | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 40              | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 85              | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 130             | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 175             | 28               | 25  | 22  | 20  | 18   | 3        | 3   | 3   |
| 215             | 28               | 25  | 22  | 18  | 13.5 | 2        | 2   | 2   |

Lead 2.5 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 20              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 40              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 65              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead (mm) | 50 to 400 (Every 50mm) | 450       | 500       |
|-----------|------------------------|-----------|-----------|
| 10        | 525                    |           | 490       |
| 5         | 350 <215>              | 290 <215> | 240 <215> |
| 2.5       | 175 <150>              | 145       | 120       |

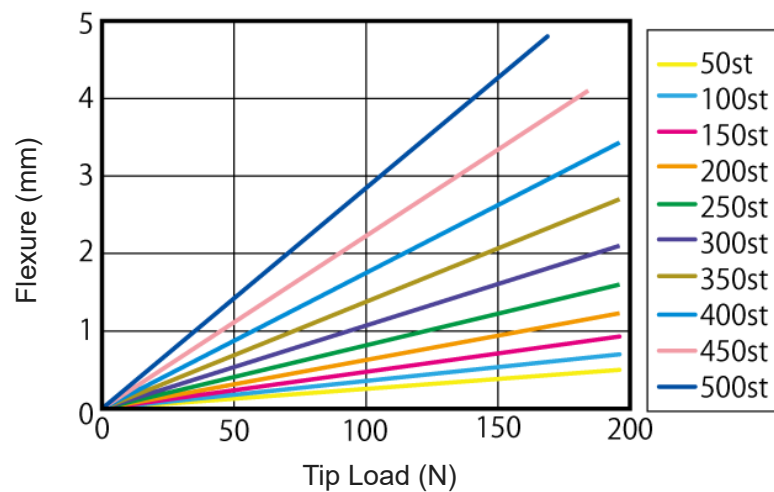
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

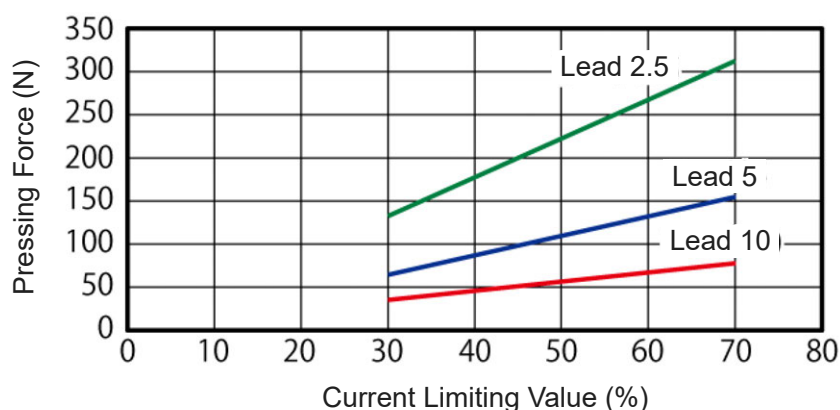
| Lead (mm) | 50 to 500 (Every 50mm) |
|-----------|------------------------|
| 10        | 350                    |
| 5         | 215                    |
| 2.5       | 65                     |

### ◆ Rod Flexure (Reference)



### ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 2.5 (N) | Lead 5 (N) | Lead 10 (N) |
|-------------------------|--------------|------------|-------------|
| 30%                     | 133          | 66         | 33          |
| 40%                     | 177          | 88         | 44          |
| 50%                     | 221          | 111        | 55          |
| 60%                     | 266          | 133        | 66          |
| 70%                     | 310          | 155        | 77          |



### Caution

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 20mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.  
For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPER Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

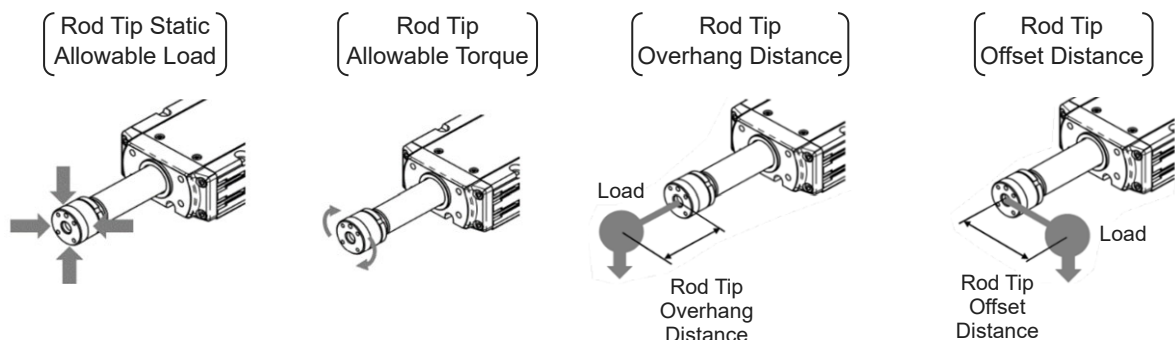
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                   | Unit  | Rod Tip Offset Distance | Stroke (mm) |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------------|-------|-------------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                                                                        |       |                         | 50          | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| Rod Tip Static Allowable Load <small>(Note 1)</small>                                  | (N)   | —                       | 196         | 196 | 196 | 196 | 196 | 196 | 196 | 196 | 184 | 169 |
| Rod Tip Dynamic Allowable Load<br>(Operating life 3,000km Remaining Probability 90%)   | (N)   | 0mm                     | 98          | 98  | 98  | 95  | 85  | 76  | 68  | 62  | 57  | 52  |
|                                                                                        | (N)   | 100mm                   | 50          | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 49  |
| Rod Tip Dynamic Allowable Load<br>(Operating life 5,000km Remaining Probability 90%)   | (N)   | 0mm                     | 98          | 98  | 91  | 80  | 71  | 63  | 57  | 52  | 47  | 43  |
|                                                                                        | (N)   | 100mm                   | 50          | 50  | 50  | 50  | 50  | 50  | 50  | 48  | 44  | 40  |
| Rod Tip Offset Distance<br>(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<br>(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<br>(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 <small>(Note 2)</small>                                      | (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.



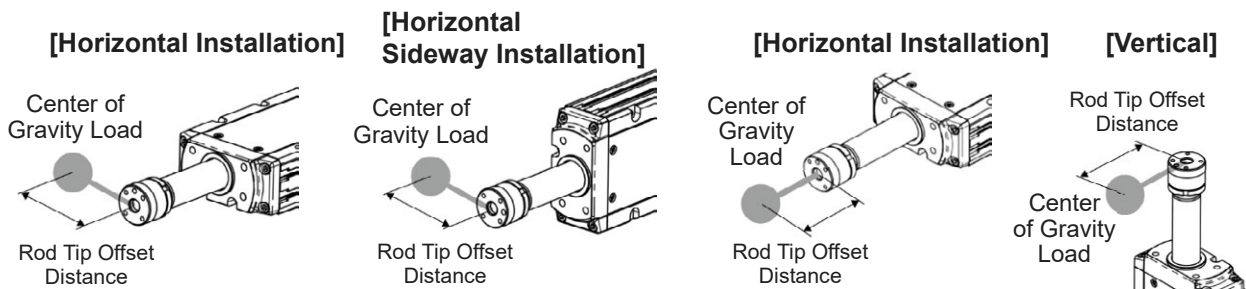
### ◆ Allowable Payload

#### ● Condition to Calculate Allowable Payload

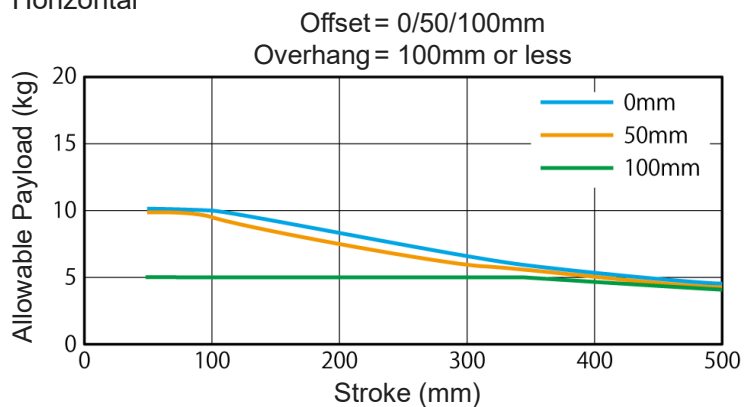
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 1G, velocity 500mm/s)

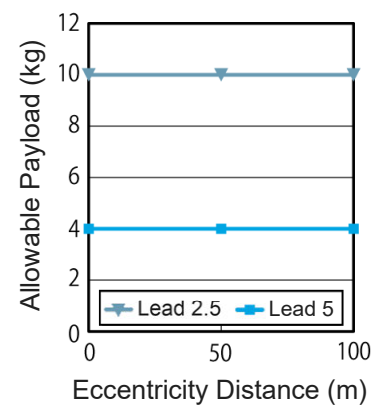
Vertical : Payload that makes 5,000km. (acceleration 0.5G, velocity 260mm/s)



Horizontal



Vertical



### 1.2.2 RCP6(S)W-WRA10R: Motor Reversing Type



#### Caution

- Lead 10 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.  
Figure out the minimum speed using the following formula.  
Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)
- The high output setting should be available to use only when it is activated.

#### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\Phi 8\text{mm}$ , rolled C10                        |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\Phi 25\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | 4.9m/s <sup>2</sup> 100Hz or less                                |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 10 (Unit: kg)

| Orientation     | Horizontal       |      |     |     |     |
|-----------------|------------------|------|-----|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |      |     |     |     |
|                 | 0.1              | 0.3  | 0.5 | 0.7 | 1   |
| 0               | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 85              | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 175             | 11.5             | 11.5 | 8.5 | 8.5 | 3.5 |
| 260             | 11.5             | 11.5 | 8.5 | 6   | 2.5 |
| 350             | 11.5             | 11.5 | 8.5 | 5   | 2   |
| 435             | 11.5             | 8.5  | 6   | 3.5 | 1.5 |
| 525             | 10.5             | 4    |     |     |     |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       |      |      |      |      | Vertical |     |     |
|-----------------|------------------|------|------|------|------|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |      |      |      |      |          |     |     |
|                 | 0.1              | 0.3  | 0.5  | 0.7  | 1    | 0.1      | 0.3 | 0.5 |
| 0               | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 40              | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 85              | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 130             | 28               | 25   | 22   | 20   | 20   | 4        | 4   | 4   |
| 175             | 28               | 25   | 22   | 20   | 18   | 3        | 3   | 3   |
| 215             | 28               | 25   | 22   | 18   | 13.5 | 2        | 2   | 2   |
| 260             | 28               | 25   | 20.5 | 15.5 | 11   |          |     |     |
| 305             | 28               | 17.5 | 12.5 | 10   | 7.5  |          |     |     |
| 350             | 28               | 9.5  | 5.5  | 3.5  |      |          |     |     |

Lead 2.5 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 20              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 40              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 65              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 85              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 105             | 40               | 35  | 35  | 35  | 30 | 10       | 10  | 10  |
| 130             | 40               | 35  | 35  | 30  | 30 | 3.5      | 3.5 | 3.5 |
| 150             | 40               | 35  | 35  | 28  | 24 | 1.5      | 1.5 | 1.5 |
| 175             | 40               | 28  | 26  | 18  | 11 |          |     |     |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 10 (Unit: kg)

| Orientation     | Horizontal       |      |     |     |     |
|-----------------|------------------|------|-----|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |      |     |     |     |
|                 | 0.1              | 0.3  | 0.5 | 0.7 | 1   |
| 0               | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 85              | 11.5             | 11.5 | 8.5 | 8.5 | 6.5 |
| 175             | 11.5             | 11.5 | 8.5 | 8.5 | 3.5 |
| 260             | 11.5             | 11.5 | 8.5 | 6   | 2.5 |
| 350             | 11.5             | 11.5 | 8.5 | 5   | 2   |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |      | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|------|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |      |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1    | 0.1      | 0.3 | 0.5 |
| 0               | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 40              | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 85              | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 130             | 28               | 25  | 22  | 20  | 20   | 4        | 4   | 4   |
| 175             | 28               | 25  | 22  | 20  | 18   | 3        | 3   | 3   |
| 215             | 28               | 25  | 22  | 18  | 13.5 | 2        | 2   | 2   |

Lead 2.5 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 20              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 40              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |
| 65              | 40               | 40  | 40  | 35  | 30 | 10       | 10  | 10  |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead (mm) | 50 to 400<br>(Every 50mm) | 450       | 500       |
|-----------|---------------------------|-----------|-----------|
| 10        | 525                       |           | 490       |
| 5         | 350 <215>                 | 290 <215> | 240 <215> |
| 2.5       | 175 <150>                 | 145       | 120       |

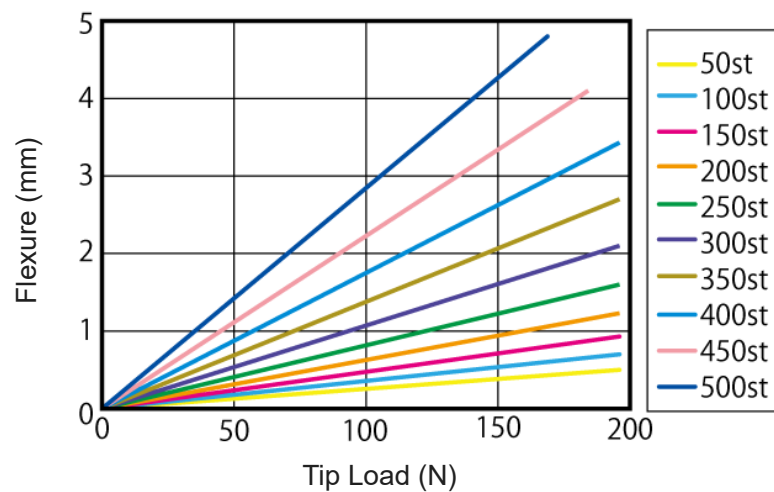
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

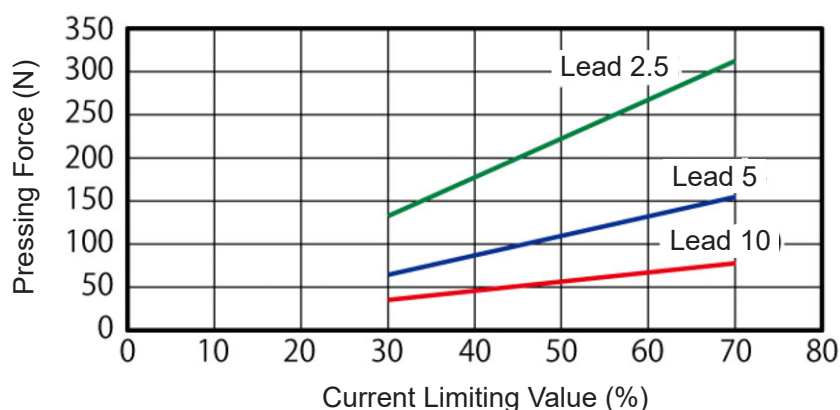
| Lead (mm) | 50 to 500<br>(Every 50mm) |
|-----------|---------------------------|
| 10        | 350                       |
| 5         | 215                       |
| 2.5       | 65                        |

### ◆ Rod Flexure (Reference)



### ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 2.5 (N) | Lead 5 (N) | Lead 10 (N) |
|-------------------------|--------------|------------|-------------|
| 30%                     | 133          | 66         | 33          |
| 40%                     | 177          | 88         | 44          |
| 50%                     | 221          | 111        | 55          |
| 60%                     | 266          | 133        | 66          |
| 70%                     | 310          | 155        | 77          |



### Caution

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 20mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.  
For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPER Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

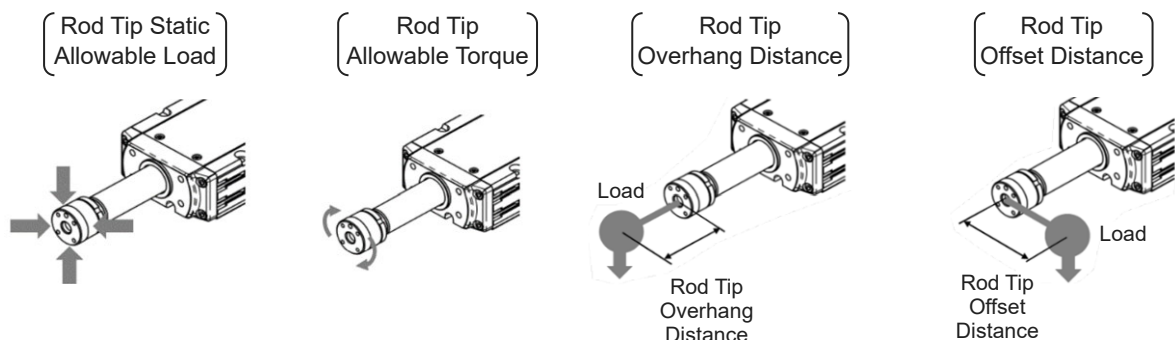
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                   | Unit  | Rod Tip Offset Distance | Stroke (mm) |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------------------------------|-------|-------------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                                                                        |       |                         | 50          | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| Rod Tip Static Allowable Load <small>(Note 1)</small>                                  | (N)   | —                       | 196         | 196 | 196 | 196 | 196 | 196 | 196 | 196 | 184 | 169 |
| Rod Tip Dynamic Allowable Load<br>(Operating life 3,000km Remaining Probability 90%)   | (N)   | 0mm                     | 98          | 98  | 98  | 95  | 85  | 76  | 68  | 62  | 57  | 52  |
|                                                                                        | (N)   | 100mm                   | 50          | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 49  |
| Rod Tip Dynamic Allowable Load<br>(Operating life 5,000km Remaining Probability 90%)   | (N)   | 0mm                     | 98          | 98  | 91  | 80  | 71  | 63  | 57  | 52  | 47  | 43  |
|                                                                                        | (N)   | 100mm                   | 50          | 50  | 50  | 50  | 50  | 50  | 50  | 48  | 44  | 40  |
| Rod Tip Offset Distance<br>(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<br>(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<br>(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 <small>(Note 2)</small>                                      | (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.



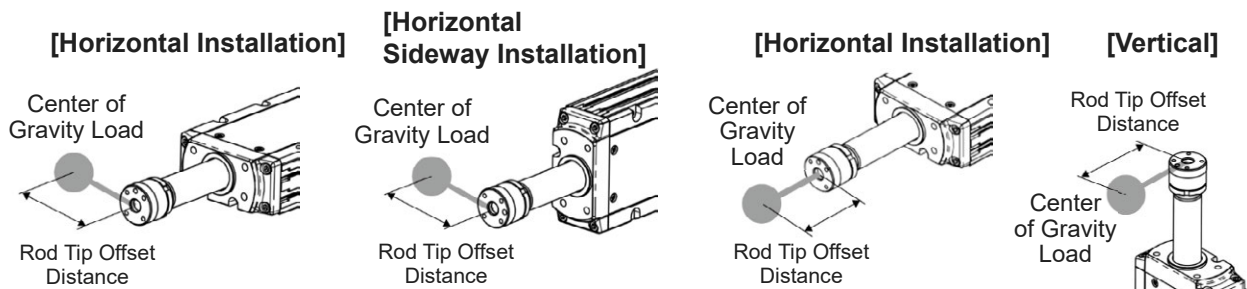
### ◆ Allowable Payload

#### ● Condition to Calculate Allowable Payload

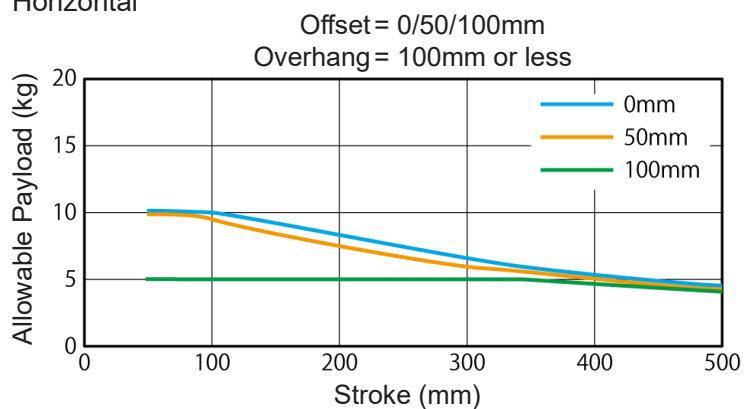
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 1G, velocity 500mm/s)

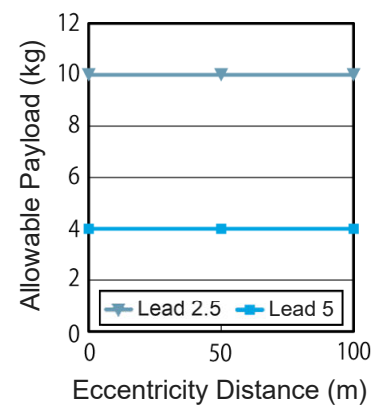
Vertical : Payload that makes 5,000km. (acceleration 0.5G, velocity 260mm/s)



Horizontal



Vertical



## 1.3 Mechanical Specifications (WRA12)

### 1.3.1 RCP6(S)W-WRA12C: Motor Straight Type



#### Caution

- Lead 12 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.  
Figure out the minimum speed using the following formula.  
Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)
- The high output setting should be available to use only when it is activated.

#### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\Phi 10\text{mm}$ , rolled C10                       |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\Phi 30\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | 4.9m/s <sup>2</sup> 100Hz or less                                |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 12 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |     |
|-----------------|------------------|-----|-----|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1   |
| 0               | 30               | 25  | 18  | 16  | 10  |
| 80              | 30               | 25  | 18  | 16  | 10  |
| 200             | 30               | 25  | 15  | 13  | 9   |
| 320             | 30               | 25  | 15  | 9   | 6   |
| 440             | 25               | 20  | 12  | 8   | 4.5 |
| 560             |                  | 7.5 | 3.5 | 1   |     |

Lead 6 (Unit: kg)

| Orientation     | Horizontal       |     |      |     |    | Vertical |     |     |
|-----------------|------------------|-----|------|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |      |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5  | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 40              | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 100             | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 160             | 55               | 40  | 32.5 | 25  | 25 | 4        | 4   | 4   |
| 220             | 55               | 40  | 27.5 | 22  | 16 | 4        | 4   | 3   |
| 280             | 55               | 35  | 25   | 18  | 11 |          |     |     |
| 340             | 55               | 23  | 14   | 12  | 8  |          |     |     |
| 400             | 38               | 7   | 2    | 1   | 1  |          |     |     |

Lead 3 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 20              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 50              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 80              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 110             | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 140             | 70               | 50  | 40  | 30  | 25 | 10       | 10  | 5   |
| 170             | 70               | 40  | 35  | 25  | 20 |          |     |     |
| 200             | 70               | 26  | 26  | 20  | 14 |          |     |     |
| 225             | 50               | 7   | 4   | 3   | 3  |          |     |     |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 12 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    |
|-----------------|------------------|-----|-----|-----|----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  |
| 0               | 30               | 25  | 18  | 16  | 10 |
| 80              | 30               | 25  | 18  | 16  | 10 |
| 200             | 30               | 25  | 15  | 13  | 9  |
| 320             | 30               | 25  | 15  | 9   | 6  |

Lead 6 (Unit: kg)

| Orientation     | Horizontal       |     |      |     |    | Vertical |     |     |
|-----------------|------------------|-----|------|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |      |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5  | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 40              | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 100             | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 160             | 55               | 40  | 32.5 | 25  | 25 | 4        | 4   | 4   |
| 220             | 55               | 40  | 27.5 | 22  | 16 | 4        | 4   | 3   |

Lead 3 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 20              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 50              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 80              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead (mm) | 50 to 400<br>(Every 50mm) | 450       | 500       |
|-----------|---------------------------|-----------|-----------|
| 12        | 560                       |           |           |
| 6         | 440 <220>                 |           | 375 <220> |
| 3         | 225 <140>                 | 220 <140> | 185 <140> |

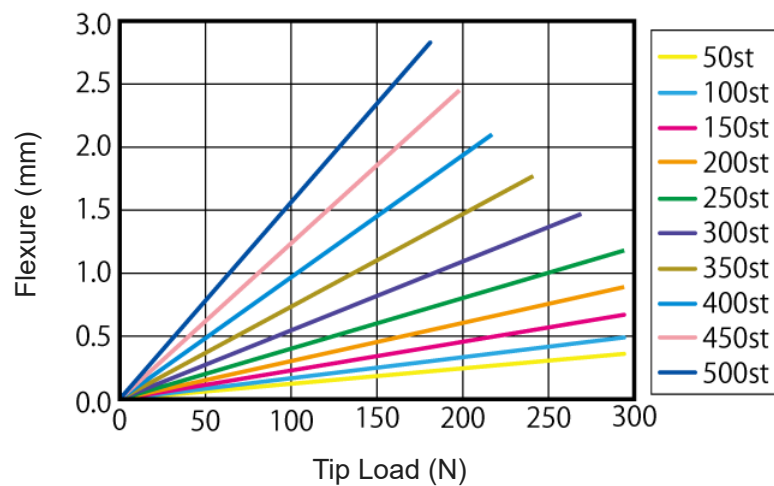
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

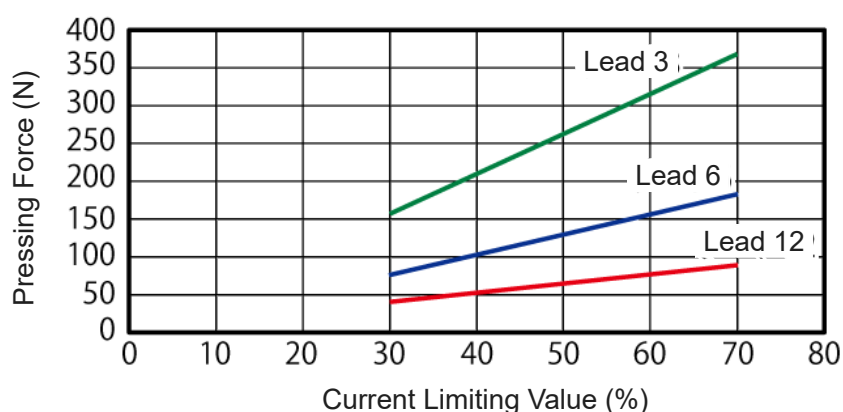
| Lead (mm) | 50 to 500<br>(Every 50mm) |
|-----------|---------------------------|
| 12        | 320                       |
| 6         | 220                       |
| 3         | 80                        |

### ◆ Rod Flexure (Reference)



### ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 3 (N) | Lead 6 (N) | Lead 12 (N) |
|-------------------------|------------|------------|-------------|
| 30%                     | 159        | 79         | 40          |
| 40%                     | 211        | 106        | 53          |
| 50%                     | 264        | 132        | 66          |
| 60%                     | 317        | 159        | 79          |
| 70%                     | 370        | 185        | 93          |



### Caution

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 20mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.  
For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPER Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

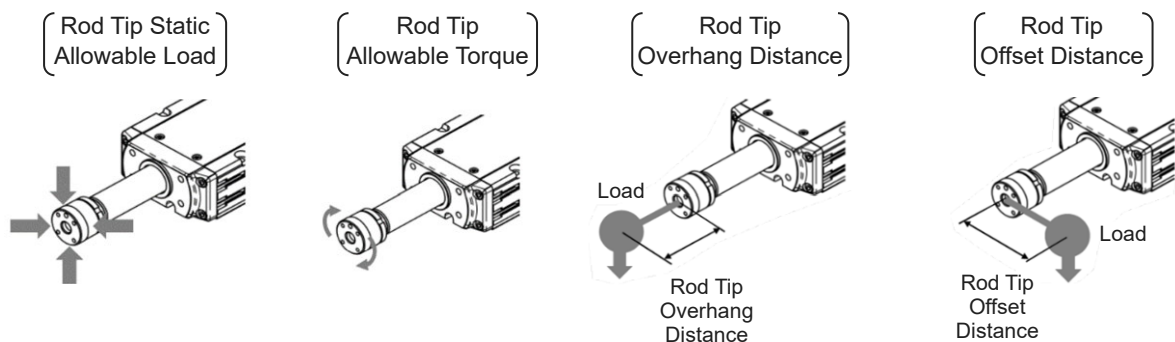
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                   | Unit  | Rod Tip Offset Distance | Stroke (mm) |      |      |      |     |     |     |     |     |     |
|----------------------------------------------------------------------------------------|-------|-------------------------|-------------|------|------|------|-----|-----|-----|-----|-----|-----|
|                                                                                        |       |                         | 50          | 100  | 150  | 200  | 250 | 300 | 350 | 400 | 450 | 500 |
| Rod Tip Static Allowable Load <small>(Note 1)</small>                                  | (N)   | —                       | 294         | 294  | 294  | 294  | 294 | 269 | 241 | 218 | 198 | 181 |
| Rod Tip Dynamic Allowable Load<br>(Operating life 3,000km Remaining Probability 90%)   | (N)   | 0mm                     | 147         | 147  | 137  | 121  | 107 | 96  | 87  | 79  | 72  | 65  |
|                                                                                        | (N)   | 100mm                   | 100         | 100  | 100  | 100  | 99  | 90  | 82  | 75  | 68  | 63  |
| Rod Tip Dynamic Allowable Load<br>(Operating life 5,000km Remaining Probability 90%)   | (N)   | 0mm                     | 147         | 133  | 115  | 101  | 90  | 80  | 72  | 65  | 59  | 54  |
|                                                                                        | (N)   | 100mm                   | 100         | 100  | 100  | 92   | 83  | 75  | 68  | 62  | 56  | 51  |
| Rod Tip Offset Distance<br>(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<br>(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<br>(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 <small>(Note 2)</small>                                      | (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.



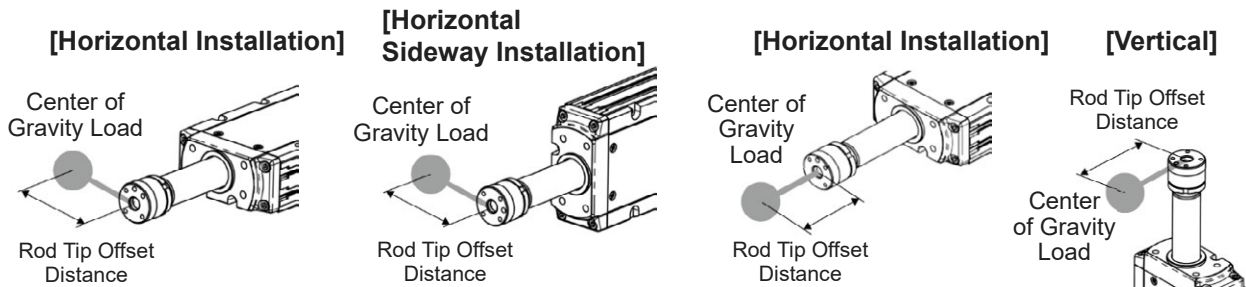
### ◆ Allowable Payload

#### ● Condition to Calculate Allowable Payload

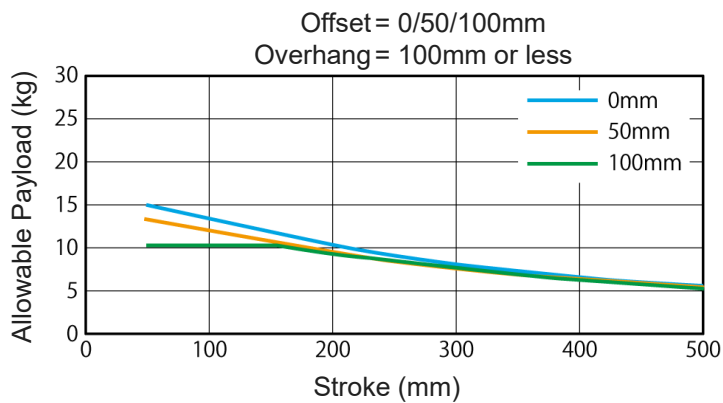
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 1G, velocity 500mm/s)

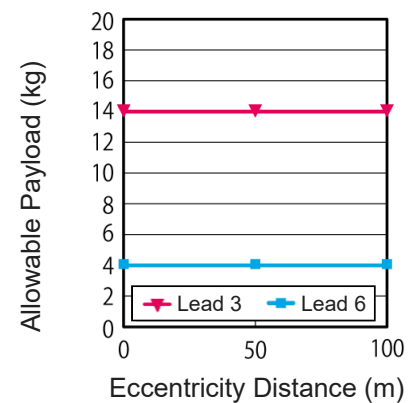
Vertical : Payload that makes 5,000km. (acceleration 0.5G, velocity 500mm/s)



Horizontal



Vertical



### 1.3.2 RCP6(S)W-WRA12R: Motor Reversing Type



#### Caution

- Lead 12 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.  
Figure out the minimum speed using the following formula.  
Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)
- The high output setting should be available to use only when it is activated.

#### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\Phi 10\text{mm}$ , rolled C10                       |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\Phi 30\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | 4.9m/s <sup>2</sup> 100Hz or less                                |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 12 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |     |
|-----------------|------------------|-----|-----|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1   |
| 0               | 30               | 25  | 18  | 16  | 10  |
| 80              | 30               | 25  | 18  | 16  | 10  |
| 200             | 30               | 25  | 15  | 13  | 9   |
| 320             | 30               | 25  | 15  | 9   | 6   |
| 440             | 25               | 20  | 12  | 8   | 4.5 |
| 560             |                  | 7.5 | 3.5 | 1   |     |

Lead 6 (Unit: kg)

| Orientation     | Horizontal       |     |      |     |    | Vertical |     |     |
|-----------------|------------------|-----|------|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |      |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5  | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 40              | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 100             | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 160             | 55               | 40  | 32.5 | 25  | 25 | 4        | 4   | 4   |
| 220             | 55               | 40  | 27.5 | 22  | 16 | 4        | 4   | 3   |
| 280             | 55               | 35  | 25   | 18  | 11 |          |     |     |
| 340             | 55               | 23  | 14   | 12  | 8  |          |     |     |
| 400             | 38               | 7   | 2    | 1   | 1  |          |     |     |

Lead 3 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 20              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 50              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 80              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 110             | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 140             | 70               | 50  | 40  | 30  | 25 | 10       | 10  | 5   |
| 170             | 70               | 40  | 35  | 25  | 20 |          |     |     |
| 200             | 70               | 26  | 26  | 20  | 14 |          |     |     |
| 225             | 50               | 7   | 4   | 3   | 3  |          |     |     |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 12 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    |
|-----------------|------------------|-----|-----|-----|----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  |
| 0               | 30               | 25  | 18  | 16  | 10 |
| 80              | 30               | 25  | 18  | 16  | 10 |
| 200             | 30               | 25  | 15  | 13  | 9  |
| 320             | 30               | 25  | 15  | 9   | 6  |

Lead 6 (Unit: kg)

| Orientation     | Horizontal       |     |      |     |    | Vertical |     |     |
|-----------------|------------------|-----|------|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |      |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5  | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 40              | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 100             | 55               | 40  | 35   | 30  | 25 | 4        | 4   | 4   |
| 160             | 55               | 40  | 32.5 | 25  | 25 | 4        | 4   | 4   |
| 220             | 55               | 40  | 27.5 | 22  | 16 | 4        | 4   | 3   |

Lead 3 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |     |     |
|-----------------|------------------|-----|-----|-----|----|----------|-----|-----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |     |     |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3 | 0.5 |
| 0               | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 20              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 50              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |
| 80              | 70               | 60  | 50  | 45  | 40 | 14       | 14  | 14  |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead (mm) | 50 to 400<br>(Every 50mm) | 450       | 500       |
|-----------|---------------------------|-----------|-----------|
| 12        | 560                       |           |           |
| 6         | 440 <220>                 |           | 375 <220> |
| 3         | 225 <140>                 | 220 <140> | 185 <140> |

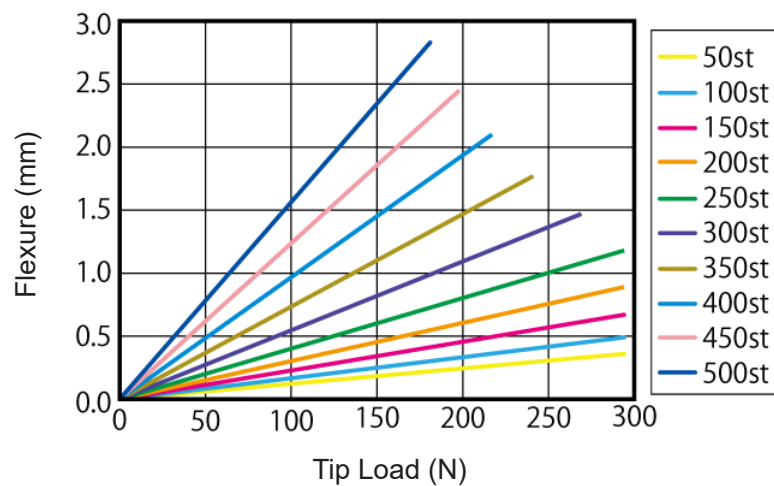
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

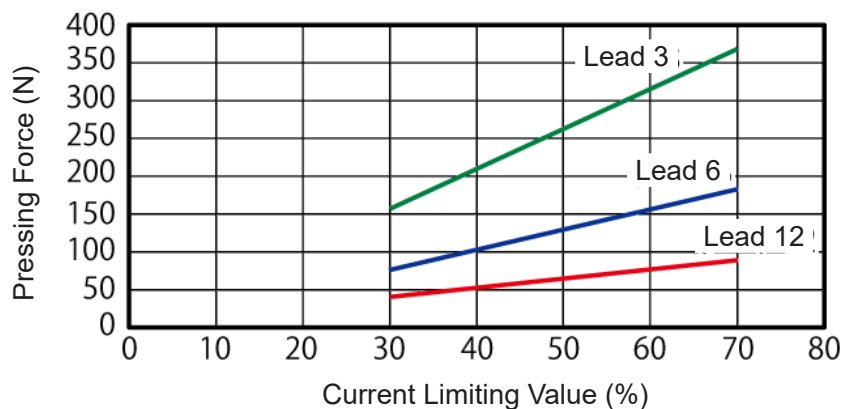
| Lead (mm) | 50 to 500<br>(Every 50mm) |
|-----------|---------------------------|
| 12        | 320                       |
| 6         | 220                       |
| 3         | 80                        |

### ◆ Rod Flexure (Reference)



## ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 3 (N) | Lead 6 (N) | Lead 12 (N) |
|-------------------------|------------|------------|-------------|
| 30%                     | 159        | 79         | 40          |
| 40%                     | 211        | 106        | 53          |
| 50%                     | 264        | 132        | 66          |
| 60%                     | 317        | 159        | 79          |
| 70%                     | 370        | 185        | 93          |

**Caution**

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 20mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.  
For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPER Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

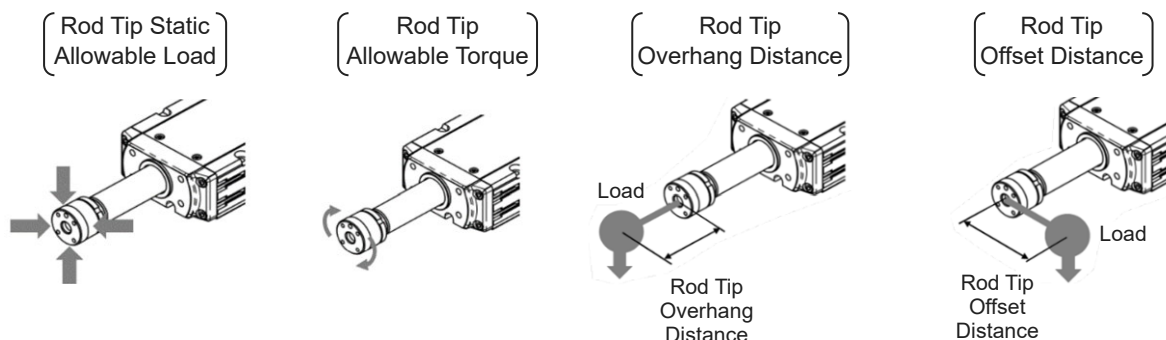
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                   | Unit  | Rod Tip Offset Distance | Stroke (mm) |      |      |      |     |     |     |     |     |     |
|----------------------------------------------------------------------------------------|-------|-------------------------|-------------|------|------|------|-----|-----|-----|-----|-----|-----|
|                                                                                        |       |                         | 50          | 100  | 150  | 200  | 250 | 300 | 350 | 400 | 450 | 500 |
| Rod Tip Static Allowable Load <small>(Note 1)</small>                                  | (N)   | —                       | 294         | 294  | 294  | 294  | 294 | 269 | 241 | 218 | 198 | 181 |
| Rod Tip Dynamic Allowable Load<br>(Operating life 3,000km Remaining Probability 90%)   | (N)   | 0mm                     | 147         | 147  | 137  | 121  | 107 | 96  | 87  | 79  | 72  | 65  |
|                                                                                        | (N)   | 100mm                   | 100         | 100  | 100  | 100  | 99  | 90  | 82  | 75  | 68  | 63  |
| Rod Tip Dynamic Allowable Load<br>(Operating life 5,000km Remaining Probability 90%)   | (N)   | 0mm                     | 147         | 133  | 115  | 101  | 90  | 80  | 72  | 65  | 59  | 54  |
|                                                                                        | (N)   | 100mm                   | 100         | 100  | 100  | 92   | 83  | 75  | 68  | 62  | 56  | 51  |
| Rod Tip Offset Distance<br>(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<br>(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<br>(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 <small>(Note 2)</small>                                      | (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.



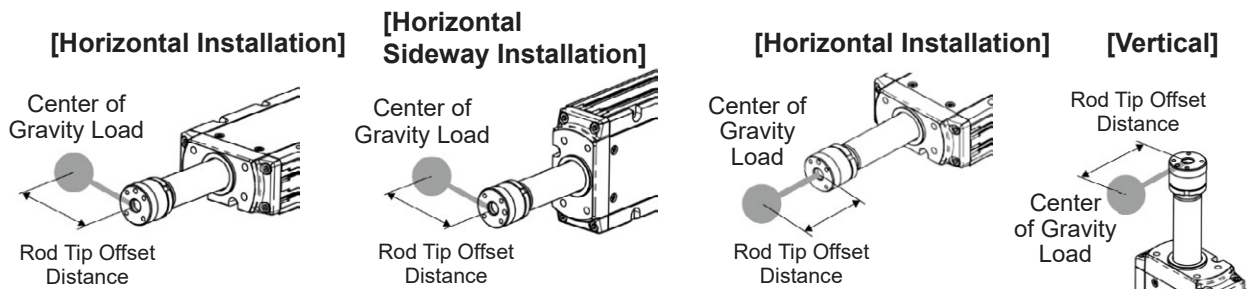
### ◆ Allowable Payload

#### ● Condition to Calculate Allowable Payload

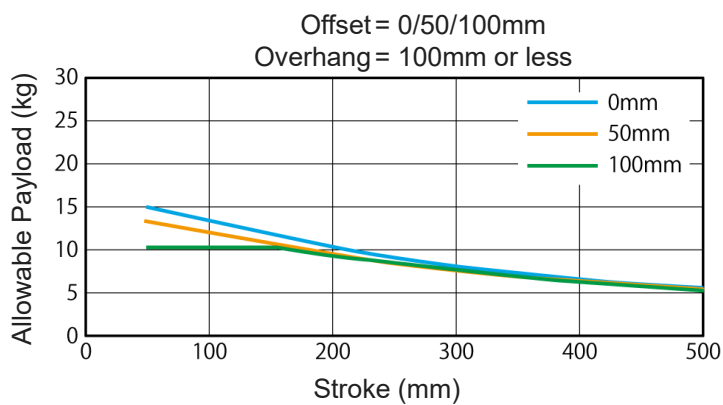
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 1G, velocity 500mm/s)

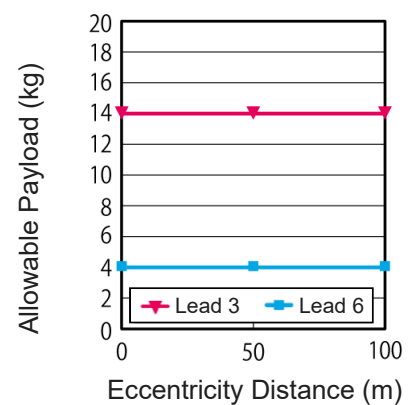
Vertical : Payload that makes 5,000km. (acceleration 0.5G, velocity 280mm/s)



Horizontal



Vertical



## 1.4 Mechanical Specifications (WRA14)

### 1.4.1 RCP6(S)W-WRA14C: Motor Straight Type



#### Caution

- Lead 16 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.  
Figure out the minimum speed using the following formula.  
Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)
- The high output setting should be available to use only when it is activated.

#### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\Phi 12\text{mm}$ , rolled C10                       |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\Phi 40\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | 4.9m/s <sup>2</sup> 100Hz or less                                |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 16 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    |
|-----------------|------------------|-----|-----|-----|----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  |
| 0               | 50               | 50  | 40  | 35  | 30 |
| 140             | 50               | 50  | 40  | 35  | 30 |
| 280             | 50               | 32  | 25  | 17  | 12 |
| 420             | 23               | 7   | 2   |     |    |

Lead 8 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 70              | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 140             | 65               | 65  | 51  | 41  | 41 | 9.5      | 9.5  | 6.5  |
| 210             | 65               | 56  | 28  | 20  | 15 | 1.5      | 1.5  |      |
| 280             | 51               | 14  | 1   |     |    |          |      |      |

Lead 4 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 35              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 70              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 105             | 85               | 80  | 51  | 46  | 40 | 15.5     | 13.5 | 12   |
| 130             | 85               | 41  | 10  | 6   | 2  | 3.5      |      |      |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 16 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    |
|-----------------|------------------|-----|-----|-----|----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  |
| 0               | 50               | 50  | 40  | 35  | 30 |
| 140             | 50               | 50  | 40  | 35  | 30 |
| 280             | 50               | 32  | 25  | 17  | 12 |

Lead 8 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 70              | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 140             | 65               | 65  | 51  | 41  | 41 | 9.5      | 9.5  | 6.5  |

Lead 4 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 35              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 70              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead<br>(mm) | 50 to 600<br>(Every 50mm) |
|--------------|---------------------------|
| 16           | 420                       |
| 8            | 280 <210>                 |
| 4            | 130                       |

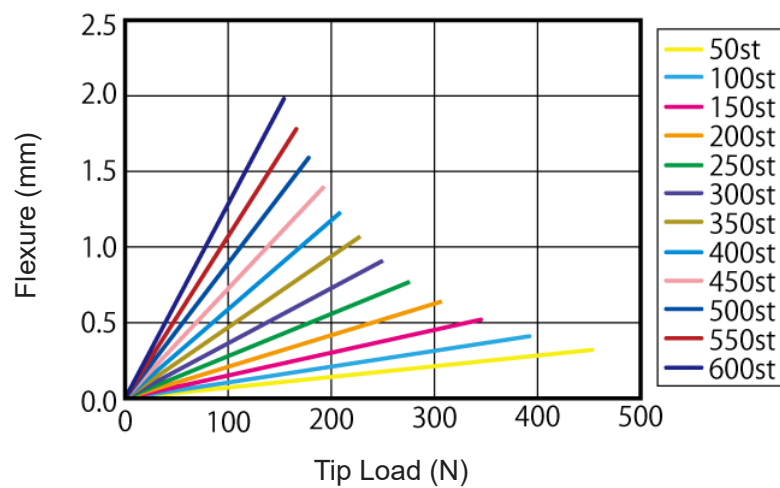
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

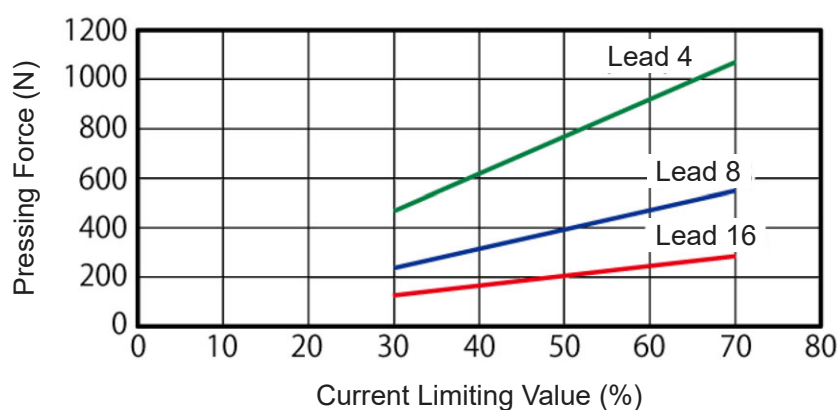
| Lead<br>(mm) | 50 to 600<br>(Every 50mm) |
|--------------|---------------------------|
| 16           | 280                       |
| 8            | 140                       |
| 4            | 70                        |

### ◆ Rod Flexure (Reference)



### ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 4 (N) | Lead 8 (N) | Lead 16 (N) |
|-------------------------|------------|------------|-------------|
| 30%                     | 469        | 234        | 117         |
| 40%                     | 625        | 312        | 156         |
| 50%                     | 781        | 391        | 195         |
| 60%                     | 937        | 469        | 234         |
| 70%                     | 1094       | 547        | 273         |



### Caution

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 20mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.  
For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPER Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

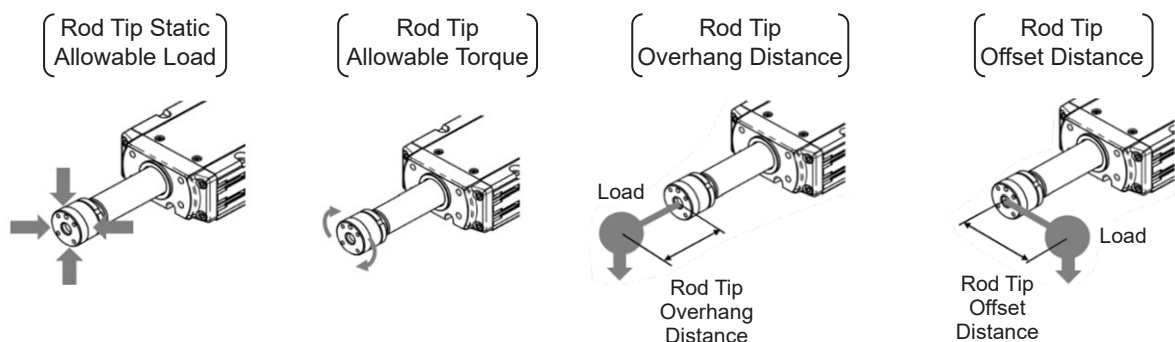
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                   | Unit  | Rod Tip Offset Distance | Stroke (mm) |      |      |      |      |      |      |      |      |     |     |     |
|----------------------------------------------------------------------------------------|-------|-------------------------|-------------|------|------|------|------|------|------|------|------|-----|-----|-----|
|                                                                                        |       |                         | 50          | 100  | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500 | 550 | 600 |
| Rod Tip Static Allowable Load <small>(Note 1)</small>                                  | (N)   | —                       | 454         | 392  | 345  | 307  | 276  | 251  | 229  | 210  | 193  | 179 | 166 | 154 |
| Rod Tip Dynamic Allowable Load<br>(Operating life 3,000km Remaining Probability 90%)   | (N)   | 0mm                     | 199         | 170  | 148  | 131  | 117  | 104  | 94   | 85   | 77   | 70  | 64  | 58  |
|                                                                                        | (N)   | 150mm                   | 100         | 100  | 100  | 100  | 100  | 95   | 87   | 79   | 72   | 66  | 60  | 55  |
| Rod Tip Dynamic Allowable Load<br>(Operating life 5,000km Remaining Probability 90%)   | (N)   | 0mm                     | 167         | 143  | 124  | 109  | 97   | 87   | 78   | 70   | 63   | 57  | 51  | 46  |
|                                                                                        | (N)   | 150mm                   | 100         | 100  | 100  | 96   | 87   | 79   | 71   | 65   | 59   | 53  | 48  | 44  |
| Rod Tip Offset Distance<br>(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<br>(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<br>(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 <small>(Note 2)</small>                                      | (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.



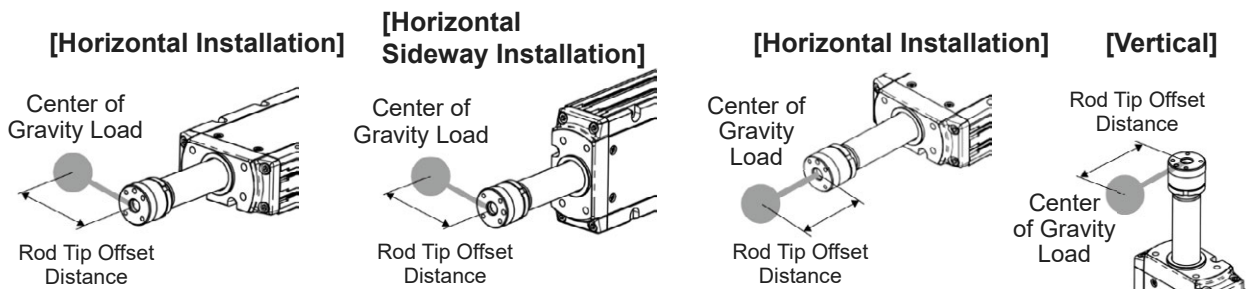
### ◆ Allowable Payload

- Condition to Calculate Allowable Payload

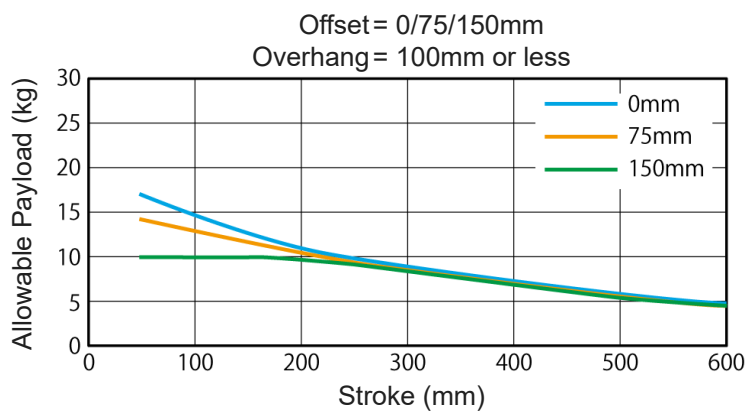
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 1G, velocity 500mm/s)

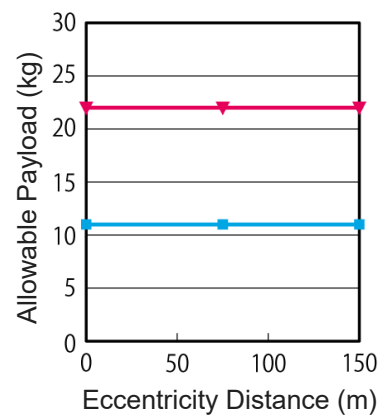
Vertical : Payload that makes 5,000km. (acceleration 0.5G, velocity 210mm/s)



Horizontal



Vertical



### 1.4.2 RCP6(S)W-WRA14R: Motor Reversing Type



#### Caution

- Lead 16 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.  
Figure out the minimum speed using the following formula.  
Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)
- The high output setting should be available to use only when it is activated.

#### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\Phi 12\text{mm}$ , rolled C10                       |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\Phi 40\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | 4.9m/s <sup>2</sup> 100Hz or less                                |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 16 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    |
|-----------------|------------------|-----|-----|-----|----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  |
| 0               | 50               | 50  | 40  | 35  | 30 |
| 140             | 50               | 50  | 40  | 35  | 30 |
| 280             | 50               | 32  | 25  | 17  | 12 |
| 420             | 23               | 7   | 2   |     |    |

Lead 8 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 70              | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 140             | 65               | 65  | 51  | 41  | 41 | 9.5      | 9.5  | 6.5  |
| 210             | 65               | 56  | 28  | 20  | 15 | 1.5      | 1.5  |      |
| 280             | 51               | 14  | 1   |     |    |          |      |      |

Lead 4 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 35              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 70              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 105             | 85               | 80  | 51  | 46  | 40 | 15.5     | 13.5 | 12   |
| 130             | 85               | 41  | 10  | 6   | 2  | 3.5      |      |      |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 16 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    |
|-----------------|------------------|-----|-----|-----|----|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  |
| 0               | 50               | 50  | 40  | 35  | 30 |
| 140             | 50               | 50  | 40  | 35  | 30 |
| 280             | 50               | 32  | 25  | 17  | 12 |

Lead 8 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 70              | 65               | 65  | 55  | 50  | 45 | 11.5     | 11.5 | 11.5 |
| 140             | 65               | 65  | 51  | 41  | 41 | 9.5      | 9.5  | 6.5  |

Lead 4 (Unit: kg)

| Orientation     | Horizontal       |     |     |     |    | Vertical |      |      |
|-----------------|------------------|-----|-----|-----|----|----------|------|------|
| Speed<br>(mm/s) | Acceleration (G) |     |     |     |    |          |      |      |
|                 | 0.1              | 0.3 | 0.5 | 0.7 | 1  | 0.1      | 0.3  | 0.5  |
| 0               | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 35              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |
| 70              | 85               | 80  | 70  | 65  | 60 | 21.5     | 19.5 | 19.5 |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead<br>(mm) | 50 to 600<br>(Every 50mm) |
|--------------|---------------------------|
| 16           | 420                       |
| 8            | 280 <210>                 |
| 4            | 130                       |

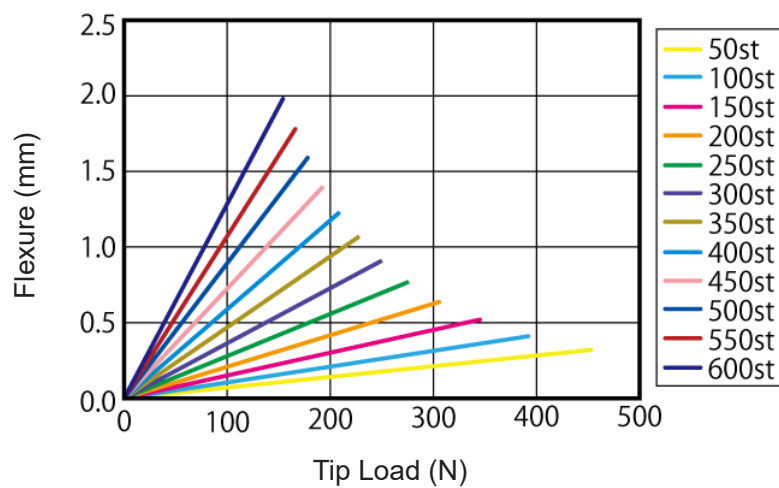
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

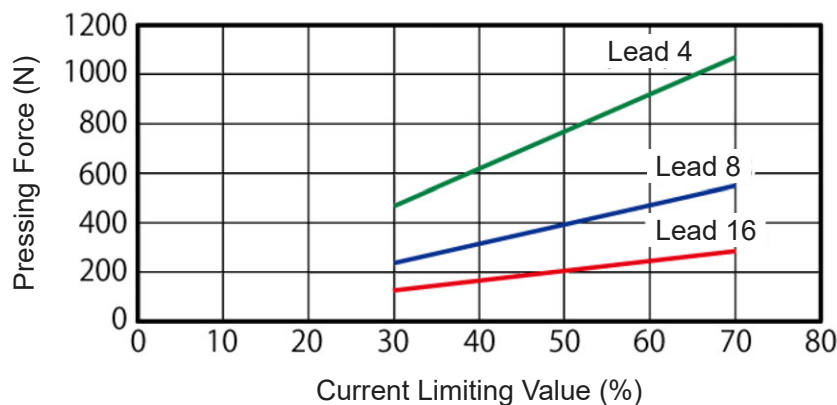
| Lead<br>(mm) | 50 to 600<br>(Every 50mm) |
|--------------|---------------------------|
| 16           | 280                       |
| 8            | 140                       |
| 4            | 70                        |

### ◆ Rod Flexure (Reference)



## ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 4 (N) | Lead 8 (N) | Lead 16 (N) |
|-------------------------|------------|------------|-------------|
| 30%                     | 469        | 234        | 117         |
| 40%                     | 625        | 312        | 156         |
| 50%                     | 781        | 391        | 195         |
| 60%                     | 937        | 469        | 234         |
| 70%                     | 1094       | 547        | 273         |

**Caution**

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 20mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 70%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 20mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.  
For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPER Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

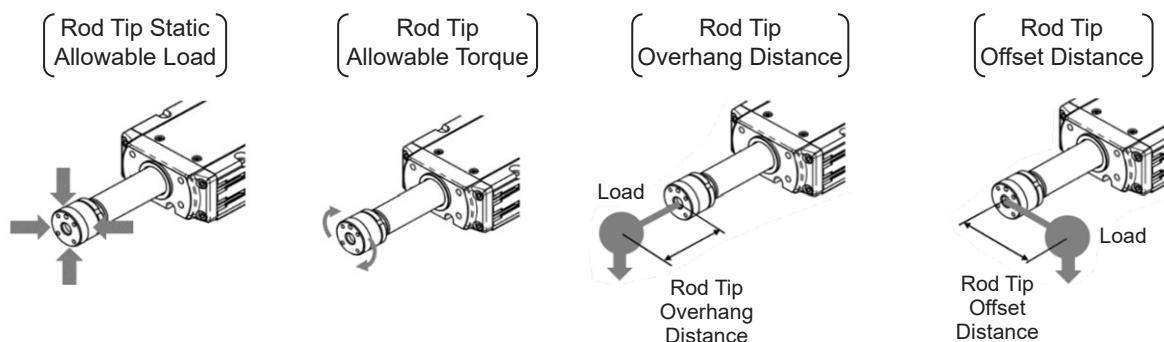
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                   | Unit  | Rod Tip Offset Distance | Stroke (mm) |      |      |      |      |      |      |      |      |     |     |     |
|----------------------------------------------------------------------------------------|-------|-------------------------|-------------|------|------|------|------|------|------|------|------|-----|-----|-----|
|                                                                                        |       |                         | 50          | 100  | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500 | 550 | 600 |
| Rod Tip Static Allowable Load <small>(Note 1)</small>                                  | (N)   | —                       | 454         | 392  | 345  | 307  | 276  | 251  | 229  | 210  | 193  | 179 | 166 | 154 |
| Rod Tip Dynamic Allowable Load<br>(Operating life 3,000km Remaining Probability 90%)   | (N)   | 0mm                     | 199         | 170  | 148  | 131  | 117  | 104  | 94   | 85   | 77   | 70  | 64  | 58  |
|                                                                                        | (N)   | 150mm                   | 100         | 100  | 100  | 100  | 100  | 95   | 87   | 79   | 72   | 66  | 60  | 55  |
| Rod Tip Dynamic Allowable Load<br>(Operating life 5,000km Remaining Probability 90%)   | (N)   | 0mm                     | 167         | 143  | 124  | 109  | 97   | 87   | 78   | 70   | 63   | 57  | 51  | 46  |
|                                                                                        | (N)   | 150mm                   | 100         | 100  | 100  | 96   | 87   | 79   | 71   | 65   | 59   | 53  | 48  | 44  |
| Rod Tip Offset Distance<br>(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<br>(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<br>(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 <small>(Note 2)</small>                                      | (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.



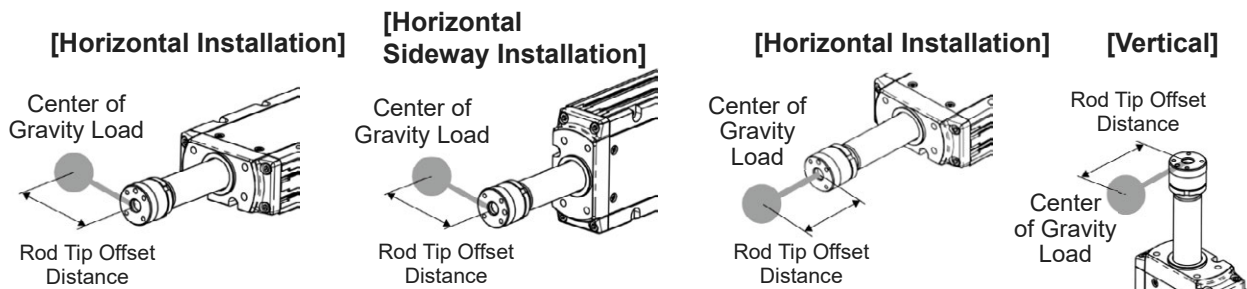
### ◆ Allowable Payload

- Condition to Calculate Allowable Payload

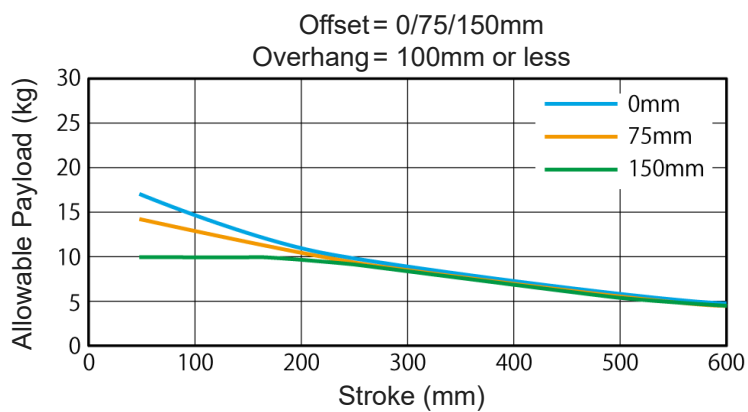
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 1G, velocity 500mm/s)

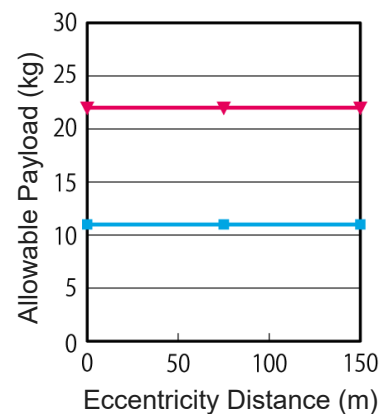
Vertical : Payload that makes 5,000km. (acceleration 0.5G, velocity 210mm/s)



Horizontal



Vertical



## 1.5 Mechanical Specifications (WRA16)

### 1.5.1 RCP6(S)W-WRA16C: Motor Straight Type



#### Caution

- Lead 20 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.

Figure out the minimum speed using the following formula.

Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)

#### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\phi 16\text{mm}$ , rolled C10                       |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\phi 45\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | 4.9m/s <sup>2</sup> 100Hz or less                                |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 20 (Unit: kg)

| Orientation     | Horizontal       |
|-----------------|------------------|
| Speed<br>(mm/s) | Acceleration (G) |
|                 | 0.2              |
| 0               | 30               |
| 240             | 30               |
| 300             | 30               |
| 360             | 12               |

Lead 10 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.2              |          |
| 0               | 60               | 30.5     |
| 88              | 60               | 30.5     |
| 100             | 60               | 20.5     |
| 110             | 60               | 15.5     |
| 120             | 60               | 12.5     |
| 130             | 60               | 10.5     |
| 140             | 60               | 7.5      |
| 150             | 60               | 3.5      |
| 160             | 23               | 1.5      |
| 200             | 23               |          |
| 220             | 2                |          |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.1              |          |
| 0               | 100              | 59       |
| 48              | 100              | 59       |
| 60              | 100              | 29       |
| 70              | 100              | 24       |
| 80              | 100              | 14       |
| 90              | 100              | 5        |
| 100             | 100              |          |
| 110             | 45               |          |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 20 (Unit: kg)

| Orientation     | Horizontal       |
|-----------------|------------------|
| Speed<br>(mm/s) | Acceleration (G) |
|                 | 0.2              |
| 0               | 30               |
| 240             | 30               |

Lead 10 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.2              |          |
| 0               | 60               | 30.5     |
| 88              | 60               | 30.5     |
| 100             | 60               | 20.5     |
| 110             | 60               | 15.5     |
| 120             | 60               | 12.5     |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.1              |          |
| 0               | 100              | 59       |
| 48              | 100              | 59       |
| 60              | 100              | 29       |
| 70              | 100              | 24       |
| 80              | 100              | 14       |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead (mm) | 50        | 100 to 450<br>(Every 50mm) | 500       | 550       | 600 | 650 | 700 | 750 | 800 |
|-----------|-----------|----------------------------|-----------|-----------|-----|-----|-----|-----|-----|
| 20        | 280       | 360                        |           | 340       | 295 | 260 | 225 | 200 | 180 |
| 10        | 220 <160> |                            | 195 <160> | 165 <160> | 145 | 125 | 110 | 100 | 90  |
| 5         | 110 <90>  |                            | 95 <90>   | 80        | 70  | 60  | 55  | 50  | 45  |

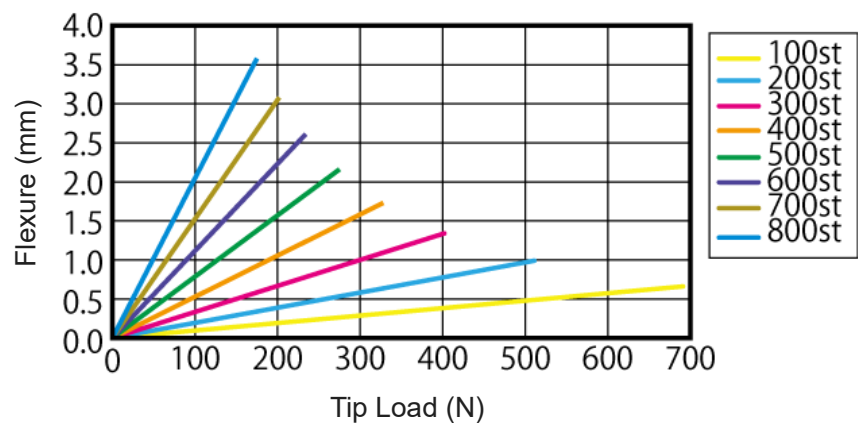
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

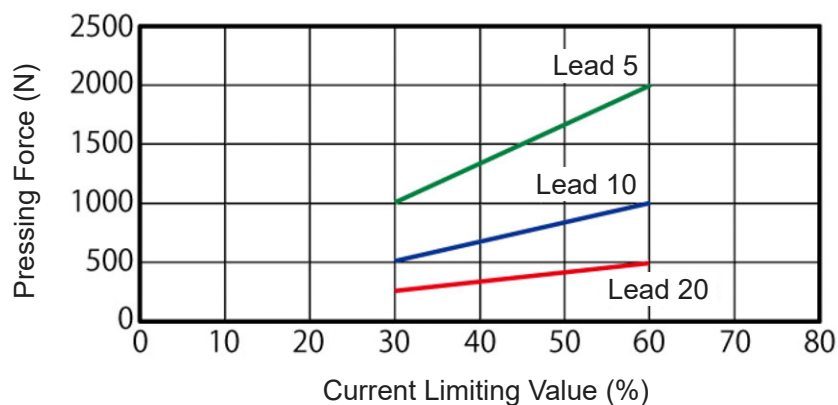
| Lead (mm) | 50  | 100 to 450<br>(Every 50mm) | 500 | 550 | 600 | 650 | 700 | 750 | 800 |
|-----------|-----|----------------------------|-----|-----|-----|-----|-----|-----|-----|
| 20        | 240 |                            |     |     |     |     | 225 | 200 | 180 |
| 10        | 120 |                            |     |     |     |     | 110 | 100 | 90  |
| 5         | 80  |                            |     |     | 70  | 60  | 55  | 50  | 45  |

### ◆ Rod Flexure (Reference)



### ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 5 (N) | Lead 10 (N) | Lead 20 (N) |
|-------------------------|------------|-------------|-------------|
| 30%                     | 1000       | 500         | 250         |
| 40%                     | 1333       | 667         | 333         |
| 50%                     | 1667       | 833         | 417         |
| 60%                     | 2000       | 1000        | 500         |



### Caution

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 10mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 60%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 10mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.

For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPR Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

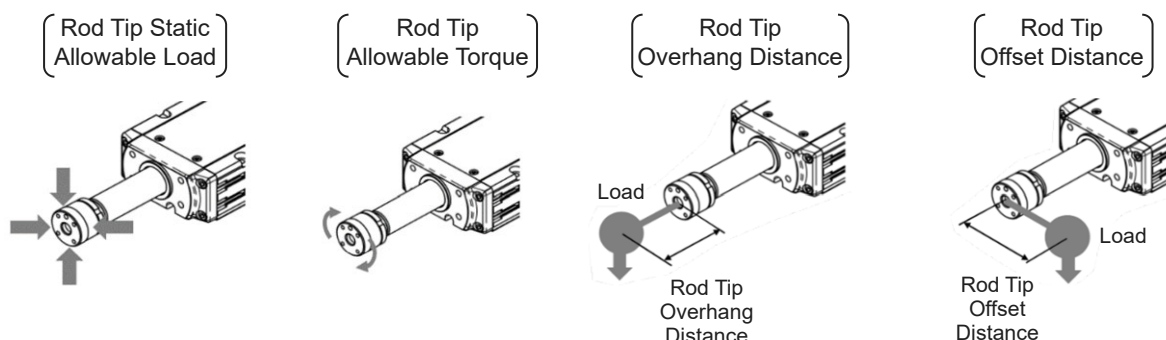
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                | Unit  | Rod Tip Offset Distance | Stroke (mm) |      |      |      |      |      |      |      |      |      |      |      |     |     |     |     |
|-------------------------------------------------------------------------------------|-------|-------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|
|                                                                                     |       |                         | 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)   | 0mm                     | 255         | 220  | 191  | 168  | 149  | 134  | 120  | 109  | 99   | 90   | 81   | 74   | 67  | 61  | 55  | 50  |
|                                                                                     | (N)   | 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)   | 0mm                     | 214         | 184  | 160  | 140  | 124  | 111  | 99   | 89   | 80   | 72   | 65   | 59   | 53  | 47  | 42  | 37  |
|                                                                                     | (N)   | 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.



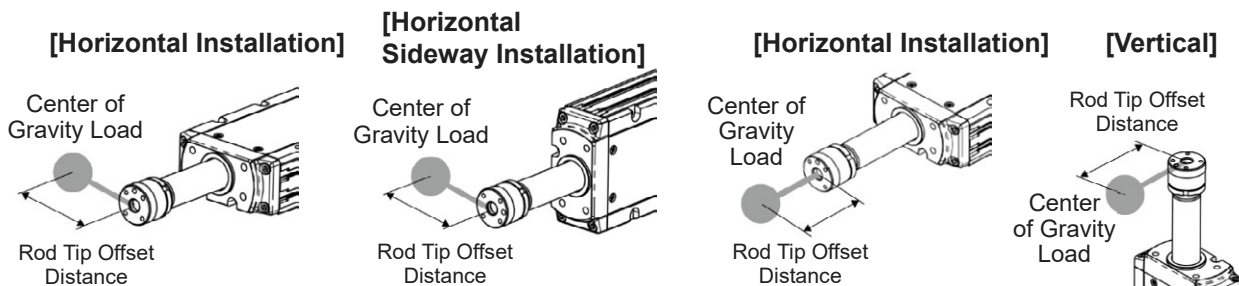
### ◆ Allowable Payload

#### ● Condition to Calculate Allowable Payload

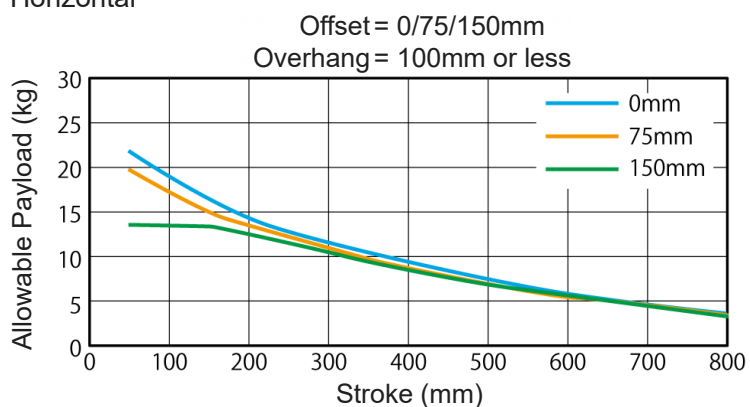
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 0.2G, velocity 450mm/s)

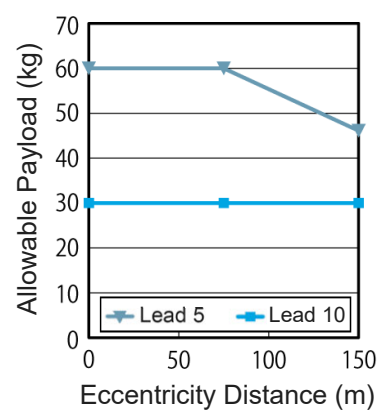
Vertical : Payload that makes 5,000km. (acceleration 0.2G, velocity 200mm/s)



Horizontal



Vertical



## 1.5.2 RCP6(S)W-WRA16R: Motor Reversing Type



### Caution

- Lead 20 cannot be installed vertically.
- Do not attempt to set speed at or less than the minimum speed. Operation will not be made in the set speed.

Figure out the minimum speed using the following formula.

Min. Speed (mm/s) = Lead Length (mm) / 800 / 0.001 (sec)

### ◆ Actuator Specifications

| Item                                   |                | Content                                                          |
|----------------------------------------|----------------|------------------------------------------------------------------|
| Drive system                           |                | Ball screw $\phi 16\text{mm}$ , rolled C10                       |
| Positioning repeatability              |                | $\pm 0.01\text{mm}$                                              |
| Lost motion                            |                | 0.1mm or less                                                    |
| Rod guide                              |                | Linear infinite circulation type                                 |
| Main component materials               | Rod            | $\phi 45\text{mm}$ Stainless Steel, Hard Chromium Electroplating |
|                                        | Frame          | Aluminum, White Anodizing Treatment                              |
|                                        | Dust seal      | Rubber (NBR)                                                     |
|                                        | Actuator cable | Vinyl Chloride (PVC)                                             |
| Rod non-rotation precision (Note 1)    |                | 0 degrees                                                        |
| Ambient operating temperature/humidity |                | 0 to 40°C, 85% RH or less (Non-condensing)                       |
| Degree of protection                   |                | IP65 (IEC60529/JIS0920)                                          |
| Vibration and Impact resistance        |                | $4.9\text{m/s}^2$ 100Hz or less                                  |
| Motor type                             |                | Pulse motor                                                      |
| Encoder type                           |                | Battery-less absolute                                            |
| Encoder pulse count                    |                | 8192 pulse/rev                                                   |

Note 1: It shows the displacement angle in the rod rotational direction at no load.

### ◆ Velocity/Acceleration Payload

When the environment temperature exceeds 5degC. Blank represents that it is not available to use.

Lead 20 (Unit: kg)

| Orientation     | Horizontal       |
|-----------------|------------------|
| Speed<br>(mm/s) | Acceleration (G) |
|                 | 0.2              |
| 0               | 30               |
| 240             | 30               |
| 300             | 30               |
| 360             | 12               |

Lead 10 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.2              |          |
| 0               | 60               | 30.5     |
| 88              | 60               | 30.5     |
| 100             | 60               | 20.5     |
| 110             | 60               | 15.5     |
| 120             | 60               | 12.5     |
| 130             | 60               | 10.5     |
| 140             | 60               | 7.5      |
| 150             | 60               | 3.5      |
| 160             | 23               | 1.5      |
| 200             | 23               |          |
| 220             | 2                |          |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.1              |          |
| 0               | 100              | 59       |
| 48              | 100              | 59       |
| 60              | 100              | 29       |
| 70              | 100              | 24       |
| 80              | 100              | 14       |
| 90              | 100              | 5        |
| 100             | 100              |          |
| 110             | 45               |          |

### ◆ Velocity/Acceleration Payload

When the environment temperature is below 5degC.

Lead 20 (Unit: kg)

| Orientation     | Horizontal       |
|-----------------|------------------|
| Speed<br>(mm/s) | Acceleration (G) |
|                 | 0.2              |
| 0               | 30               |
| 240             | 30               |

Lead 10 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.2              |          |
| 0               | 60               | 30.5     |
| 88              | 60               | 30.5     |
| 100             | 60               | 20.5     |
| 110             | 60               | 15.5     |
| 120             | 60               | 12.5     |

Lead 5 (Unit: kg)

| Orientation     | Horizontal       | Vertical |
|-----------------|------------------|----------|
| Speed<br>(mm/s) | Acceleration (G) |          |
|                 | 0.1              |          |
| 0               | 100              | 59       |
| 48              | 100              | 59       |
| 60              | 100              | 29       |
| 70              | 100              | 24       |
| 80              | 100              | 14       |

### ◆ Stroke and Max. Speed

When the environment temperature exceeds 5degC.

Unit (mm/s)

| Lead (mm) | 50        | 100 to 450<br>(Every 50mm) | 500       | 550       | 600 | 650 | 700 | 750 | 800 |
|-----------|-----------|----------------------------|-----------|-----------|-----|-----|-----|-----|-----|
| 20        | 280       | 360                        |           | 340       | 295 | 260 | 225 | 200 | 180 |
| 10        | 220 <160> |                            | 195 <160> | 165 <160> | 145 | 125 | 110 | 100 | 90  |
| 5         | 110 <90>  |                            | 95 <90>   | 80        | 70  | 60  | 55  | 50  | 45  |

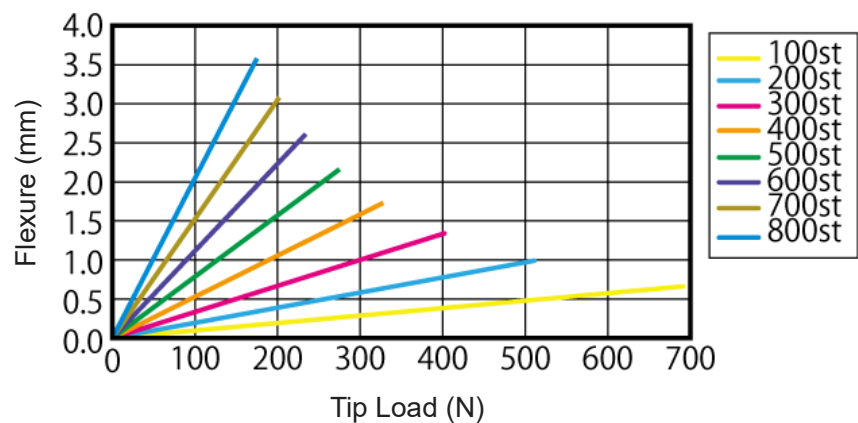
< > represents vertical operation.

When the environment temperature is below 5degC.

Unit (mm/s)

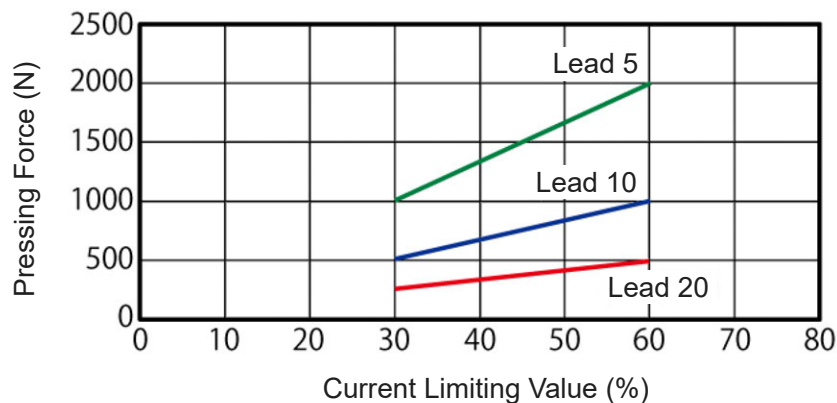
| Lead (mm) | 50  | 100 to 450<br>(Every 50mm) | 500 | 550 | 600 | 650 | 700 | 750 | 800 |
|-----------|-----|----------------------------|-----|-----|-----|-----|-----|-----|-----|
| 20        | 240 |                            |     |     |     |     | 225 | 200 | 180 |
| 10        | 120 |                            |     |     |     |     | 110 | 100 | 90  |
| 5         | 80  |                            |     |     | 70  | 60  | 55  | 50  | 45  |

### ◆ Rod Flexure (Reference)



### ◆ Pressing Force and Current Limiting Values

| Current Limiting Values | Lead 5 (N) | Lead 10 (N) | Lead 20 (N) |
|-------------------------|------------|-------------|-------------|
| 30%                     | 1000       | 500         | 250         |
| 40%                     | 1333       | 667         | 333         |
| 50%                     | 1667       | 833         | 417         |
| 60%                     | 2000       | 1000        | 500         |



### Caution

- The relation of the pressing force and the current limit value is a reference when assuming the speed is 10mm/s.
- There is a little variance in the actual pressing force. The variance of the pressing force becomes large when the current limit value is low.
- Use the product within the range in the graph for the current limit value. Pressing force will not be stable if used below 30%. There is even a case that it would not operate. An operation cannot be made also when it is beyond 60%. Doing so may cause degradation in the motor coil insulation by heat radiation, which results in shortening the product life.
- For the CON system controllers such as PCON, when the approach speed (setting in the position table) to the pressing start position is 10mm/s or less, pressing is performed at the approach speed. In such a case also the pressing force will be unstable. In such cases, check in advance that the actuator can be used with no problem before omit using.

For the SEL system controllers such as MSEL, pressing operation is performed at the speed set in PAPR Command regardless of the approach speed to the pressing start position.

### ◆ Allowable Load and Torque on Rod Tip

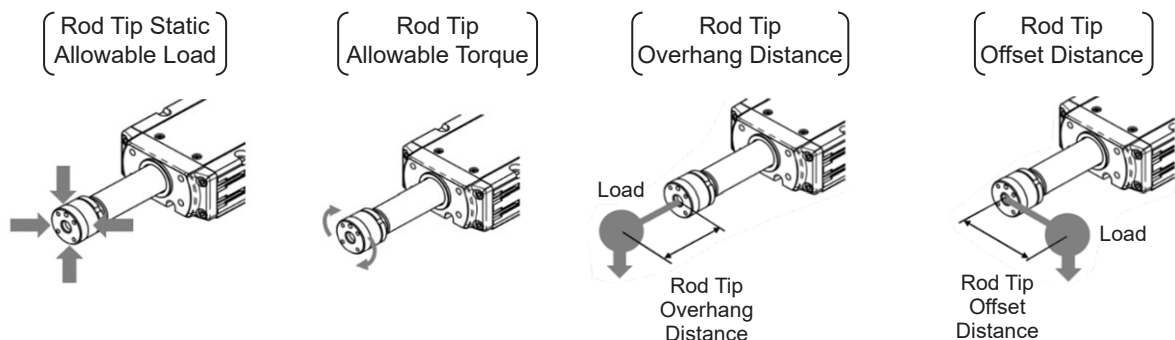
Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table.

Applying excess load may cause an operation failure, parts malfunction and shortened life.

| Item                                                                                | Unit  | Rod Tip Offset Distance | Stroke (mm) |      |      |      |      |      |      |      |      |      |      |      |     |     |     |     |
|-------------------------------------------------------------------------------------|-------|-------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|
|                                                                                     |       |                         | 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)   | 0mm                     | 255         | 220  | 191  | 168  | 149  | 134  | 120  | 109  | 99   | 90   | 81   | 74   | 67  | 61  | 55  | 50  |
|                                                                                     | (N)   | 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)   | 0mm                     | 214         | 184  | 160  | 140  | 124  | 111  | 99   | 89   | 80   | 72   | 65   | 59   | 53  | 47  | 42  | 37  |
|                                                                                     | (N)   | 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.



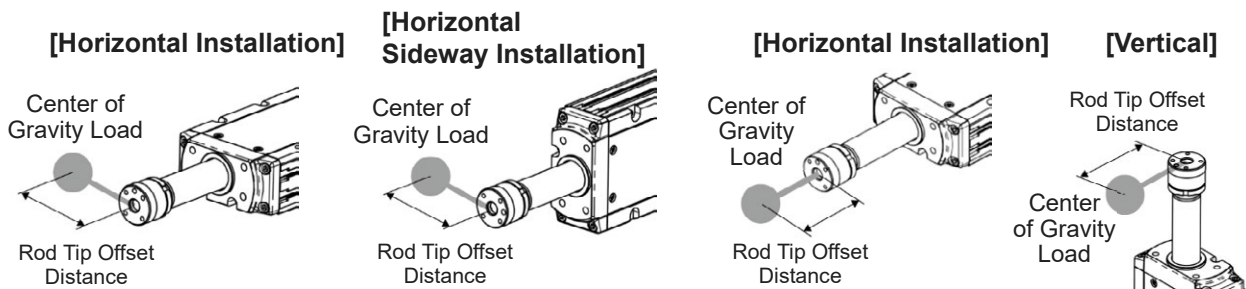
### ◆ Allowable Payload

#### ● Condition to Calculate Allowable Payload

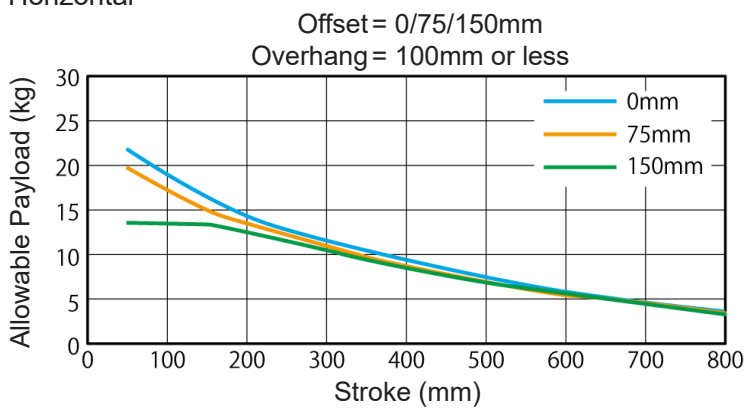
Guide drive life considering moment by acceleration/deceleration

Horizontal : Payload that makes 5,000km. (acceleration 0.2G, velocity 420mm/s)

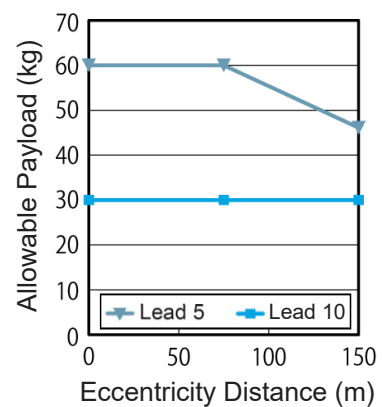
Vertical : Payload that makes 5,000km. (acceleration 0.2G, velocity 180mm/s)



Horizontal



Vertical

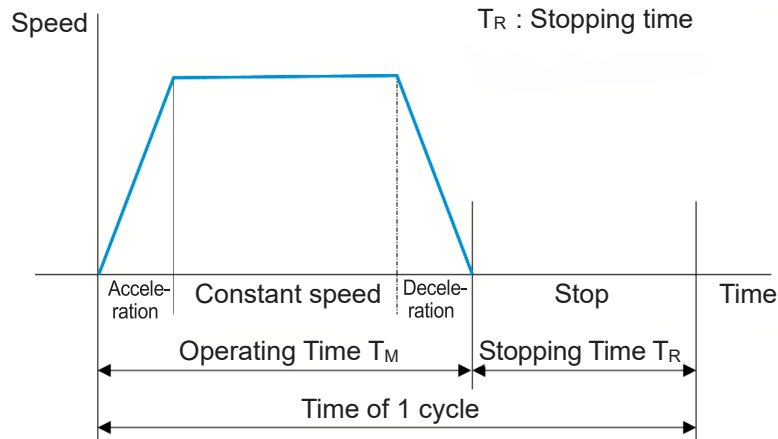


## 1.6 Duty Ratio

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

$$D = \frac{T_M}{T_M + T_R} \times 100 (\%)$$

D : Duty ratio  
 $T_M$  : Operating time  
 (including push-motion operation)  
 $T_R$  : Stopping time



There is a limitation in the duty ratio due to the ambient temperature as shown below.

### [Standard Specification]

Continuous operation is available with the duty ratio 100%.

### [Built-in Controller Specification]

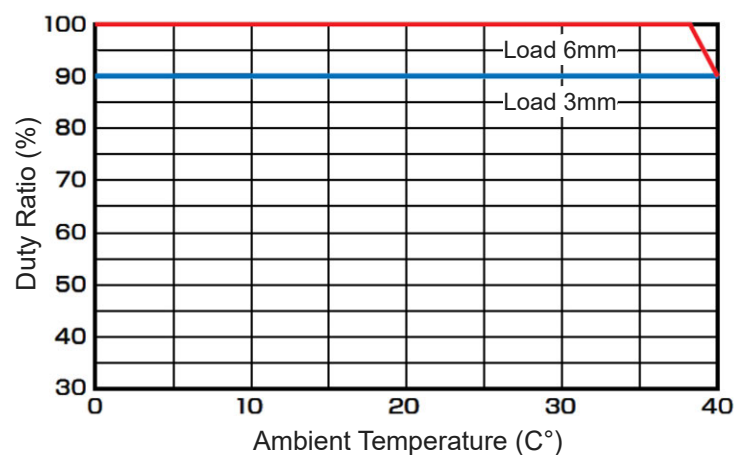
#### RCP6SW-WRA10C, 10R

Continuous operation is available with the duty ratio 100%.

#### RCP6SW-WRA12C, 12R

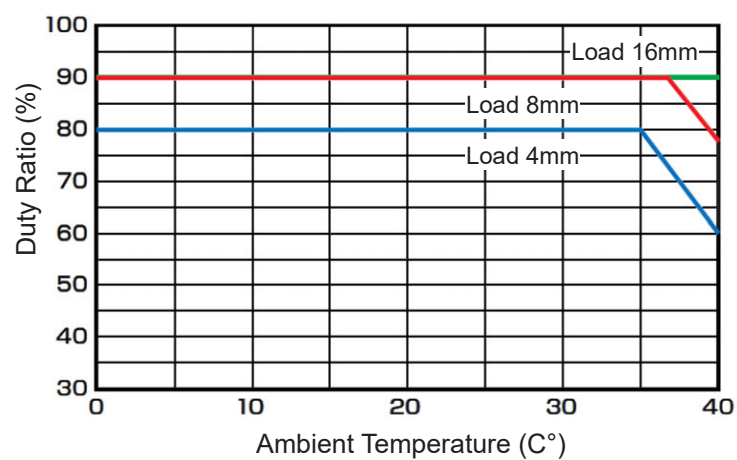
Lead 12mm are available for continuous operation at 100% of the duty ratio.

Follow the graph below for the duty ratio when operating Lead 3mm and 6mm.



**RCP6SW-WRA14C, 14R**

Follow the graph below for the duty ratio when operating Lead 4mm, 8mm and 16mm.

**RCP6SW-WRA16C, 16R**

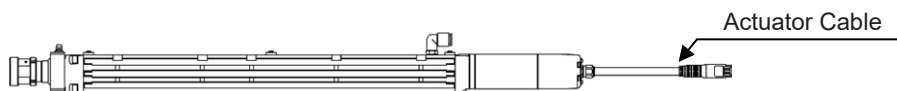
Perform operation at 70% of duty ratio or less.

## 1.7 Options

### 1.7.1 Changing Actuator Cable Length (Model Code: AC5/AC10/AC15)

It should be indicated when it is required to change the actuator cable length.

No indication: 2m, AC5: 5m, AC10: 10m, AC15: 15m



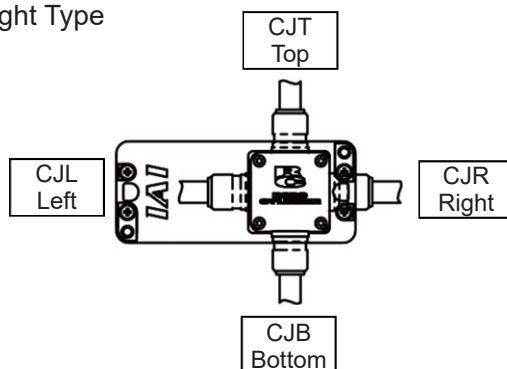
### 1.7.2 Brake Type (Model Code: B)

It retains a rod so it would not move during power cutoff or the servo is turned off. It is a structure to retain and not to move. This option is necessary when an actuator is installed in the vertical orientation.

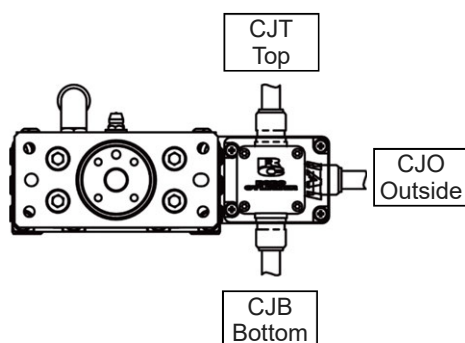
### 1.7.3 Cable Eject Direction Changed (Model Code: CJB, CJL, CJO, CJR, CJT)

The direction to eject the motor / encoder cable applied on the actuator main unit can be changed to top/bottom/right/left.

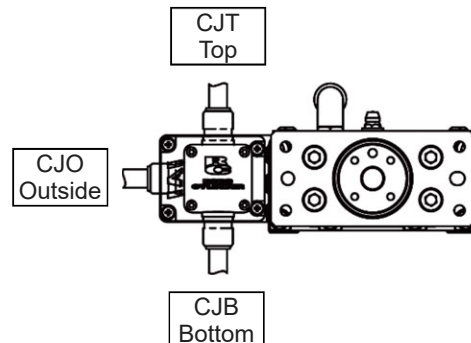
#### ●Motor Straight Type



#### ●Motor Left Reversed (ML)



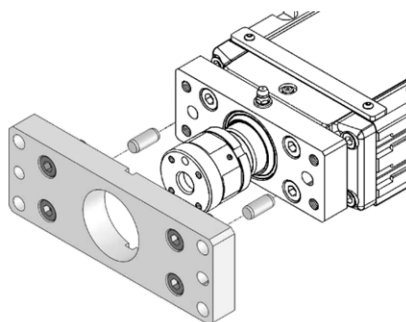
#### ●Motor Right Reversed (MR)



### 1.7.4 Flange (Model Code: FL)

It is a bracket for installation to affix with screws from the actuator main unit side.  
Refer to [2.3.7 Installation using the flange (front)] for dimensions and how to install.

\* As it is not delivered in an assembled state, assemble it referring to the drawing.



#### **RCP6(S)W-WRA10□**

Single Unit Model Code: RCP6W-FL-WRA10

Single Unit Weight: 0.5kg

Material: Steel [Nickel Plating]

#### **RCP6(S)W-WRA14□**

Single Unit Model Code: RCP6W-FL-WRA14

Single Unit Weight: 1.9kg

Material: Steel [Nickel Plating]

#### **RCP6(S)W-WRA12□**

Single Unit Model Code: RCP6W-FL-WRA12

Single Unit Weight: 1.0kg

Material: Steel [Nickel Plating]

#### **RCP6(S)W-WRA16□**

Single Unit Model Code: RCP6W-FL-WRA16

Single Unit Weight: 2.4kg

Material: Steel [Nickel Plating]

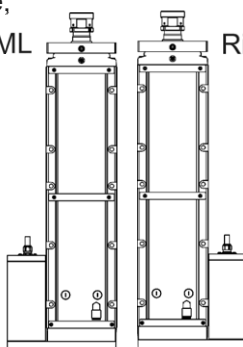
### 1.7.5 Motor Reversed Specification (Model Code: ML, MR)

The orientation to reverse a motor should be indicated in the motor reversed type.

From the view of the motor side,

Left Reversed is ML

Right Reversed is MR



### 1.7.6 Reversed-home Specification (Model Code: NM)

Although the home position is set on the motor side in normal, when it is required to set on the other side due to the layout of the equipment and so on, the orientation of the home position can be set opposite in the option.

Normal



Reversed-home Specification



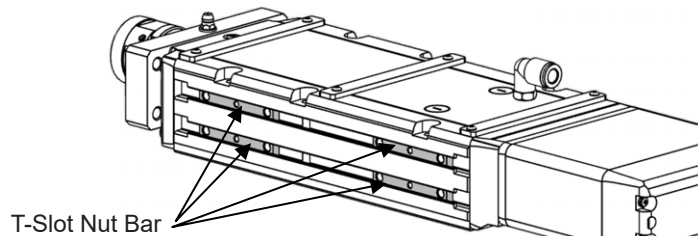
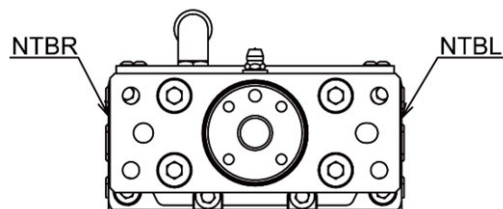
### 1.7.7 T-Slot Nut Bar (Model Code: NTBL, NTBR)

It is a bracket in bar shape equipped with threaded holes, which should be inserted to T-shaped slots on an actuator.

There should be four pieces of T-shaped slot nut bars assembled on delivery.

Refer to [2.3.5 Installation using T-shaped slots on the side] for dimensions and how to install.

- \* As it is not available for a user to replace it, it is not sold as an individual product.
- \* The installation hole on the top of the base, which crosses T-slot nut bar, cannot be used.



# ROBO Cylinder

## Chapter 2

# Installation

|        |                                                                             |      |
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## 2.1 Transportation

### 2.1.1 Handling of Robot

#### [1] Handling the Packed Unit

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

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

#### [2] Handling the Actuator After Unpacking

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

Supplement : For the names of each part of the actuator, refer to [Names of the Parts]

### 2.1.2 Handling in the Assembled Condition

---

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

#### [1] How to Handle the Package

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

#### [2] How to Handle after Unpackaged

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

### **2.1.3 Handling in Condition of being assembled in Machinery Equipment (System)**

These are some caution notes for when transporting the actuator being assembled in the machinery equipment (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 hanging up the machinery equipment (system) with ropes, do not attempt to apply load on the actuators or the connector box. Also pay attention not to pinch cables and bend or deform them forcefully.

## 2.2 Installation and Storage • Preservation Environment

### 2.2.1 Installation Environment

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

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

- 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)
- Environment not protectable with the protection feature of IP65  
IP65: Solid Substance: No ingress of dust with complete protection against contact.  
Liquid: Water projected by a nozzle against enclosure from any direction shall have no harmful effects.
- Where the actuator is subject to 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

When using the product in any of the locations specified below, provide a sufficient shield.

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

### 2.2.2 Storage • Preservation Environment

---

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

2.3 How to Install

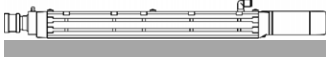
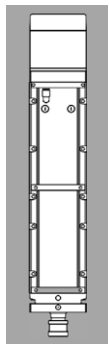
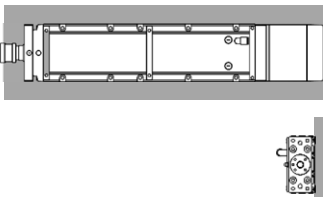
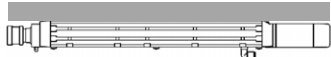
2.3.1 Mounting Orientation

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

○: Possible    Δ: Daily inspection is required    ×: Not possible

| Type                                                                 | Horizontal Installation | Vertical Installation | Sideway Installation | Ceiling mount Installation |
|----------------------------------------------------------------------|-------------------------|-----------------------|----------------------|----------------------------|
| WRA10C, WRA10R<br>WRA12C, WRA12R<br>WRA14C, WRA14R<br>WRA16C, WRA16R | ○                       | ○                     | ○                    | ○                          |

Mounting Orientation

| Horizontal                                                                          | Vertical                                                                            | Sideways                                                                             | Ceiling Mount                                                                         |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |



Caution

- When the motor straight type is to be installed vertically, it is recommended that the motor comes to the top.

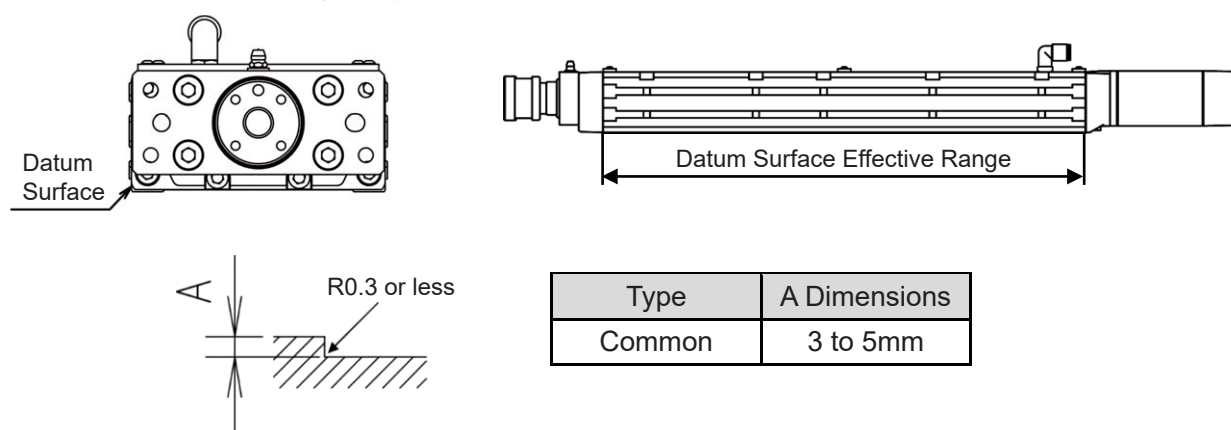
### 2.3.2 About Installation of Main Body

- 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. Also, the platform should have a structure stiff enough to install the unit so it would not generate vibration or other abnormality.
- Also consider enough space necessary for maintenance work such as actuator replacement and inspection.
- The side and bottom surfaces of the base on the actuator work as the datum surfaces for the side of the rod.

Use these surfaces as the datum surfaces for mounting.

- As there could be a case that the width dimension of the front bracket or rear bracket is wider than the datum surface dimension on the side, have them pushed towards the datum surface within the datum surface effective range.

Having machining work to press the brackets towards the datum surface outside the datum surface effective range may cause interference to brackets and motors.



- On the base there is a datum surface prepared for the attachment slotted holes.  
On the back side of the actuator, there are through holes, positioning reamed holes and slotted holes. For the details of the positions and dimensions, check in the appearance drawings.  
Refer to [Chapter 6 External Dimensions]  
When repeatability in re-attaching is required after it is detached, utilize the reamed holes.  
Please note, however, that a consideration is necessary such as to use only one point on the motor side of the reamed holes when a fine-tuning such as perpendicularity is required.
- There are T-shaped slots on the side of an actuator, and threaded holes on the frame front and the reversed type rear bracket.  
By using them, installation in the following ways is available.
  - Installation using the through holes from the top of an actuator
  - Installation using T-shaped slots on the side
  - Installation using the threaded holes on the dust seal housing
  - Installation using a front flange (option)
  - Installation using the attachment holes on a motor reversed type bracket

### 2.3.3 About Attachment Screws

- For external threads for attachment, use high-strength hex socket bolts with their strength equivalent to ISO-10.9 or higher.
- For the effective engagement length between the bolt and female thread, provide at least the applicable value specified below:  
 Female thread is made of steel material → Same length as the nominal diameter  
 Female thread is made of aluminum → 1.8 times of nominal diameter
- Screws to hold the actuator are to be prepared by the user.
- Be careful with regard to the length of the mounting bolt and positioning pin. The use of screwin depth greater than that of the screw or reamed mounting holes may damage the screw hole or reduce the mounting strength of the transported object, leading to decreased accuracy or unexpected accidents.

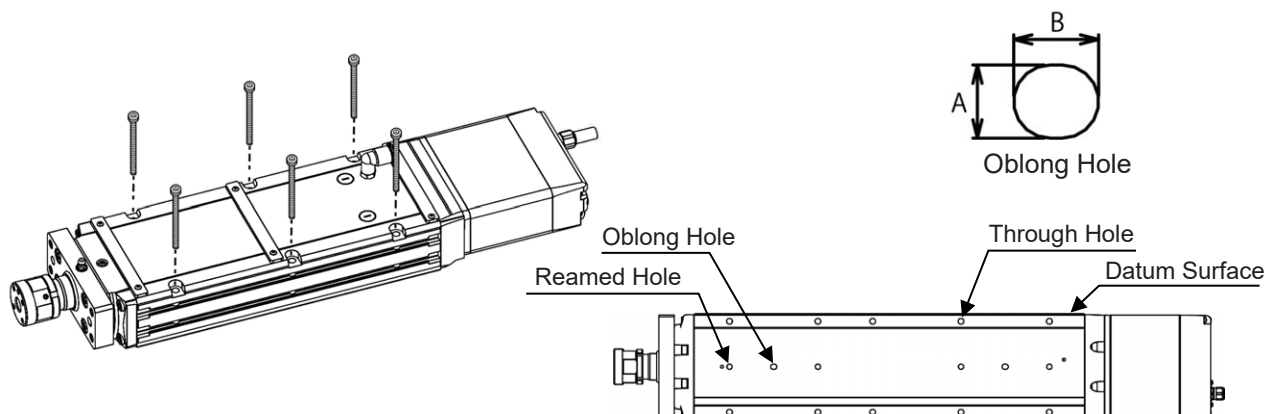
### 2.3.4 Installation using the through holes from the top of an actuator

There are through holes equipped to fix the unit from the top.

There are also reamed holes and a oblong hole for positioning pins.

\* There are no oblong holes on Stroke 50mm and 100mm.

For details regarding the position and dimensions, refer to [Chapter 6 External Dimensions]



| Type             | Through Hole                               | Mounting Screw | Tightening Torque | Reamed Hole  | Oblong Hole                      |
|------------------|--------------------------------------------|----------------|-------------------|--------------|----------------------------------|
| WRA10C<br>WRA10R | Φ5.5 through<br>Φ11 counterbore depth 6.5  | M5             | 3.42N·m           | Φ5H7 depth 5 | A:5 $^{+0.012}_0$<br>B:6 depth 5 |
| WRA12C<br>WRA12R | Φ6.6 through<br>Φ12.5 counterbore depth 7  | M6             | 5.36N·m           | Φ6H7 depth 6 | A:6 $^{+0.012}_0$<br>B:7 depth 6 |
| WRA14C<br>WRA14R | Φ9 through<br>Φ16.5 counterbore depth 10.5 | M8             | 11.48N·m          | Φ8H7 depth 9 | A:8 $^{+0.015}_0$<br>B:9 depth 9 |
| WRA16C<br>WRA16R | Φ9 through<br>Φ16.5 counterbore depth 10.5 | M8             | 11.48N·m          | Φ8H7 depth 9 | A:8 $^{+0.015}_0$<br>B:9 depth 9 |

### 2.3.5 Installation using T-shaped slots on the side

There are T-shaped slots equipped to fix the unit from the side.

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).

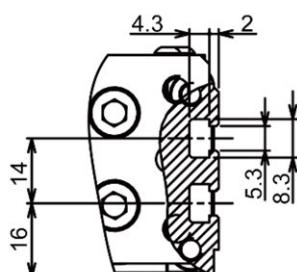


#### Caution

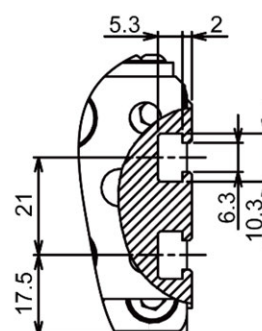
- Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the screw holes may be damaged, actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.
- The installation hole on the top of the base, which crosses a square nut or T-slot nut bar, cannot be used.
- In order to keep the airtightness, we do not allow a user to install the T-slot nut bars.

[Dimensions for T-Slot]

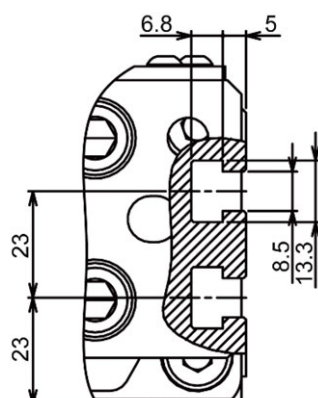
WRA10



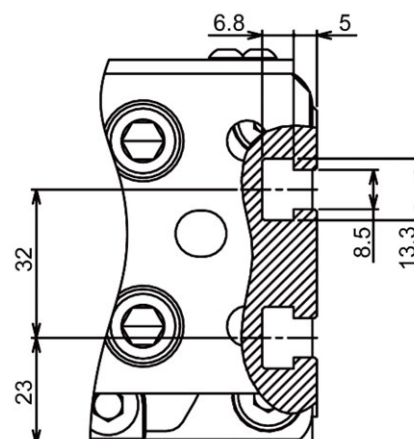
WRA12



WRA14



WRA16

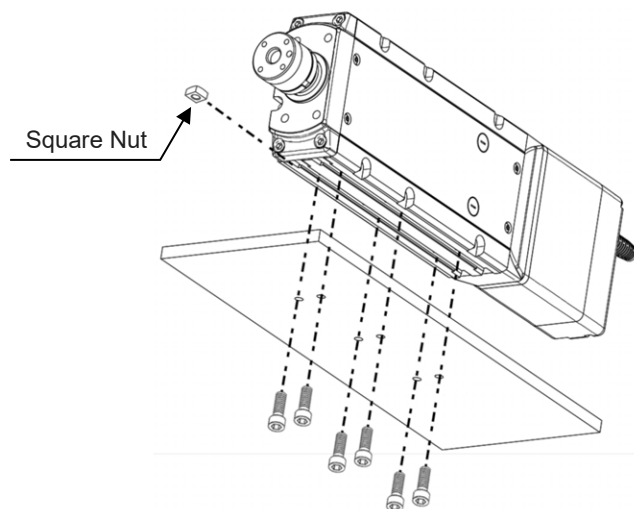


## 2.3 How to Install

### (1) Installation Using Square Nut

Insert square nuts and fix it with screws.

Follow the minimum number of fixing bolts and tightening torque specified for installation.



| Tyep  | Min. Number of<br>Fixing Bolt (pieces) | Tightening Torque<br>(N·m) |
|-------|----------------------------------------|----------------------------|
| WRA10 | 6                                      | 3.42                       |
| WRA12 | 6                                      | 5.36                       |
| WRA14 | 6                                      | 11.5                       |
| WRA16 | 6                                      | 11.5                       |

## (2) Installation on T-Shaped Slot Nut Bars

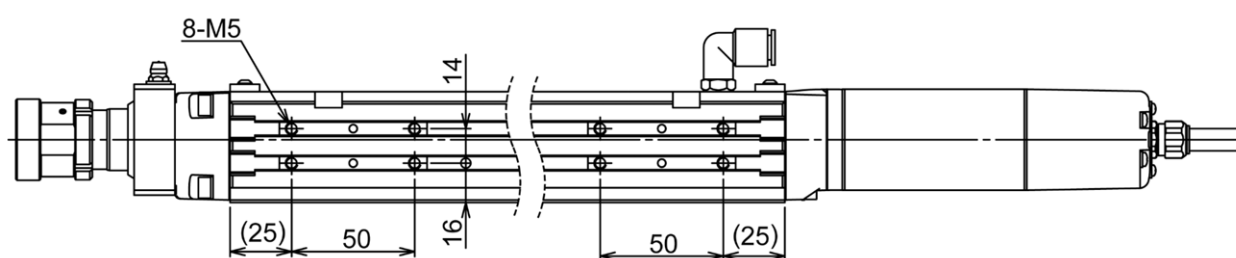
The equipment is delivered under the condition that the T-slot nut bar is fixed with the hex socket set screws at the positions shown below.

Loosen the screws to adjust the position.

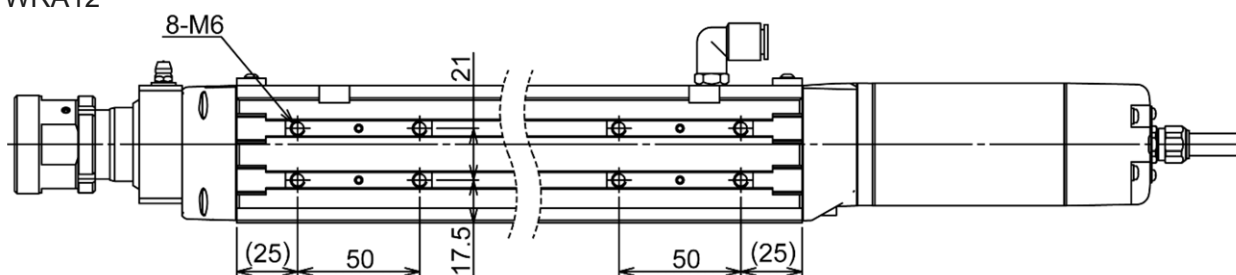
\* The installation hole on the top of the base, which crosses T-slot nut bar, cannot be used.

\* The equipment is delivered under the condition that the T-slot nut bar is fixed at the positions shown below.

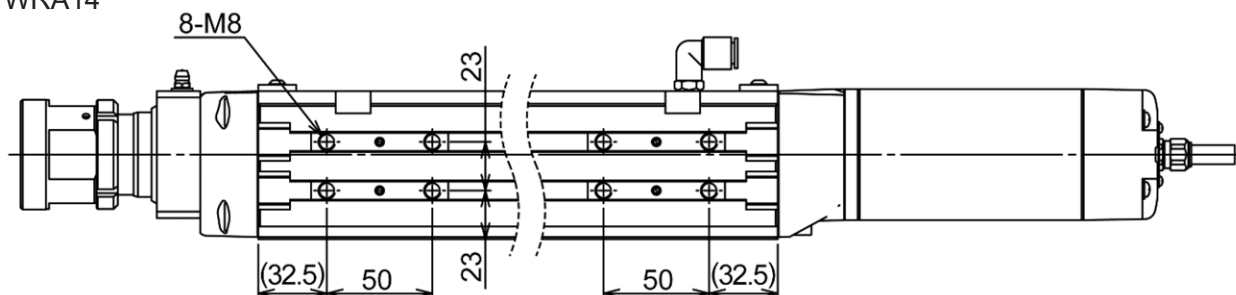
WRA10



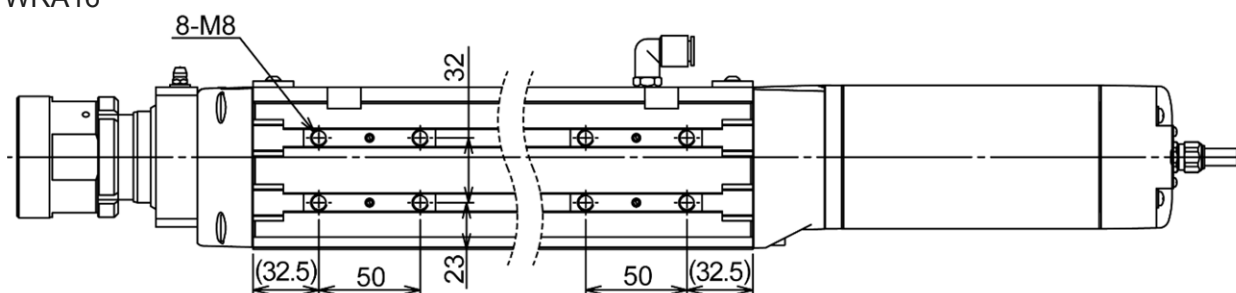
WRA12



WRA14



WRA16



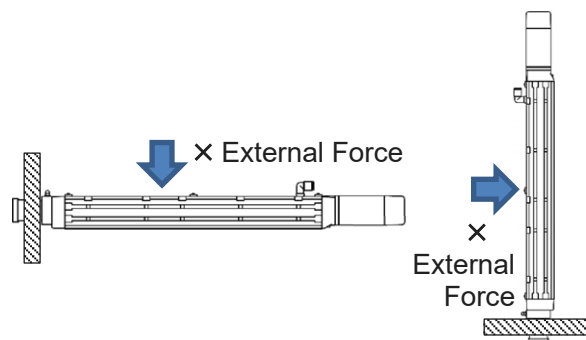
### 2.3.6 Installation using the threaded holes on the dust seal housing

There are screw holes equipped on the dust seal housing.  
Utilize these screw holes for installation.

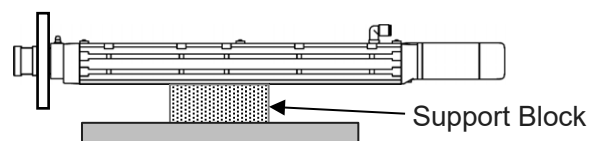


#### Caution

- Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the screw holes may be damaged, actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.
- Do not attempt to apply any external force to the body when installing using dust seal housing. External force may cause an operation failure or parts malfunction.

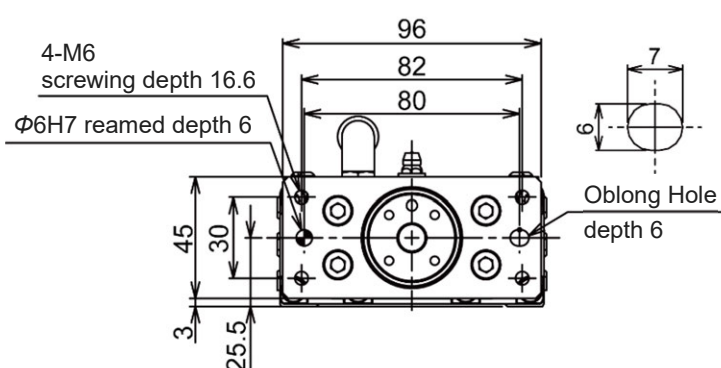


- Prepare a support block as shown in the figure below for the horizontal installation of the unit with its stroke more than 150 even if there is no external force applied on the body. Even for those with the stroke less than 150, it is recommended to have a support block to avoid vibration being generated due to the operation condition or installation environment, which may cause an operation failure or parts malfunction.



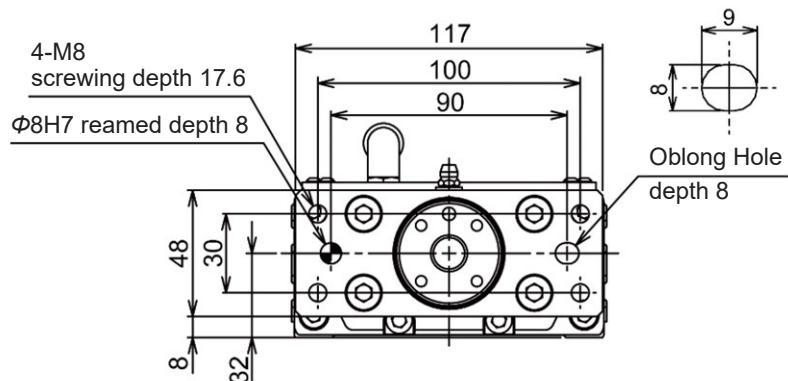
- Operation of the actuator with attachment only on the dust seal housing applies the external force of the acceleration/deceleration multiplied by the weight of the actuator to the unit body.  
Control the acceleration/deceleration at 0.05G or less (for reference) when the actuator is moved with attachment only on the dust seal housing.
- Use hex socket head bolts for the male threads for installing the base.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Have the length of thread engagement approximately 1.2 times of the nominal diameter.

## WRA10



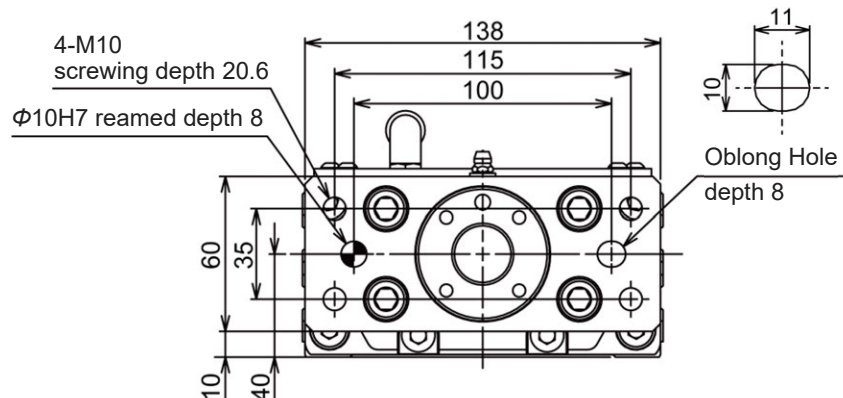
| Tightening Torque<br>(for each seating surface) |          |
|-------------------------------------------------|----------|
| Steel                                           | Aluminum |
| 12.3N·m                                         | 5.36N·m  |

## WRA12



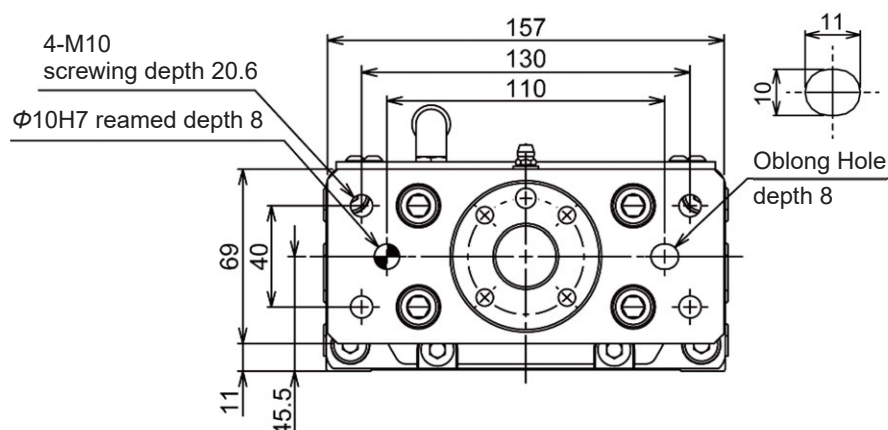
| Tightening Torque<br>(for each seating surface) |          |
|-------------------------------------------------|----------|
| Steel                                           | Aluminum |
| 29.97N·m                                        | 11.48N·m |

## WRA14



| Tightening Torque<br>(for each seating surface) |          |
|-------------------------------------------------|----------|
| Steel                                           | Aluminum |
| 59.37N·m                                        | 23.3N·m  |

## WRA16



| Tightening Torque<br>(for each seating surface) |          |
|-------------------------------------------------|----------|
| Steel                                           | Aluminum |
| 59.37N·m                                        | 23.3N·m  |

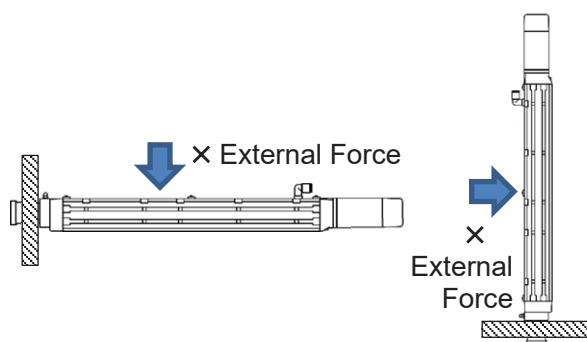
### 2.3.7 Installation using the flange (front)

By using a flange (option), fix it with screws from the actuator main unit side.

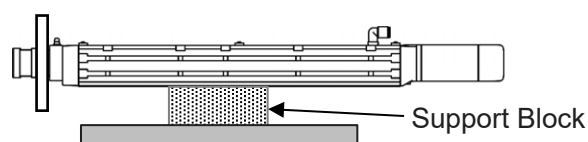


#### Caution

- Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the screw holes may be damaged, actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.
- When installing the unit using a flange, pay attention not to apply any external load on the main unit. External force may cause an operation failure or parts malfunction.

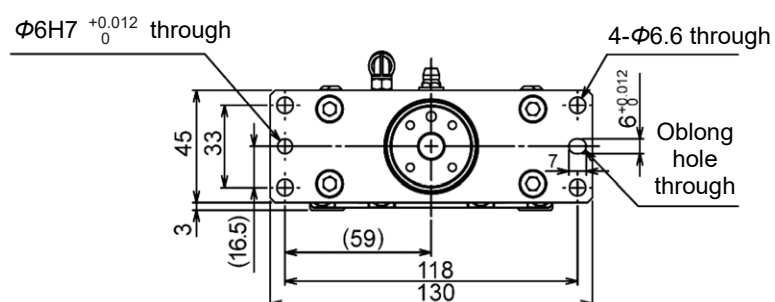


- Prepare a support block as shown in the figure below for the horizontal installation of the unit with its stroke more than 150 even if there is no external force applied on the body. Even for those with the stroke less than 150, it is recommended to have a support block to avoid vibration being generated due to the operation condition or installation environment, which may cause an operation failure or parts malfunction.

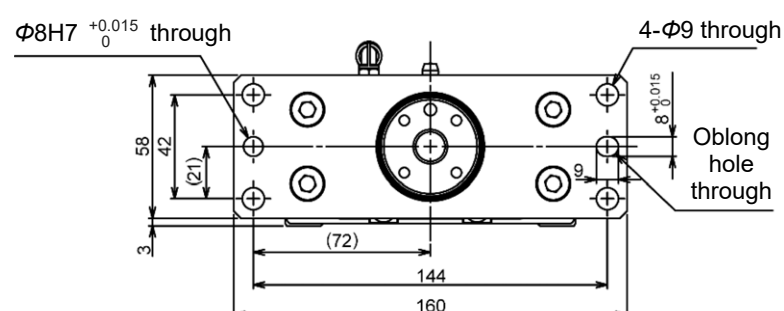


- Operation of the actuator with attachment only on the flange applies the external force of the acceleration/deceleration multiplied by the weight of the actuator to the unit body. Control the acceleration/deceleration at 0.05G or less (for reference) when the actuator is moved with attachment only on the flange.
- Use hex socket head bolts for the male threads for installing the base.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Have the length of thread engagement approximately 1.2 times of the nominal diameter.

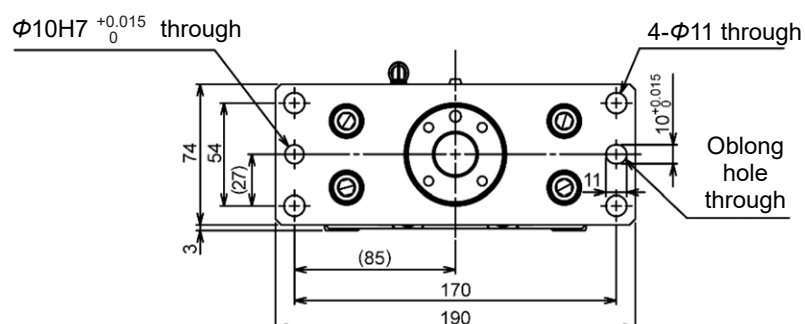
## ●WRA10C, WRA10R



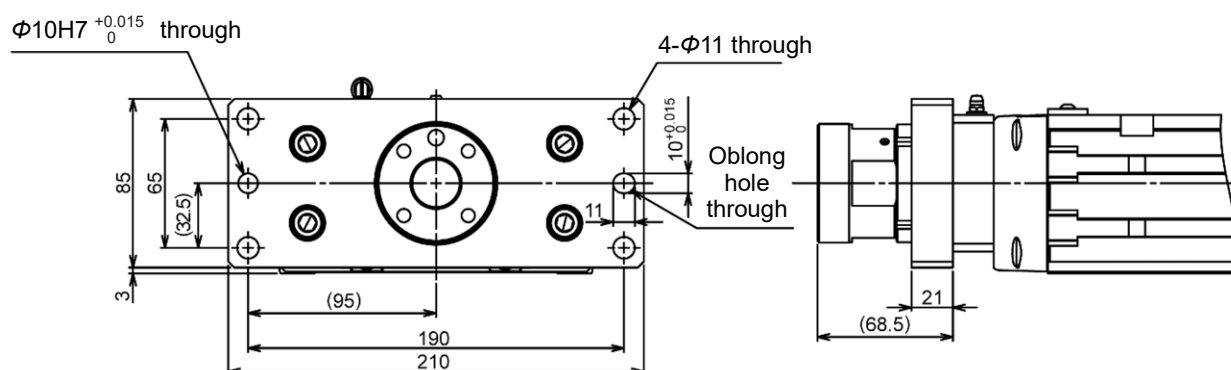
## ●WRA12C, WRA12R



## ●WRA14C, WRA14R



## ●WRA16C, WRA16R



2.3.8 Installation Using Attachment Holes on Reverse Bracket

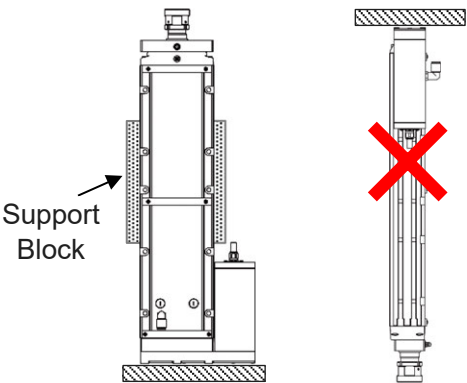
There are threaded holes equipped on the reverse bracket for the motor reversed type WRA10R, WRA12R, WRA14R and WRA16R. Utilize these screw holes for installation.



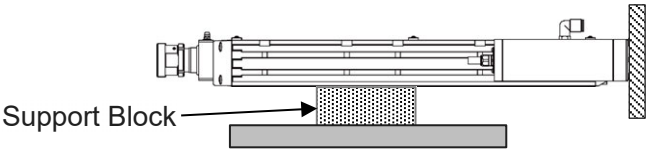
Caution

- Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the attachment holes may be damaged, actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.
- Use hex socket head bolts for the male threads for installing the base.  
Use of high-tension bolts meeting at least ISO 10.9 is recommended.  
Make sure the bolt and internal thread effective engagement length is approximately 1.8 times or more of bolt nominal diameter.
- Although it depends on the installation posture, it should basically be avoided to fix the unit only with the attachment holes on the reversing bracket.
- Do not apply external force to the main body.  
There may be caused vibration due to the operating condition or installation environment, which may result in operational failures or components malfunction.  
\* When it is perpendicular installation without support etc., external force does not act, it is not attempt to apply the radial load.

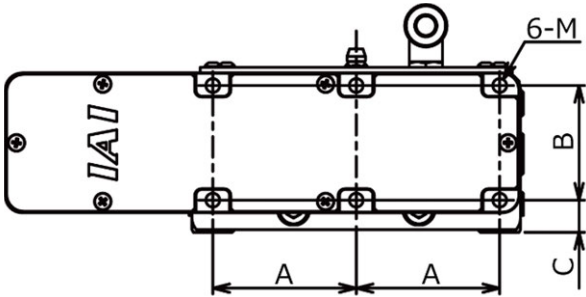
| Supports | Installation Posture |          |               |
|----------|----------------------|----------|---------------|
|          | Horizontal           | Vertical | Ceiling Mount |
| No       | ×                    | ×        | ×             |
| Yes      | ○                    | ○        | ×             |



- Support the main unit with such as a support block so external force would not be applied on it.



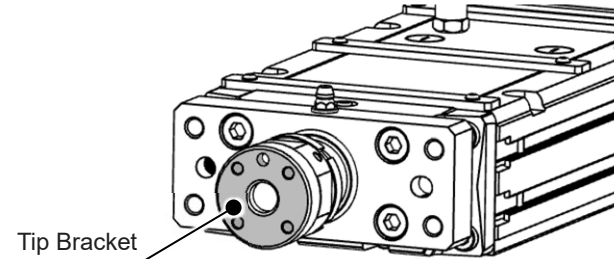
◆ Reverse Bracket Attachment Hole Dimensions



| Type   | A      | B    | C      | Screw Hole  | Tightening Torque<br>(for each seating surface) |          |
|--------|--------|------|--------|-------------|-------------------------------------------------|----------|
|        |        |      |        |             | Steel                                           | Aluminum |
| WRA10R | 42.5mm | 33mm | 9mm    | M5 depth 10 | 7.27N·m                                         | 3.42N·m  |
| WRA12R | 51.5mm | 41mm | 11.5mm | M6 depth 10 | 12.3N·m                                         | 5.36N·m  |
| WRA14R | 60mm   | 50mm | 15mm   | M8 depth 12 | 29.97N·m                                        | 11.48N·m |
| WRA16R | 70.5mm | 59mm | 16mm   | M8 depth 16 | 29.97N·m                                        | 11.48N·m |

### 2.3.9 Attachment of Work Part (Transported Object)

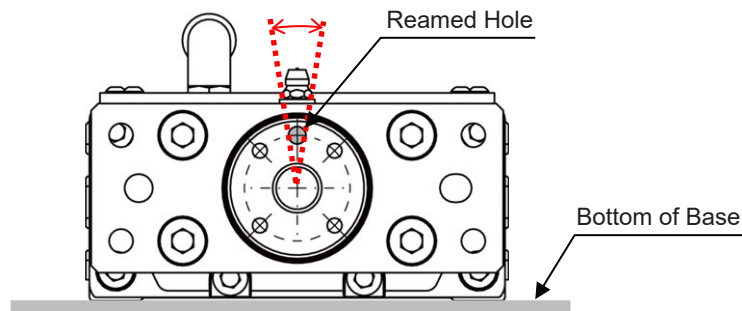
There are screw holes equipped on the tip bracket on the rod. Utilize them to attach a transported object. Also, use the reamed hole when it is necessary to ensure the repeatability when attached repeatedly.



#### Caution

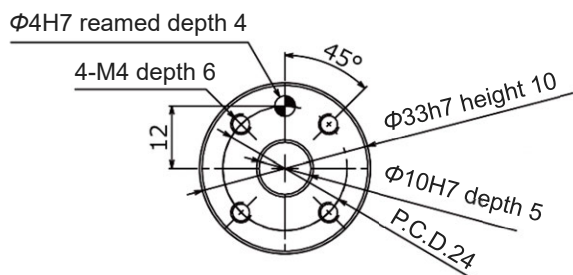
- Use hex socket head bolts for the male threads for installing the base.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- Make sure the bolt and internal thread effective engagement length is approximately 1 times or more of bolt nominal diameter.
- Do not attempt to apply torque 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  $\pm 1^\circ$  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.

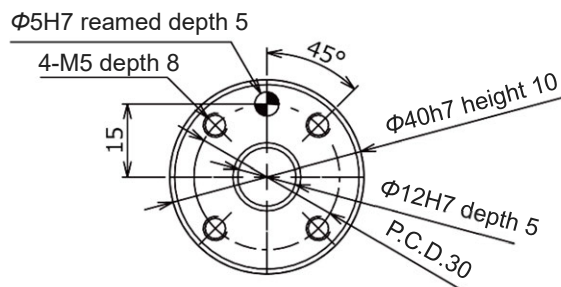


### ◆ Attachment Hole Dimensions

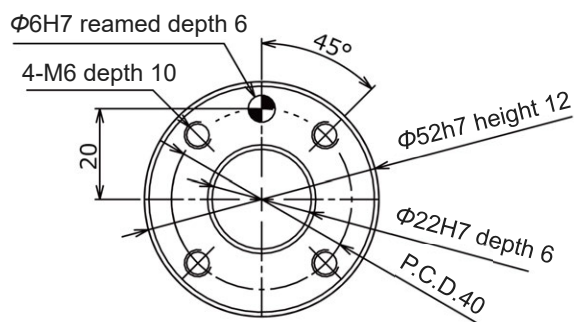
[WRA10]



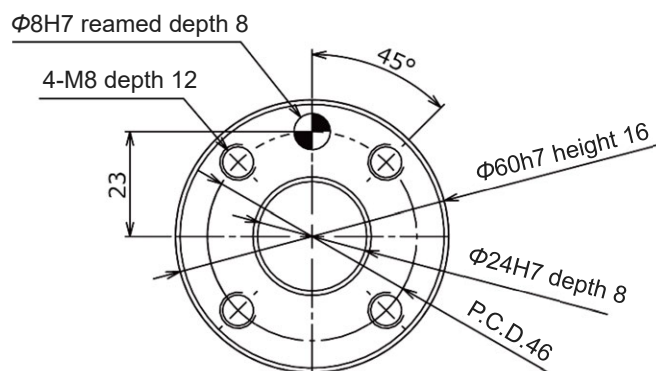
[WRA12]



[WRA14]



[WRA16]



| Type   | Tightening Torque<br>(for each seating surface) |          |
|--------|-------------------------------------------------|----------|
|        | Steel                                           | Aluminum |
| WRA10R | 3.59N·m                                         | 1.76N·m  |
| WRA12R | 7.27N·m                                         | 3.42N·m  |
| WRA14R | 12.3N·m                                         | 5.36N·m  |
| WRA16R | 29.97N·m                                        | 11.48N·m |

### 2.3.10 Connection of Air Tube

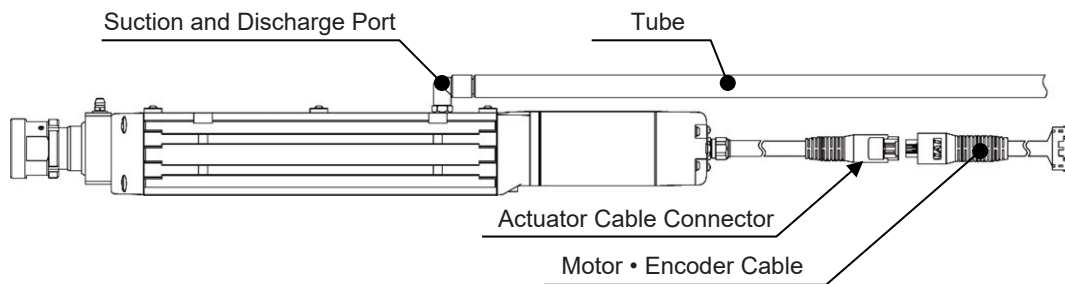


#### Caution

- Do not attempt to have liquid sucked at the suction and discharge port. Otherwise, it may cause malfunction.

Join a tube with its outer diameter  $\phi 8$  to the suction and discharge port and extend the other end of the tube to a position where water will not be applied. Do not have air purge performed.

Also, the connector on the actuator cable is not water-proofed. Have it connected to the motor • encoder cable at the position with no influence of dust and water, or have a water-proof treatment on the connector.



## ROBO Cylinder

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# Chapter 3

# Connecting with the Controller

|       |                                                                          |     |
|-------|--------------------------------------------------------------------------|-----|
| 3.1   | Connecting with the Controller .....                                     | 3-1 |
| 3.2   | Motor • Encoder Cables .....                                             | 3-7 |
| 3.2.1 | Dedicated connection cable for other than RCON, RSEL, and RCM-P6PC ..... | 3-7 |
| 3.2.2 | Connection Cable Dedicated for RCON, RSEL, and RCM-P6PC .....            | 3-9 |



## 3.1 Connecting with the Controller



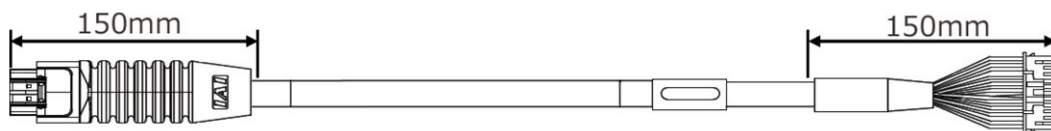
### Warning

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

- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or rejoint 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.

### 3.1 Connecting with the Controller

- Make sure there is not too much friction inside the cable storage equipment.
- Do not apply radiated heat to power line or cables.
- Do not bend the cable in the area from the connector tip inward to 150mm on both ends.  
 Standard Cable CB-CAN-MPA□□□, CB-CFA3-MPA□□□, CB-ADPC-MPA□□□  
 Robot Cable CB-CAN-MPA□□□-RB, CB-CFA3-MPA□□□-RB, CB-ADPC-MPA□□□-RB

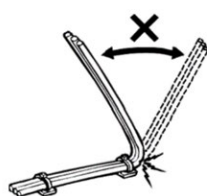


- Do not attempt to use the motor / encoder cable in a condition that the cable is bundled up in several layers such as coil winding.

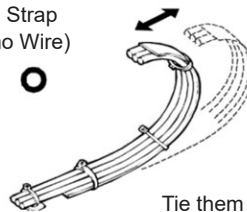
There are motor driving power line and encoder signal line in the motor / encoder cable. Therefore, if the motor / encoder cable is bundled up, the noise generated from the motor driving power line could give an influence to the encoder and may cause an error.



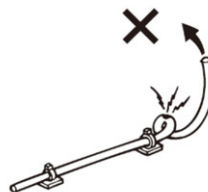
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



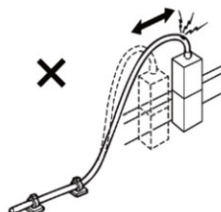
Steel Strap  
(Piano Wire)



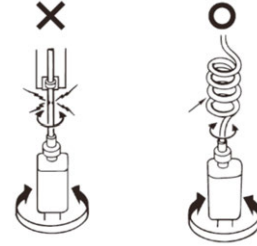
- Do not let the cable bend, kink or twist.



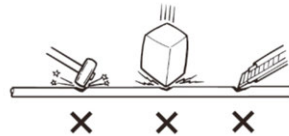
- Do not pull the cable with a strong force.



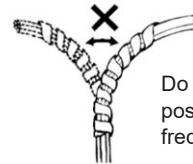
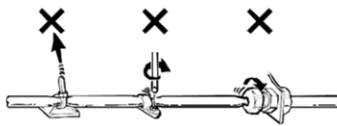
- Pay attention not to concentrate the twisting force to one point on a cable.



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

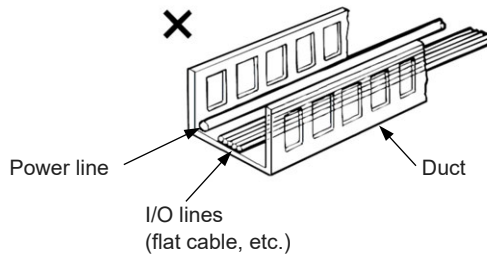


- When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.



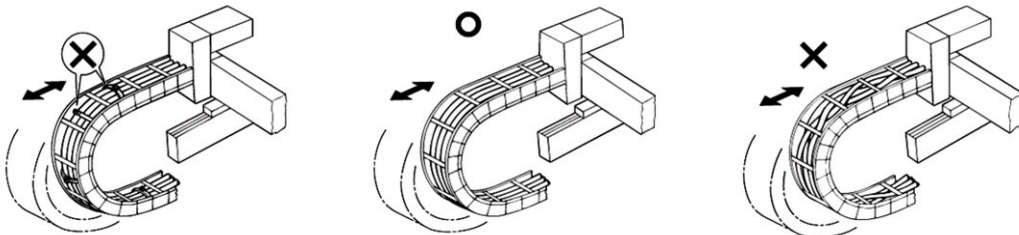
Do not use spiral tube in any position where cables are bent frequently.

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



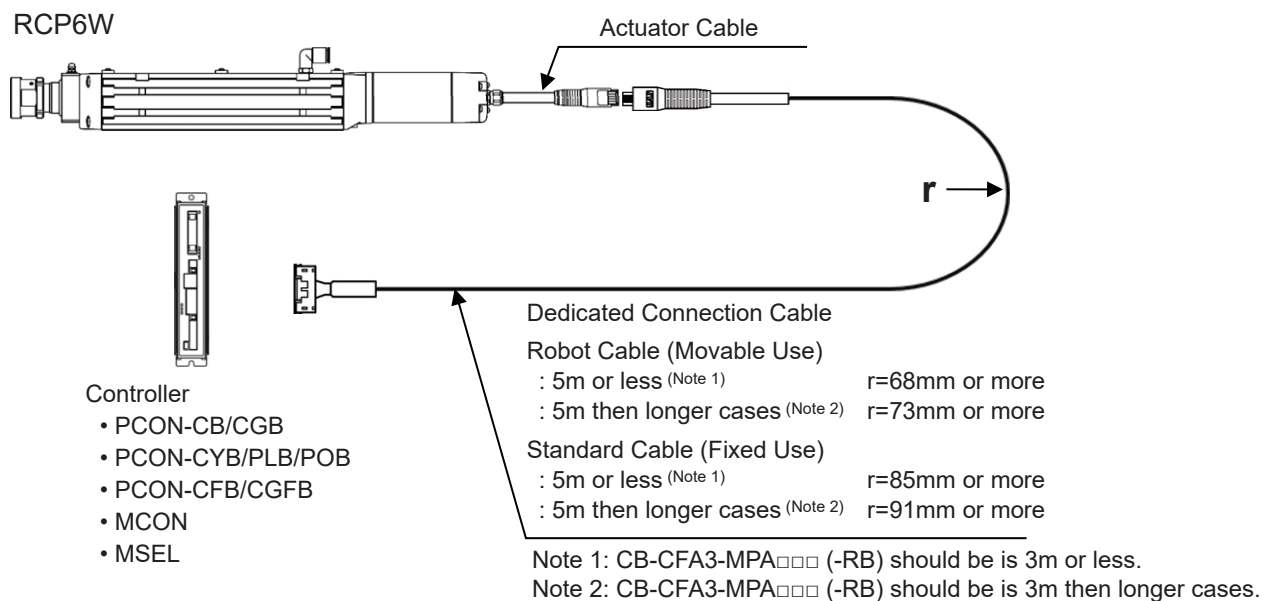
**[Follow the instructions below when using a cable track.]**

- 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.



### 3.1 Connecting with the Controller

[1] For Controllers PCON, MCON and MSEL



#### Dedicated Connection Cable Model Code

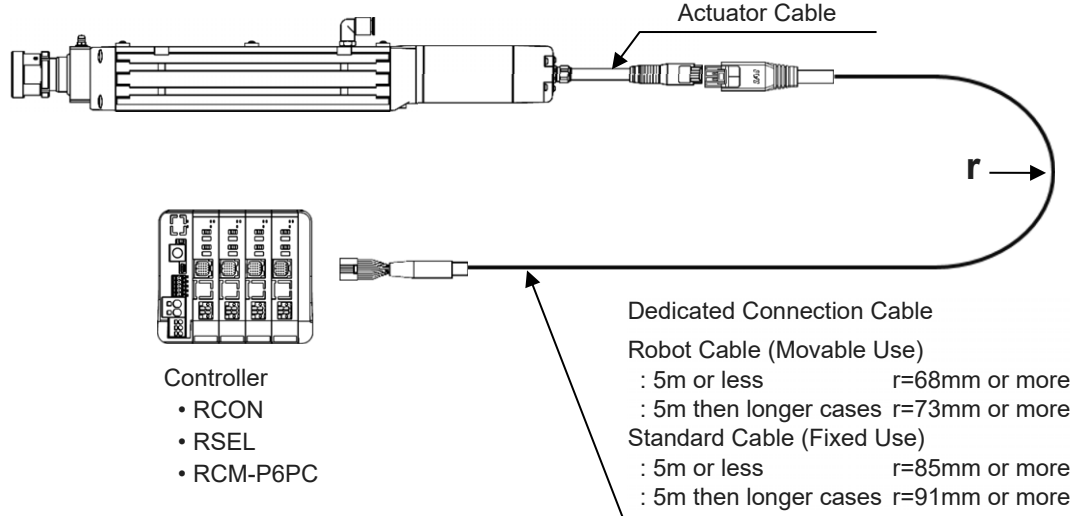
| Cable Type                                                   | WRA10, WRA12, WRA14 | WRA16             |
|--------------------------------------------------------------|---------------------|-------------------|
| Motor Encoder Integrated Cable                               | CB-CAN-MPA□□□       | CB-CFA3-MPA□□□    |
| Motor Encoder Integrated Robot Cable                         | CB-CAN-MPA□□□-RB    | CB-CFA3-MPA□□□-RB |
| Motor Encoder Integrated Cable<br>4-way Connector Type       | CB-CAN2-MPA□□□      | —                 |
| Motor Encoder Integrated Robot Cable<br>4-way Connector Type | CB-CAN2-MPA□□□-RB   | —                 |

\* □□□ represents the cable length. e.g.) 080 = 8m

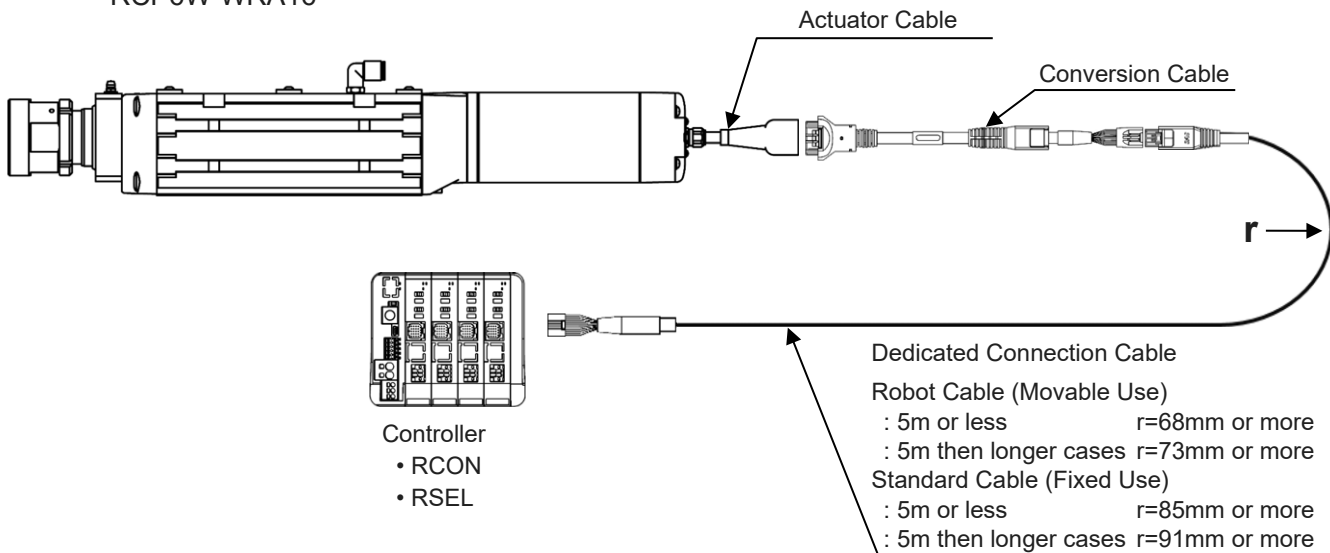
Note: The cable length in total of the actuator cable and the motor/encoder cable should be 20m at the maximum.

[2] For Controllers RCON, RSEL and RCM-P6PC

#### RCP6W-WRA10/WRA12/WRA14



#### RCP6W-WRA16



#### Dedicated Connection Cable Model Code

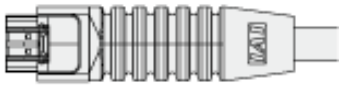
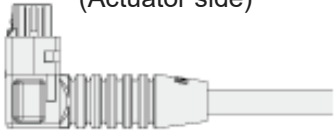
| Cable Type                                                   | RA4, RA6, RA7      | RA8                |
|--------------------------------------------------------------|--------------------|--------------------|
| Motor Encoder Integrated Cable                               | CB-ADPC-MPA□□□     | CB-ADPC-MPA□□□     |
| Motor Encoder Integrated Robot Cable                         | CB-ADPC-MPA□□□-RB  | CB-ADPC-MPA□□□-RB  |
| Motor Encoder Integrated Cable<br>4-way Connector Type       | CB-ADPC2-MPA□□□    | CB-ADPC2-MPA□□□    |
| Motor Encoder Integrated Robot Cable<br>4-way Connector Type | CB-ADPC2-MPA□□□-RB | CB-ADPC2-MPA□□□-RB |
| Conversion Cable                                             | —                  | CB-CAN-AJ002       |

\* □□□ represents the cable length. e.g.) 080 = 8m

Note: The cable length in total of the actuator cable and the motor/encoder cable should be 20m at the maximum.

[4-way Connector Cable]

It is a cable that can change the orientation of the cable connector on ROBO Cylinder in four ways.

|                                                                                                                                 |                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Standard Connector Type<br>(Actuator side)<br> | 4-way Connector Type<br>(Actuator side)<br> |
| CB-CAN-MPA□□□ (-RB)                                                                                                             | CB-CAN2-MPA□□□ (-RB)                                                                                                          |
| CB-ADPC-MPA□□□ (-RB)                                                                                                            | CB-ADPC2-MPA□□□ (-RB)                                                                                                         |



Caution

- The 4-way connector type should not rotate in 360degC. It can be turned “1 time to left” and “2 times to right” from the datum point. (Have the count of rotation at 10 times or less)
- For the motor reversing type, it may interfere to an actuator may occur depending on the cable ejection direction.



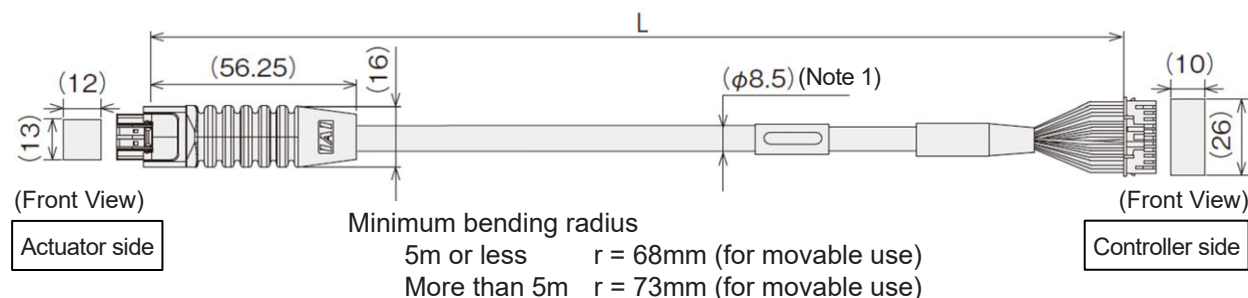
## 3.2 Motor • Encoder Cables

### 3.2.1 Dedicated connection cable for other than RCON, RSEL, and RCM-P6PC

[1] Motor • Encoder Integrated Cables (For WRA10, WRA12, WRA14)

Model code **CB-CAN-MPA□□□/CB-CAN-MPA□□□-RB** (Robot Cable)

(□□□ indicates the cable length L, Example: 030=3m), Max.20m



\* A robot cable is a cable with high bending resistance performance.  
 A robot cable is to be used when cables laid through in a cable track.

(Note 1) It should be  $\phi 9.1$  when the cable length is 5m or more.

Connection Diagram

| DF62DL-24S-2.2C (Hirose) |                   |           |         | PADP-24V-1-S (JST) |           |
|--------------------------|-------------------|-----------|---------|--------------------|-----------|
| Color (Thickness)        |                   | Symbol    | Pin No. | Pin No.            | Symbol    |
| Standard Cable           | Robot Cable       |           |         |                    |           |
| Blue (AWG22/19)          | Black (AWG22/19)  | $\phi A$  | 3       | 1                  | $\phi A$  |
| Orange (AWG22/19)        | White (AWG22/19)  | VMM       | 5       | 2                  | VMM       |
| Brown (AWG22/19)         | Green (AWG22/19)  | $\phi B$  | 10      | 3                  | $\phi B$  |
| Gray (AWG22/19)          | Yellow (AWG22/19) | VMM       | 9       | 4                  | VMM       |
| Green (AWG22/19)         | Brown (AWG22/19)  | $\phi_A$  | 4       | 5                  | $\phi_A$  |
| Red (AWG22/19)           | Red (AWG22/19)    | $\phi_B$  | 15      | 6                  | $\phi_B$  |
| Light Blue (AWG26)       | White (AWG26)     | SA [mABS] | 12      | 11                 | SA [mABS] |
| Orange (AWG26)           | Yellow (AWG26)    | SB [mABS] | 17      | 12                 | SB [mABS] |
| Green (AWG26)            | Red (AWG26)       | A+        | 1       | 13                 | A+        |
| Brown (AWG26)            | Green (AWG26)     | A-        | 6       | 14                 | A-        |
| Gray (AWG26)             | Black (AWG26)     | B+        | 11      | 15                 | B+        |
| Red (AWG26)              | Brown (AWG26)     | B-        | 16      | 16                 | B-        |
| Black (AWG26)            | Blue (AWG26)      | VPS       | 18      | 18                 | VPS       |
| Yellow (AWG26)           | Pink (AWG26)      | LS+       | 8       | 7                  | LS+       |
| Light Blue (AWG26)       | Black (AWG26)     | BK+       | 20      | 9                  | BK+       |
| Orange (AWG26)           | Brown (AWG26)     | BK-       | 2       | 10                 | BK-       |
| Gray (AWG26)             | White (AWG26)     | VCC       | 21      | 17                 | VCC       |
| Red (AWG26)              | Yellow (AWG26)    | GND       | 7       | 19                 | GND       |
| Brown (AWG26)            | Red (AWG26)       | LS-       | 14      | 8                  | LS-       |
| Green (AWG26)            | Green (AWG26)     | LS_GND    | 13      | 20                 | LS_GND    |
| —                        | —                 | —         | 19      | 22                 | —         |
| Pink (AWG26)             | Orange (AWG26)    | CF_VCC    | 22      | 21                 | CF_VCC    |
| —                        | —                 | —         | 23      | 23                 | —         |
| Black (AWG26)            | Green (AWG26)     | FG        | 24      | 24                 | FG        |

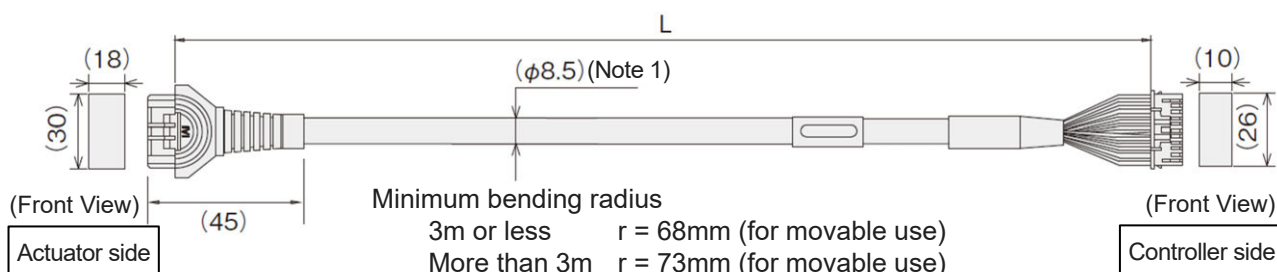
Standard: Purple (AWG26)  
 Robot: Gray (AWG26)

(Note) The colors of the lines shown are the colors after lines are changed. The cable color before change should be different.

## [2] Motor • Encoder Integrated Cables (For WRA16)

Model code CB-CFA3-MPA□□□/CB-CFA3-MPA□□□-RB (Robot Cable)

(□□□ indicates the cable length L, Example: 030=3m), Max.20m



\* A robot cable is a cable with high bending resistance performance.  
 A robot cable is to be used when cables laid through in a cable track.

(Note 1) It should be  $\phi 9.1$  when the cable length is 5m or more.

## Connection Diagram

| 9-1827863-1 (AMP)  |                   |           |         | PADP-24V-1-S (JST) |           |                    |                   |
|--------------------|-------------------|-----------|---------|--------------------|-----------|--------------------|-------------------|
| Color (Thickness)  |                   | Symbol    | Pin No. | Pin No.            | Symbol    | Color (Thickness)  |                   |
| Standard Cable     | Robot Cable       |           |         |                    |           | Standard Cable     | Robot Cable       |
| Blue (AWG22/19)    | Black (AWG22/19)  | $\phi A$  | A1      | 1                  | $\phi A$  | Blue (AWG22/19)    | Black (AWG22/19)  |
| Orange (AWG22/19)  | White (AWG22/19)  | VMM       | B1      | 2                  | VMM       | Orange (AWG22/19)  | White (AWG22/19)  |
| Green (AWG22/19)   | Green (AWG22/19)  | $\phi_A$  | A2      | 5                  | $\phi_A$  | Green (AWG22/19)   | Green (AWG22/19)  |
| Brown (AWG22/19)   | Yellow (AWG22/19) | $\phi B$  | B2      | 3                  | $\phi B$  | Brown (AWG22/19)   | Yellow (AWG22/19) |
| Gray (AWG22/19)    | Brown (AWG22/19)  | VMM       | A3      | 4                  | VMM       | Gray (AWG22/19)    | Brown (AWG22/19)  |
| Red (AWG22/19)     | Red (AWG22/19)    | $\phi B$  | B3      | 6                  | $\phi B$  | Red (AWG22/19)     | Red (AWG22/19)    |
| Light Blue (AWG26) | White (AWG26)     | SA [mABS] | A6      | 11                 | SA [mABS] | Light Blue (AWG26) | White (AWG26)     |
| Orange (AWG26)     | Yellow (AWG26)    | SB [mABS] | B6      | 12                 | SB [mABS] | Orange (AWG26)     | Yellow (AWG26)    |
| Green (AWG26)      | Red (AWG26)       | A+        | A7      | 13                 | A+        | Green (AWG26)      | Red (AWG26)       |
| Brown (AWG26)      | Green (AWG26)     | A-        | B7      | 14                 | A-        | Brown (AWG26)      | Green (AWG26)     |
| Gray (AWG26)       | Black (AWG26)     | B+        | A8      | 15                 | B+        | Gray (AWG26)       | Black (AWG26)     |
| Red (AWG26)        | Brown (AWG26)     | B-        | B8      | 16                 | B-        | Red (AWG26)        | Brown (AWG26)     |
| Black (AWG26)      | Blue (AWG26)      | VPS       | B9      | 18                 | VPS       | Black (AWG26)      | Blue (AWG26)      |
| Yellow (AWG26)     | Pink (AWG26)      | LS+       | A4      | 7                  | LS+       | Yellow (AWG26)     | Pink (AWG26)      |
| Light Blue (AWG26) | Black (AWG26)     | BK+       | A5      | 9                  | BK+       | Light Blue (AWG26) | Black (AWG26)     |
| Orange (AWG26)     | Brown (AWG26)     | BK-       | B5      | 10                 | BK-       | Orange (AWG26)     | Brown (AWG26)     |
| Green (AWG26)      | White (AWG26)     | LS_GND    | A9      | 20                 | LS_GND    | Green (AWG26)      | White (AWG26)     |
| Brown (AWG26)      | Yellow (AWG26)    | LS-       | B4      | 8                  | LS-       | Brown (AWG26)      | Yellow (AWG26)    |
| Gray (AWG26)       | Red (AWG26)       | VCC       | A10     | 21                 | VCC       | Gray (AWG26)       | Red (AWG26)       |
| Red (AWG26)        | Green (AWG26)     | GND       | B10     | 19                 | GND       | Red (AWG26)        | Green (AWG26)     |
| —                  | —                 | —         | A11     | 17                 | —         | —                  | —                 |
| Black (AWG26)      | Green (AWG26)     | FG        | B11     | 22                 | —         | —                  | —                 |
|                    |                   |           |         | 23                 | —         | —                  | —                 |
|                    |                   |           |         | 24                 | FG        | Black (AWG26)      | Green (AWG26)     |

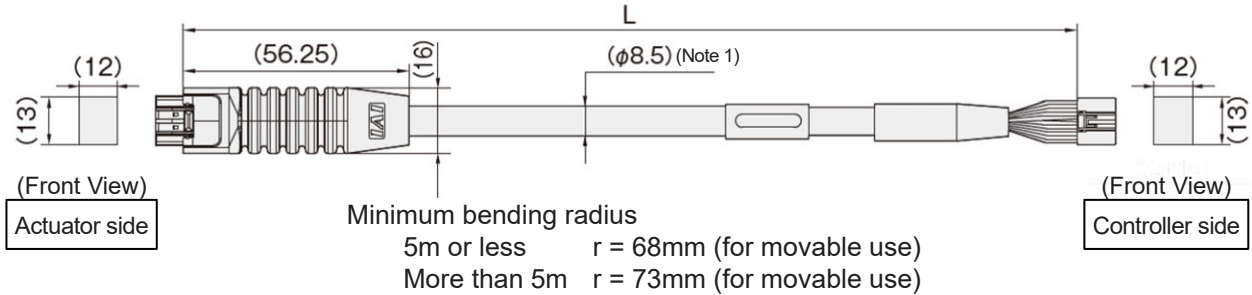
(Note) The colors of the lines shown are the colors after lines are changed. The cable color before change should be different.

### 3.2.2 Connection Cable Dedicated for RCON, RSEL, and RCM-P6PC

[1] Motor • Encoder Integrated Cables Standard Connector

Model code CB-ADPC-MPA□□□/CB-ADPC-MPA□□□-RB (Robot Cable)

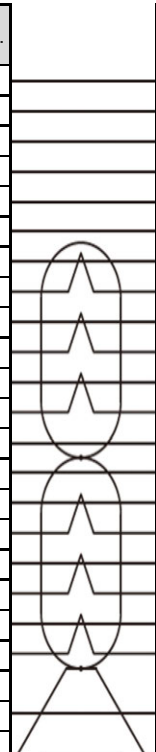
(□□□ indicates the cable length L, Example: 030=3m), Max.20m



\* A robot cable is a cable with high bending resistance performance.  
 A robot cable is to be used when cables laid through in a cable track.

(Note 1) It should be  $\phi 9.1$  when the cable length is 5m or more.

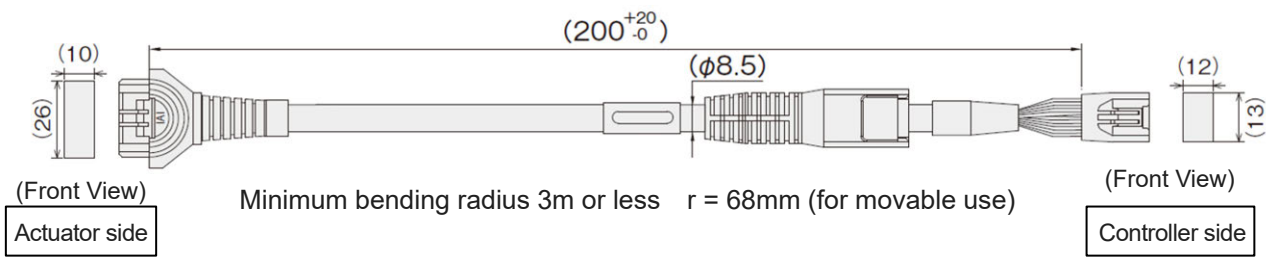
Connection Diagram

| DF62DL-24S-2.2C (Hirose) |                   |           |         |  | DF62DL-24S-2.2C (Hirose) |               |                    |                   |
|--------------------------|-------------------|-----------|---------|-------------------------------------------------------------------------------------|--------------------------|---------------|--------------------|-------------------|
| Color (Thickness)        |                   | Symbol    | Pin No. |                                                                                     | Pin No.                  | Symbol        | Color (Thickness)  |                   |
| Standard Cable           | Robot Cable       |           |         |                                                                                     |                          |               | Standard Cable     | Robot Cable       |
| Blue (AWG22/19)          | Black (AWG22/19)  | ΦA        | 3       |                                                                                     | 3                        | ΦA            | Blue (AWG22/19)    | Black (AWG22/19)  |
| Orange (AWG22/19)        | White (AWG22/19)  | VMM       | 5       |                                                                                     | 5                        | VMM           | Orange (AWG22/19)  | White (AWG22/19)  |
| Brown (AWG22/19)         | Green (AWG22/19)  | ΦB        | 10      |                                                                                     | 10                       | ΦB            | Brown (AWG22/19)   | Green (AWG22/19)  |
| Gray (AWG22/19)          | Yellow (AWG22/19) | VMM       | 9       |                                                                                     | 9                        | VMM           | Gray (AWG22/19)    | Yellow (AWG22/19) |
| Green (AWG22/19)         | Brown (AWG22/19)  | Φ A       | 4       |                                                                                     | 4                        | Φ A           | Green (AWG22/19)   | Brown (AWG22/19)  |
| Red (AWG22/19)           | Red (AWG22/19)    | Φ B       | 15      |                                                                                     | 15                       | Φ B           | Red (AWG22/19)     | Red (AWG22/19)    |
| Light Blue (AWG26)       | White (AWG26)     | SA [mABS] | 12      |                                                                                     | 12                       | SA [mABS]     | Light Blue (AWG26) | White (AWG26)     |
| Orange (AWG26)           | Yellow (AWG26)    | SB [mABS] | 17      |                                                                                     | 17                       | SB [mABS]     | Orange (AWG26)     | Yellow (AWG26)    |
| Green (AWG26)            | Red (AWG26)       | A+        | 1       |                                                                                     | 1                        | A+            | Green (AWG26)      | Red (AWG26)       |
| Brown (AWG26)            | Green (AWG26)     | A-        | 6       |                                                                                     | 6                        | A-            | Brown (AWG26)      | Green (AWG26)     |
| Gray (AWG26)             | Black (AWG26)     | B+        | 11      |                                                                                     | 11                       | B+            | Gray (AWG26)       | Black (AWG26)     |
| Red (AWG26)              | Brown (AWG26)     | B-        | 16      |                                                                                     | 16                       | B-            | Red (AWG26)        | Brown (AWG26)     |
| Black (AWG26)            | Blue (AWG26)      | VPS       | 18      |                                                                                     | 18                       | VPS           | Black (AWG26)      | Blue (AWG26)      |
| Yellow (AWG26)           | Pink (AWG26)      | LS+       | 8       |                                                                                     | 8                        | LS+           | Yellow (AWG26)     | Pink (AWG26)      |
| Light Blue (AWG26)       | Black (AWG26)     | BK+       | 20      |                                                                                     | 20                       | BK+           | Light Blue (AWG26) | Black (AWG26)     |
| Orange (AWG26)           | Brown (AWG26)     | BK-       | 2       |                                                                                     | 2                        | BK-           | Orange (AWG26)     | Brown (AWG26)     |
| Gray (AWG26)             | White (AWG26)     | VCC       | 21      |                                                                                     | 21                       | VCC           | Gray (AWG26)       | White (AWG26)     |
| Red (AWG26)              | Yellow (AWG26)    | GND       | 7       |                                                                                     | 7                        | GND           | Red (AWG26)        | Yellow (AWG26)    |
| Brown (AWG26)            | Red (AWG26)       | LS-       | 14      |                                                                                     | 14                       | LS-           | Brown (AWG26)      | Red (AWG26)       |
| Green (AWG26)            | Green (AWG26)     | LS_GND    | 13      |                                                                                     | 13                       | LS_GND        | Green (AWG26)      | Green (AWG26)     |
| —                        | —                 | —         | 19      |                                                                                     | 19                       | —             | —                  | —                 |
| Pink (AWG26)             | Orange (AWG26)    | CF_VCC    | 22      | 22                                                                                  | CF_VCC                   | Pink (AWG26)  | Orange (AWG26)     |                   |
| —                        | —                 | —         | 23      | 23                                                                                  | —                        | —             | —                  |                   |
| Black (AWG26)            | Green (AWG26)     | FG        | 24      | 24                                                                                  | FG                       | Black (AWG26) | Green (AWG26)      |                   |

Standard: Purple (AWG26)  
 Robot: Gray (AWG26)

[2] Conversion Cable

Model code **CB-CAN-AJ002**    Length 0.2m



Connection Diagram

9-1827863-1 (AMP)

DF62B-24EP-2.2C (Hirose)

| Color (Thickness) | Symbol    | Pin No. | Pin No. | Symbol    | Color (Thickness) |
|-------------------|-----------|---------|---------|-----------|-------------------|
| Black (AWG22)     | $\phi A$  | A1      | 3       | $\phi A$  | Black (AWG22)     |
| White (AWG22)     | VMM       | B1      | 5       | VMM       | White (AWG22)     |
| Green (AWG22)     | $\phi B$  | B2      | 10      | $\phi B$  | Green (AWG22)     |
| Yellow (AWG22)    | VMM       | A3      | 9       | VMM       | Yellow (AWG22)    |
| Brown (AWG22)     | $\phi_A$  | A2      | 4       | $\phi_A$  | Brown (AWG22)     |
| Red (AWG22)       | $\phi_B$  | B3      | 15      | $\phi_B$  | Red (AWG22)       |
| White (AWG26)     | SA [mABS] | A6      | 12      | SA [mABS] | White (AWG26)     |
| Yellow (AWG26)    | SB [mABS] | B6      | 17      | SB [mABS] | Yellow (AWG26)    |
| Red (AWG26)       | A+        | A7      | 1       | A+        | Red (AWG26)       |
| Green (AWG26)     | A-        | B7      | 6       | A-        | Green (AWG26)     |
| Black (AWG26)     | B+        | A8      | 11      | B+        | Black (AWG26)     |
| Brown (AWG26)     | B-        | B8      | 16      | B-        | Brown (AWG26)     |
| Blue (AWG26)      | VPS       | B9      | 18      | VPS       | Blue (AWG26)      |
| Pink (AWG26)      | LS+       | A4      | 8       | LS+       | Pink (AWG26)      |
| Black (AWG26)     | BK+       | A5      | 20      | BK+       | Black (AWG26)     |
| Brown (AWG26)     | BK-       | B5      | 2       | BK-       | Brown (AWG26)     |
| White (AWG26)     | VCC       | A10     | 21      | VCC       | White (AWG26)     |
| Yellow (AWG26)    | GND       | B10     | 7       | GND       | Yellow (AWG26)    |
| Red (AWG26)       | LS-       | B4      | 14      | LS-       | Red (AWG26)       |
| Green (AWG26)     | LS_GND    | A9      | 13      | LS_GND    | Green (AWG26)     |
| —                 | —         | A11     | 19      | —         | —                 |
| Green (AWG26)     | FG        | B11     | 22      | CF_VCC    | White (AWG26)     |
|                   |           |         | 23      | —         | —                 |
|                   |           |         | 24      | FG        | Green (AWG26)     |

**ROBO Cylinder**

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# Chapter 4

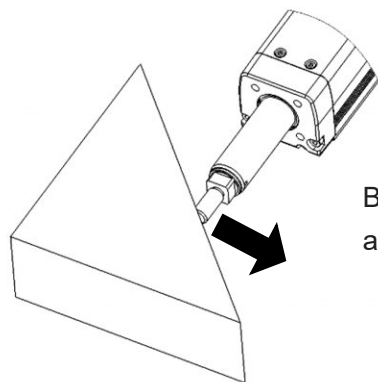
## Operation

|     |                             |     |
|-----|-----------------------------|-----|
| 4.1 | Caution for Operation ..... | 4-1 |
|-----|-----------------------------|-----|



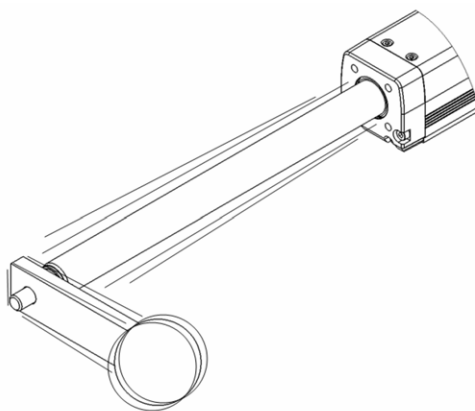
## 4.1 Caution for Operation

- 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.

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

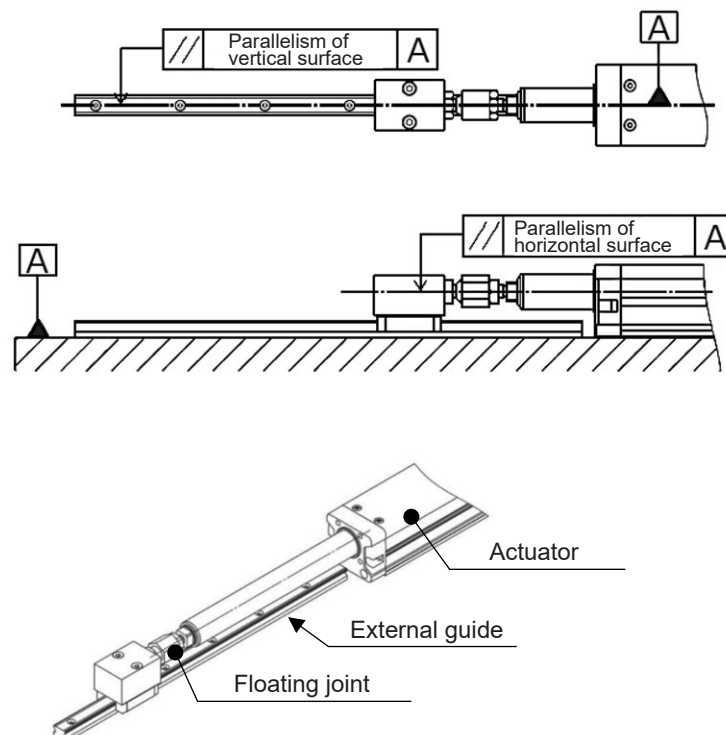


### [When Using External Guide Together]

- If the parallelism between the actuator and external guide (horizontal/vertical surfaces) is not adjusted with sufficient precision, malfunctions and premature actuator damage may occur.
- When mounting the guide, perform centering for the actuator and guide. Make sure that the sliding resistance is constant over the entire stroke.
- Make sure that the current value is constant, using the monitoring function of the teaching tool.
- For the radial cylinder type, it is recommended to have a “floating joint” for fixation with an external guide.

A floating joint enables to make adjustment easy by absorbing the misalignment in parallelism between a built-in guide and an external guide.

Rigid fixing makes the parallelism adjustment between a built-in guide and an external guide difficult. Even with a slight misalignment in parallelism may apply load on the guide, which may damage in early stage.



## ROBO Cylinder

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# Chapter 5

# Maintenance and Inspection

|       |                                                   |      |
|-------|---------------------------------------------------|------|
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## 5.1 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.
- 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.



### 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. Refer to [5.5 Grease Supply]

## 5.2 Inspection

Follow the maintenance and 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.

| Period of Time                                                   | External Visual Inspection | Internal Inspection | Grease Supply <sup>(Note 1)</sup> |
|------------------------------------------------------------------|----------------------------|---------------------|-----------------------------------|
| Start of work inspection                                         | ○                          |                     |                                   |
| 1 month inspection                                               | ○                          |                     |                                   |
| 3 month inspection<br>or every 300km of operated distance        | ○                          |                     | ○ (Scraper) <sup>(Note 2)</sup>   |
| Every 3 months thereafter<br>or every 300km of operated distance | ○                          |                     | ○ (Scraper) <sup>(Note 2)</sup>   |
| 6 month inspection<br>or every 5000km of operated distance       | ○                          | ○                   | ○ Ball screw/guide                |
| Every 1 year thereafter                                          | ○                          | ○                   | ○ Ball screw/guide                |

Note 1 If the actuators are moved back and forth continuously over a short distance of 30mm or less, grease film may run out. As a guide, move the actuators back and forth repeatedly for around 5 cycles over a distance of 50mm or more after every 5,000 to 10,000 cycles.

A layer of the grease will recover.

Note 2 To maintain the level of water protection, apply grease to the scraper regularly.

Otherwise, it may cause malfunction.

## 5.3 Visual Inspection

### 5.3.1 External Visual Inspection

An external visual inspection should check the following things.

\* Make sure to turn the power off before 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 grease dripping out?<br>(especially if vertically mounted)          | Clean up any drips.<br>Replenish the grease.                                       |
| Is the rod sliding surface grease not lubricating well?                | Wipe away the old grease, then replenish with new grease.                          |
| Is there any dust or contamination adhered on the rod sliding surface? | Clean up the rod sliding surface before applying new grease.                       |

### 5.3.2 Internal Visual Inspection

An internal visual inspection should check the following things.

\* Make sure to turn the power off before inspection.

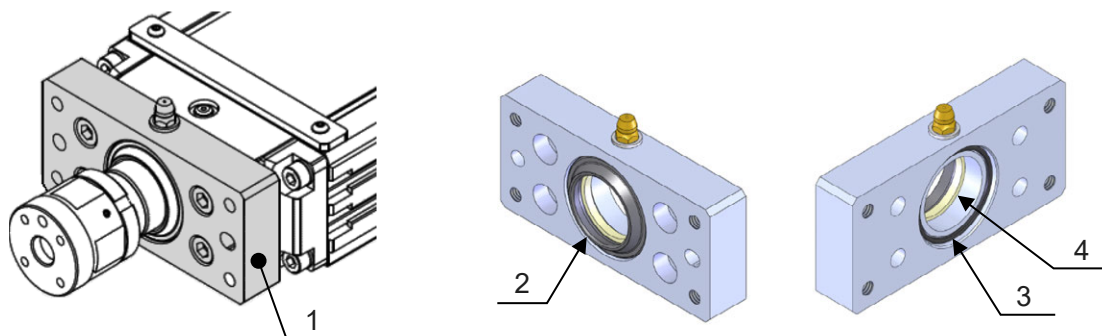
| Inspection items                                                                    | Maintenance work                                                                                                                  |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Backlash/play or wear debris found?                                                 | The ball screw or guide may be damaged.<br>Contact IAI.                                                                           |
| Is there any damage, defect or abrasion on Front Seal Assembly (dust seal housing)? | In case there is damage found, replace Front Seal Assembly.<br>Refer to [5.6.5 Replacing Front Seal Assembly (Dust Seal Housing)] |

\* A scraper assembled in Front Seal Assembly is a consumable component.

As a reference for the replacement period, consider every 1,000km of running distance or, when the running distance is less than 1,000km, consider every year. Degradation and abrasion may be faster in some environment of use or operational conditions.

#### ◆ Inspection Points in Front Seal Assembly

Refer to [5.6.5 Replacing Front Seal Assembly (Dust Seal Housing)] for how to take it off.



| No. | Type   | Part Name                               |
|-----|--------|-----------------------------------------|
| 1   | Common | Front Seal Assembly (Dust Seal Housing) |
| 2   | Common | Scraper (Dust Seal)                     |
| 3   | Common | O-ring                                  |
| 4   | Common | Soft Wiper                              |

## 5.4 Cleaning

### 5.4.1 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 when wiping up appearance.
- 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.

## 5.5 Grease Supply

### 5.5.1 Grease Used

Use an equivalent product.

| Applied Area        | Recommended product grease                          |
|---------------------|-----------------------------------------------------|
| Rod Sliding Surface | Kyodo Yushi / Multitemp ET-R<br>(Urea based grease) |
| Scraper             |                                                     |
| Ball Screw          |                                                     |
| Guide               |                                                     |

[Reference] Grease Applied on Delivery : Kyodo Yushi / Multemp ET-R



#### Caution

- Do not attempt to apply any grease other than urea based grease.
- Mixing with grease types other than urea based grease not only reduces the performance of the grease, but it may even cause damage to the actuator.

### 5.5.2 Grease Supply Procedure



#### Caution

- Supplying too much grease may increase sliding resistance and load to the motor, resulting in a drop of performance.  
Also, excess grease on the ball screw may be splashed around in the ambience.
- In case the grease got into your eye, rinse it off 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.

#### ◆ Preparation

- Protection Gear (e.g. Rubber Gloves)
- Cloth
- Grease Gun (Prepare one considering diameter of grease nipple.)  
[Reference Grease Gun]  
Grease gun of mounting screw R1/8 (Example) CH-400 (Yamada Corporation)

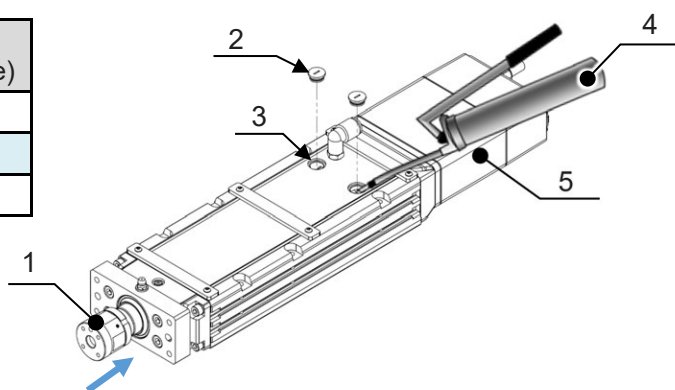
### ◆ Grease Supply Procedure

[1] Ball screw, Guide

Grease should be supplied at the two points of grease nipples on the top of the frame.

1. Move the rod to the motor side manually or by JOG operation of a controller.
2. Take the hole cap off at the grease supply inlet.
3. Lubricate using a grease gun.
4. Move the rod in its full stroke to spread the grease evenly.
5. Wipe off excess grease on the outer surface.
6. Put the hole cap on at the grease inlet.

| Type         | Reference for Grease Supply Volume (1 place) |
|--------------|----------------------------------------------|
| WRA10        | 1.5 to 2.0CC                                 |
| WRA12, WRA14 | 2.0 to 2.5CC                                 |
| WRA16        | 3.5 to 4.0CC                                 |



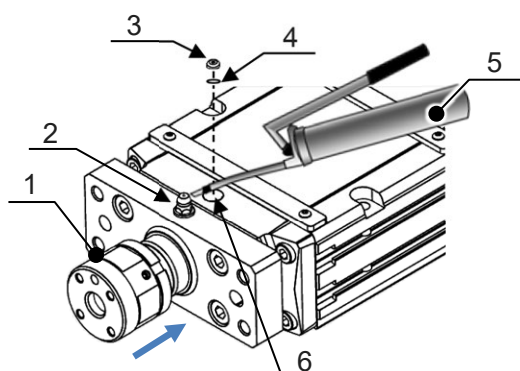
| No. | Type                | Part Name     | Size       | Quantity |
|-----|---------------------|---------------|------------|----------|
| 1   | Common              | Rod           | —          | —        |
| 2   | Common              | Cap           | —          | 2        |
| 3   | WRA10               | Grease Nipple | $\phi 3.5$ | 2        |
|     | WRA12, WRA14, WRA16 |               | $\phi 6.0$ | 2        |
| 4   | Common              | Grease Gun    | —          | —        |
| 5   | Common              | Motor         | —          | —        |

## [2] Scraper, Rod Sliding Area

Grease should be supplied at the grease nipple on the front side of the frame.

1. Move the rod to the motor side manually or by JOG operation of a controller.
2. Remove to the slim head hex socket screw (1 pc).
3. Lubricate using a grease gun.
4. Clean the grease come out at the grease exhausting port and close the grease exhausting port with the slim head hex socket screw.
5. Move the rod full-stroke to apply the grease thoroughly.
6. Wipe off excess grease on the outer surface.

| Type  | Reference for Grease Supply Volume |
|-------|------------------------------------|
| WRA10 | 0.5 cc                             |
| WRA12 | 1.0 cc                             |
| WRA14 | 1.5 cc                             |
| WRA16 | 2.0 cc                             |



| No. | Type   | Part Name                  | Size   | Quantity | Tightening Torque |
|-----|--------|----------------------------|--------|----------|-------------------|
| 1   | Common | Rod                        | —      | —        | —                 |
| 2   | Common | Grease Nipple              | Φ6     | 1        | —                 |
| 3   | Common | Slim Head Hex Socket Screw | M3 × 4 | 1        | 48.5N·m           |
| 4   | Common | Seal Washer                | M3     | 1        | —                 |
| 5   | Common | Grease Gun                 | —      | —        | —                 |
| 6   | Common | Grease Discharge Outlet    | —      | —        | —                 |

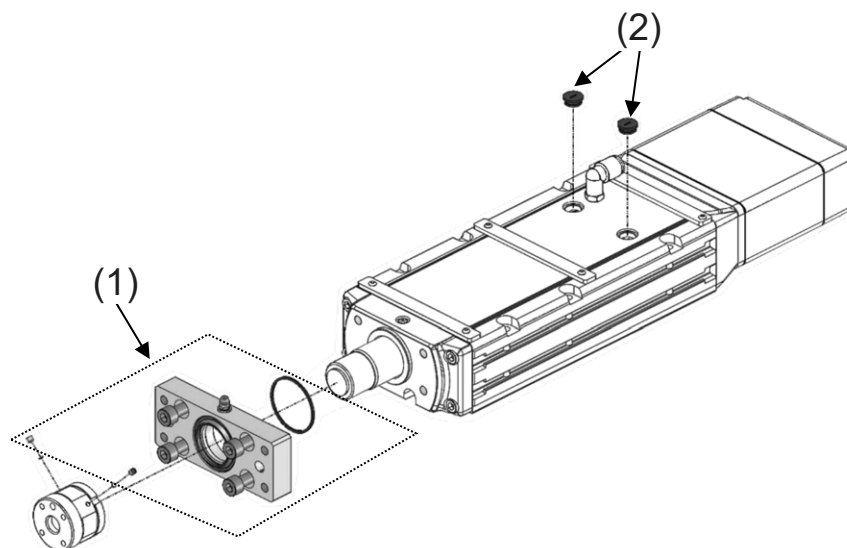
\* It is recommended to replace the seal washer to the new ones in reassembly as their sealing effect will decrease due to rubber deform.

Seal Washer on Delivery: SWS 3x6.4-A

## 5.6 Replacing Components

### 5.6.1 List of parts for replacement

List of Components Available for Maintenance



#### (1) Rod Seal Assembly

| Type           | Model Code      |
|----------------|-----------------|
| WRA10C, WRA10R | RCP6W-FBA-WRA10 |
| WRA12C, WRA12R | RCP6W-FBA-WRA12 |
| WRA14C, WRA14R | RCP6W-FBA-WRA14 |
| WRA16C, WRA16R | RCP6W-FBA-WRA16 |

\* An O-ring (1 pc), set pieces (2 pcs) and hex socket head screws (4 pcs) are enclosed.

#### (2) Cap

| Type   | Model Code  |
|--------|-------------|
| Common | RCP5W-CS-RA |

### 5.6.2 Motor Replacement

To secure the performance of IP65, the motor replacement work cannot be conducted on the customer's site.

Please contact IAI and ask for the replacement work if it is necessary.

### 5.6.3 Timing Belt Replacement

To secure the performance of IP65, the timing belt replacement work cannot be conducted on the customer's site.

Please contact IAI and ask for the replacement work if it is necessary.

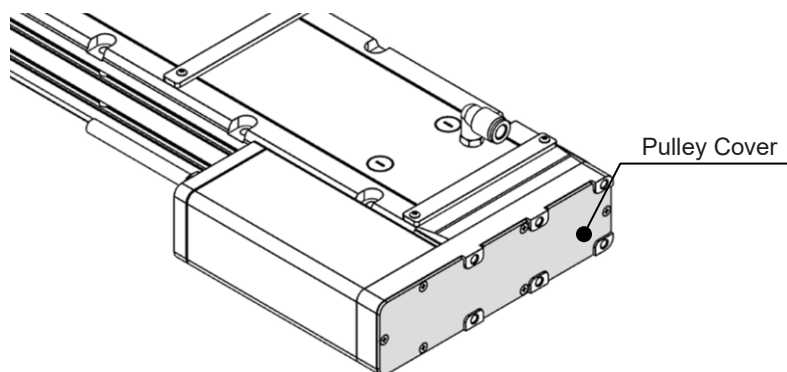
Applicable Model: Motor Reversing Type

### 5.6.4 Pulley Cover Replacement

In order to obtain IP65 performance, the pulley cover has changed to adhered fixation.

Please contact IAI and ask for the replacement work if it is necessary.

Applicable Model: Motor Reversing Type



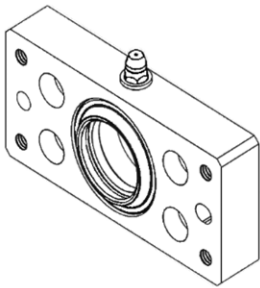
5.6.5 Replacing Front Seal Assembly (Dust Seal Housing)

Work should be conducted in a condition that will not give any influence of dust and water.

◆ Preparation

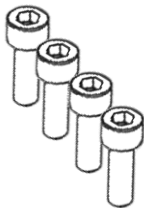
- Protection Gear (e.g. Cotton Work Gloves)
- Hex Wrench and Torque Wrench    Parallel faces: 2.5mm, 3mm, 5mm, 8mm
- Spanner or Wrench
- Hook Spanner
- Rod Seal Assembly for replacement

| Type           | Model Code      |
|----------------|-----------------|
| WRA10C, WRA10R | RCP6W-FBA-WRA10 |
| WRA12C, WRA12R | RCP6W-FBA-WRA12 |
| WRA14C, WRA14R | RCP6W-FBA-WRA14 |
| WRA16C, WRA16R | RCP6W-FBA-WRA16 |



Dust Seal Housing (1 piece)

Accessories



Hex Socket Head Screw  
(4 pieces)



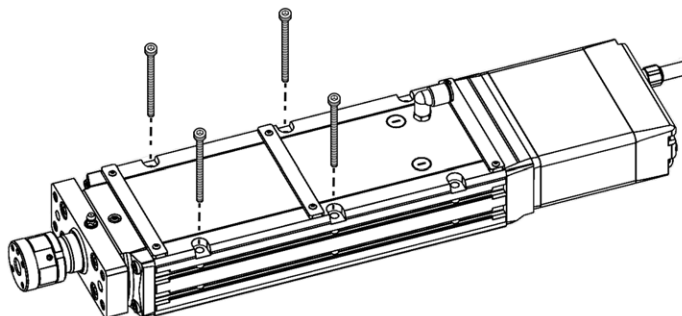
O-ring (1 piece)



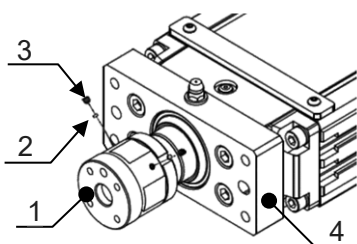
Set Piece (2 pieces)

### ◆ Procedure for Replacement

1. Affix the actuator main body on a flat surface which possesses enough stiffness.  
When affixing the actuator, it is necessary to have the base bottom surface as the installation surface and use four or more through hole from the side opposite the motor end.

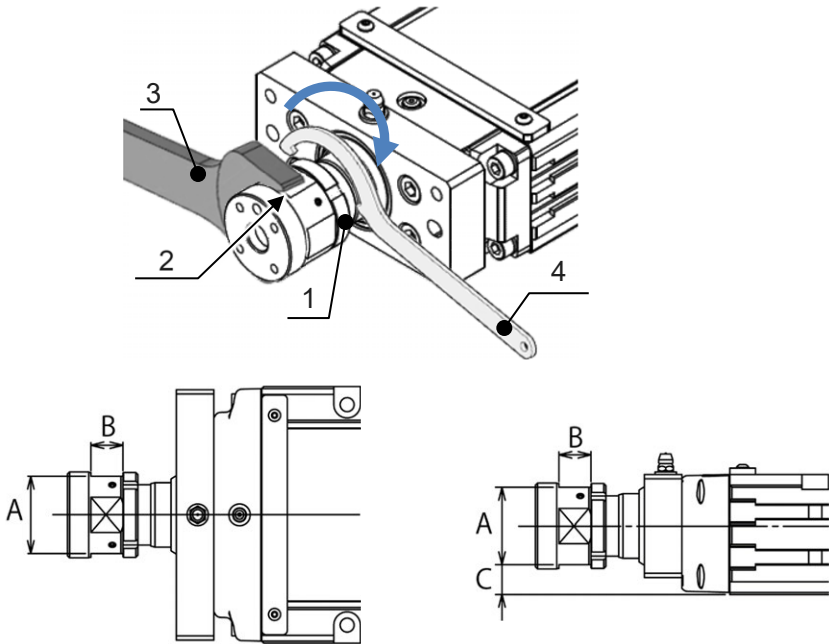


2. Take off a hex socket set screw on the tip bracket.  
\* Pay attention not to drop the set pieces when taking them off.



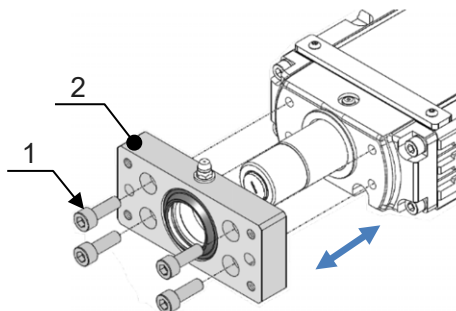
| No. | Type                  | Part Name            | Size    | Quantity | Tightening Torque (N·m) |
|-----|-----------------------|----------------------|---------|----------|-------------------------|
| 1   | Common                | Tip Bracket          | —       | 1        | —                       |
| 2   | WRA10                 | Set Piece            | SM-301E | 2        | —                       |
|     | WRA12, WRA14<br>WRA16 |                      | SM-401E | 2        | —                       |
| 3   | WRA10                 | Hex Socket Set Screw | M3 × 3  | 2        | 0.69                    |
|     | WRA12, WRA14<br>WRA16 |                      | M4 × 4  | 2        | 1.67                    |
| 4   | Common                | Front Seal Assembly  | —       | 1        | —                       |

3. Hold the tip bracket using the parallel faces on it and using a tool such as a wrench, and loosen the lock nut using a tool such as a hook spanner to take the tip bracket and lock nut off.



| No. | Type   | Part Name                      | Size (mm)           |      | Quantity | Tightening Torque (N·m) |
|-----|--------|--------------------------------|---------------------|------|----------|-------------------------|
| 1   | WRA10  | Lock Nut                       | Outer diameter 32.5 |      | 1        | 45                      |
|     | WRA12  | Lock Nut                       | Outer diameter 39.5 |      | 1        | 80                      |
|     | WRA14  | Lock Nut                       | Outer diameter 51.5 |      | 1        | 150                     |
|     | WRA16  | Lock Nut                       | Outer diameter 59.5 |      | 1        | 220                     |
| 2   | WRA10  | Tip Bracket Width Across Flats | A                   | 30   | 1        | —                       |
|     |        |                                | B                   | 14   |          |                         |
|     |        |                                | C                   | 10.5 |          |                         |
|     | WRA12  | Tip Bracket Width Across Flats | A                   | 36   | 1        | —                       |
|     |        |                                | B                   | 15   |          |                         |
|     |        |                                | C                   | 14   |          |                         |
|     | WRA14  | Tip Bracket Width Across Flats | A                   | 46   | 1        | —                       |
|     |        |                                | B                   | 22.5 |          |                         |
|     |        |                                | C                   | 17   |          |                         |
|     | WRA16  | Tip Bracket Width Across Flats | A                   | 55   | 1        | —                       |
|     |        |                                | B                   | 22.5 |          |                         |
|     |        |                                | C                   | 18   |          |                         |
| 3   | Common | Spanner                        | —                   |      | 1        | —                       |
| 4   | Common | Hook Spanner                   | —                   |      | 1        | —                       |

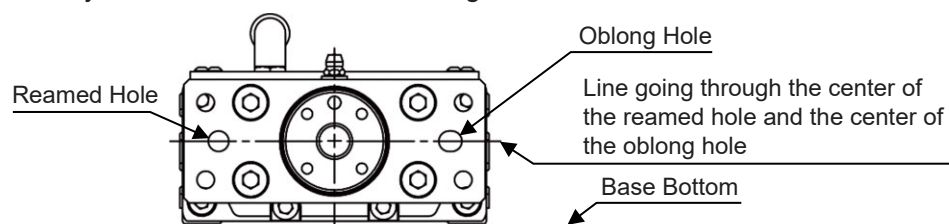
4. Remove the hex socket head screws (4 pcs) and replace the front seal assembly (dust seal housing).



| No. | Type         | Part Name             | Size     | Quantity | Tightening Torque (N·m) |
|-----|--------------|-----------------------|----------|----------|-------------------------|
| 1   | WRA10        | Hex Socket Head Screw | M6 × 18  | 4        | 6.4                     |
|     | WRA12        |                       | M8 × 20  | 4        | 13.8                    |
|     | WRA14, WRA16 |                       | M10 × 25 | 4        | 28.0                    |
| 2   | Common       | Front Seal Assembly   | —        | 1        | —                       |

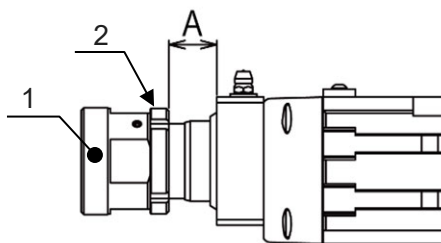
In case the screw hole on the front seal assembly (dust seal housing) is used for attachment to the main body, consider to adjust the angle of the front seal assembly to install.

Parallelism at delivery is obtained as shown in the figure below.



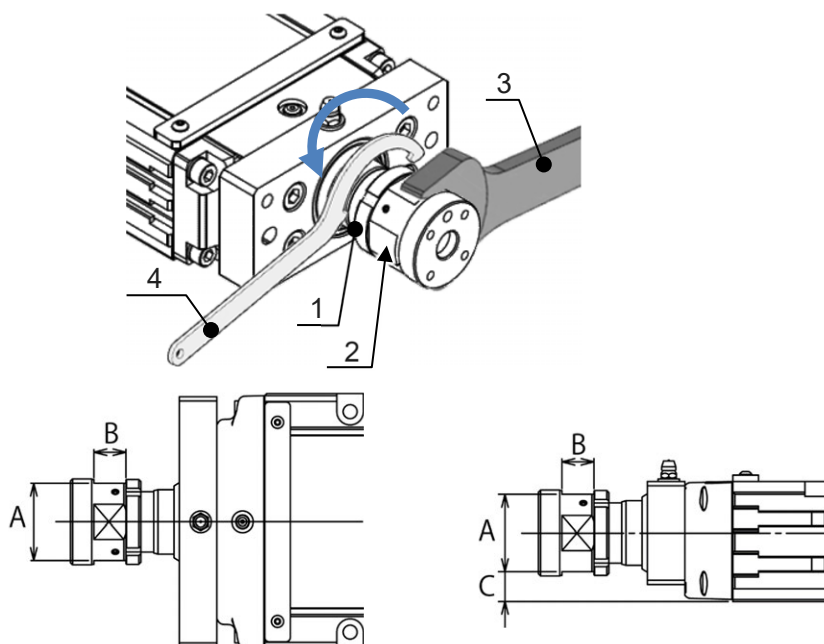
- \* Parallelism of a line going through the center of the reamed hole and the center of the oblong hole to the base bottom face = 0.2mm

5. Attach the tip bracket and the lock nut to the position below.



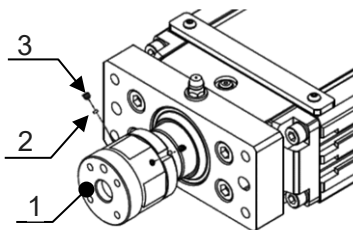
| No. | Type   | Part Name   | A (mm)   |
|-----|--------|-------------|----------|
| 1   | Common | Tip Bracket | —        |
| 2   | WRA10  | Lock Nut    | 17±1     |
|     | WRA12  |             | 18±1     |
|     | WRA14  |             | 18.5±1.5 |
|     | WRA16  |             | 18.5±1.5 |

6. Hold the tip bracket using the parallel faces on it and using a tool such as a wrench, and tighten the lock nut using a tool such as a hook spanner.



| No. | Type   | Part Name                      | Size (mm)           |      | Quantity | Tightening Torque (N·m) |
|-----|--------|--------------------------------|---------------------|------|----------|-------------------------|
| 1   | WRA10  | Lock Nut                       | Outer diameter 32.5 |      | 1        | 45                      |
|     | WRA12  | Lock Nut                       | Outer diameter 39.5 |      | 1        | 80                      |
|     | WRA14  | Lock Nut                       | Outer diameter 51.5 |      | 1        | 150                     |
|     | WRA16  | Lock Nut                       | Outer diameter 59.5 |      | 1        | 220                     |
| 2   | WRA10  | Tip Bracket Width Across Flats | A                   | 30   | 1        | —                       |
|     |        |                                | B                   | 14   |          |                         |
|     |        |                                | C                   | 10.5 |          |                         |
|     | WRA12  | Tip Bracket Width Across Flats | A                   | 36   | 1        | —                       |
|     |        |                                | B                   | 15   |          |                         |
|     |        |                                | C                   | 14   |          |                         |
|     | WRA14  | Tip Bracket Width Across Flats | A                   | 46   | 1        | —                       |
|     |        |                                | B                   | 22.5 |          |                         |
|     |        |                                | C                   | 17   |          |                         |
|     | WRA16  | Tip Bracket Width Across Flats | A                   | 55   | 1        | —                       |
|     |        |                                | B                   | 22.5 |          |                         |
|     |        |                                | C                   | 18   |          |                         |
| 3   | Common | Spanner                        | —                   |      | 1        | —                       |
| 4   | Common | Hook Spanner                   | —                   |      | 1        | —                       |

7. Affix the tip bracket with the hex socket set screw and set piece.



| No. | Type                  | Part Name            | Size    | Quantity | Tightening Torque (N·m) |
|-----|-----------------------|----------------------|---------|----------|-------------------------|
| 1   | Common                | Tip Bracket          | —       | 1        | —                       |
| 2   | WRA10                 | Set Piece            | SM-301E | 2        | —                       |
|     | WRA12, WRA14<br>WRA16 |                      | SM-401E | 2        | —                       |
| 3   | WRA10                 | Hex Socket Set Screw | M3 × 3  | 2        | 0.69                    |
|     | WRA12, WRA14<br>WRA16 |                      | M4 × 4  | 2        | 1.67                    |



## ROBO Cylinder

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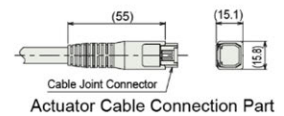
# Chapter 6

# External Dimensions

|      |                                   |               |      |
|------|-----------------------------------|---------------|------|
| 6.1  | Standard Specification            | RCP6W-WRA10C  | 6-1  |
| 6.2  | Built-in Controller Specification | RCP6SW-WRA10C | 6-2  |
| 6.3  | Standard Specification            | RCP6W-WRA12C  | 6-3  |
| 6.4  | Built-in Controller Specification | RCP6SW-WRA12C | 6-4  |
| 6.5  | Standard Specification            | RCP6W-WRA14C  | 6-5  |
| 6.6  | Built-in Controller Specification | RCP6SW-WRA14C | 6-6  |
| 6.7  | Standard Specification            | RCP6W-WRA16C  | 6-7  |
| 6.8  | Built-in Controller Specification | RCP6SW-WRA16C | 6-8  |
| 6.9  | Standard Specification            | RCP6W-WRA10R  | 6-9  |
| 6.10 | Built-in Controller Specification | RCP6SW-WRA10R | 6-10 |
| 6.11 | Standard Specification            | RCP6W-WRA12R  | 6-11 |
| 6.12 | Built-in Controller Specification | RCP6SW-WRA12R | 6-12 |
| 6.13 | Standard Specification            | RCP6W-WRA14R  | 6-13 |
| 6.14 | Built-in Controller Specification | RCP6SW-WRA14R | 6-14 |

|      |                                   |                     |      |
|------|-----------------------------------|---------------------|------|
| 6.15 | Standard Specification            | RCP6W-WRA16R .....  | 6-15 |
| 6.16 | Built-in Controller Specification | RCP6SW-WRA16R ..... | 6-16 |

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



### Actuator Cable Connection Part

97 (End cover assembly width)

### Detail of T-Slot on Side

Cross Section of Z-Z  
Detail of Counterbore  
for Base Attachment

## Unit (mm)

Unit (kg)6-1

## 6. External Dimensions

### 6.2 Built-in Controller Specification RCP6SW-WRA10C

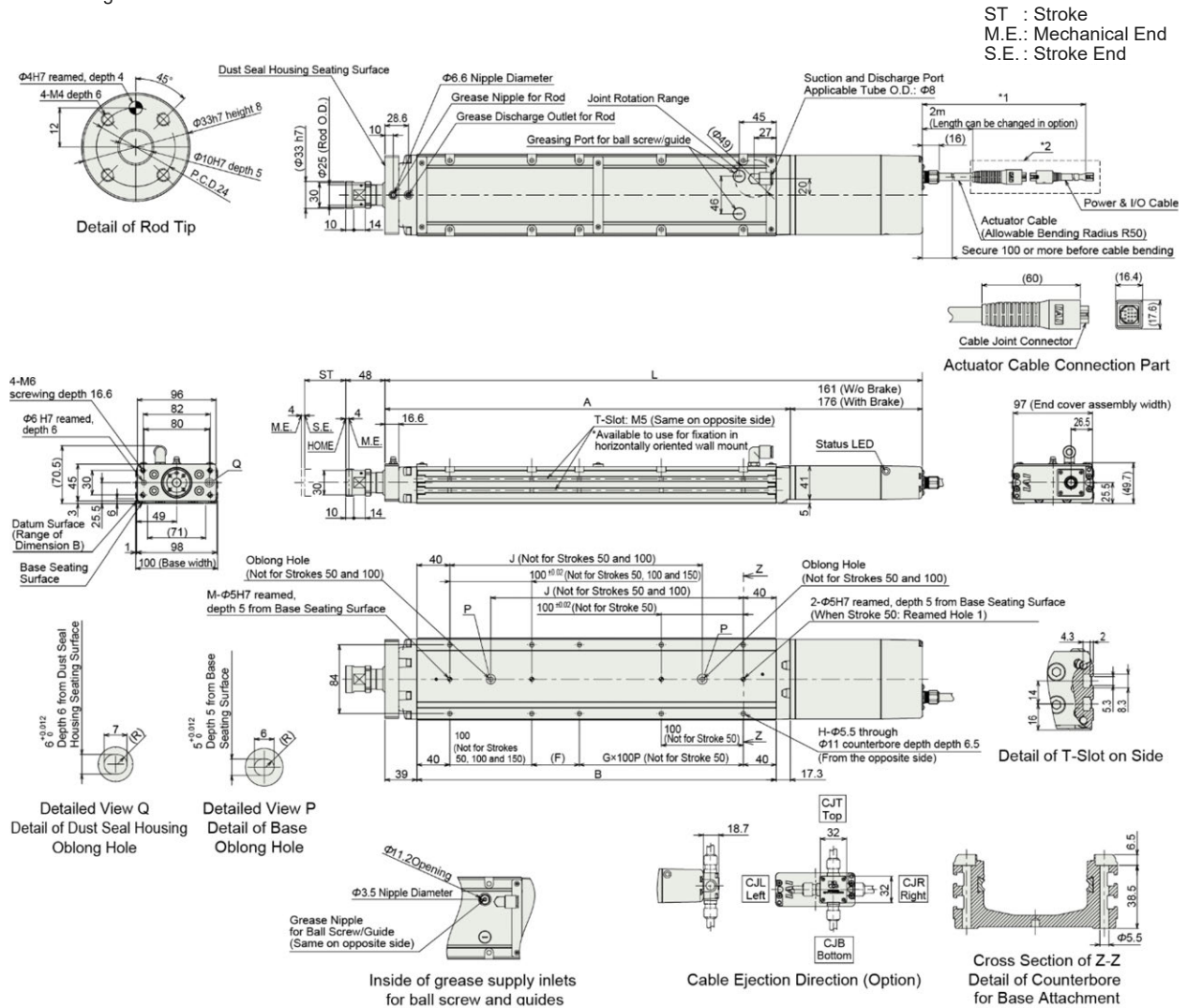
\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.



■ Dimensions by Stroke Unit (mm)

| Stroke | 50         | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   |
|--------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L      | W/o Brake  | 405.3 | 455.3 | 505.3 | 555.3 | 605.3 | 655.3 | 705.3 | 755.3 | 805.3 |
|        | With Brake | 420.3 | 470.3 | 520.3 | 570.3 | 620.3 | 670.3 | 720.3 | 770.3 | 820.3 |
| A      |            | 244.3 | 294.3 | 344.3 | 394.3 | 444.3 | 494.3 | 544.3 | 594.3 | 644.3 |
| B      |            | 188   | 238   | 288   | 338   | 388   | 438   | 488   | 538   | 588   |
| F      |            | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    | 108   |
| G      |            | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 4     |
| H      |            | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    |
| J      |            | —     | —     | 158   | 208   | 258   | 308   | 358   | 408   | 458   |
| M      |            | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     |

■ Mass by Stroke Unit (kg)

| Stroke | 50         | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|--------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Mass   | W/o Brake  | 3.8 | 4.2 | 4.7 | 5.1 | 5.6 | 6.0 | 6.5 | 6.9 | 7.4 |
|        | With Brake | 4.0 | 4.4 | 4.9 | 5.3 | 5.8 | 6.2 | 6.7 | 7.1 | 7.6 |

### 6.3 Standard Specification RCP6W-WRA12C

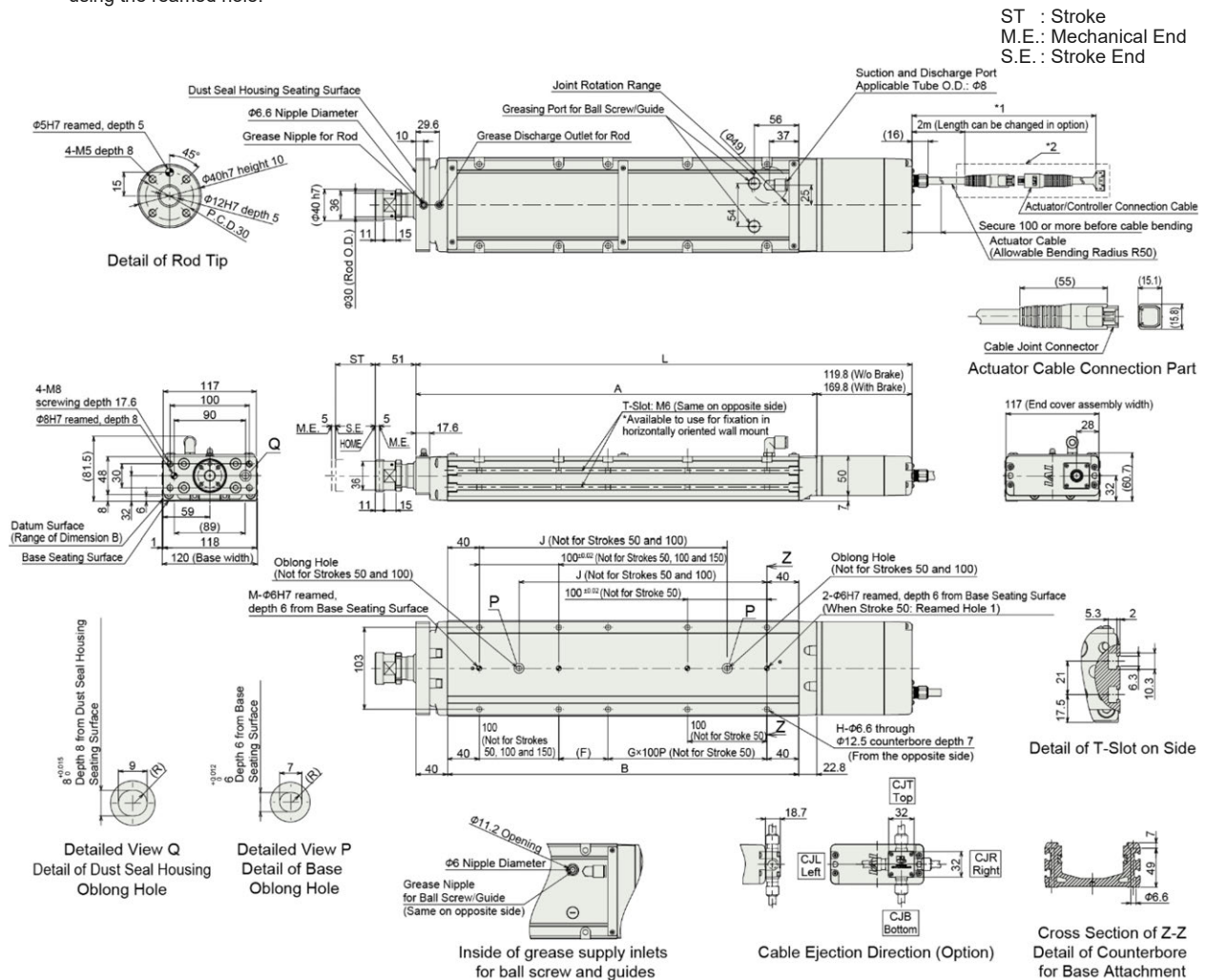
\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.



#### ■ Dimensions by Stroke

Unit (mm)

| Stroke | 50         | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   |
|--------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L      | W/o Brake  | 374.6 | 424.6 | 474.6 | 524.6 | 574.6 | 624.6 | 674.6 | 724.6 | 774.6 |
|        | With Brake | 424.6 | 474.6 | 524.6 | 574.6 | 624.6 | 674.6 | 724.6 | 774.6 | 824.6 |
| A      | 254.8      | 304.8 | 354.8 | 404.8 | 454.8 | 504.8 | 554.8 | 604.8 | 654.8 | 704.8 |
| B      | 192        | 242   | 292   | 342   | 392   | 442   | 492   | 542   | 592   | 642   |
| F      | 112        | 62    | 112   | 62    | 112   | 62    | 112   | 62    | 112   | 62    |
| G      | 0          | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     |
| H      | 4          | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    |
| J      | —          | —     | 162   | 212   | 262   | 312   | 362   | 412   | 462   | 512   |
| M      | 1          | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |

#### ■ Mass by Stroke

Unit (kg)

| Stroke | 50         | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450  | 500  |
|--------|------------|-----|-----|-----|-----|-----|-----|-----|------|------|
| Mass   | W/o Brake  | 5.2 | 5.8 | 6.5 | 7.1 | 7.8 | 8.4 | 9.1 | 9.7  | 10.4 |
|        | With Brake | 5.5 | 6.1 | 6.8 | 7.4 | 8.1 | 8.7 | 9.4 | 10.0 | 10.7 |

## 6. External Dimensions

### 6.4 Built-in Controller Specification RCP6SW-WRA12C

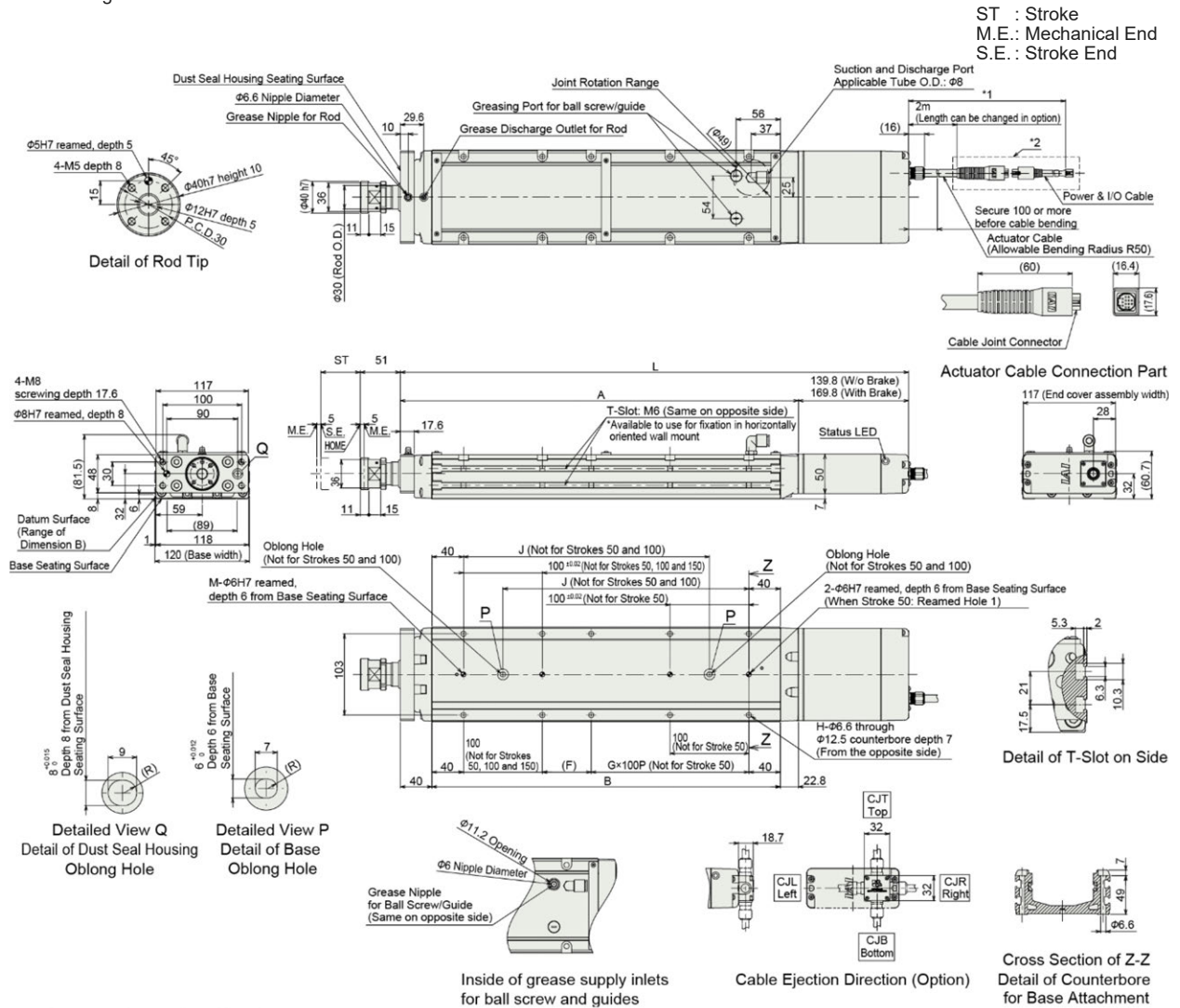
\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.



#### ■ Dimensions by Stroke

|   |            | Unit (mm) |       |       |       |       |       |       |       |       |       |
|---|------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L | Stroke     | 50        | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   |
|   | W/o Brake  | 394.6     | 444.6 | 494.6 | 544.6 | 594.6 | 644.6 | 694.6 | 744.6 | 794.6 | 844.6 |
|   | With Brake | 424.6     | 474.6 | 524.6 | 574.6 | 624.6 | 674.6 | 724.6 | 774.6 | 824.6 | 874.6 |
|   | A          | 254.8     | 304.8 | 354.8 | 404.8 | 454.8 | 504.8 | 554.8 | 604.8 | 654.8 | 704.8 |
|   | B          | 192       | 242   | 292   | 342   | 392   | 442   | 492   | 542   | 592   | 642   |
|   | F          | 112       | 62    | 112   | 62    | 112   | 62    | 112   | 62    | 112   | 62    |
|   | G          | 0         | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     |
|   | H          | 4         | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    |
|   | J          | —         | —     | 162   | 212   | 262   | 312   | 362   | 412   | 462   | 512   |
|   | M          | 1         | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |

#### ■ Mass by Stroke

|      |            | Unit (kg) |     |     |     |     |     |     |      |      |      |
|------|------------|-----------|-----|-----|-----|-----|-----|-----|------|------|------|
| Mass | Stroke     | 50        | 100 | 150 | 200 | 250 | 300 | 350 | 400  | 450  | 500  |
|      | W/o Brake  | 5.3       | 5.9 | 6.6 | 7.2 | 7.9 | 8.5 | 9.2 | 9.8  | 10.5 | 11.1 |
|      | With Brake | 5.6       | 6.2 | 6.9 | 7.5 | 8.2 | 8.8 | 9.5 | 10.1 | 10.8 | 11.4 |

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



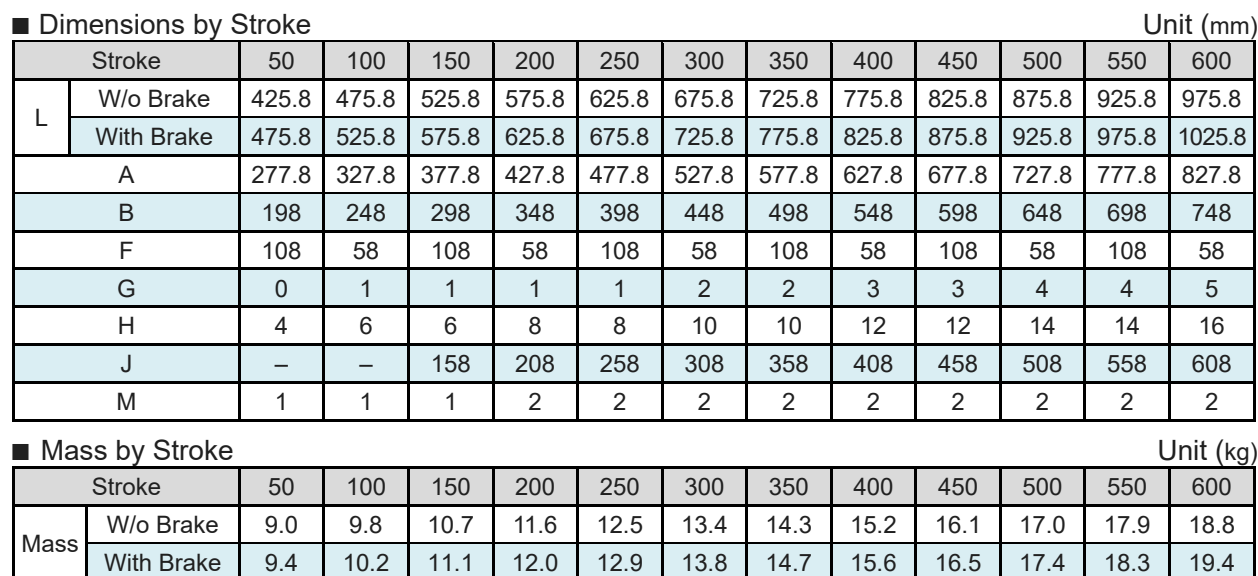
Unit (mm)

■ Mass by Stroke Unit (kg)

Unit (kg)

6-5

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.  
\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proof.  
(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.  
(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.  
(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.



## 6.7 Standard Specification RCP6W-WRA16C

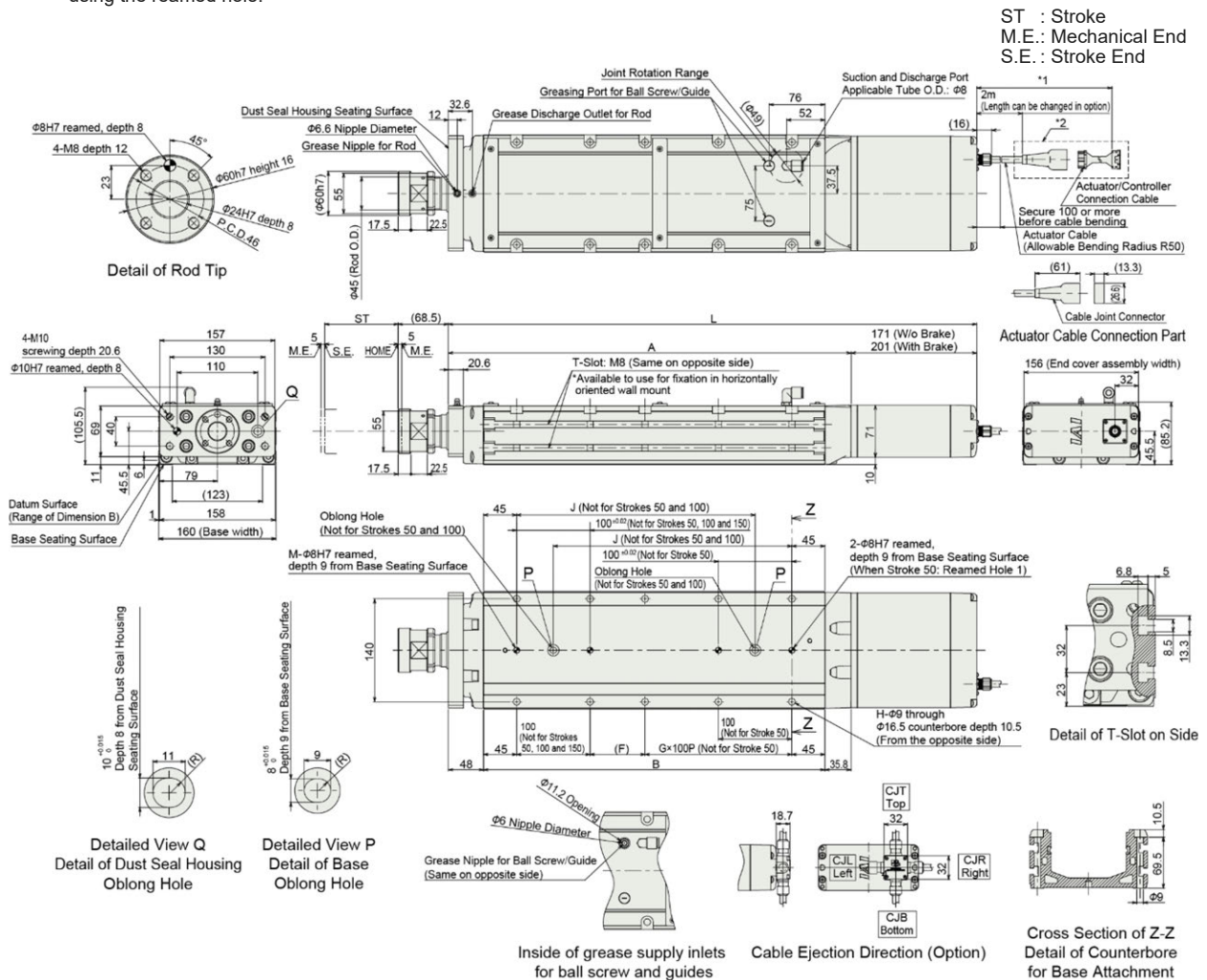
\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.



### ■ Dimensions by Stroke

Unit (mm)

| Stroke | 50         | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   | 550   | 600   | 650    | 700    | 750    | 800    |
|--------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
| L      | W/o Brake  | 469.8 | 519.8 | 569.8 | 619.8 | 669.8 | 719.8 | 769.8 | 819.8 | 869.8 | 919.8 | 969.8 | 1019.8 | 1069.8 | 1119.8 | 1169.8 |
|        | With Brake | 499.8 | 549.8 | 599.8 | 649.8 | 699.8 | 749.8 | 799.8 | 849.8 | 899.8 | 949.8 | 999.8 | 1049.8 | 1099.8 | 1149.8 | 1199.8 |
| A      |            | 298.8 | 348.8 | 398.8 | 448.8 | 498.8 | 548.8 | 598.8 | 648.8 | 698.8 | 748.8 | 798.8 | 848.8  | 898.8  | 948.8  | 998.8  |
| B      |            | 215   | 265   | 315   | 365   | 415   | 465   | 515   | 565   | 615   | 665   | 715   | 765    | 815    | 865    | 915    |
| F      |            | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75     | 125    | 75     | 125    |
| G      |            | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     | 4     | 5      | 5      | 6      | 7      |
| H      |            | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    | 14    | 16     | 16     | 18     | 20     |
| J      |            | —     | —     | 175   | 225   | 275   | 325   | 375   | 425   | 475   | 525   | 575   | 625    | 675    | 725    | 775    |
| M      |            | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2      | 2      | 2      | 2      |

### ■ Mass by Stroke

Unit (kg)

| Stroke | 50         | 100  | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500  | 550  | 600  | 650  | 700  | 750  | 800  |
|--------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Mass   | W/o Brake  | 12.4 | 13.6 | 14.8 | 15.9 | 17.0 | 18.2 | 19.3 | 20.5 | 21.6 | 22.8 | 23.9 | 25.1 | 26.2 | 27.4 | 28.5 |
|        | With Brake | 12.9 | 14.1 | 15.3 | 16.4 | 17.5 | 18.7 | 19.8 | 21.0 | 22.1 | 23.3 | 24.4 | 25.6 | 26.7 | 27.9 | 29.0 |

## 6. External Dimensions

### 6.8 Built-in Controller Specification RCP6SW-WRA16C

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

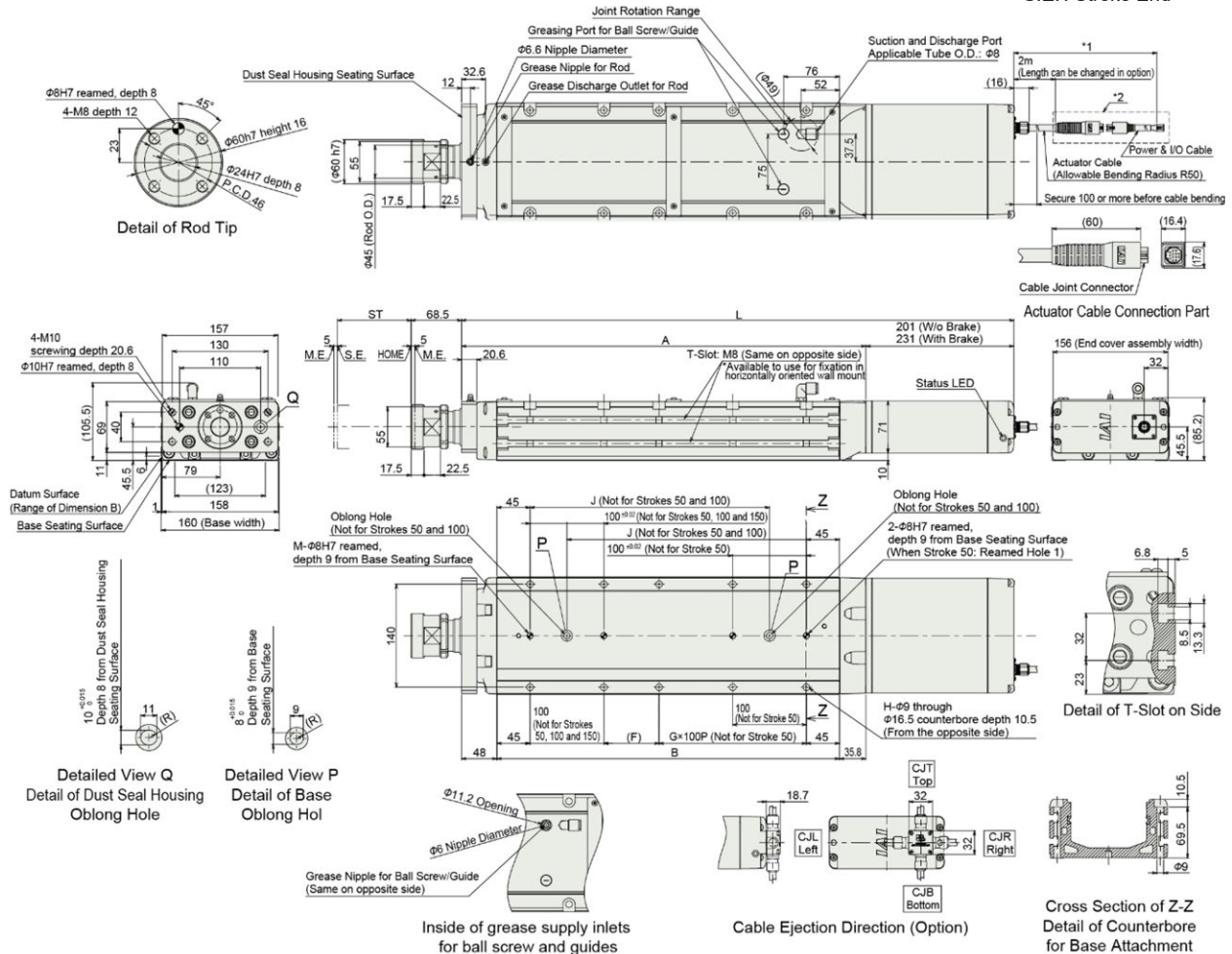
\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

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



#### ■ Dimensions by Stroke

Unit (mm)

| Stroke |            | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   | 550    | 600    | 650    | 700    | 750    | 800    |
|--------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| L      | W/o Brake  | 499.8 | 549.8 | 599.8 | 649.8 | 699.8 | 749.8 | 799.8 | 849.8 | 899.8 | 949.8 | 999.8  | 1049.8 | 1099.8 | 1149.8 | 1199.8 | 1249.8 |
|        | With Brake | 529.8 | 579.8 | 629.8 | 679.8 | 729.8 | 779.8 | 829.8 | 879.8 | 929.8 | 979.8 | 1029.8 | 1079.8 | 1129.8 | 1179.8 | 1229.8 | 1279.8 |
| A      |            | 298.8 | 348.8 | 398.8 | 448.8 | 498.8 | 548.8 | 598.8 | 648.8 | 698.8 | 748.8 | 798.8  | 848.8  | 898.8  | 948.8  | 998.8  | 1048.8 |
| B      |            | 215   | 265   | 315   | 365   | 415   | 465   | 515   | 565   | 615   | 665   | 715    | 765    | 815    | 865    | 915    | 965    |
| F      |            | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125    | 75     | 125    | 75     | 125    | 75     |
| G      |            | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     | 4      | 5      | 5      | 6      | 6      | 7      |
| H      |            | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    | 14     | 16     | 16     | 18     | 18     | 20     |
| J      |            | —     | —     | 175   | 225   | 275   | 325   | 375   | 425   | 475   | 525   | 575    | 625    | 675    | 725    | 775    | 825    |
| M      |            | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2      | 2      | 2      | 2      | 2      | 2      |

#### ■ Mass by Stroke

Unit (kg)

| Stroke |            | 50   | 100  | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500  | 550  | 600  | 650  | 700  | 750  | 800  |
|--------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Mass   | W/o Brake  | 12.5 | 13.7 | 14.9 | 16.0 | 17.1 | 18.3 | 19.4 | 20.6 | 21.7 | 22.9 | 24.0 | 25.2 | 26.3 | 27.5 | 28.6 | 29.8 |
|        | With Brake | 13.0 | 14.2 | 15.4 | 16.5 | 17.6 | 18.8 | 19.9 | 21.1 | 22.2 | 23.4 | 24.5 | 25.7 | 26.8 | 28.0 | 29.1 | 30.3 |

## 6.9 Standard Specification RCP6W-WRA10R

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

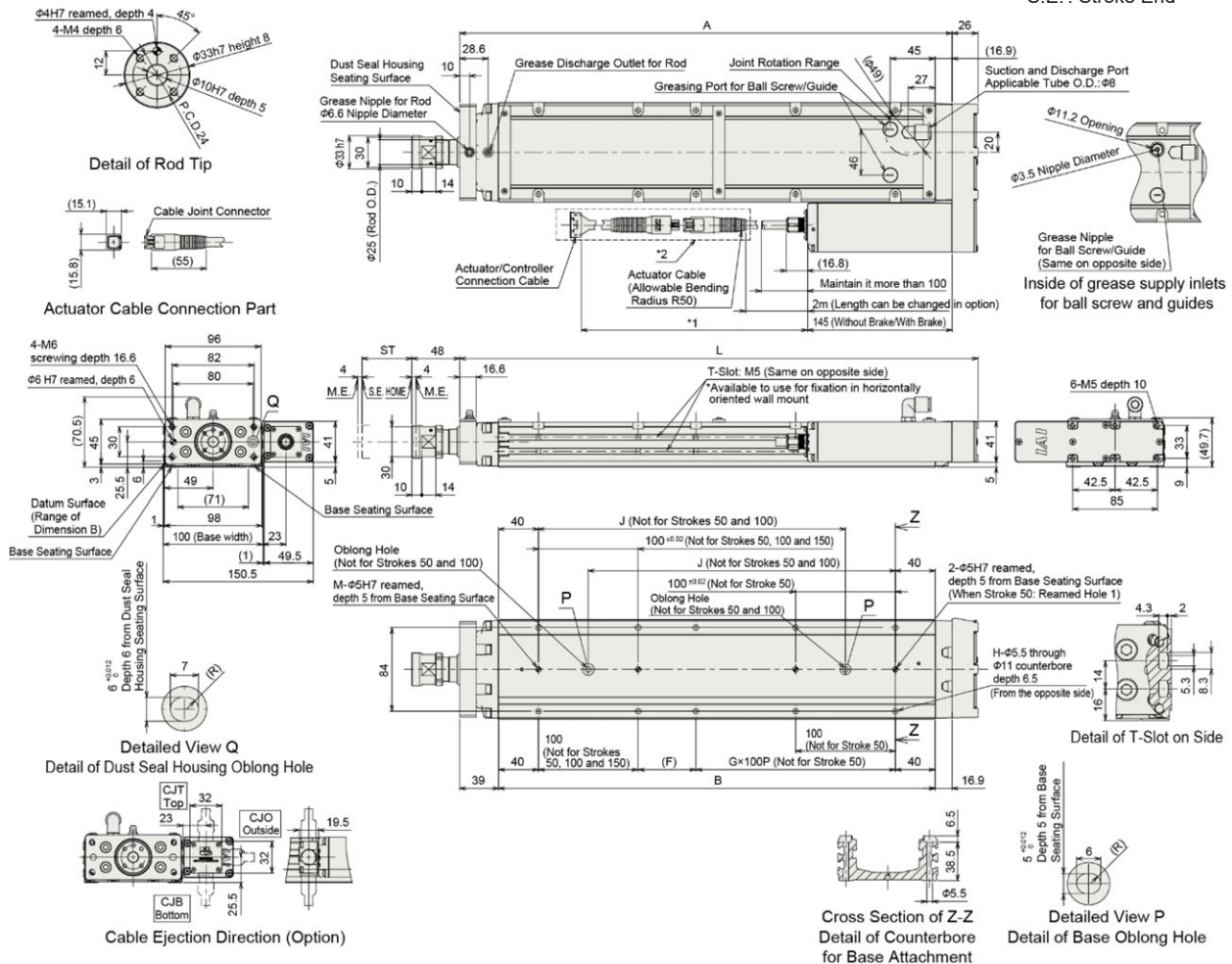
(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

(Note) The figure below shows the motor left reversed type (Model code: ML).

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



### ■ Dimensions by Stroke

Unit (mm)

| Stroke | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L      | 269.9 | 319.9 | 369.9 | 419.9 | 469.9 | 519.9 | 569.9 | 619.9 | 669.9 | 719.9 |
| A      | 243.9 | 293.9 | 343.9 | 393.9 | 443.9 | 493.9 | 543.9 | 593.9 | 643.9 | 693.9 |
| B      | 188   | 238   | 288   | 338   | 388   | 438   | 488   | 538   | 588   | 638   |
| F      | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    |
| G      | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     |
| H      | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    |
| J      | —     | —     | 158   | 208   | 258   | 308   | 358   | 408   | 458   | 508   |
| M      | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |

### ■ Mass by Stroke

Unit (kg)

| Stroke | 50         | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|--------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Mass   | W/o Brake  | 3.8 | 4.2 | 4.7 | 5.1 | 5.6 | 6.0 | 6.5 | 6.9 | 7.4 |
|        | With Brake | 3.9 | 4.3 | 4.8 | 5.2 | 5.7 | 6.1 | 6.6 | 7.0 | 7.5 |

## 6. External Dimensions

### 6.10 Built-in Controller Specification RCP6SW-WRA10R

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

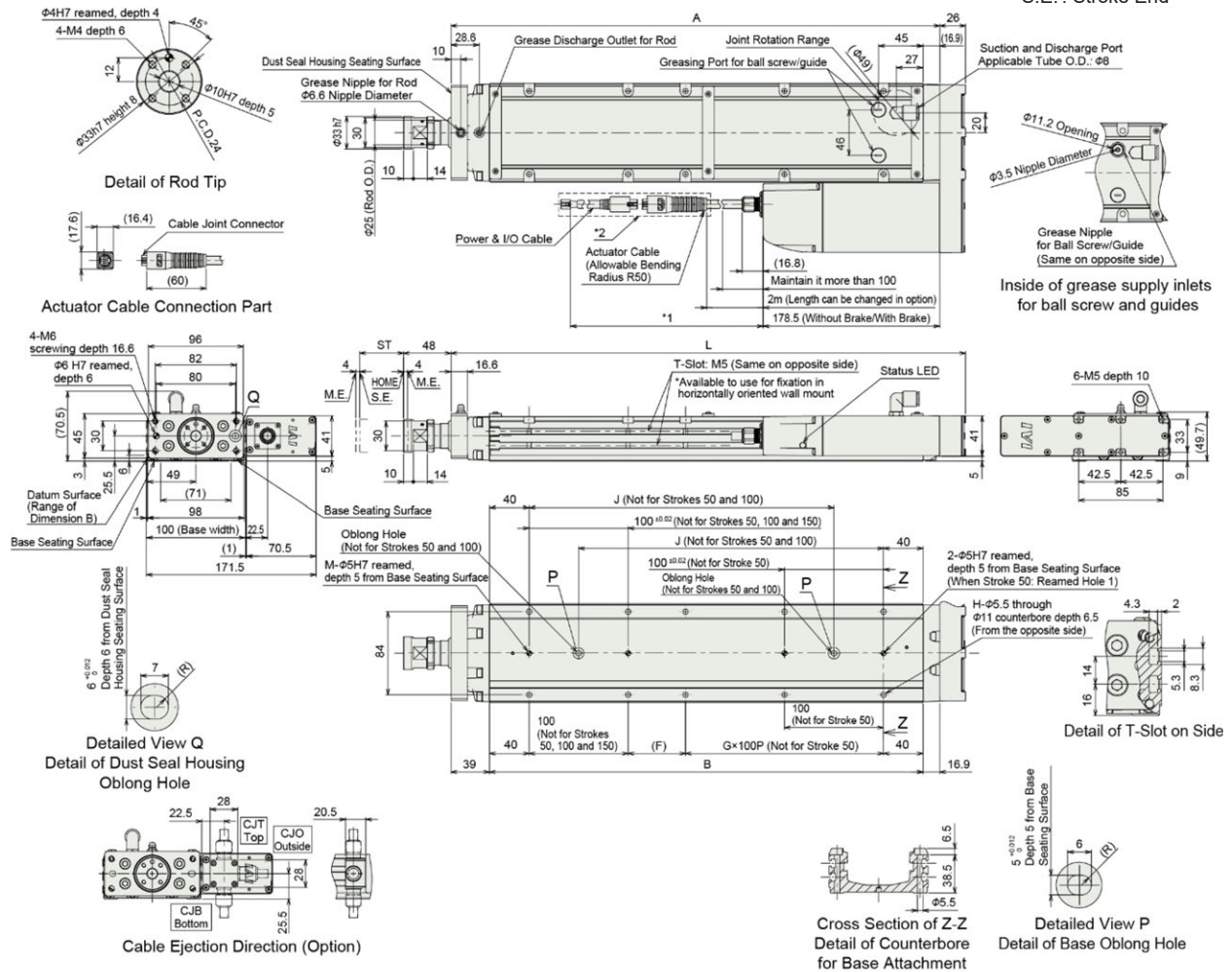
(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

(Note) The figure below shows the motor left reversed type (Model code: ML).

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



#### ■ Dimensions by Stroke

Unit (mm)

| Stroke | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L      | 269.9 | 319.9 | 369.9 | 419.9 | 469.9 | 519.9 | 569.9 | 619.9 | 669.9 | 719.9 |
| A      | 243.9 | 293.9 | 343.9 | 393.9 | 443.9 | 493.9 | 543.9 | 593.9 | 643.9 | 693.9 |
| B      | 188   | 238   | 288   | 338   | 388   | 438   | 488   | 538   | 588   | 638   |
| F      | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    |
| G      | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     |
| H      | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    |
| J      | —     | —     | 158   | 208   | 258   | 308   | 358   | 408   | 458   | 508   |
| M      | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |

#### ■ Mass by Stroke

Unit (kg)

| Stroke     | 50  | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Mass       |     |     |     |     |     |     |     |     |     |     |
| W/o Brake  | 4.0 | 4.4 | 4.9 | 5.3 | 5.8 | 6.2 | 6.7 | 7.1 | 7.6 | 8.0 |
| With Brake | 4.1 | 4.5 | 5.0 | 5.4 | 5.9 | 6.3 | 6.8 | 7.2 | 7.7 | 8.1 |

## 6.11 Standard Specification RCP6W-WRA12R

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

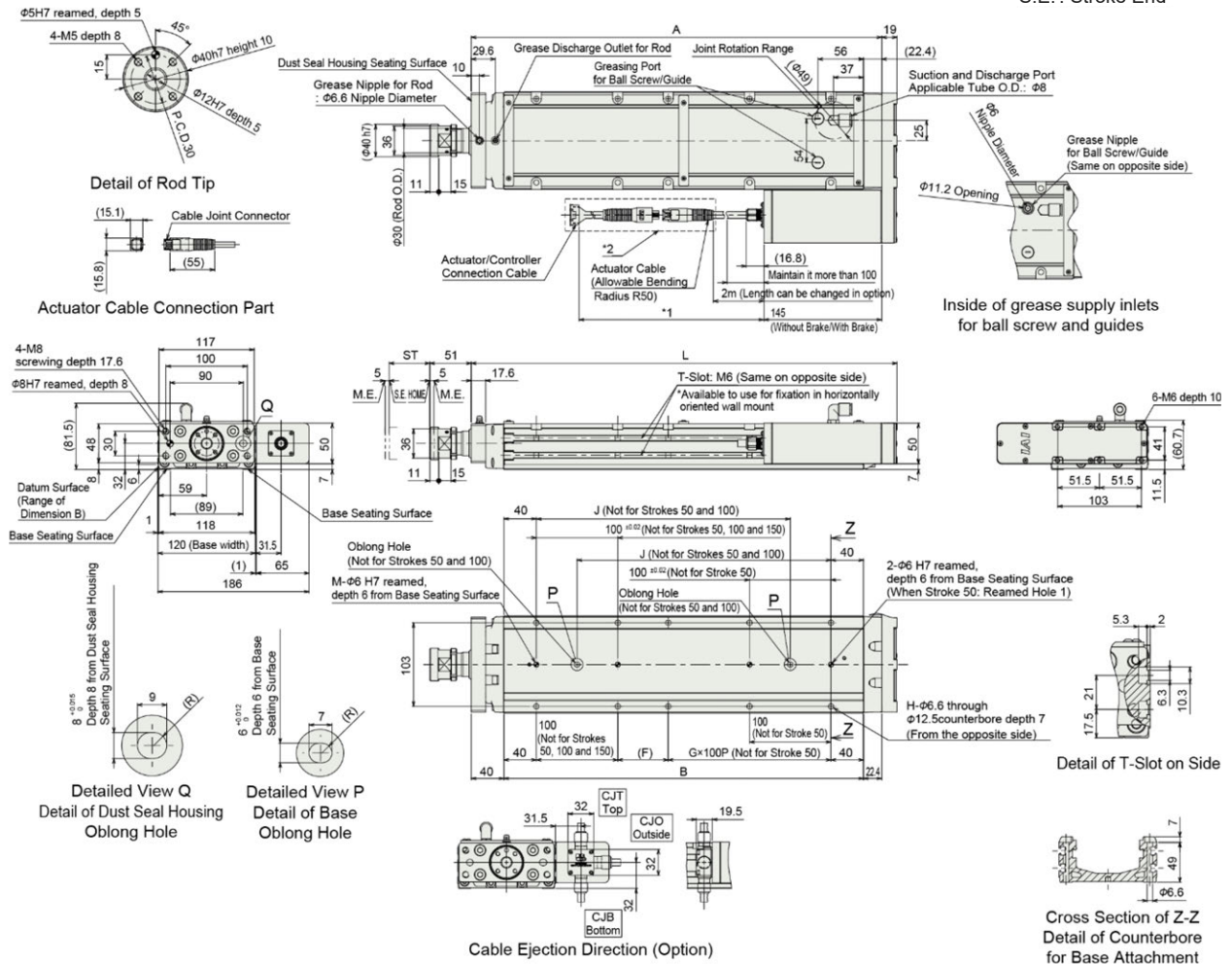
(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

(Note) The figure below shows the motor left reversed type (Model code: ML).

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



## 6. External Dimensions

### 6.12 Built-in Controller Specification RCP6SW-WRA12R

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

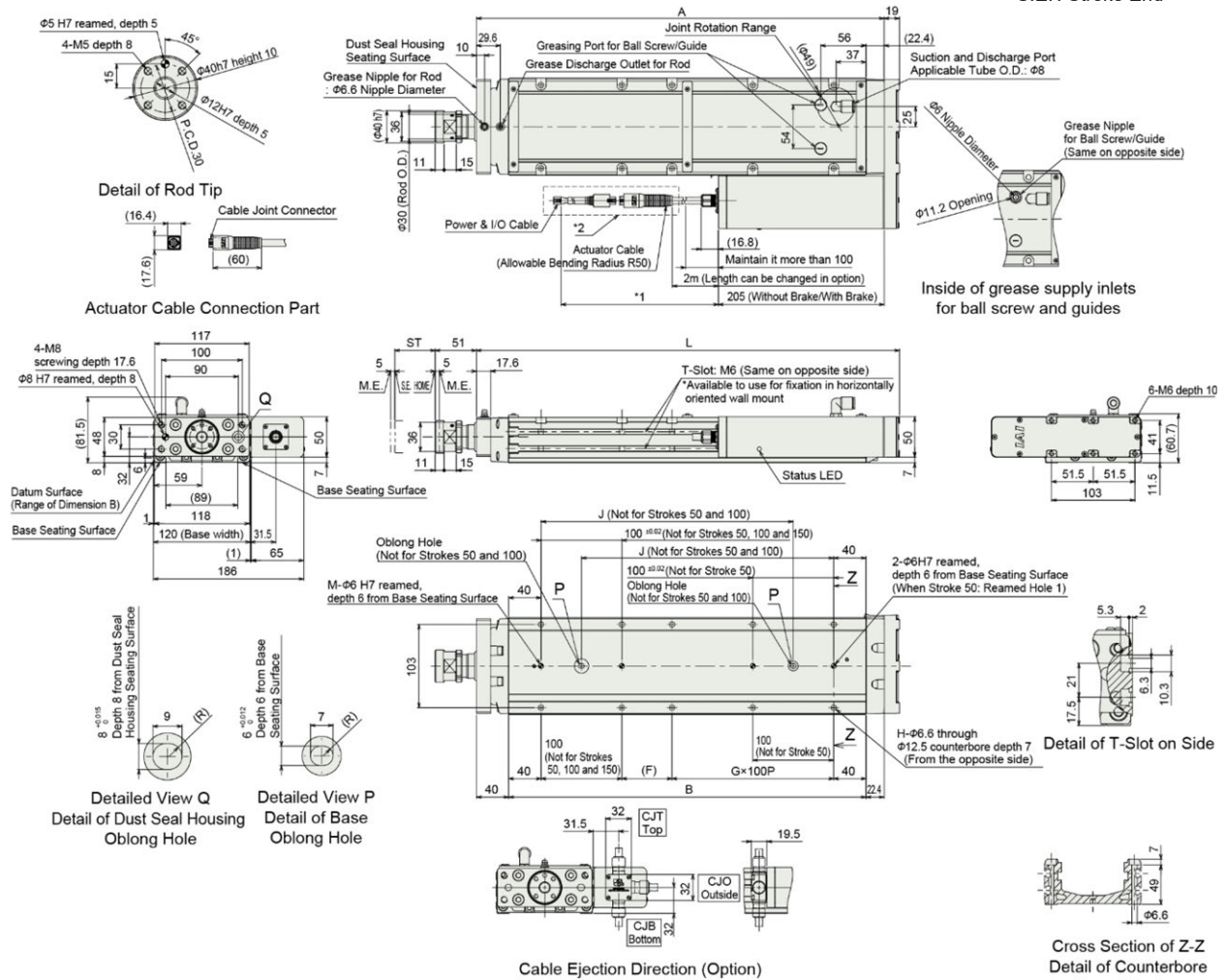
(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

(Note) The figure below shows the motor left reversed type (Model code: ML).

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



#### ■ Dimensions by Stroke

| Stroke | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L      | 273.4 | 323.4 | 373.4 | 423.4 | 473.4 | 523.4 | 573.4 | 623.4 | 673.4 | 723.4 |
| A      | 254.4 | 304.4 | 354.4 | 404.4 | 454.4 | 504.4 | 554.4 | 604.4 | 654.4 | 704.4 |
| B      | 192   | 242   | 292   | 342   | 392   | 442   | 492   | 542   | 592   | 642   |
| F      | 112   | 62    | 112   | 62    | 112   | 62    | 112   | 62    | 112   | 62    |
| G      | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     |
| H      | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    |
| J      | —     | —     | 162   | 212   | 262   | 312   | 362   | 412   | 462   | 512   |
| M      | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |

#### ■ Mass by Stroke

| Stroke     | 50  | 100 | 150 | 200 | 250 | 300 | 350 | 400  | 450  | 500  |
|------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| Mass       |     |     |     |     |     |     |     |      |      |      |
| W/o Brake  | 5.5 | 6.1 | 6.8 | 7.4 | 8.1 | 8.7 | 9.4 | 10   | 10.7 | 11.3 |
| With Brake | 5.6 | 6.2 | 6.9 | 7.5 | 8.2 | 8.8 | 9.5 | 10.1 | 10.8 | 11.4 |

## 6.13 Standard Specification RCP6W-WRA14R

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

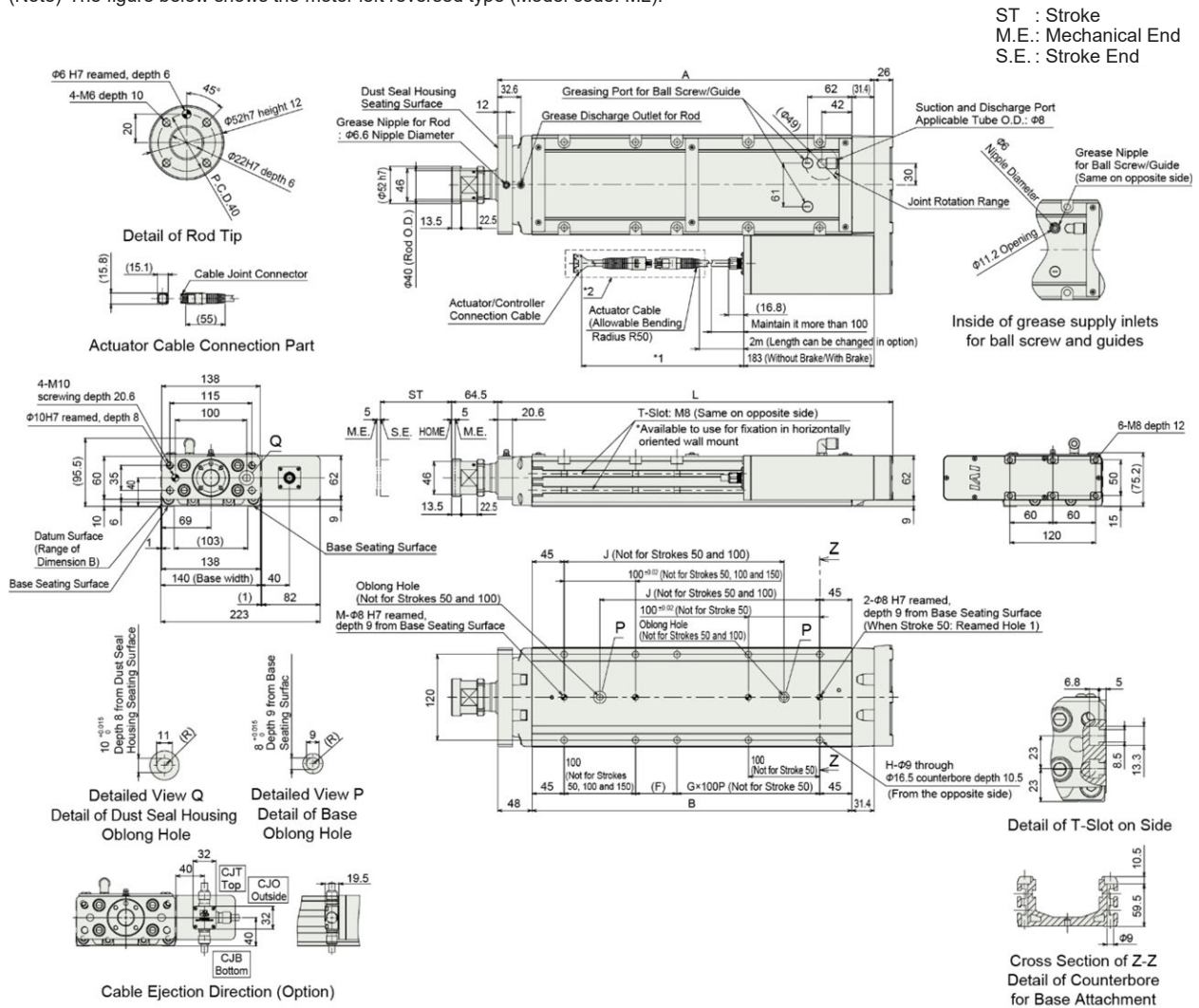
\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

(Note) The figure below shows the motor left reversed type (Model code: ML).



### ■ Dimensions by Stroke

Unit (mm)

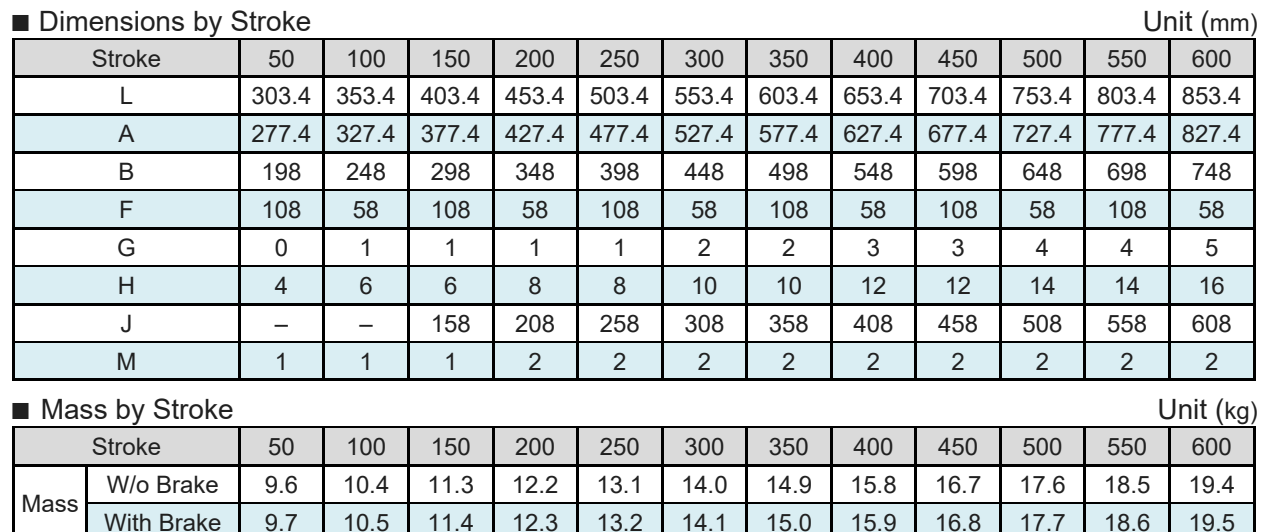
| Stroke | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   | 550   | 600   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L      | 303.4 | 353.4 | 403.4 | 453.4 | 503.4 | 553.4 | 603.4 | 653.4 | 703.4 | 753.4 | 803.4 | 853.4 |
| A      | 277.4 | 327.4 | 377.4 | 427.4 | 477.4 | 527.4 | 577.4 | 627.4 | 677.4 | 727.4 | 777.4 | 827.4 |
| B      | 198   | 248   | 298   | 348   | 398   | 448   | 498   | 548   | 598   | 648   | 698   | 748   |
| F      | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    | 108   | 58    |
| G      | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     | 4     | 5     |
| H      | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    | 14    | 16    |
| J      | —     | —     | 158   | 208   | 258   | 308   | 358   | 408   | 458   | 508   | 558   | 608   |
| M      | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |

### ■ Mass by Stroke

Unit (kg)

| Stroke | 50         | 100 | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500  | 550  | 600  |
|--------|------------|-----|------|------|------|------|------|------|------|------|------|------|
| Mass   | W/o Brake  | 9.4 | 10.2 | 11.1 | 12.0 | 12.9 | 13.8 | 14.7 | 15.6 | 16.5 | 17.4 | 18.3 |
|        | With Brake | 9.5 | 10.3 | 11.2 | 12.1 | 13.0 | 13.9 | 14.8 | 15.7 | 16.6 | 17.5 | 18.4 |

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



## 6.15 Standard Specification RCP6W-WRA16R

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

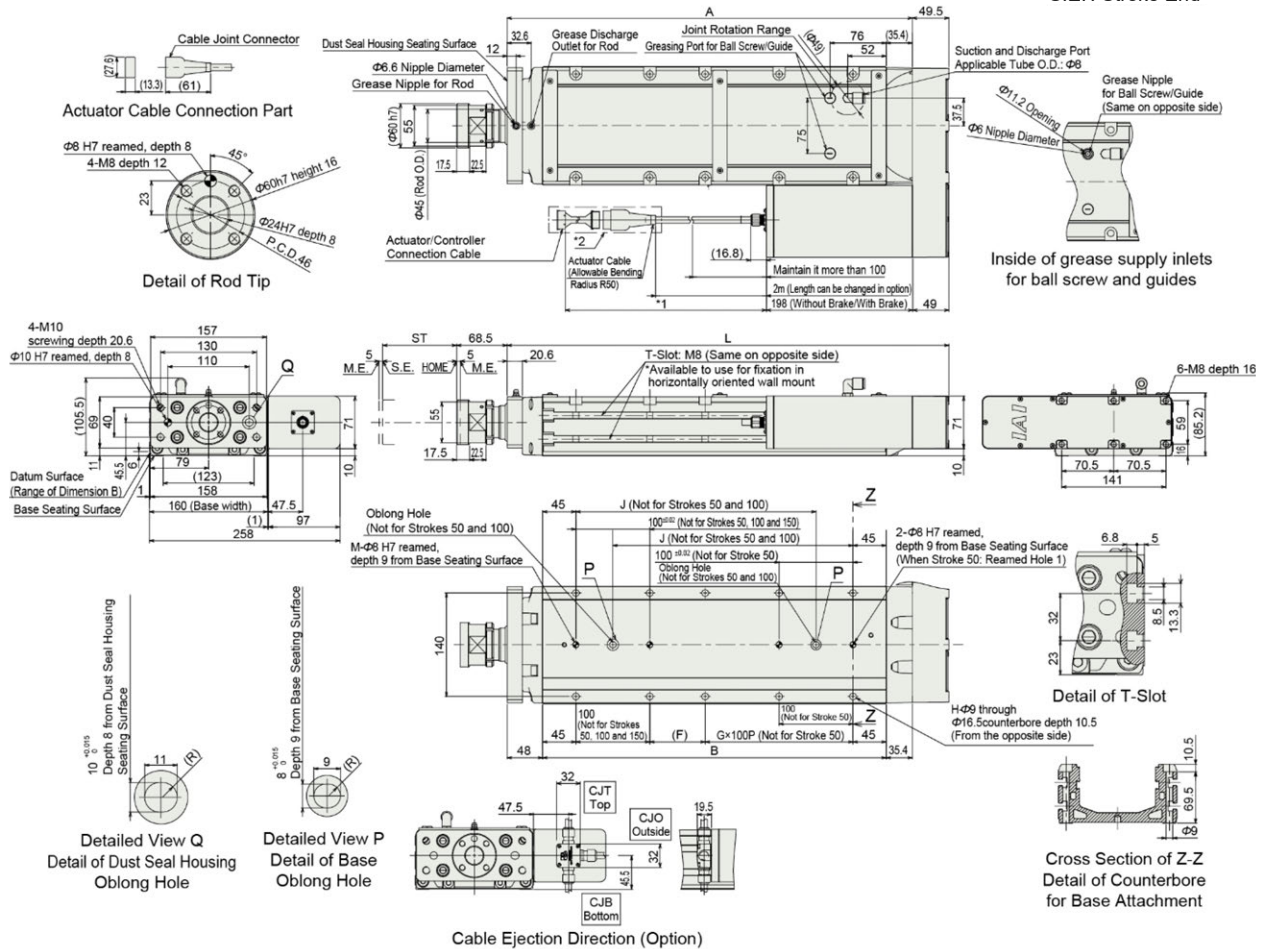
(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

(Note) The figure below shows the motor left reversed type (Model code: ML).

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



### ■ Dimensions by Stroke

Unit (mm)

| Stroke | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   | 550   | 600   | 650   | 700   | 750    | 800    |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| L      | 347.9 | 397.9 | 447.9 | 497.9 | 547.9 | 597.9 | 647.9 | 697.9 | 747.9 | 797.9 | 847.9 | 897.9 | 947.9 | 997.9 | 1047.9 | 1097.9 |
| A      | 298.4 | 348.4 | 398.4 | 448.4 | 498.4 | 548.4 | 598.4 | 648.4 | 698.4 | 748.4 | 798.4 | 848.4 | 898.4 | 948.4 | 998.4  | 1048.4 |
| B      | 215   | 265   | 315   | 365   | 415   | 465   | 515   | 565   | 615   | 665   | 715   | 765   | 815   | 865   | 915    | 965    |
| F      | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125    | 75     |
| G      | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     | 4     | 5     | 5     | 6     | 6      | 7      |
| H      | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    | 14    | 16    | 16    | 18    | 18     | 20     |
| J      | —     | —     | 175   | 225   | 275   | 325   | 375   | 425   | 475   | 525   | 575   | 625   | 675   | 725   | 775    | 825    |
| M      | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2      | 2      |

### ■ Mass by Stroke

Unit (kg)

| Stroke     | 50   | 100  | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500  | 550  | 600  | 650  | 700  | 750  | 800  |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| W/o Brake  | 13.5 | 14.7 | 15.9 | 17.0 | 18.1 | 19.3 | 20.4 | 21.6 | 22.7 | 23.9 | 25.0 | 26.2 | 27.3 | 28.5 | 29.6 | 30.8 |
| With Brake | 13.8 | 15.0 | 16.2 | 17.3 | 18.4 | 19.6 | 20.7 | 21.9 | 23.0 | 24.2 | 25.3 | 26.5 | 27.6 | 28.8 | 29.9 | 31.1 |

## 6. External Dimensions

### 6.16 Built-in Controller Specification RCP6SW-WRA16R

\*1 Select the actuator cable and the actuator/controller cable to have the total length of them at 20m or less.

\*2 The cable relay part (cable joint connectors) surrounded with dotted lines is not drip-proofed.

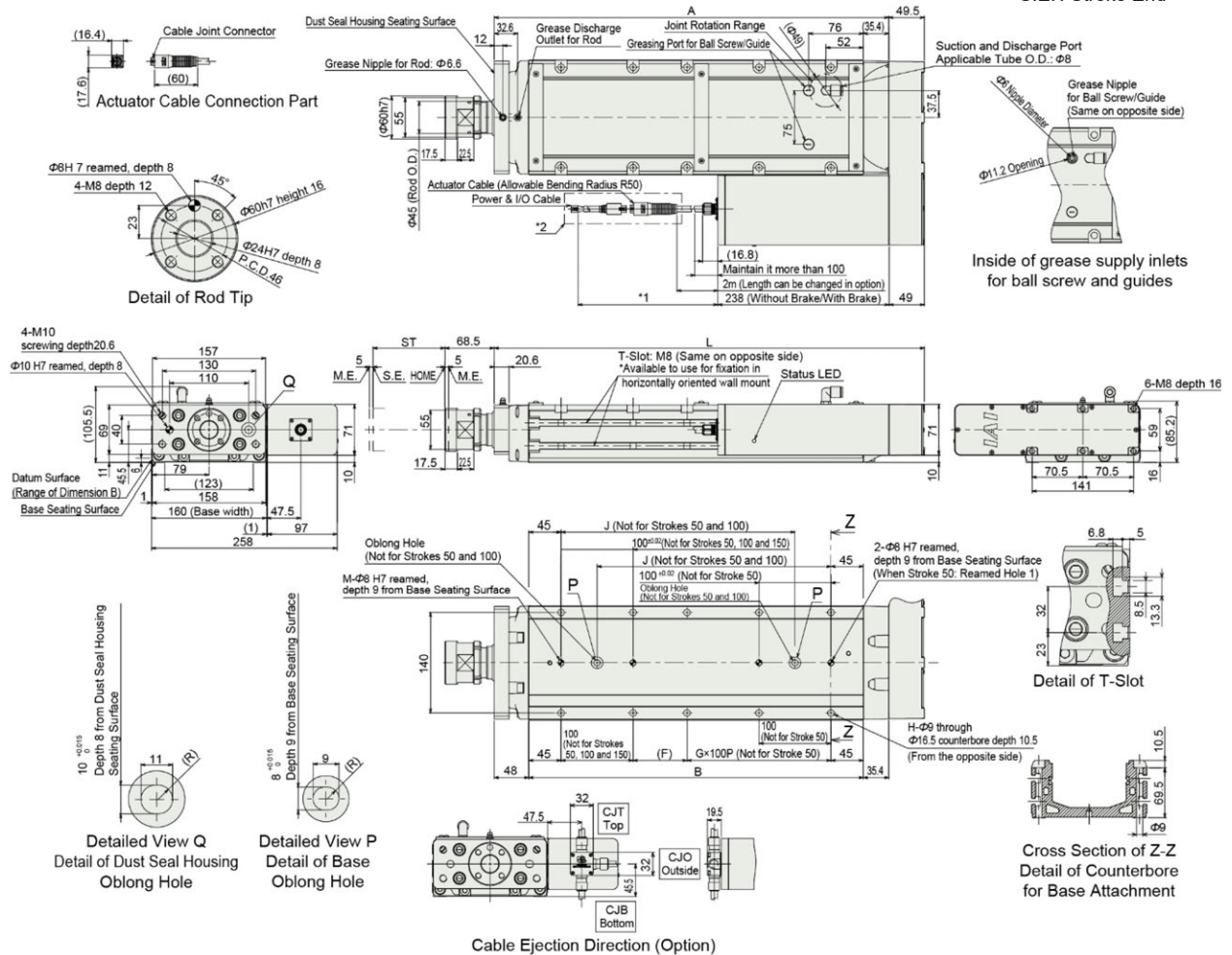
(Note) The rod should move to M. E. when the home-return operation is performed. Pay attention to interference to peripherals.

(Note) Do not perform air-purge at the suction and discharge ports. Connect a tube and extend it to a place where water or dust is not applied.

(Note) When the hangover of a transferred object is large or precise angle adjustment is necessary, attach the transferred object without using the reamed hole.

(Note) The figure below shows the motor left reversed type (Model code: ML).

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



#### ■ Dimensions by Stroke

Unit (mm)

| Stroke | 50    | 100   | 150   | 200   | 250   | 300   | 350   | 400   | 450   | 500   | 550   | 600   | 650   | 700   | 750    | 800    |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| L      | 347.9 | 397.9 | 447.9 | 497.9 | 547.9 | 597.9 | 647.9 | 697.9 | 747.9 | 797.9 | 847.9 | 897.9 | 947.9 | 997.9 | 1047.9 | 1097.9 |
| A      | 298.4 | 348.4 | 398.4 | 448.4 | 498.4 | 548.4 | 598.4 | 648.4 | 698.4 | 748.4 | 798.4 | 848.4 | 898.4 | 948.4 | 998.4  | 1048.4 |
| B      | 215   | 265   | 315   | 365   | 415   | 465   | 515   | 565   | 615   | 665   | 715   | 765   | 815   | 865   | 915    | 965    |
| F      | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125   | 75    | 125    | 75     |
| G      | 0     | 1     | 1     | 1     | 1     | 2     | 2     | 3     | 3     | 4     | 4     | 5     | 5     | 6     | 6      | 7      |
| H      | 4     | 6     | 6     | 8     | 8     | 10    | 10    | 12    | 12    | 14    | 14    | 16    | 16    | 18    | 18     | 20     |
| J      | —     | —     | 175   | 225   | 275   | 325   | 375   | 425   | 475   | 525   | 575   | 625   | 675   | 725   | 775    | 825    |
| M      | 1     | 1     | 1     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2      | 2      |

#### ■ Mass by Stroke

Unit (kg)

| Stroke     | 50   | 100  | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500  | 550  | 600  | 650  | 700  | 750  | 800  |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Mass       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| W/o Brake  | 13.7 | 14.9 | 16.1 | 17.2 | 18.3 | 19.5 | 20.6 | 21.8 | 22.9 | 24.1 | 25.2 | 26.4 | 27.5 | 28.7 | 29.8 | 31.0 |
| With Brake | 14.0 | 15.2 | 16.4 | 17.5 | 18.6 | 19.8 | 20.9 | 22.1 | 23.2 | 24.4 | 25.5 | 26.7 | 27.8 | 29.0 | 30.1 | 31.3 |

## ROBO Cylinder

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# Chapter 7

## Life

|       |                                                      |     |
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## 7.1 Operation Life

### 7.1.1 WRA10C, WRA10R, WRA12C, WRA12R, WRA14C, WRA14R

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 the allowable load and allowable torque on the rod tip for each type in [1.2 Mechanical Specifications (WRA10)], [1.3 Mechanical Specifications (WRA12)] and [1.4 Mechanical Specifications (WRA14)].

### 7.1.2 WRA16C, WRA16R

The life is assumed under condition of operation with maximum payload and maximum acceleration/deceleration, and it is 3,000km or 5,000km (reference).

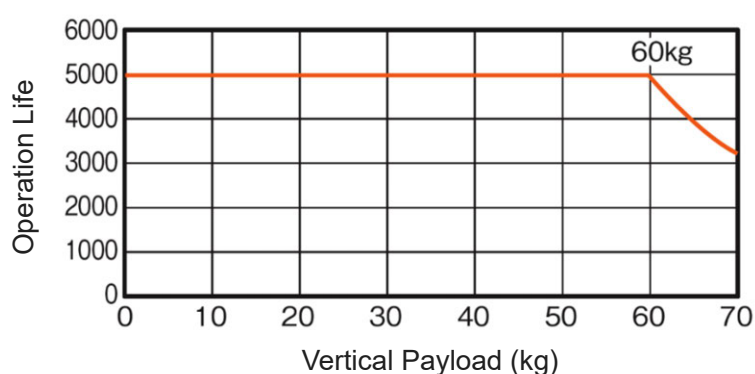
The operation life, whether it is 3,000km or 5,000km (reference), depends on the allowable load weight and the allowable torque of each.

Refer to the allowable load and allowable torque on the rod tip in [1.5 Mechanical Specifications (WRA16)].

For vertical orientation of Lead 5mm, the operation life may vary depending on the payload.

The graph below shows the relation of payload and life.

Scraper should be excluded from the product life as it is considered as a consumable part.





## ROBO Cylinder

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# Chapter 8

# Warranty

|     |                                                                                              |     |
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## 8.1 Warranty period

Whichever of the following periods is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to a specified location
- 2,500 operational hours

## 8.2 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:

- Anything other than our product
- Modification or repair performed by a party other than IAI (unless approved by IAI)
- Anything that could not be easily predicted with the level of science and technology available at the time of shipment from IAI
- Natural disaster, unnatural disaster, incident or accident for which we are not liable
- Natural fading of paint or other symptoms of aging
- Wear, depletion or other expected results of use
- 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.

## 8.3 Honoring the warranty

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

### 8.4 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.

### 8.5 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:

- Medical equipment used to maintain, control or otherwise affect human life or physical health
  - Mechanisms and machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)
  - Machinery components essential for safety (safety devices etc.)
  - 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.

### 8.6 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:

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

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|-----------------------------------|------|
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## Motor Straight Type

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## Change History

| Revision Date | Revised Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2017.05       | First edition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2017.07       | 1B edition<br>p. 105 Note added stating CB-CFA3-MPA□□□(-RB) should be 3m or less or more than 3m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2017.12       | 1C edition<br>p. 103 Note added stating "Do not have air purge performed."                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2018.06       | 1D edition<br>p. 47 Change made to pressing speed 10mm/s □ 20mm/s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2018.07       | 1E edition<br>Contents added for RCON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2019.02       | 1F edition<br>p. 124 Correction made from "for RRA6/RRA7" to "for all models"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2020.03       | 1G edition<br>p. 78 Electric wire color changed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2020.10       | 1H edition<br>p. 82, 83 Note added stating finished outer diameter is $\phi 9.1$ when exceeds 5m<br>p. 88 Description added stating installation with motor on the bottom not recommended                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2021.03       | 1I edition<br>p. 78 Change made to cable drawing<br>p. 79 to 81 Change made to tables in cable drawing and connection diagram                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2025.05       | Second edition<br><ul style="list-style-type: none"> <li>• Overall layout changed</li> <li>• Changed to "Revised RoHS Directive" in compliance with overseas standards</li> <li>• 1.1.1 Components DVD deleted</li> <li>• 1.1.2 Added related instruction manual</li> <li>• 1.2 Mechanical Specifications layout changed for each model</li> <li>• 1.5 Mechanical Specifications (WRA16) correction made to velocity in caution in WRA16C ◆ Pressing Force and Current Limit</li> <li>• 1.4 Motor • Encoder Cables moved to Chapter 3</li> <li>• 3.1 Controller and Connection [4-Way Connector Cable] added</li> <li>• 4.1 Caution for Operation [When Using External Guide Together] added</li> <li>• 5.1 Caution in Maintenance/Inspection Work added</li> <li>• 5.6.1 List of parts for replacement added</li> </ul> |

| Revision Date | Revised Content                                                                                                                                                                                                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2025.05       | <ul style="list-style-type: none"><li>• 5.6.3 Replacing Timing Belt changed to Replacing not available</li><li>• 5.6.4 Replacing Pulley Cover changed to Replacing not available</li><li>• 5.6.5 Replacing Front Seal Assembly (Dust Seal Housing) added</li><li>• Index added</li><li>• Correction made</li></ul> |
| 2026.03       | 2B edition <ul style="list-style-type: none"><li>• Changes due to discontinuation of including the First Step Guide</li></ul>                                                                                                                                                                                      |







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