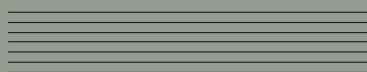
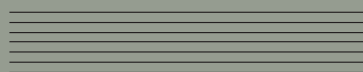




RCP2W
ROBO Cylinder Actuator
Slider, Dust-proof/Splash-proof Type
Operating Manual
[RCP2W-SA16C]



Fifth Edition



IAI America, Inc.

Please Read Before Use

Thank you for purchasing our product.

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

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

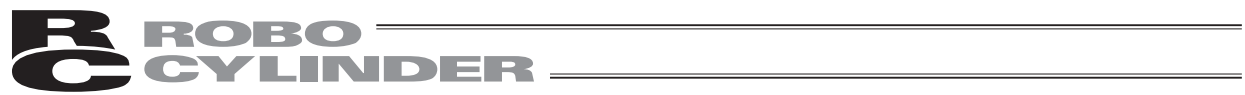
The CD or DVD that comes with the product contains operation manuals for IAI products.

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

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

[Important]

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



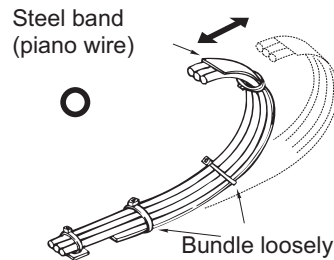
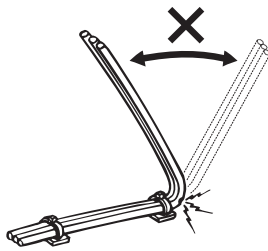
CE Marking

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

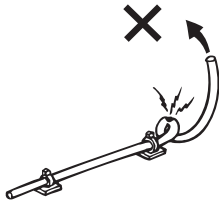
Prohibited Handling of Cables

When designing an application system using IAI's actuators and controllers, incorrect wiring or connection of each cable may cause unexpected problems such as a disconnected cable or poor contact, or even a runaway system. This section explains prohibited handling of cables. Read the information carefully to connect the cables properly.

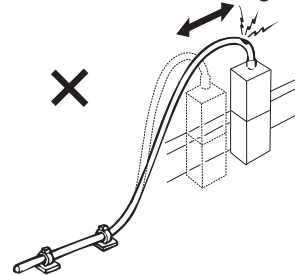
1. Do not let the cable flex at a single point.



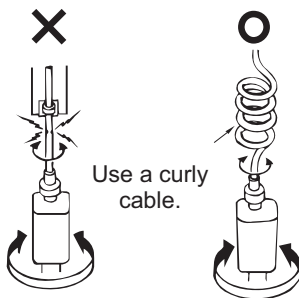
2. Do not let the cable bend, kink or twist.



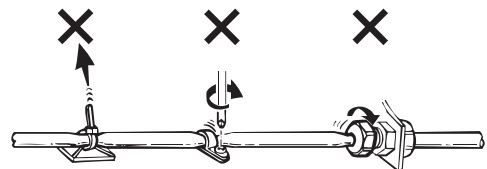
3. Do not pull the cable with a strong force.



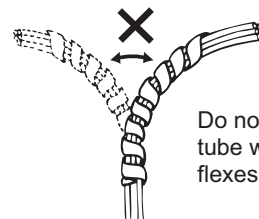
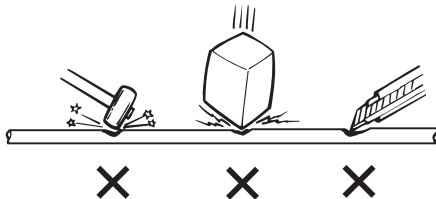
4. Do not let the cable receive a turning force at a single point.



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



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



Do not use a spiral tube where the cable flexes frequently.

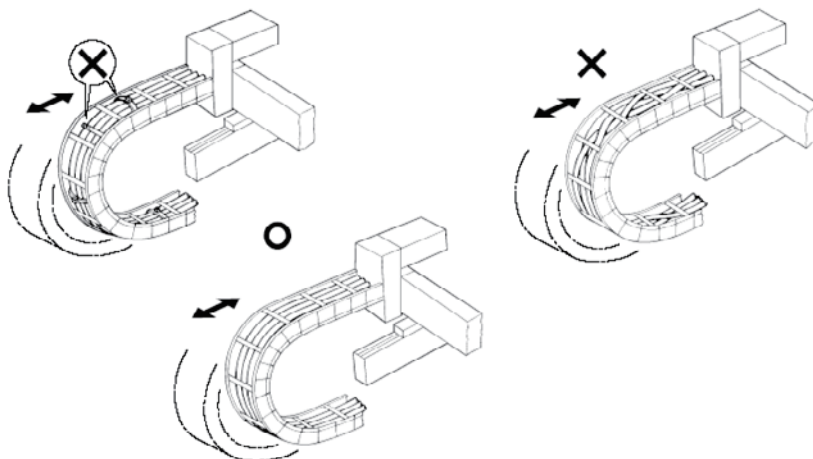
7. Notes on using cable bearers

- The supplied cables are not robot cables. Accordingly, never store the cables in a cable bearer.

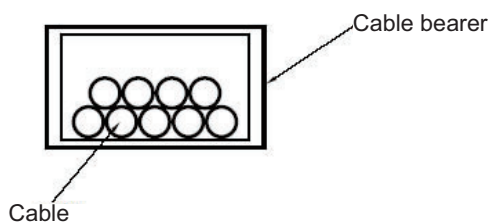
- Always use a robot cable for each relay cable.

- Use a cable bearer with a bending radius (r) of 50 mm or greater.

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



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



- Do not lay signal lines together with circuit lines that create a strong electric field.

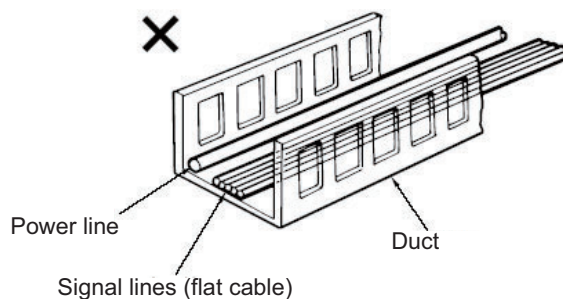


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Safety Guide

“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">• This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications.<ol style="list-style-type: none">1) Medical equipment used to maintain, control or otherwise affect human life or physical health.2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)3) Important safety parts of machinery (Safety device, etc.)• Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product.• Do not use it in any of the following environments.<ol style="list-style-type: none">1) Location where there is any inflammable gas, inflammable object or explosive2) Place with potential exposure to radiation3) Location with the ambient temperature or relative humidity exceeding the specification range4) Location where radiant heat is added from direct sunlight or other large heat source5) Location where condensation occurs due to abrupt temperature changes6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)7) Location exposed to significant amount of dust, salt or iron powder8) Location subject to direct vibration or impact• For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

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

No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> • Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. • Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. • Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. • When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. • Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. • Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. <p>(3) Grounding</p> <ul style="list-style-type: none"> • The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. • For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm^2 (AWG20 or equivalent) or more for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). • Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).





No.	Operation Description	Description
4	Installation and Start	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> • When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. • Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. • Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. • Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. • When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. • Take the measure so that the work part is not dropped in power failure or emergency stop. • Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. • Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	<ul style="list-style-type: none"> • When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. • When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. • When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. • Place a sign "Under Operation" at the position easy to see. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. <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"> • When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. • When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. • Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. • Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	<ul style="list-style-type: none"> • Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. • Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. • Make sure to operate automatic operation start from outside of the safety protection fence. • In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. • When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

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

Alert Indication

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

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

Caution in Handling

1. Do not set speeds and accelerations/decelerations equal to or greater than the respective ratings.

If the actuator is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.

In the case of interpolated operation of combined axes, the speed and acceleration/deceleration settings should correspond to the minimum values among all combined axes.

2. Keep the load moment within the allowable value.

If the actuator is operated under a load equal to or greater than the allowable load moment, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.

3. Back and forth operation in a short distance may cause wear of grease.

Continuous back and forth operation within a distance less than 30mm may cause wear of grease.

It is recommended to have 5 rounds of back and forth operation in a distance more than 50mm after every 5,000 to 10,000 rounds of the short distance operation. A layer of the grease will recover.

4. Turn the servo ON after putting the actuator or rod away from the mechanical end.

Turning the servo ON near the mechanical end may disturb the magnetic pole phase detection, and may cause the magnetic pole unconfirmed error or the excitation detection error.

Put the slider or rod away from the mechanical end when performing this operation.

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

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

1. Foreword

Thank you for purchasing the ROBO Cylinder Actuator.

This actuator adopts a new mechanism called “Magnet Coupling” that connects the ball screw nut and slider by means of magnetic force to transmit thrust. This allows the ball screw to be completely sealed, which in turn ensures the actuator’s high dust-proof and splash-proof performance.

- ⚠ Caution:

 - Never perform push-motion operation, as it will cause the magnetic coupling to lose alignment due to the structure of this actuator.
 - When transporting and storing the actuator, handle it in a horizontal position. (Refer to page 4 for details.)
 - As a rule, the actuator is designed only for horizontal applications. Do not install it vertically. (Refer to page 6 for details.)

This manual explains the correct handling, structure, maintenance and other important information regarding this actuator. Before using your actuator, be sure to read this manual to understand the correct use. Keep this manual so that you can review the relevant sections when necessary. Also peruse the operating manual for your controller for additional information regarding the actuator operation.

2. Safety Precautions

2.1 Basic Operating Instructions

- Please do not attempt to use or operate the actuator in any manner not indicated in this manual or the controller manual.
- Please be sure to use only the cable provided by IAI to connect the actuator and controller.
- Please do not allow people within the moving range of the unit when it is in operation or when the power is ON since this is dangerous.

2.2 Maintenance and Inspection

- When doing maintenance and inspection work, always shut down the controller power first.
- When doing inspection, make sure that no one can inadvertently turn the power ON.
- Make sure that a sign indicating work in progress is clearly visible.
- If several persons are working, be sure to watch out for each other’s safety. In particular, check before turning power ON or OFF and let others know if you are doing work involving axis movement.

- ⚠ Caution:

 - The content of this manual is subject to change without notice for the purpose of improvement.

3. Warranty

3.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after shipment from our company
- 12 months after delivery to the specified location

3.2 Scope of Warranty

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

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

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

- [1] Anything other than our product
- [2] Modification or repair performed by a party other than us (unless we have approved such modification or repair)
- [3] Anything that could not be easily predicted with the level of science and technology available at the time of shipment from our company
- [4] A natural disaster, man-made disaster, incident or accident for which we are not liable
- [5] Natural fading of paint or other symptoms of aging
- [6] Wear, depletion or other expected result of use
- [7] Operation noise, vibration or other subjective sensation not affecting function or maintenance

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

3.3 Honoring the Warranty

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

3.4 Limited Liability

- (1) We shall assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.
- (2) We shall not be liable for any program or control method created by the customer to operate our product or for the result of such program or control method.

3.5 Conditions of Conformance with Applicable Standards/Regulations, Etc., and Applications

- (1) If our product is combined with another product or any system, device, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc. In such a case we will not be liable for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:
 - [1] Medical equipment pertaining to maintenance or management of human life or health
 - [2] A mechanism or mechanical equipment intended to move or transport people (such as a vehicle, railway facility or aviation facility)
 - [3] Important safety parts of mechanical equipment (such as safety devices)
 - [4] Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact us at the earliest opportunity if our product is to be used in any condition or environment that differs from what is specified in the catalog or operation manual.

3.6 Other Items Excluded from Warranty

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

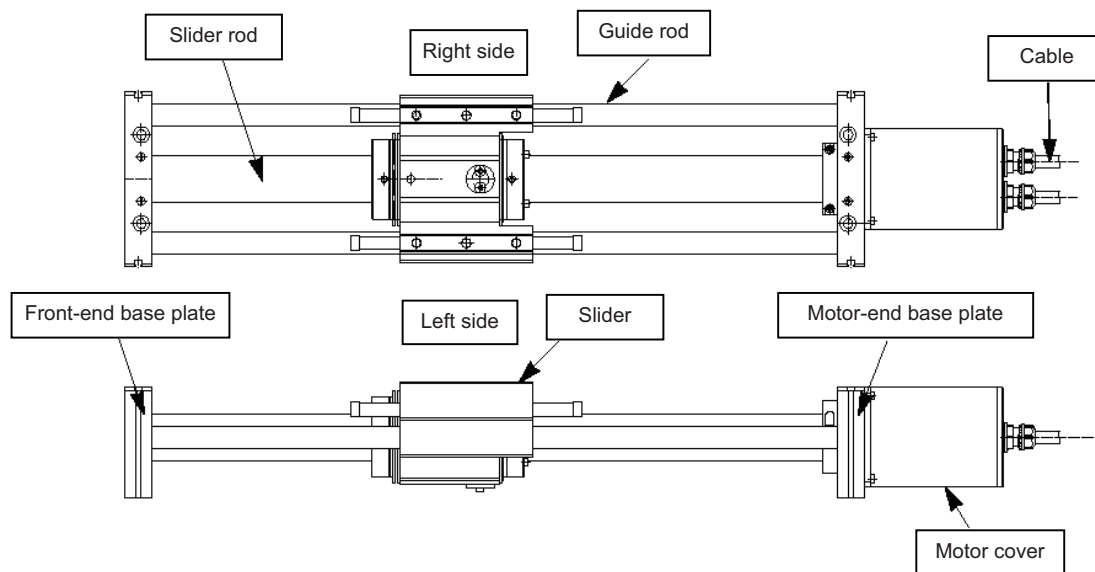
- [1] Guidance for installation/adjustment and witnessing of test operation
- [2] Maintenance and inspection
- [3] Technical guidance and education on operating/wiring methods, etc.
- [4] Technical guidance and education on programming and other items related to programs

4. Names of the Parts

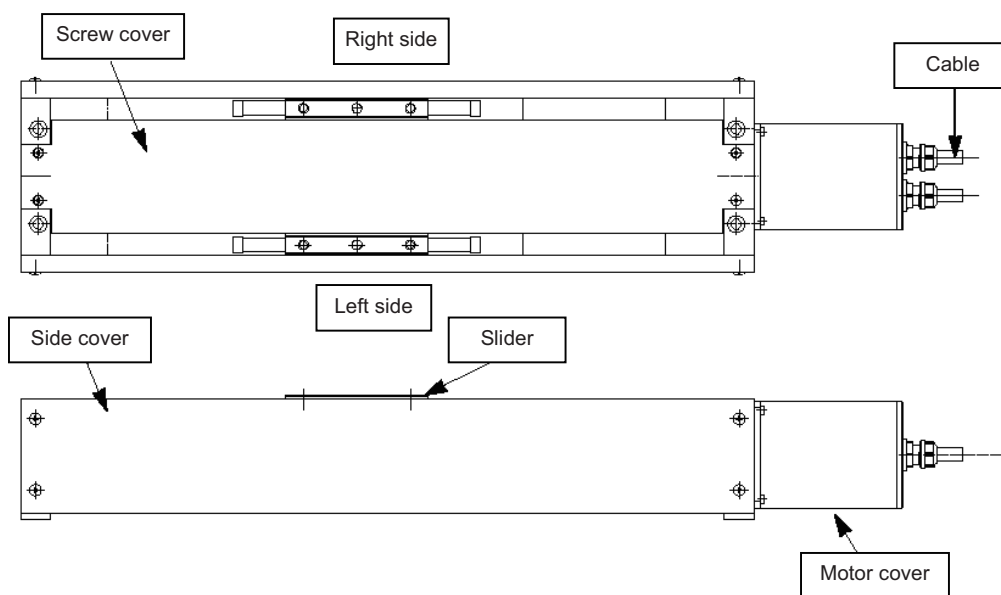
The names of the actuator parts are indicated below.

The left and right sides are indicated by looking at the actuator from the motor end with the actuator set down horizontally. Front end means the side opposite the motor end.

● Standard Type



● Cover Type



5. Transporting and Handling

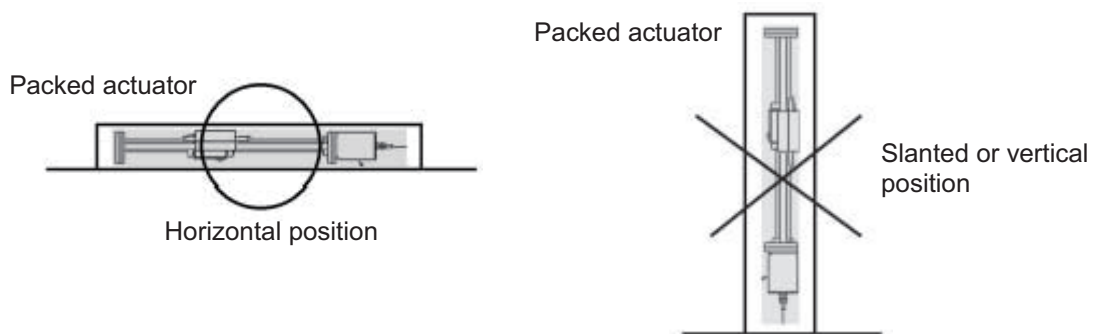
5.1 Handling the Packed Unit

Unless otherwise specified, each actuator (axis) is shipped individually.

Please take care that the shipping box is not dropped or subjected to strong impact during transport.

- The operator should not carry heavy shipping boxes by themselves.
- When storing or transporting on a truck the unpacked unit, it should be in a horizontal position. Setting it in a slanted or vertical position may place the motor at the bottom, allowing the mechanical oil sealed in the pipe to leak out and cause failures.

Also, keep the unpacked unit in a horizontal position until installed.



- Do not climb on top of the shipping box.
- Do not place heavy objects on top of the shipping box.

5.2 Handling the Actuator After It is Unpacked

Hold the base plates when taking the actuator out of the shipping box.

- When carrying the actuator, take care not to bump it.
- Do not exert excessive force on any part of the actuator.
- When unpacking the actuator, exercise due caution not to injure yourself or damage the actuator by dropping the shipping box or actuator.

* Please refer to Section 4 above for the names of the actuator parts.

6. Operating and Storage Environment

6.1 Operating Environment

The actuator should be set up in an environment, which meets the following criteria:

- Avoid direct sunlight.
- Avoid radiant heat from strong heat sources such as a furnace.
- Surrounding air temperature should be 0 ~ 40°C.
- The atmosphere is free from corrosive gases, combustible gases, combustible dust particles, flammable liquids, etc.
- The actuator will not receive impact or vibration exceeding 0.3 G.
- Avoid extreme electromagnetic waves, ultraviolet rays and radiation.
- Sufficient space is available that allows teaching, maintenance or inspection to be performed safely.
- The actuator will not be immersed in liquid.
- The atmosphere is free from cutting oil.
- The atmosphere is free from mist of sulfur-containing cutting fluid, grounding fluid, etc.

* Contact IAI for the actuator's splash-proof performance against liquids other than water.

6.2 Storage Environment

Store the actuator in an environment meeting the same conditions specified for the installation environment. If the actuator will be stored for an extended period of time, take appropriate measures to prevent bedewing.

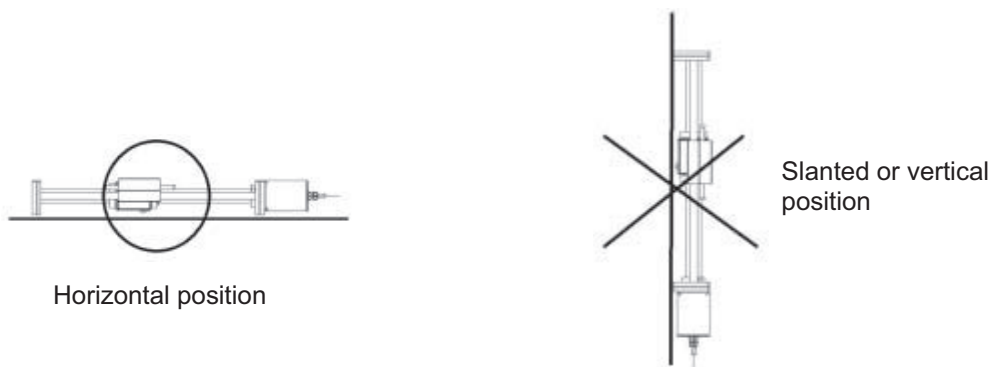
Unless otherwise specified by the customer, the actuator is shipped without any drying agent placed in the package. If you anticipate bedewing in your storage environment, provide anti-bedewing measures over the shipping box or directly onto the actuator inside the box.

During storage, the actuator can withstand temperatures of up to 60°C for a short period. If the actuator will be stored over one month, keep the surrounding air temperature to 50°C or below.

7. Installation

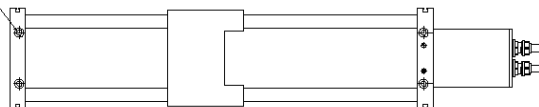
7.1 Installing the Main Body

As a rule, the actuator should be installed in a horizontal position. Do not install it in a slanted or vertical position with the motor located at the bottom. The mechanical oil sealed in the pipe may leak out and cause failures.



The base plates on both ends of the actuator have through holes. Use these holes when installing the actuator.

4-9 bore, $\varnothing 14$ deep, counterbore depth 10



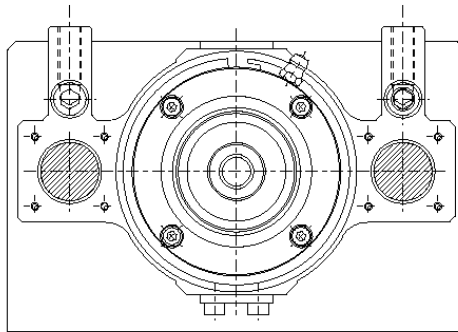
For installation, refer to the table below and use hexagon socket-head bolts of the specification appropriate for the material of the frame on which the actuator is installed.

Steel frame	Aluminum frame
M8 x 100	M8 x 110

Use of high-tensile bolts conforming to ISO 10.9 or greater is recommended. Recommended torque is 14 N·m (1.43 kgf·m).

7.2 Mounting Surface

- The frame should have sufficient rigidity to avoid generating vibration.
- The surface where the actuator will be mounted should be machined or be equally level and the flatness tolerance between the actuator and the table should be within 0.05 mm.
- Provide enough space around the actuator to permit maintenance work to be done.



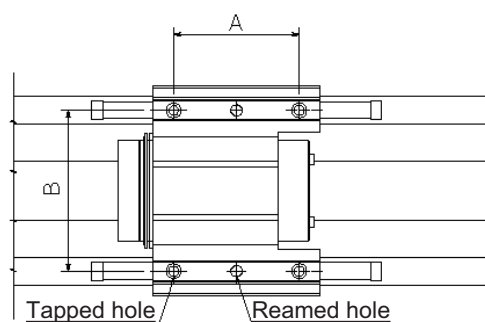
⚠ Caution: The actuator has no reference plane on its base, so do not use it in applications where traveling precision is required.

7.3 Installing the Load to the Slider

- Tapped holes are provided on the slider for installing the load.
- Please use two reamed holes on the slider when repeatability of mounting and dismounting is required.
When fine adjustment of the squareness is necessary, use only one reamed hole to allow adjustment.

Diameters of tapped holes and reamed holes in slider

Tapped hole diameter	Tapping depth	A	B
M8	20 mm	90 mm	115 mm



8. Connecting to the Controller

The actuator is shipped with a 2-meter cable pre-assembled to the actuator body. Connect the connector on the free end of this cable to the controller via a relay cable.

- This cable offers excellent flexibility, but it is not a robot cable.
Do not store the cable in a movable cable duct whose bending radius is smaller than the specified dimension.
- In applications where the cable cannot be affixed, minimize the load on the cable by not allowing it to bend more than the deflection due to the self-weight of the cable, by using a self-standing cable hose, etc., or by wiring the cable over a large radius.
- Do not cut the cable or reconnect a cut cable to shorten or extend its length.

Should you require the cable to be modified, consult IAI.

9. Notes on Use

9.1 Restrictions on Operating Condition and Installation Position

- Never perform push-motion operation, as it will cause the magnetic coupling to lose alignment.
- Use the actuator horizontally. It cannot be installed vertically or on its side.

9.2 Precision

This actuator adopts a structure whereby the pipe and slider slide against each other via a wear ring and make connection by means of magnetic force. Accordingly, its hysteresis is much greater than what is usually expected on general ball-screw type actuators. Therefore, use this actuator properly by giving full consideration to its characteristics.

Particularly when the actuator is used for positioning from different directions, the effect of lost motion must be considered.

- Positioning repeatability: Within ± 0.08 mm
- Lost motion: 0.5 mm max.

9.3 Duty

During continuous operation, the actuator generates frictional heat due to sliding of the pipe over the wear ring.

Since higher pipe temperatures reduce the clearance between the pipe and wear ring, shorten the actuator life or cause other unwanted conditions, use the actuator at a duty of 50% or below.

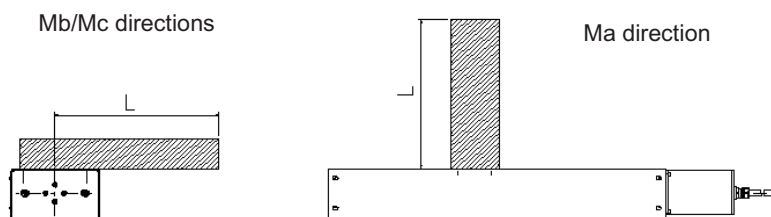
$$\text{Duty (\%)} = \frac{\text{Operating time}}{(\text{Operating time} + \text{Stopped time})} \times 100$$

9.4 Moment Load

The guides use slide bushes made of special resin.

Because of these bushes, application of moment load can sometimes cause vibration or increase the slide resistance due to scoring, leading to shorter life of guides, reduced loading capacity, drop in speed, or other unwanted conditions.

To avoid these conditions, use the actuator in such a way that during movement the actuator does not receive any moment load in the Mb or Mc direction and that whatever load applied is distributed uniformly over the slider.



- Allowable overhang length: 200 mm (Ma direction only)
- Allowable static moment: 20.4 N·m

9.5 Splash-proof Performance

This actuator provides a level of protection conforming to IP67. However, this protection performance is conditional upon heeding the restrictions specified below.

Also, the end of the pre-assembled actuator cable to be connected to a relay cable is not splash-proof. Provide appropriate measures to prevent this connection point from coming in contact with water.

- Consult IAI beforehand, if the actuator will be used in an environment subject to splashes of liquids other than water.
- The actuator cannot be used in an environment subject to splashes of viscous liquids.
- The actuator cannot be used in water.

Structurally the actuator is designed to withstand washing with water, etc. However, the actuator cannot be immersed in water, as it will cause the slide bushes to swell or create other unwanted conditions.

9.6 Dust-proof Performance

The electrical parts of the actuator, such as its motor and encoder, are designed to completely shut off dust. As for the moving parts (such as the sliding parts of the pipe and slider), the gaps are covered with felt seals.

Despite the above measures, however, dust may still enter the pipe and slider or underneath the seals. Since such dust may damage the actuator or cause other unwanted conditions depending on the type and state of dust, the actuator should not be used in the following environments:

- Environment where magnetic dust particles are dispersed or suspended
- Environment where polishing agent or other abrasive dust particles are dispersed or suspended

9.7 Misalignment

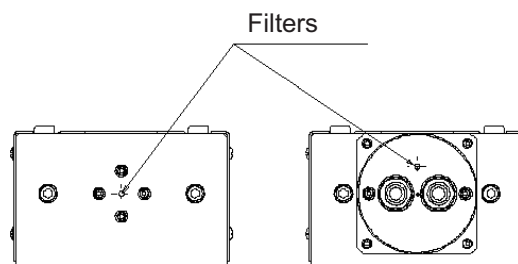
Since the ball screw nut and slider are attracted/coupled to each other via a pipe by means of magnetic force, application of excessive force will cause this magnetic coupling to lose alignment. If this occurs, the ball screw will separate from the slider and the actuator will no longer function.

Therefore, do not tap with a hammer or otherwise apply excessive force to the slider.

9.8 Filter

This actuator has its ball screw and motor sealed inside the pipe and case to prevent entry of water and dust into the ball screw/motor. In addition, Gore-Tex filters are attached on the end faces of the motor case and pipe so that air pressure difference does not generate between the inside and outside or dews do not form within the actuator.

Take note that if these filters receive high-pressure water directly or are poked with a sharp object, the filters may puncture and lose their splash-proofing property.



10. Maintenance

10.1 Maintenance Schedule

Perform maintenance work according to the schedule below.

The schedule is set assuming eight hours of operation a day. When the operation time is long such as 24-hour operation, shorten the maintenance intervals as needed.

	Visual inspection	Grease supply
Start of operation	○	○*
After 1 month of operation	○	○
Every 1 month thereafter	○	○

* Grease may be consumed more quickly in an environment where the actuator is exposed to steam and warm water. In this case, it is recommended that you add grease before the scheduled timings.

10.2 Visual Inspection

Visually check the items specified below.

Actuator body	Loosening of body mounting bolts, etc.
Slider rod	Lubricating condition of food-grade grease, scratches on pipe surface, deformation
Guide rod	Scratches on pipe surface, deformation
Supplied cable	Scratches, coupling condition of connector
General	Abnormal noise, vibration

10.3 Adding Grease

Since the pipe and slider are designed to slide against each other via a wear ring, food-grade grease is charged as lubricant in order to extend the life of the wear ring and keep the pipe temperature from rising. This grease contains antibacterial agent to prevent growth of bacteria and mildews. It also offers strong adhesive power to withstand the flushing forces of high-pressure water. However, the grease will still be consumed over time due to actuator operation, washing with water, and so on. If necessary, therefore, apply grease during the inspection.

If the actuator had not been operated for a prolonged period of time, apply grease before operating it again.

Applicable grease ---- Supplier: Taiyo Petroleum Gas Model: Medallion FM1 (antibacterial grease)

[How to Add Grease]

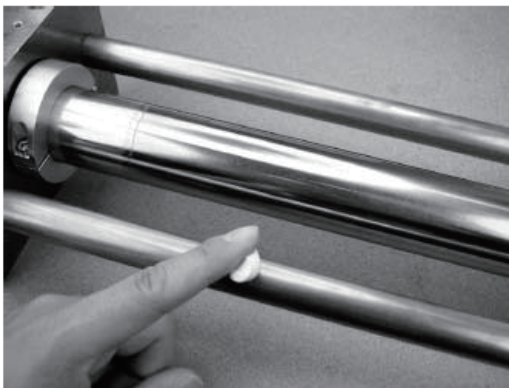
If the actuator has a screw cover, remove the cover.

Clean the surface of the slider rod, and apply grease over the entire surface using your finger.

To reach inaccessible areas of the slider, turn on the power and move the slider until the applicable areas are exposed. Then, turn off the power and apply grease.



Also apply grease over the guides on both sides.

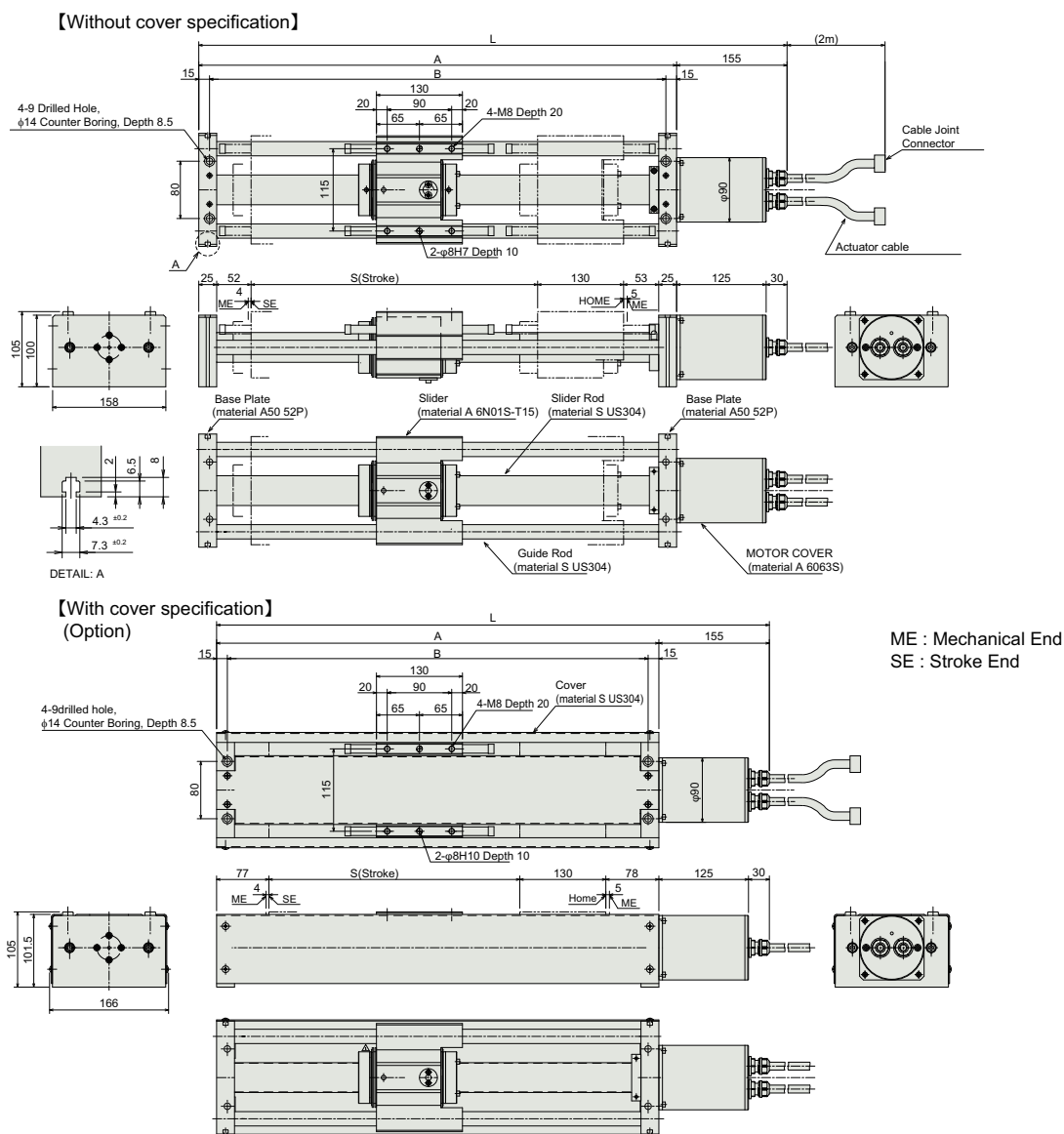


⚠ Caution: In case the grease got into your eye, immediately go to see the doctor to get an appropriate care.
After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

11. Appendix

11.1 External Dimensions

11.1.1 RCP2W-SA16C

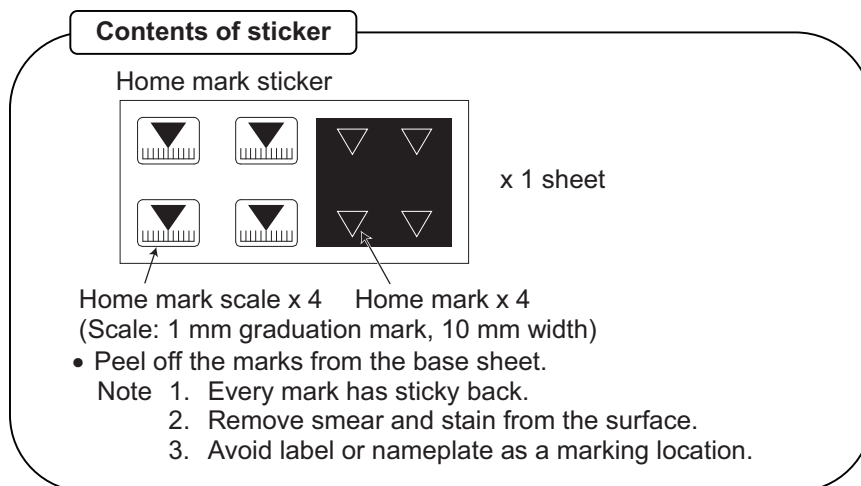


■ Dimensions for each Stroke

Stroke	50	100	150	200	250	300	350	400	450	500	550	600
L	490	540	590	640	690	740	790	840	890	940	990	1040
A	335	385	435	485	535	585	635	685	735	785	835	885
B	305	355	405	455	505	555	605	655	705	755	805	855
S	50	100	150	200	250	300	350	400	450	500	550	600
Weight without Cover [Kg]	9	9.4	9.9	10.4	10.9	11.3	11.8	12.3	12.7	13.2	13.7	15.1
Weight with Cover [Kg]	10.5	11.1	11.8	12.5	13.2	13.8	14.6	15.3	15.9	16.6	17.3	18.9

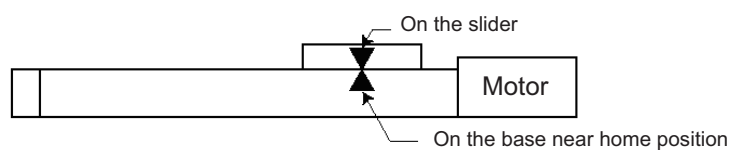
11.2 How to use the home mark

- ◆ Please affix these marks to the actuator as home markers as needed.

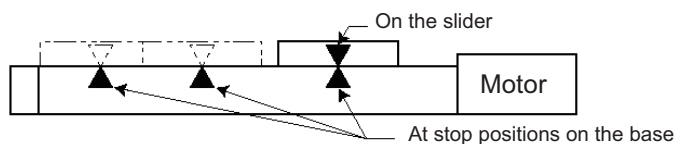


Example of Use

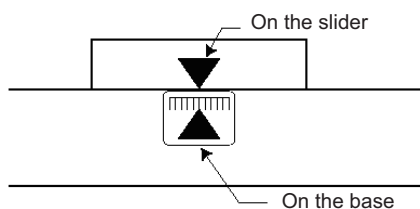
- [1] Used to indicate the direction of actuator home



- [2] Used as stop positions



- [3] Used for position deviation check



- Place the marks when the actuator is stopped at home position.

Change History

Revision Date	Description of Revision
April 2011	Fourth edition A page for CE Marking added
March 2012	Fifth edition <ul style="list-style-type: none">• CAUTION deleted• P.1 to 7: Contents added and changed in Safety Guide• P.8: Caution in Handling added• P.10 to 11: Contents changed in 3. Warranty• P.23: Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care.• P.24: External Dimensions added



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