



ROBO Cylinder RCP2 Actuator ROBO Rotary Type

Small Type, 330-degree Rotation Specification [RTBS/RTCS Types]
Small Type, Multi-rotation Specification [RTBSL/RTCSL Types]
Medium Type, 330-degree Rotation Specification [RTB/RTC Types]
Medium Type, Multi-rotation Specification [RTBL/RTCL Types]
Large Type, 330-degree Rotation Specification [RTBB/RTCB Types]
Large Type, Multi-rotation Specification [RTBBL/RTCBL Types]

Instruction Manual

===== Fourteenth Edition =====

Please Read Before Use

Thank you for purchasing our product.

This Instruction 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 DVD that comes with the product contains instruction manuals for IAI products.

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

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

[Important]

- This Instruction Manual is original.
- This product is not to be used for any other purpose from what is noted in this Instruction Manual. IAI shall not be liable whatsoever for any loss or damage arising from the result of using the product for any other purpose from what is noted in the manual.
- The information contained in this Instruction Manual is subject to change without notice for the purpose of production improvement.
- If you have any question or finding regarding the information contained in this Instruction Manual, contact our customer center or our sales office near you.
- Using or copying all or a part of this Instruction Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

Table of Contents

Safety Guide	1
Caution in Handling	8
International Standards Compliances.....	10
Names of the Parts.....	11
1. Specification Check	12
1.1 Checking the Product.....	12
1.1.1 Parts.....	12
1.1.2 Related Operation Manuals for the Each Controller Supported by this Product.....	12
1.1.3 How to Read the Model Nameplate.....	13
1.1.4 How to Read the Model Number	13
1.2 Specifications	14
1.2.1 Small Type	14
1.2.2 Medium Type	17
1.2.3 Large Type	20
1.2.4 Cleanroom Specification.....	23
1.2.5 Dustproof/Splash Proof Specification	23
1.3 Notes on Use	24
1.3.1 Range of Operation and Home Return.....	24
1.3.2 Home return direction	24
1.3.3 Home return operation.....	25
1.4 Options.....	28
1.4.1 Reversed-home Specification (Model : NM).....	28
1.4.2 Shaft Adapters (Model : SA)	28
1.4.3 Table Adapters (Model : TA).....	29
1.4.4 Brake-Equipped Type (Model : B).....	30
1.5 Motor • Encoder Cables	31
1.5.1 Small Type [RTBS, RTBSL, RTCS, RTCSL]	31
1.5.2 Medium Type (RTB, RTBL, RTC, RTCL) Large Type (RTBB, RTBBL, RTCB, RTCBL)	33
1.5.3 Cleanroom, Dust and Splash-Proof Type	35
2. Installation.....	38
2.1 Transportation	38
2.2 Installation and Storage • Preservation Environment.....	40
2.3 How to Install.....	41
2.3.1 Installation Orientation	41
2.4 Installation of the Actuator.....	42
2.4.1 Small Type	42
2.4.2 Medium Type	44
2.4.3 Large Type.....	46
2.5 Output Shaft Adapters (Optional).....	48
2.5.1 Small Type	48
2.5.2 Medium Type	50
2.5.3 Large Type.....	52
3. Connecting with the Controller.....	54
4. Maintenance and Inspection	58
4.1 Inspection Items and Schedule.....	58
4.2 Visually Inspecting the Exterior.....	58
4.3 Cleaning	58
4.4 Grease Supply	59
4.4.1 Grease to Apply	59
4.4.2 How to apply the grease	60

5. External Dimensions	65
5.1 Small Type.....	65
5.1.1 Standard Specification	65
5.1.2 Dustproof/Splash proof • Cleanroom Specification	67
5.2 Medium Type.....	69
5.2.1 Standard Specification	69
5.2.2 Dustproof/Splash Proof • Cleanroom Specification	73
5.3 Large Type	77
5.3.1 Standard Specification	77
5.3.2 Dustproof/Splash Proof • Cleanroom Specification	81
6. Life	85
7. Warranty	86
7.1 Warranty Period	86
7.2 Scope of the Warranty.....	86
7.3 Honoring the Warranty	86
7.4 Limited Liability.....	86
7.5 Conditions of Conformance with Applicable Standards/Regulations, Etc., and Applications ...	87
7.6 Other Items Excluded from Warranty.....	87
Change History.....	88

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 explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) 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 instruction 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 0.5mm² (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 Instruction 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. Use in incomplete condition may cause damage to the product or an injury. <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 instruction 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 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.
 2. Do not conduct any treatment or operation that is not stated in this instruction manual.
 3. 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.
 4. It is recommended to apply our products for the wiring between the actuator and the controller.
 5. Do not attempt to establish the settings for the speed and acceleration/deceleration above the allowable range.
If the robot is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
 6. Set the allowable load moment within the allowable range.
If the robot is operated under a load equal to or greater than the allowable load moment, abnormal noise or vibration, failure, or shorter life may result. If it is extreme, flaking may occur on the guide.
 7. 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.
 8. Pay attention to cable layout when putting cables through the hollowed hole on the cleanroom type.
It may cause to generate dust due to contact of shaft and cables.
 9. Dustproof/Splash proof applies non-contact labyrinth sealing structure and air purging structure.
This structure shuts out foreign object and liquid from getting into output shaft by the combination of labyrinth seal and air purge.
(It blocks foreign objects and liquid with air flow from the gap on the tip of the output shaft)
- (1) Splash proof Performance
The product possesses IP*4 splash proof performance. It is not applicable under such an environment that the actuator may get direct hit of liquid jets.
Protection class IP*4
2nd Number (Protection against Ingress of Water)
4: Should be no harmful influence by splashes from any direction

(2) Air Purging

Apply cleaned and dried air through air dryer when supplying air.

Allowing water or oil to enter may cause failure.

Follow the indicated air flow volume for air supply.

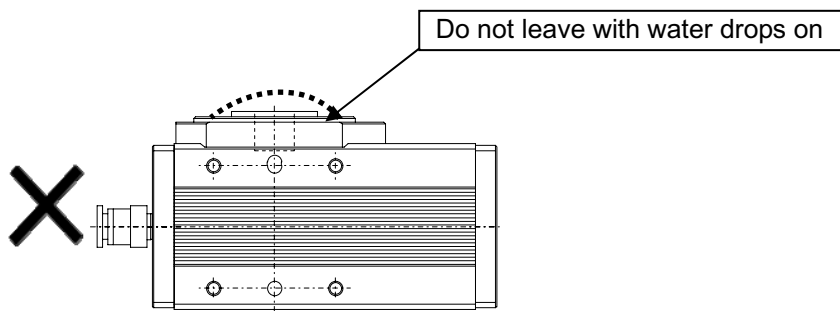
It is mandatory to have air purging to satisfy dust and splash proof performance. Do not attempt to have an operation without air purging.

It can allow liquid or foreign object to get in.

(Pay attention especially at operation start and stop)

(3) Wipe off water drops around the output shaft with cloth while air purge is activated when stopping operation.

Leaving the unit with water drops on in condition with air purge inactivated may risk the actuator to get water inside.

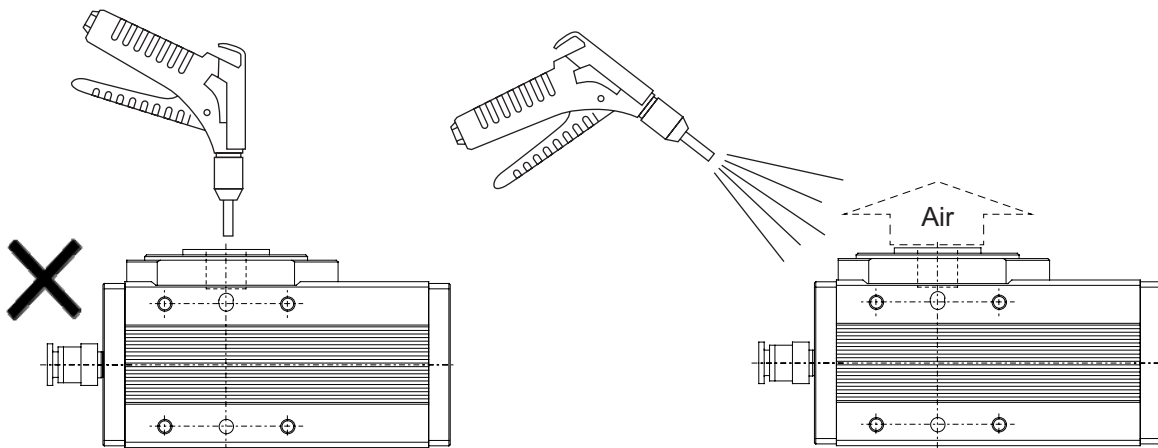


* Consider a structure to avoid water drops from staying on around the output shaft when you mount such as a table on the output shaft.

(4) Air Blow with Air Gun

Do not attempt to air blow with air gun directly to the output shaft.

Activate the air purge when cleaning up around the actuator with air blow.



International Standards Compliances

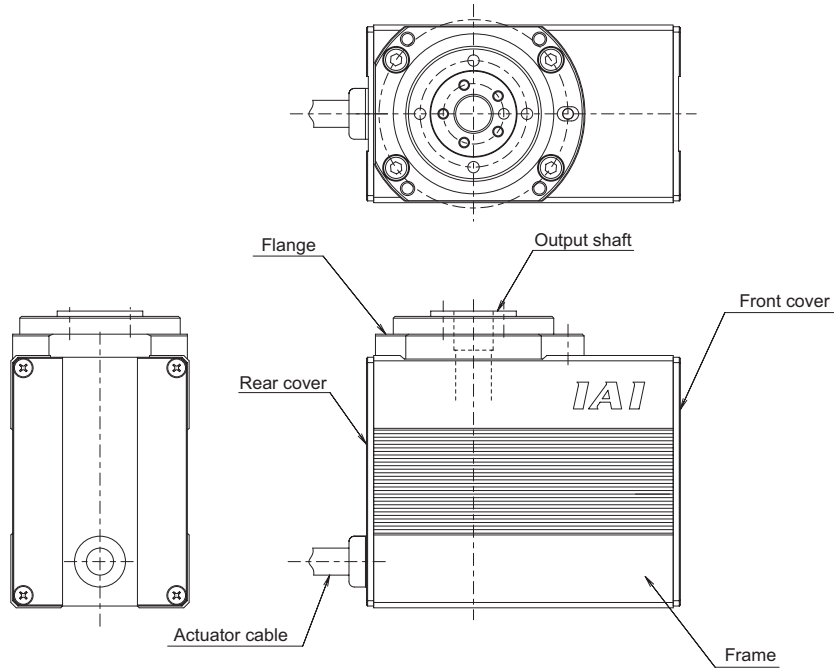
This actuator complies with the following overseas standard.
Refer to Overseas Standard Compliance Manual (ME0287) for more detailed information.

RoHS Directive	CE Marking
○	○

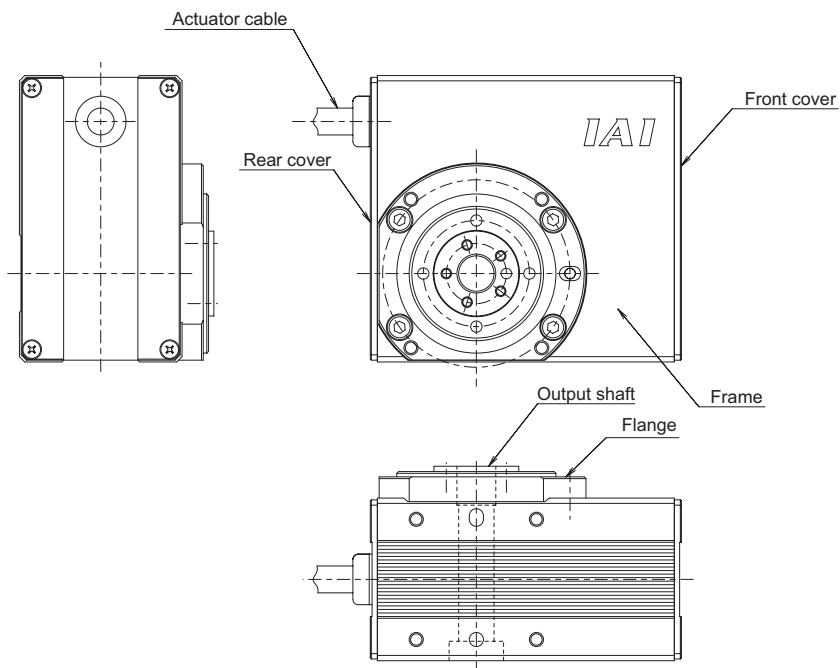
Names of the Parts

In this manual, the right and left sides of the actuator are expressed in the way it is placed horizontally as shown in the figure below, and is looked at from the motor side.

- Vertical Type



- Flat Type



1. Specification Check

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 Parts

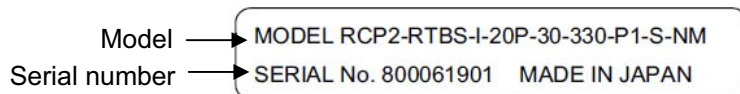
No.	Name	Model number	Quantity
1	Actuator	Refer to "How to Read the Model Nameplate" and "How to Read the Model Number."	1
Accessories			
2	Motor • encoder cables (Note 1)		1
3	First Step Guide		1
4	Operation Manual (DVD)		1
5	Safety Guide		1

Note 1 The motor • encoder cables supplied vary depending on the controller used. [Refer to 1.4, "Motor • Encoder Cables."]

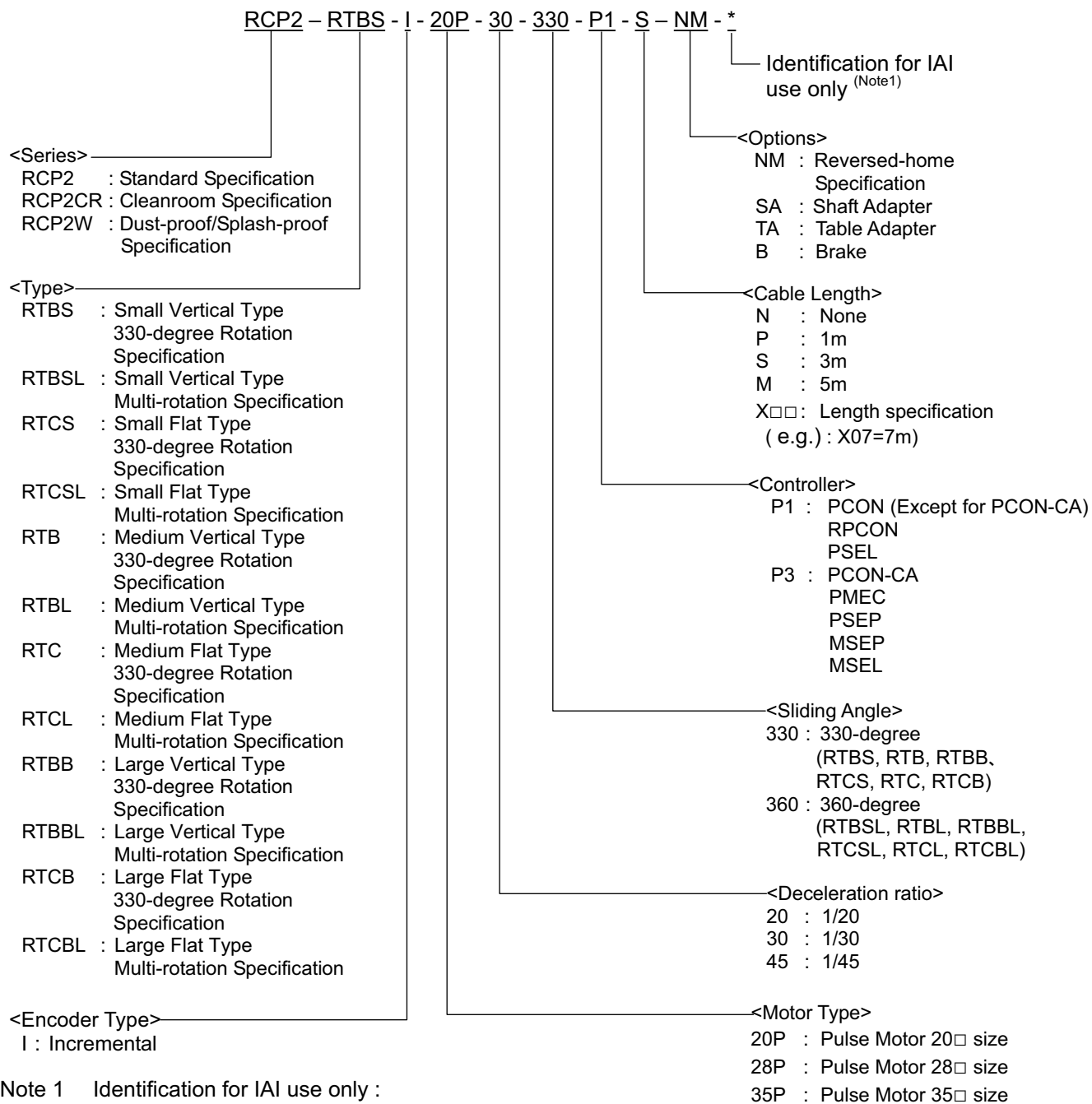
1.1.2 Related Operation Manuals for the Each Controller Supported by this Product

No.	Name	Control No.
1	Instruction Manual for PSEL Controller	ME0172
2	Instruction Manual for PCON-C-/CG/CF Controller	ME0170
3	Instruction Manual for PCON-CY Controller	ME0156
4	Instruction Manual for PCON-SE Controller	ME0163
5	Instruction Manual for PCON-PL/PO Controller	ME0164
6	Instruction Manual for PCON-CA/CFA Controller	ME0289
7	Instruction Manual for ASEP/PSEP Controller	ME0216
8	Instruction Manual for MSEP Controller	ME0299
9	Instruction Manual for MSEL Controller	ME0336
10	Instruction Manual for PC Software IA-101X-XMW/ZA-101-X-USBMW	MJ0154
11	Instruction Manual for PC Software RCM-101-MW/RCM-101-USB	MJ0155
12	Instruction Manual for Touch Panel Teaching Pendant SEL-T/TD	MJ0183
13	Instruction Manual for Touch Panel Teaching Pendant CON-T/TG	MJ0178
14	Instruction Manual for Touch Panel Teaching Pendant CON-PT/PD/PG	MJ0227
15	Instruction Manual for Touch Panel Teaching Pendant CON-PTA/PDA/PGA	MJ0295
16	Instruction Manual for Touch Panel Teaching Pendant SEP-PT	MJ0217
17	Instruction Manual for Touch Panel Teaching Pendant TB-01/01D/01DR Applicable for Program Controller	MJ0324

1.1.3 How to Read the Model Nameplate



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 Specifications

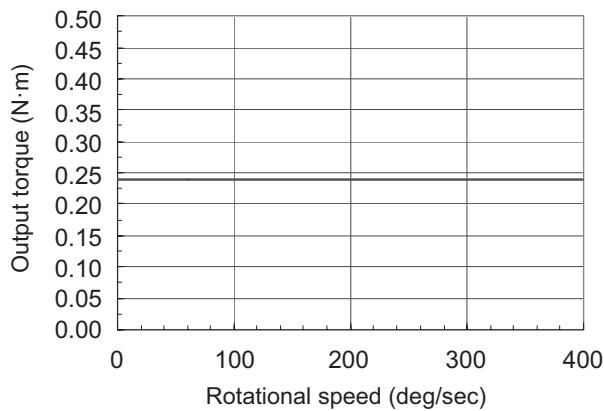
1.2.1 Small Type

Model		RTBS / RTBSL		RTCS / RTCSL	
		1/30	1/45	1/30	1/45
Deceleration Ratio		1/30	1/45	1/30	1/45
Operation Range	deg	Standard Specification : 330 deg / Multi-rotation Specification : ±9999 deg			
Maximum torque	N·m	0.24	0.36	0.24	0.36
Maximum speed	deg /sec	400	266	400	266
Positioning Repeatability	deg	±0.05			
Backlash	deg	±0.1			
Allowable Moment of Inertia	Kg·m ²	0.0023	0.0035	0.0023	0.0035
Allowable Thrust Load	N	30			
Allowable Load Moment	N·m	3.6			
Home-Return Accuracy	deg	Within ±0.05 deg			
Drive system		Stepping motor + Timing belt + Spiral bevel gear (1/30)			
No. of Encoder Pulses	P/R	200			

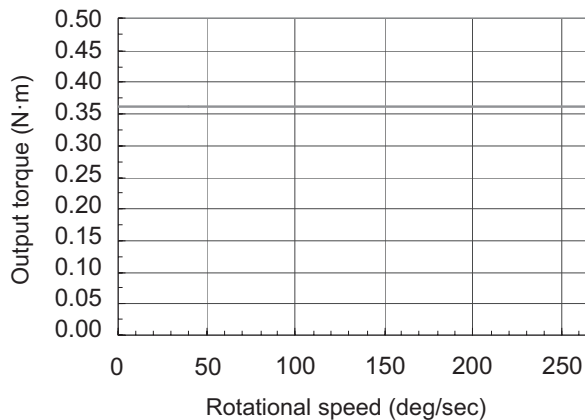
• Output torque

The output torque of the rotating axis will vary depending on the rotational speed of the axis.

330-degree rotation specification RTBS/RTCS (deceleration ratio: 1/30)
Multi-rotation specification RTBSL/RTCSL (deceleration ratio: 1/30)



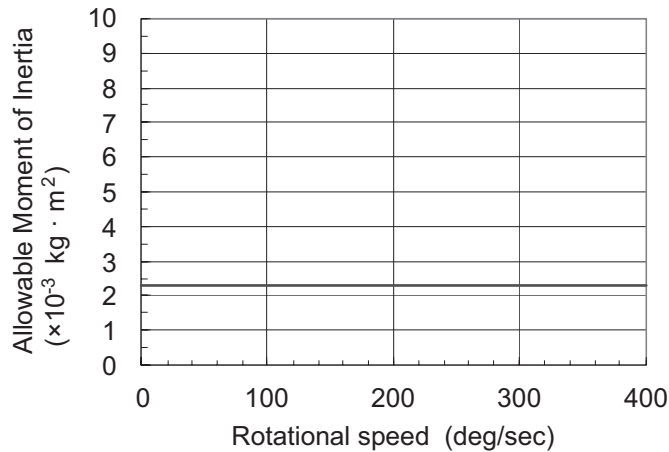
330-degree rotation specification RTBS/RTCS (deceleration ratio: 1/45)
Multi-rotation specification RTBSL/RTCSL (deceleration ratio: 1/45)



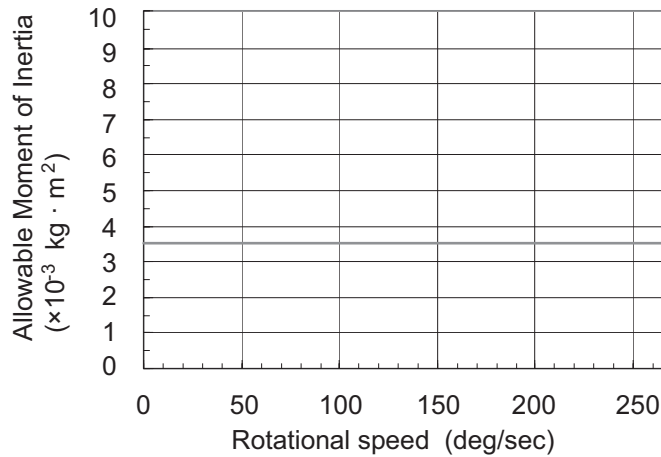
• Allowable Moment of Inertia

The maximum inertial moment of the work that can be carried in rotating motion using the actuator will vary depending on the rotational speed. Design the work after checking the operating condition and inertial moment.

330-degree rotation specification RTBS/RTCS (deceleration ratio: 1/30)
 Multi-rotation specification RTBSL/RTCSL (deceleration ratio: 1/30)



330-degree rotation specification RTBS/RTCS (deceleration ratio: 1/45)
 Multi-rotation specification RTBSL/RTCSL (deceleration ratio: 1/45)

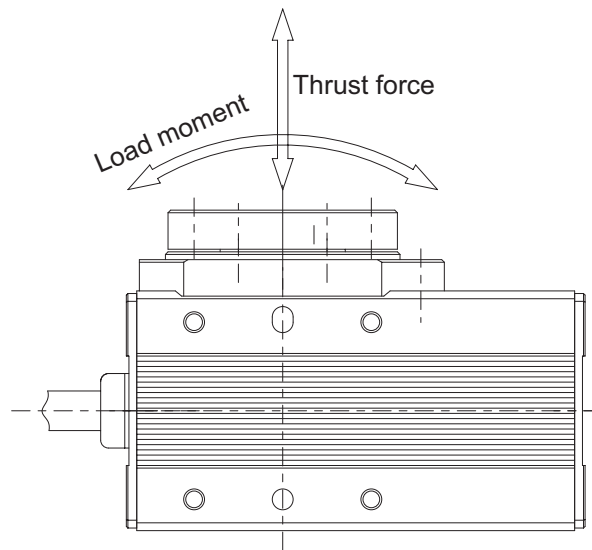


Caution: When the rotational axis is used horizontally, load torque will generate due to gravity if the center of gravity of the work is located away from the center of rotation. In this case, the rotational speed must be lowered or the inertial moment of the work must be reduced.

• Allowable load moment/thrust force

Check if the load moment and thrust force received by the rotational axis are within the allowable ranges specified below.

Model	Allowable load moment	Allowable thrust force
330-degree rotation specification RTBS/RTCS	3.6 N • m	30 N
Multi-rotation specification RTBSL/RTCSL		



Caution:

- Any work whose load moment or thrust force exceeds the allowable level may result in actuator malfunction or damage or shorten the life of the actuator. Therefore, the work must be set within the allowable ranges of moment and thrust.
- If the rotational axis is used horizontally, design an appropriate work structure that can minimize the load torque.

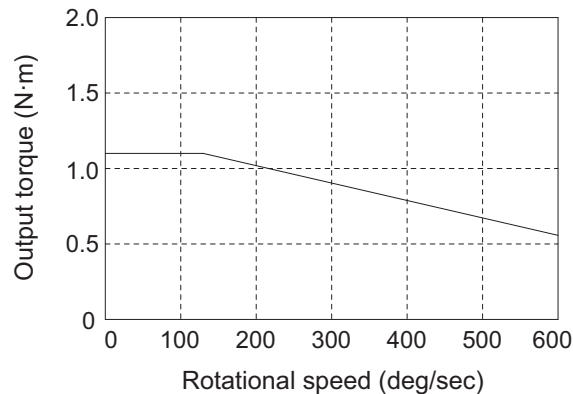
1.2.2 Medium Type

Model		RTB / RTBL		RTC / RTCL	
		1/20	1/30	1/20	1/30
Deceleration Ratio		1/20	1/30	1/20	1/30
Operation Range	deg	Standard Specification : 330 deg / Multi-rotation Specification : ±9999 deg			
Maximum torque	N·m	1.1	1.7	1.1	1.7
Maximum speed	deg /sec	600	400	600	400
Positioning Repeatability	deg	±0.01			
Backlash	deg	±0.1			
Allowable Moment of Inertia	Kg·m ²	0.01	0.015	0.01	0.015
Allowable Thrust Load	N	50			
Allowable Load Moment	N·m	3.9			
Home-Return Accuracy	deg	Standard Specification : Within ±0.01 deg / Multi-rotation Specification : Within ±0.05 deg /			
Drive system		Stepping motor + Timing belt + Spiral bevel gear (1/20)			
No. of Encoder Pulses	P/R	200			
Holding Torque of Brake-equipped Type	N·m	0.4 (Converted to output axis)			

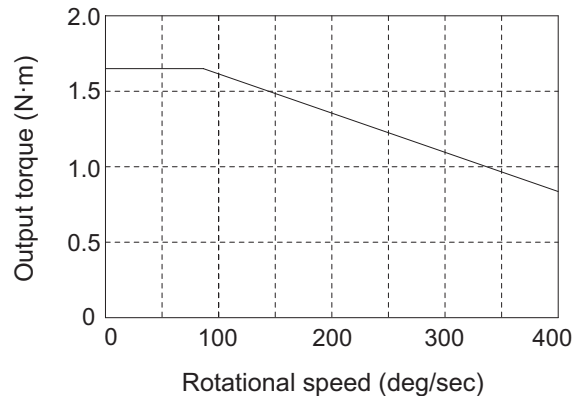
• Output torque

The output torque of the rotating axis will vary depending on the rotational speed of the axis.

330-degree rotation specification RTB/RTC (deceleration ratio: 1/20)
Multi-rotation specification RTBL/RTCL (deceleration ratio: 1/20)



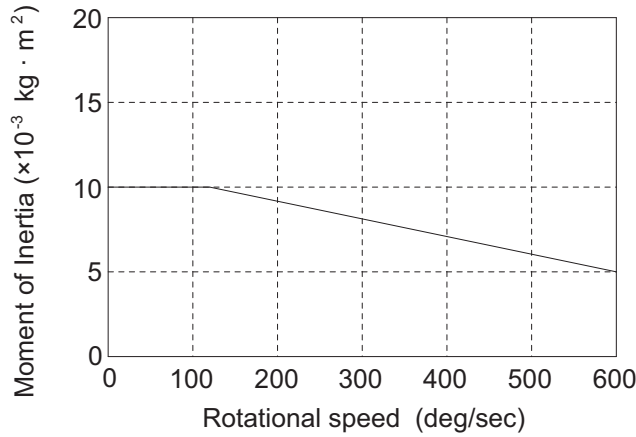
330-degree rotation specification RTB/RTC (deceleration ratio: 1/30)
Multi-rotation specification RTBL/RTCL (deceleration ratio: 1/30)



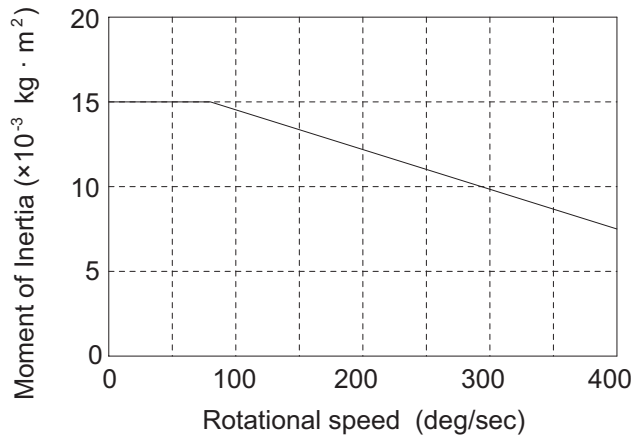
• Allowable Moment of Inertia

The maximum inertial moment of the work that can be carried in rotating motion using the actuator will vary depending on the rotational speed. Design the work after checking the operating condition and inertial moment.

330-degree rotation specification RTB/RTC (deceleration ratio: 1/20)
 Multi-rotation specification RTBL/RTCL (deceleration ratio: 1/20)



330-degree rotation specification RTB/RTC (deceleration ratio: 1/30)
 Multi-rotation specification RTBL/RTCL (deceleration ratio: 1/30)

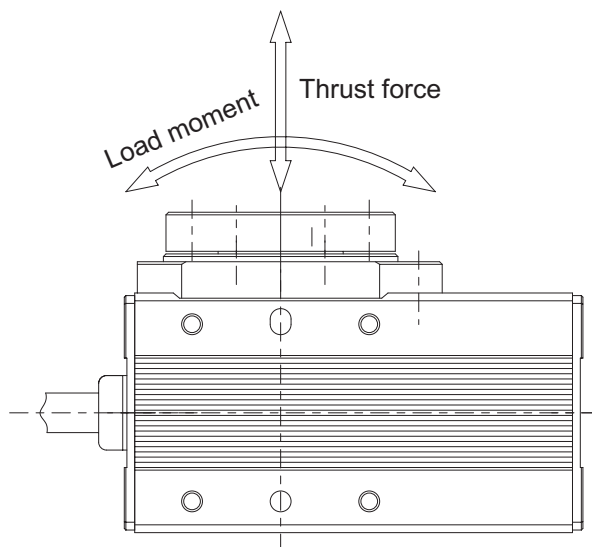



Caution: When the rotational axis is used horizontally, load torque will generate due to gravity if the center of gravity of the work is located away from the center of rotation. In this case, the rotational speed must be lowered or the inertial moment of the work must be reduced.

• Allowable load moment/thrust force

Check if the load moment and thrust force received by the rotational axis are within the allowable ranges specified below.

Model	Allowable load moment	Allowable thrust force
330-degree rotation specification RTB/RTC	3.9 N • m	50 N
Multi-rotation specification RTBL/RTCL		



 **Caution:**

- Any work whose load moment or thrust force exceeds the allowable level may result in actuator malfunction or damage or shorten the life of the actuator. Therefore, the work must be set within the allowable ranges of moment and thrust.
- If the rotational axis is used horizontally, design an appropriate work structure that can minimize the load torque.

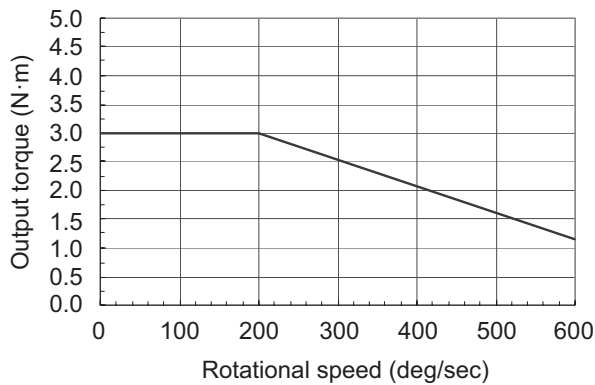
1.2.3 Large Type

Model		RTBB / RTBBL		RTCB / RTCBL	
		1/20	1/30	1/20	1/30
Deceleration Ratio		1/20	1/30	1/20	1/30
Operation Range	deg	Standard Specification : 330 deg / Multi-rotation Specification : ±9999 deg			
Maximum torque	N·m	3	4.6	3	4.6
Maximum speed	deg /sec	600	400	600	400
Positioning Repeatability	deg	±0.01			
Backlash	deg	±0.1			
Allowable Moment of Inertia	Kg·m ²	0.02	0.03	0.02	0.03
Allowable Thrust Load	N	200			
Allowable Load Moment	N·m	17.7			
Home-Return Accuracy	deg	Standard Specification : Within ±0.01 deg / Multi-rotation Specification : Within ±0.03 deg /			
Drive system		Stepping motor + Timing belt + Spiral bevel gear (1/20)			
No. of Encoder Pulses	P/R	200			
Holding Torque of Brake-equipped Type	N·m	2.9 (Converted to output axis)			

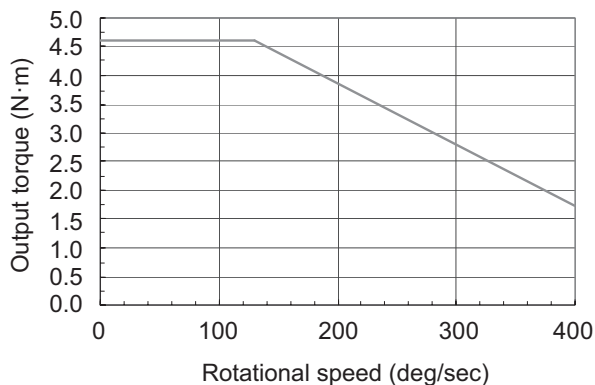
• Output torque

The output torque of the rotating axis will vary depending on the rotational speed of the axis.

330-degree rotation specification RTBB/RTCB (deceleration ratio: 1/20)
Multi-rotation specification RTBBL/RTCBL (deceleration ratio: 1/20)



330-degree rotation specification RTBB/RTCB (deceleration ratio: 1/30)
Multi-rotation specification RTBBL/RTCBL (deceleration ratio: 1/30)

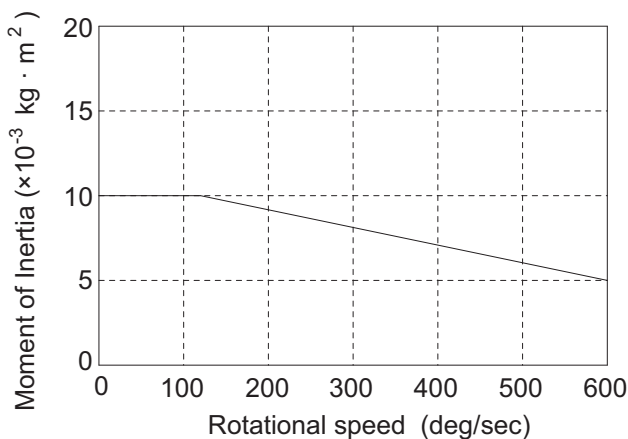


• Allowable Moment of Inertia

The maximum inertial moment of the work that can be carried in rotating motion using the actuator will vary depending on the rotational speed. Design the work after checking the operating condition and inertial moment.

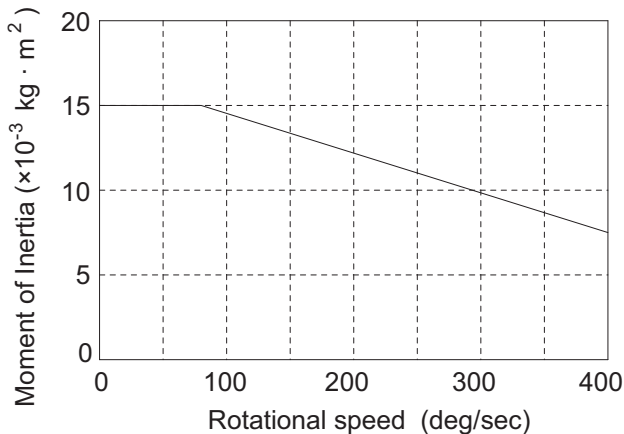
330-degree rotation specification RTBB/RTCB (deceleration ratio: 1/20)


Multi-rotation specification RTBBL/RTCBL (deceleration ratio: 1/20)



330-degree rotation specification RTBB/RTCB (deceleration ratio: 1/30)

Multi-rotation specification RTBBL/RTCBL (deceleration ratio: 1/30)

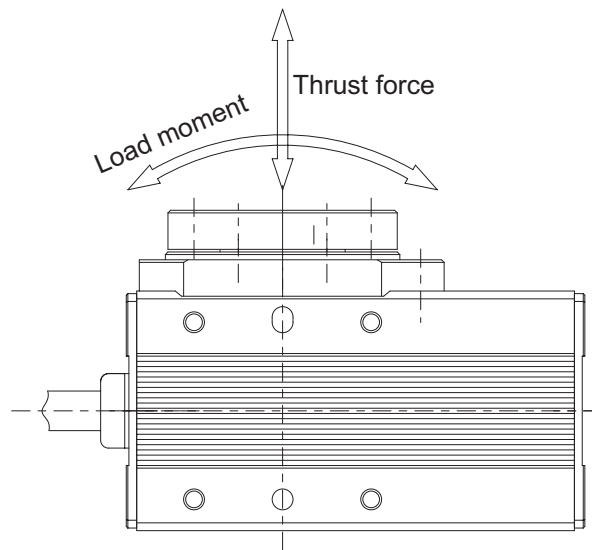


 **Caution:** When the rotational axis is used horizontally, load torque will generate due to gravity if the center of gravity of the work is located away from the center of rotation. In this case, the rotational speed must be lowered or the inertial moment of the work must be reduced.

• Allowable load moment/thrust force

Check if the load moment and thrust force received by the rotational axis are within the allowable ranges specified below.

Model	Allowable load moment	Allowable thrust force
330-degree rotation specification RTBB/RTCB	17.7 N · m	200 N
Multi-rotation specification RTBBL/RTCBL		



Caution:

- Any work whose load moment or thrust force exceeds the allowable level may result in actuator malfunction or damage or shorten the life of the actuator. Therefore, the work must be set within the allowable ranges of moment and thrust.
- If the rotational axis is used horizontally, design an appropriate work structure that can minimize the load torque.

1.2.4 Cleanroom Specification

Cleanliness	Class 10 (0.1 μ m)		
Pipe joint for vacuuming	Quick joint Applicable Tube O. D. = ϕ 6		
Vacuuming flow volume	RTBS/RTBSL/RTCS/RTCSL	RTB/RTBL/RTC/RTCL	RTBB/RTBBL/RTCB/RTCBL
	10 NI/min	15 NI/min	20 NI/min

1.2.5 Dustproof/Splash Proof Specification

Protection Class	IP54 or equiv.		
Pipe joint for air purge	Quick joint Applicable Tube O. D. = ϕ 6		
Air purge flow volume	RTBS/RTBSL/RTCS/RTCSL	RTB/RTBL/RTC/RTCL	RTBB/RTBBL/RTCB/RTCBL
	15 NI/min	20 NI/min	40 NI/min

1.3 Notes on Use

1.3.1 Range of Operation and Home Return

- Range of operation (position setting)

The angle of movement from the home position determines the position value.

- 330-degree rotation specification: Position specification range = 0 to 330 degrees

- Multi-rotation specification: Position specification range = As specified below.

Mode	Absolute position specification	Relative position specification
Rotational axis, normal mode	-0.15 to +9999.15	-9999.30 to +9999.30
Rotational axis, index mode	0 to 359.99	-360.00 to +360.00

* For details, refer to the specification sheet of your controller.

- Angular velocity and acceleration/deceleration commands

Rotation angle commands are issued based as angular velocity (deg/sec).

Accelerations and decelerations are specified in “G” in operation programs.

Small type: RTBS, RTCS, RTBSL, RTCSL

Rated angular acceleration/deceleration: 0.2 G = 1,960 deg/s²

Medium type: RTB, RTC, RTBL, RTCL / Large type: RTBB, RTCB, RTBBL, RTCBL

Rated angular acceleration/deceleration: 0.3 G = 2,940 deg/s²

1.3.2 Home return direction

The moving end of the output shaft, which turns in the counterclockwise direction, is defined as the home.

- * The multi-rotation specification is available with the direction of axis rotation reversed. On an actuator with the reverse-rotation specification, home return is implemented in the clockwise direction.

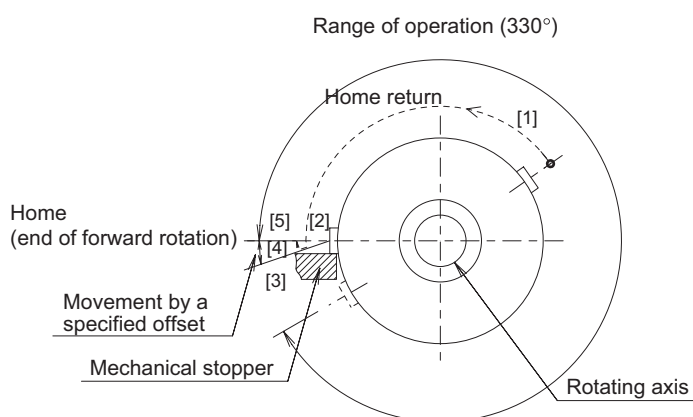


Caution: If the factory-set home return direction is changed using a parameter, the home return direction will be reversed but the home position will deviate due to the structure of the actuator.
Therefore, do not change the factory-set home return direction in the parameter.

1.3.3 Home return operation

- 330-degree rotation specification

[1] Start of home return → [2] Detection of a mechanical stopper → [3] Reversing → [4] Movement by a specified offset → [5] Home position



330-degree rotation specification RTBS/RTCS, RTB/RTC, RTBB/RTCB



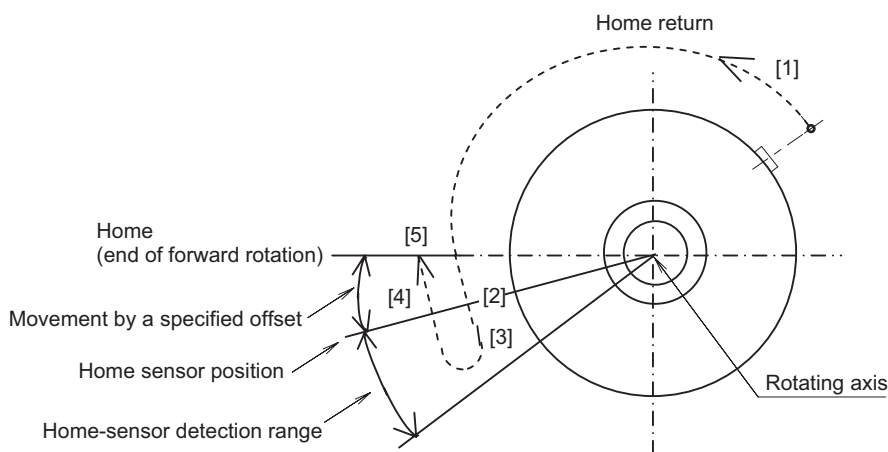
Caution: The actuator always rotates in the specified direction during home return. If the home return direction is of standard specification, the actuator always rotates in the counterclockwise direction. If you have guided a cable, etc., through an open hole in the actuator, pay attention to the load received by the cable. The cable may be severed if an excessive load is applied.

• Multi-rotation specification

PCON controller	V 0018 or earlier
PSEL controller	V 0.21 or earlier

[1] Start of home return → [2] Home-sensor detection (when the contact B logic is selected: detection of the falling edge or ON state of the signal) → [3] Reversing → [4] Home-sensor detection (when the contact B logic is selected: detection of the rising edge or OFF state of the signal) → [5] Movement by a specified offset → [5] Home position.

* If home return operation is started with the actuator positioned inside the home-sensor detection range, the actuator will move out of the home-sensor detection range first and then implement home return operation.



Multi-rotation specification RTBL/RTCL

⚠ Caution: The actuator always rotates in the specified direction during home return. If the home return direction is of standard specification, the actuator always rotates in the counterclockwise direction. With an actuator of multi-rotation specification, take note that the actuator always returns home in the counterclockwise direction from positions outside the home-sensor detection range shown in the figure. The actuator will not take a short-cut. If you have guided a cable, etc., through an open hole in the actuator, pay attention to the load received by the cable. The cable may be severed if an excessive load is applied.

• Multi-rotation specification

PCON controller	V 0019 or later
PSEL controller	V 0.22 or later

[Detection of home-sensor detection range (home side)]

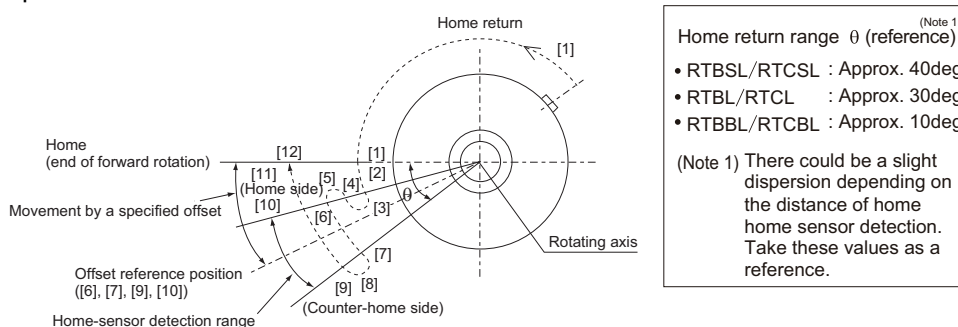
- [1] Start of home return (Search for the home-sensor detection range)
- [2] Detection of a home-sensor detection range (home side) (when the contact B logic is selected: detection of the falling edge or OFF state of the signal)
- [3] Reversing (Search the home-sensor non-detection range)
- [4] Detection of a home-sensor non-detection range (home side) (when the contact B logic is selected: detection of the rising edge or ON state of the signal)
- [5] Reversing

[Detection of four points [6], [7], [9], [10] inside the home-sensor detection range. The center of [6], [7], [9] and [10] is set as the offset reference position.]

- [6] Detection of a home-sensor detection range (home side) (when the contact B logic is selected: detection of the falling edge or OFF state of the signal), followed by movement to the home-sensor non-detection range (counter-home side)
- [7] Detection of a home-sensor non-detection range (counter-home side) (when the contact B logic is selected: detection of the rising edge or ON state of the signal)
- [8] Reversing, followed by movement to the home-sensor detection range (counter-home side)
- [9] Detection of a home-sensor detection range (counter-home side) (when the contact B logic is selected: detection of the falling edge or OFF state of the signal), followed by movement to the home-sensor non-detection range (home side)
- [10] Detection of a home-sensor non-detection range (home side) (when the contact B logic is selected: detection of the rising edge or ON state of the signal)

[Offset movement operation]

- [11] The offset reference position is determined from the center of [6], [7], [9] and [10].
The position achieved after moving from the offset reference position by the offset travel becomes the home. The actuator moves from the current position to home.
- [12] Home position



Multi-rotation specification RTBSL/RTCSSL, RTBL/RTCL, RTBBL/RTCBL



Caution:

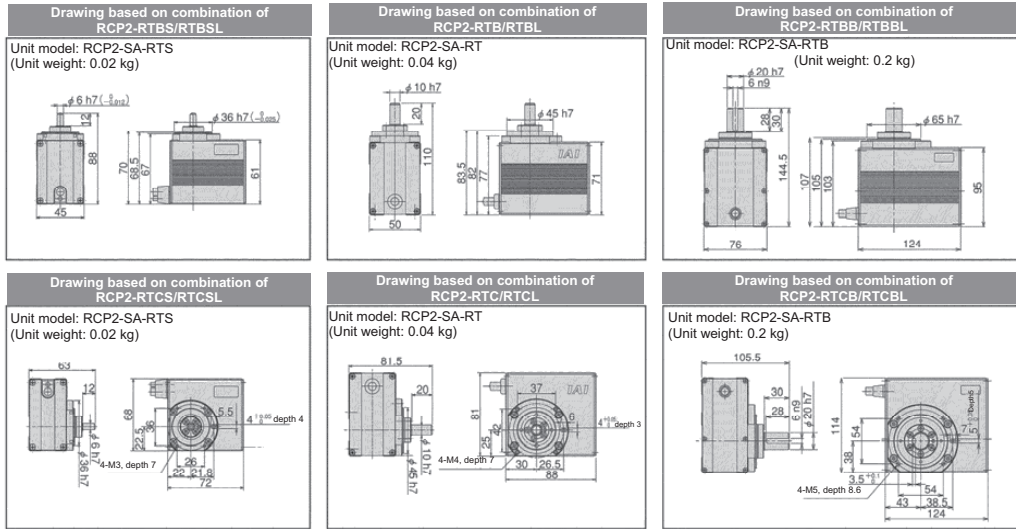
The actuator always rotates in the specified direction during home return.
 If the home return direction is of standard specification, the actuator always rotates in the counterclockwise direction.
 With an actuator of multi-rotation specification, take note that the actuator always returns home in the counterclockwise direction from positions outside the home-sensor detection range shown in the figure. The actuator will not take a short-cut.
 If you have guided a cable, etc., through an open hole in the actuator, pay attention to the load received by the cable.
 The cable may be severed if an excessive load is applied.

1.4 Options

1.4.1 Reversed-home Specification (Model : NM)

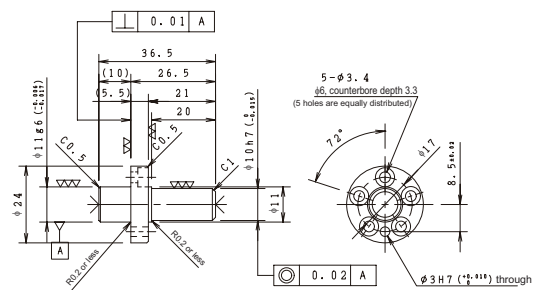
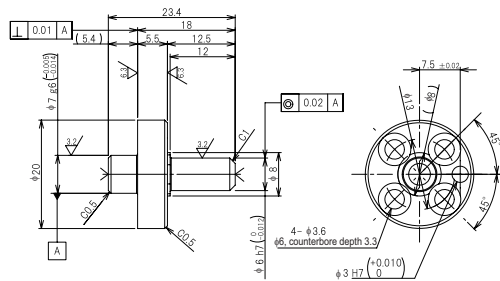
1.4.2 Shaft Adapters (Model : SA)

These shaft-shaped adapters are used to install a jig, etc., to the rotating part.

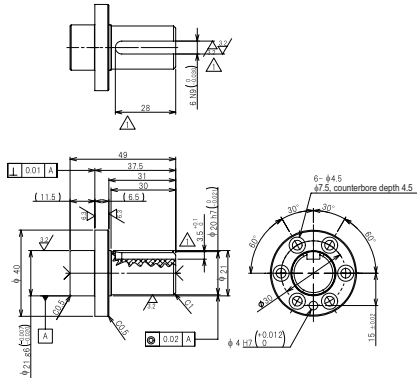


RTBS/RTBSL/RTCS/RTCSL shaft

RTB/RTBL/RTC/RTCL shaft

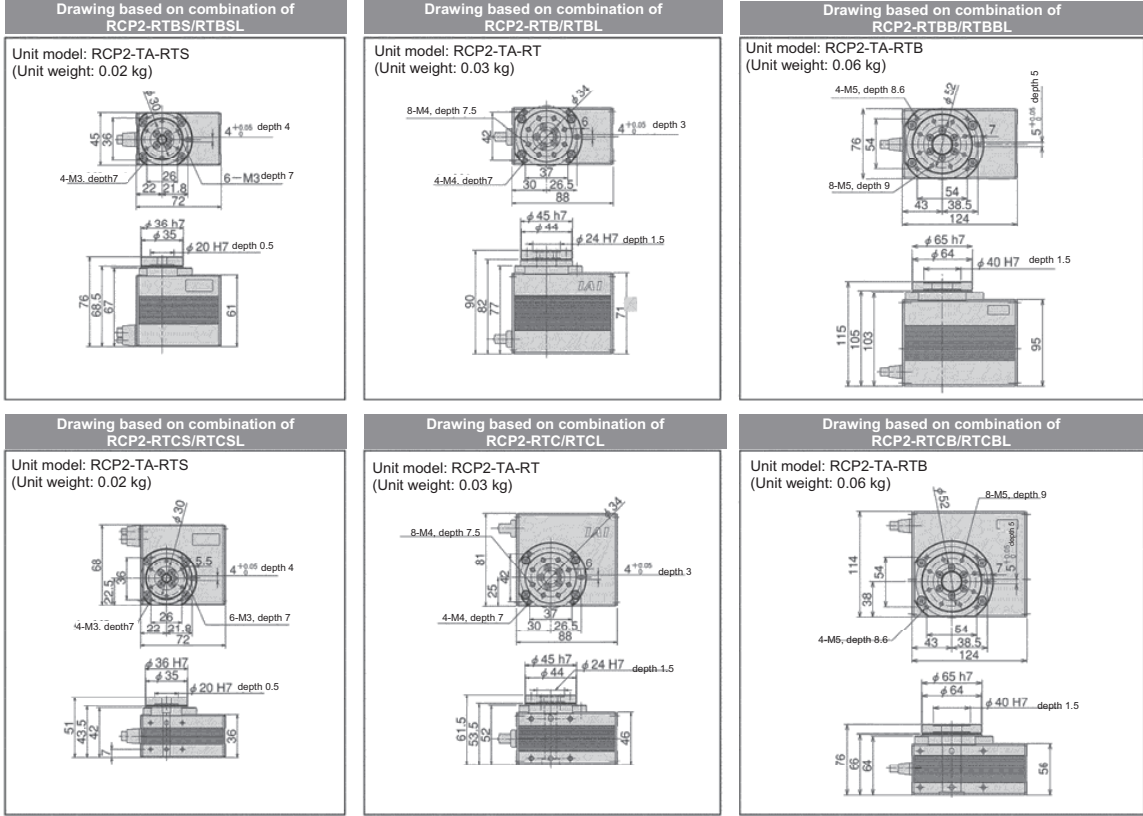


RTBB/RTBBL/RTCB/RTCBL shaft

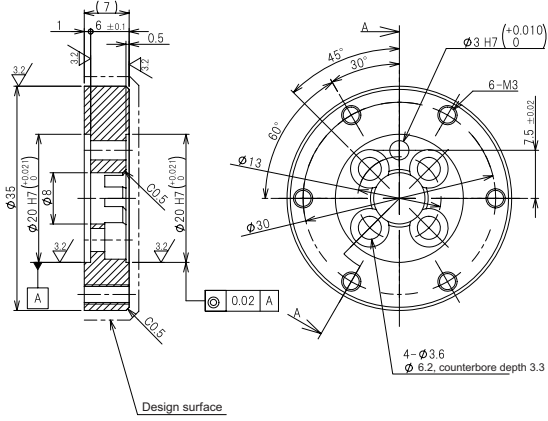


1.4.3 Table Adapters (Model : TA)

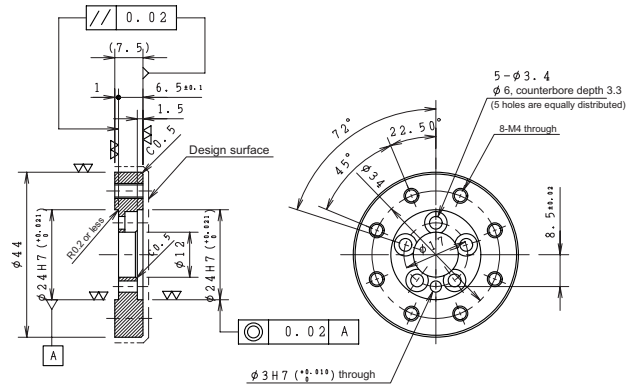
These table-shaped adapters are used to install a jig, etc., to the rotating part.



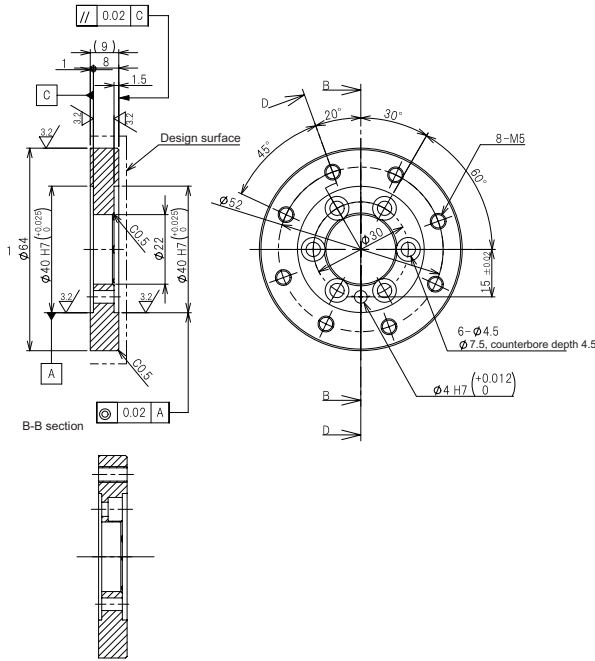
RTBS/RTBSL/RTCS/RTCSL table



RTB/RTBL/RTCS/RTCL table



RTBB/RTBBL/RTCB/RTCBL table



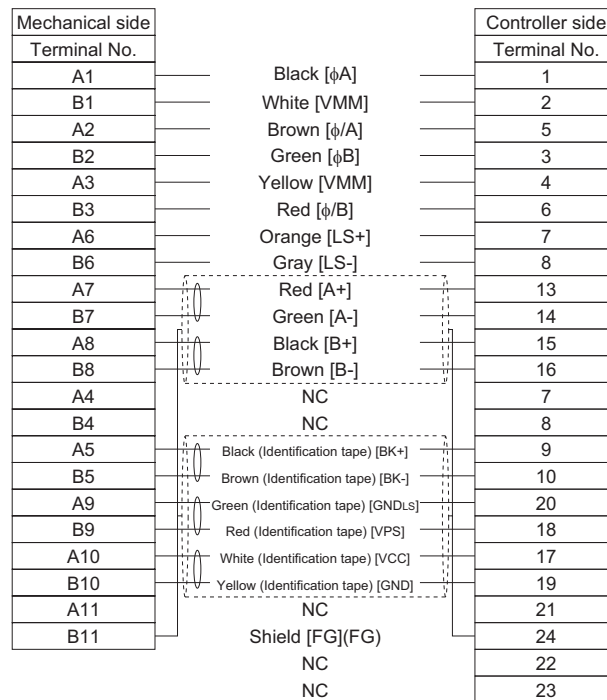
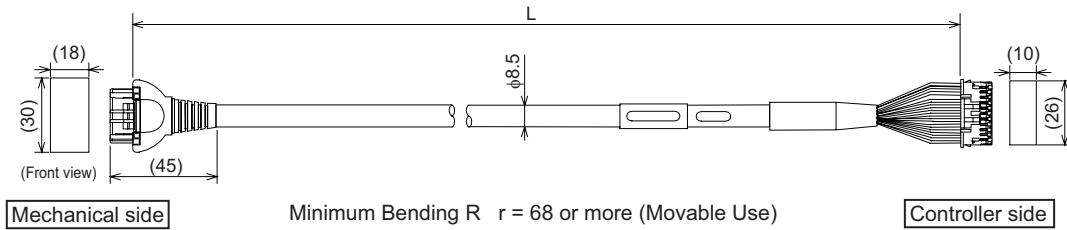
1.4.4 Brake-Equipped Type (Model: B)

1.5 Motor • Encoder Cables

1.5.1 Small Type [RTBS, RTBSL, RTCS, RTCSL]

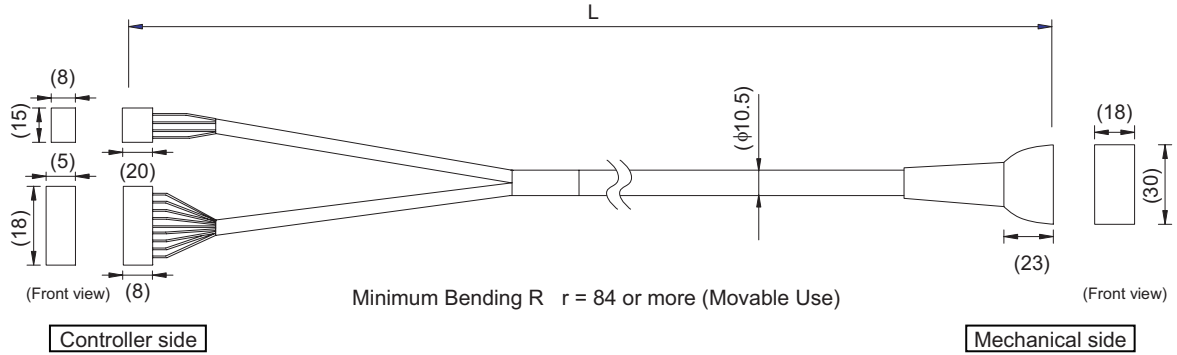
[PMEC, PSEP, MSEP, MSEL, PCON-CA controller]

1) Motor • Encoder Integrated Cables : CB-RPSEP-MPA□□□



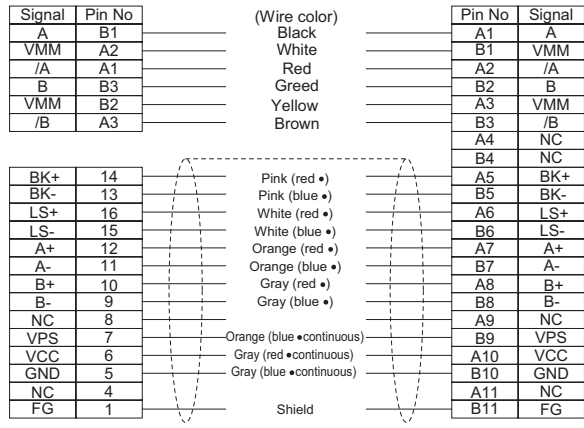
[PCON-CY/SE/PL/PO, PSEL controller]

2) Motor • Encoder Integrated Cables : CB-PCS-MPA□□□



Controller side

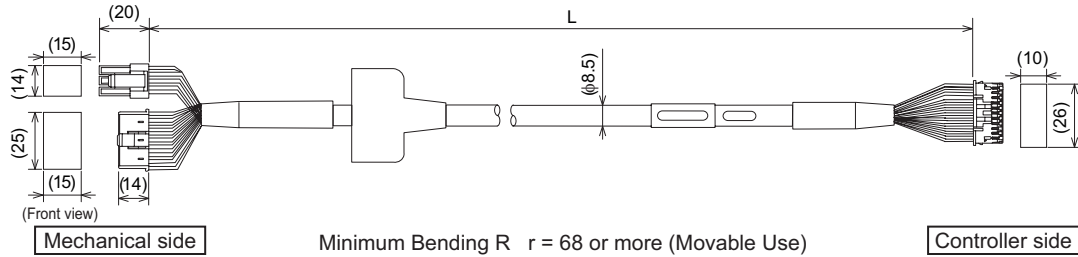
Mechanical side



1.5.2 Medium Type (RTB, RTBL, RTC, RTCL) Large Type (RTBB, RTBBL, RTCB, RTCBL)

[PMEC, PSEP, MSEP, MSEL, PCON-CA controller]

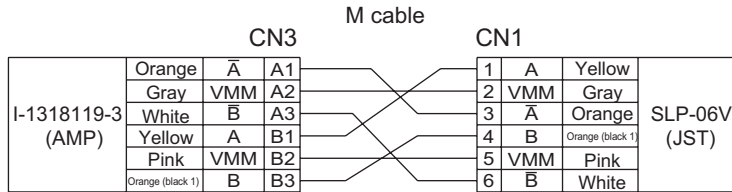
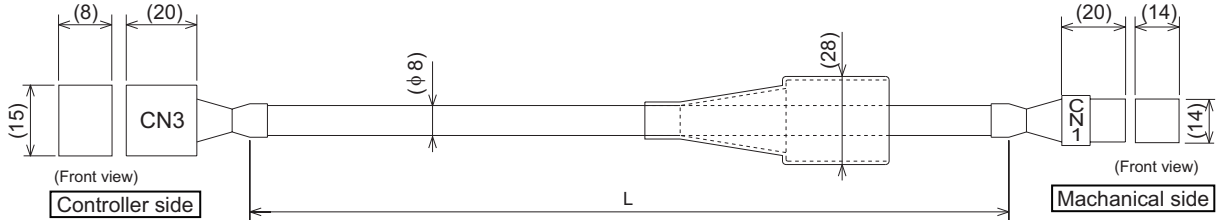
1) Motor • Encoder Integrated Cables : CB-PSEP-MPA□□□



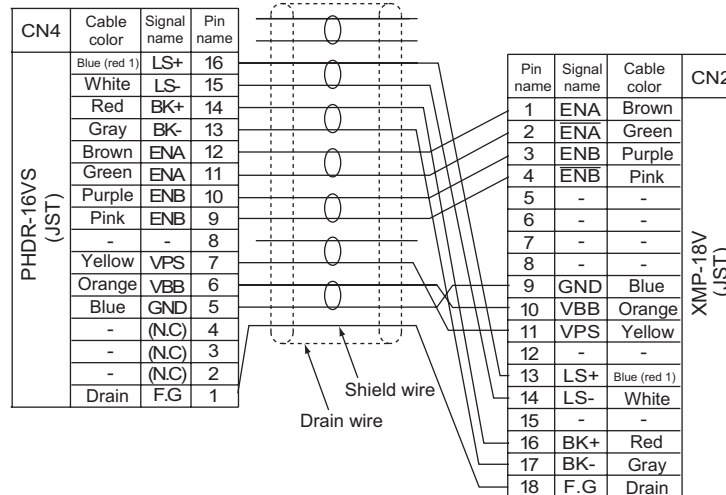
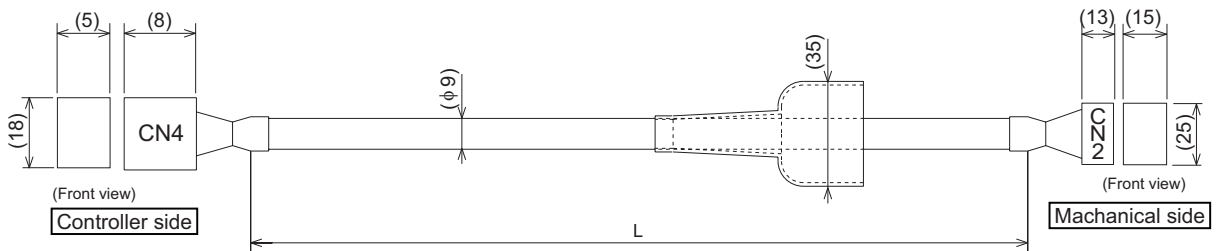
Mechanical side Terminal No.		Controller side Terminal No.
1	Black [ϕ A]	1
2	White [VMM]	2
4	Red [ϕ B]	3
5	Green [VMM]	4
3	Brown [ϕ /A]	5
6	Yellow [ϕ /B]	6
16	Orange [BK+]	9
17	Gray [BK-]	10
5	NC	11
6	NC	12
13	Black [LS+]	7
14	Brown [LS-]	8
1	White [A+]	13
2	Yellow [A+]	14
3	Red [B+]	15
4	Green [B-]	16
10	White (Identification tape) [VCC]	17
11	Yellow (Identification tape) [VPS]	18
9	Red (Identification tape) [GND]	19
12	Green (Identification tape) [(Reserve)]	20
15	NC	21
7	NC	22
8	NC	23
18	Shield [FG]	24

[PCON-CY / SE / PL / PO, PSEL controller]

2) Motor Cable : CB-RCP2-MA□□□



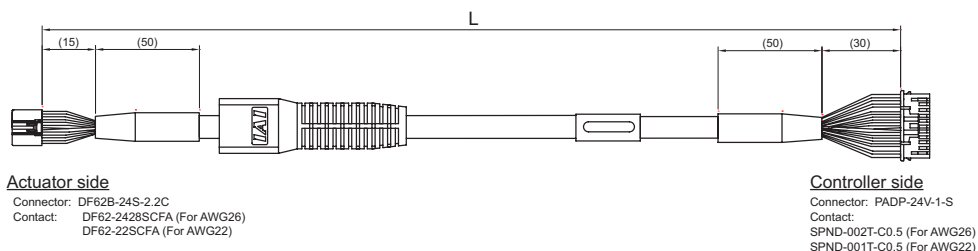
3) Encoder cable : CB-RCP2-PB□□□
Encoder Robot Cable : CB-RCP2- PB□□□-RB



1.5.3 Cleanroom, Dust and Splash-Proof Type

[PMEC, PSEP, MSEP, MSEL, PCON-CA controller]

1) Motor • Encoder Integrated Cables : CB-CAN-MPA□□□



Connection diagram

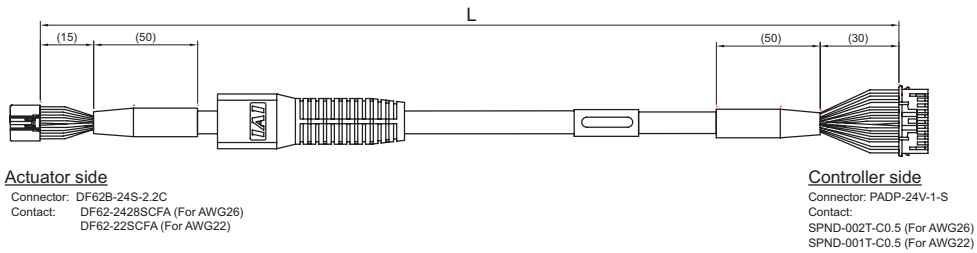
Actuator side

Controller side

Thickness	Electric Wire Color	Symbol	Pin No.	Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	ϕ A	3	1	ϕ A	Blue	AWG22/19
AWG22/19	Orange	VMM	5	2	VMM	Orange	AWG22/19
AWG22/19	Brown	ϕ B	10	3	ϕ B	Brown	AWG22/19
AWG22/19	Gray	VMM	9	4	VMM	Gray	AWG22/19
AWG22/19	Green	ϕ _A	4	5	ϕ _A	Green	AWG22/19
AWG22/19	Red	ϕ _B	15	6	ϕ _B	Red	AWG22/19
AWG26	Black	LS+	8	7	LS+	Black	AWG26
AWG26	Yellow	LS-	14	8	LS-	Yellow	AWG26
AWG26	Blue	SA	12	11	SA	Blue	AWG26
AWG26	Orange	SB	17	12	SB	Orange	AWG26
AWG26	Green	A+	1	13	A+	Green	AWG26
AWG26	Brown	A-	6	14	A-	Brown	AWG26
AWG26	Gray	B+	11	15	B+	Gray	AWG26
AWG26	Red	B-	16	16	B-	Red	AWG26
AWG26	Blue	BK+	20	9	BK+	Blue	AWG26
AWG26	Orange	BK-	2	10	BK-	Orange	AWG26
AWG26	Gray	VCC	21	17	VCC	Gray	AWG26
AWG26	Red	GND	7	19	GND	Red	AWG26
AWG26	Brown	VPS	18	18	VPS	Brown	AWG26
AWG26	Green	LS_GND	13	20	LS_GND	Green	AWG26
-	-	-	19	22	-	-	-
AWG26	Pink	-	22	21	-	Pink	AWG26
-	-	-	23	23	-	-	-
AWG26	Black	FG	24	24	FG	Black	AWG26

(Note) About thickness AWG22/19
 The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

2) Motor • Encoder Integrated Robot Cables : CB-CAN-MPA□□□-RB



Connection diagram

Actuator side

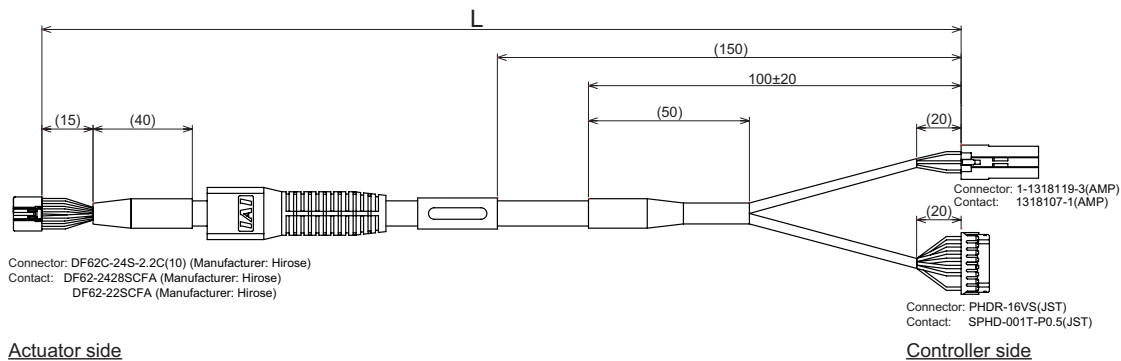
Controller side

Thickness	Electric Wire Color	Symbol	Pin No.		Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	ϕ A	3		1	ϕ A	Blue	AWG22/19
AWG22/19	Orange	VMM	5		2	VMM	Orange	AWG22/19
AWG22/19	Brown	ϕ B	10		3	ϕ B	Brown	AWG22/19
AWG22/19	Gray	VMM	9		4	VMM	Gray	AWG22/19
AWG22/19	Green	ϕ _A	4		5	ϕ _A	Green	AWG22/19
AWG22/19	Red	ϕ _B	15		6	ϕ _B	Red	AWG22/19
AWG26	Black	LS+	8		7	LS+	Black	AWG26
AWG26	Yellow	LS-	14		8	LS-	Yellow	AWG26
AWG26	Blue	SA	12		11	SA	Blue	AWG26
AWG26	Orange	SB	17		12	SB	Orange	AWG26
AWG26	Green	A+	1		13	A+	Green	AWG26
AWG26	Brown	A-	6		14	A-	Brown	AWG26
AWG26	Gray	B+	11		15	B+	Gray	AWG26
AWG26	Red	B-	16		16	B-	Red	AWG26
AWG26	Blue	BK+	20		9	BK+	Blue	AWG26
AWG26	Orange	BK-	2		10	BK-	Orange	AWG26
AWG26	Gray	VCC	21		17	VCC	Gray	AWG26
AWG26	Red	GND	7		19	GND	Red	AWG26
AWG26	Brown	VPS	18		18	VPS	Brown	AWG26
AWG26	Green	LS_GND	13		20	LS_GND	Green	AWG26
-	-	-	19		22	-	-	-
AWG26	Pink	-	22		21	-	Pink	AWG26
-	-	-	23		23	-	-	-
AWG26	Black	FG	24		24	FG	Black	AWG26

(Note) About thickness AWG22/19
 The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

[PCON-CY / SE / PL / PO, PSEL controller]

3) Motor • Encoder Integrated Robot Cables : CB-PCS2-MPA□□□



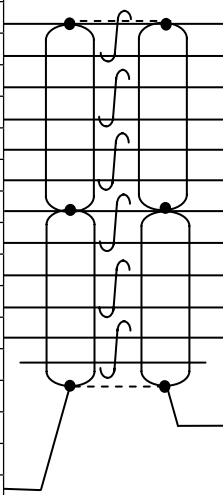
Connection diagram

Actuator side

Controller side

Thickness	Electric Wire Color	Symbol	Pin No.
AWG22	Blue	ϕ A	3
AWG22	Orange	VMM	5
AWG22	Brown	ϕ B	10
AWG22	Gray	VMM	9
AWG22	Green	ϕ _A	4
AWG22	Red	ϕ _B	15
AWG26	Black	LS+	8
AWG26	Yellow	LS-	14
AWG26	-	-	12
AWG26	-	-	17
AWG26	Green	A+	1
AWG26	Brown	A-	6
AWG26	Gray	B+	11
AWG26	Red	B-	16
AWG26	Blue	BK+	20
AWG26	Orange	BK-	2
AWG26	Gray	VCC	21
AWG26	Red	GND	7
AWG26	Brown	VPS	18
-	-	-	13
-	-	-	19
-	-	-	22
-	-	-	23
AWG26	Black	FG	24

Pin No.	Symbol	Electric Wire Color	Thickness
B1	ϕ A	Blue	AWG22
A2	VMM	Orange	AWG22
B3	ϕ B	Brown	AWG22
B2	VMM	Gray	AWG22
A1	ϕ _A	Green	AWG22
A3	ϕ _B	Red	AWG22
16	LS+	Black	AWG26
15	LS-	Yellow	AWG26
4	-	-	-
3	-	-	-
12	A+	Green	AWG26
11	A-	Brown	AWG26
10	B+	Gray	AWG26
9	B-	Red	AWG26
14	BK+	Blue	AWG26
13	BK-	Orange	AWG26
6	VCC	Gray	AWG26
5	GND	Red	AWG26
7	VPS	Brown	AWG26
8	-	-	-
2	-	-	-
1	FG	Black	AWG26



2. Installation

2.1 Transportation

[1] Handling of the Actuator

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

(1) Handling the Packed Unit

- 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 a 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 the actuator by its motor unit or its cable or attempt to move it by pulling the cable.
- Hold the base part or bracket section of the body when transporting the actuator main body.
- Do not hit or drop the actuator during transportation.
- Do not attempt to force any part of the actuator.

[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. The sliders are fixed so they would not accidentally move. 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

- Fix the slider so they would not accidentally 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 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 tapped 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.

[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 table so 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

[1] Installation Environment

The actuator should be installed in a location other than those specified below. Also provide sufficient work space required for maintenance inspection.

- 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
- When the air purging was conducted possesses the water durability of IP54 protection structure.
- 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) (The except for dust the dust-proof specification)
- Where the actuator is subject to splashed water, oil (including oil mist or cutting fluid) or chemical solutions
- Where the actuator receives impact or vibration

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

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

[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

This chapter explains how to install the actuator on your mechanical system.

2.3.1 Installation Orientation

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

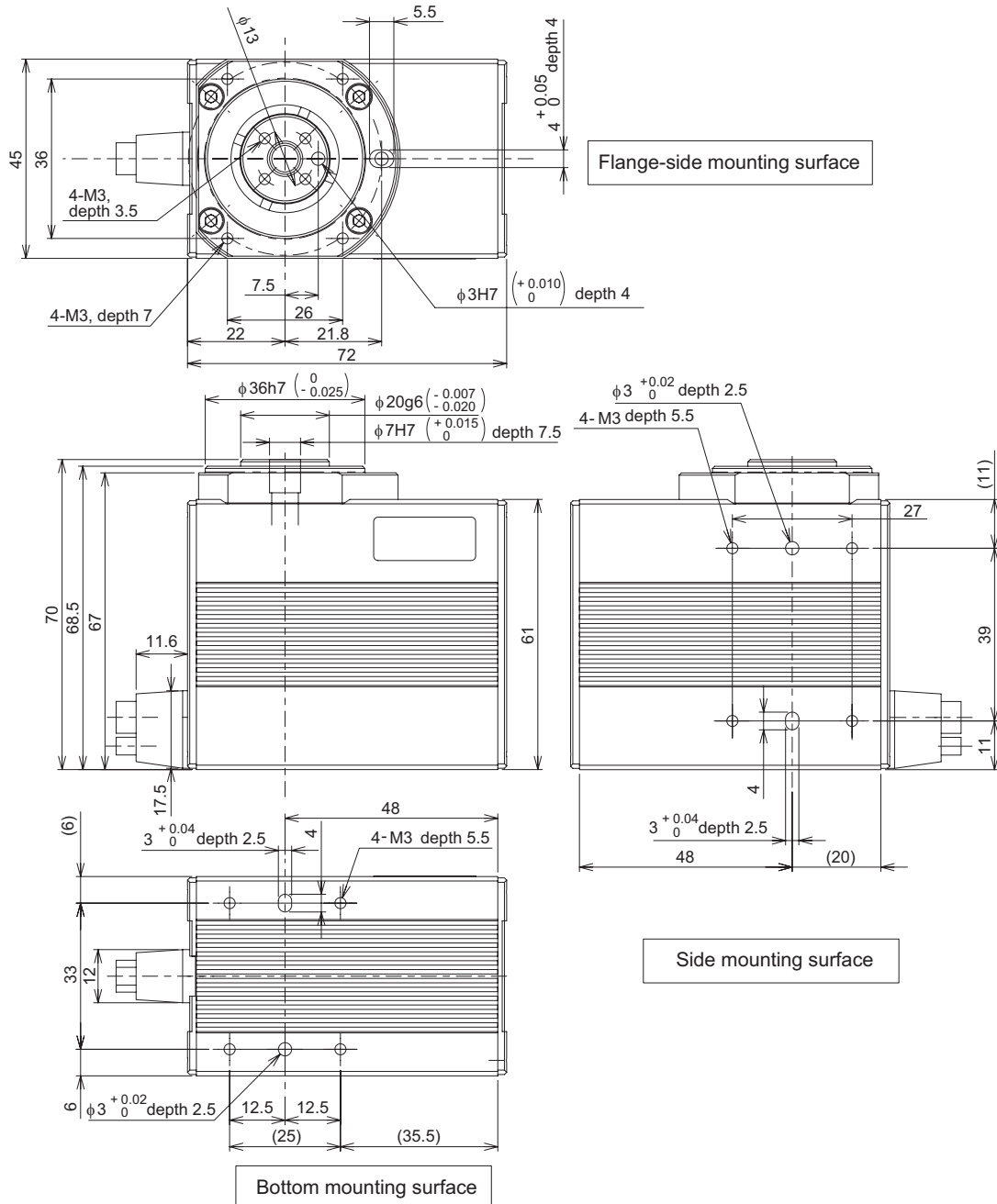
○ : Possible × : Not possible

Horizontal installation	Vertical installation	Sideways installation	Ceiling Mount installation
○	○	○	○

2.4 Installation of the Actuator

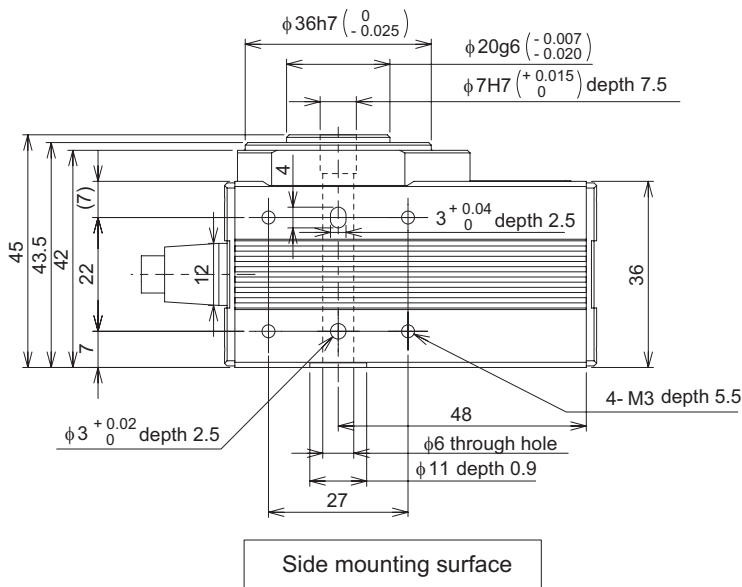
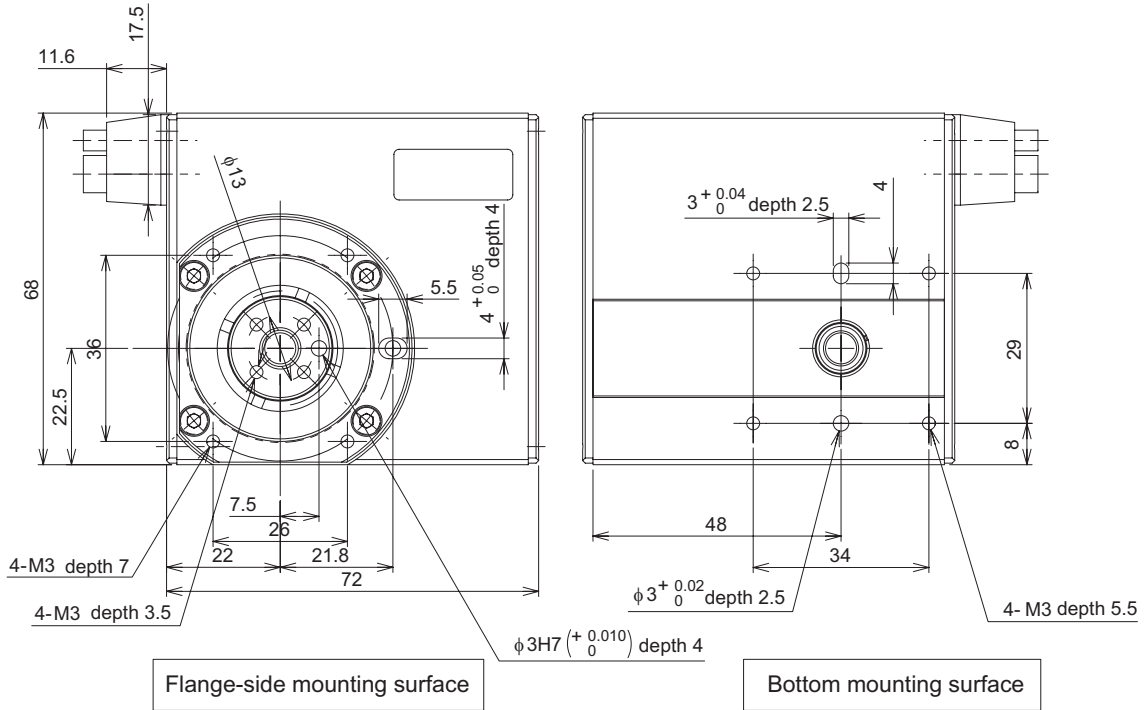
2.4.1 Small Type

- 330-degree Rotation Specification RTBS, Multi-Rotation Specification RTBSL (Vertical Type)



Caution: Some of the tapped mounting holes are through holes. Therefore, never use long screws whose effective thread length exceeds the maximum screw-in depth. They may damage the mechanical or electrical parts inside the actuator.

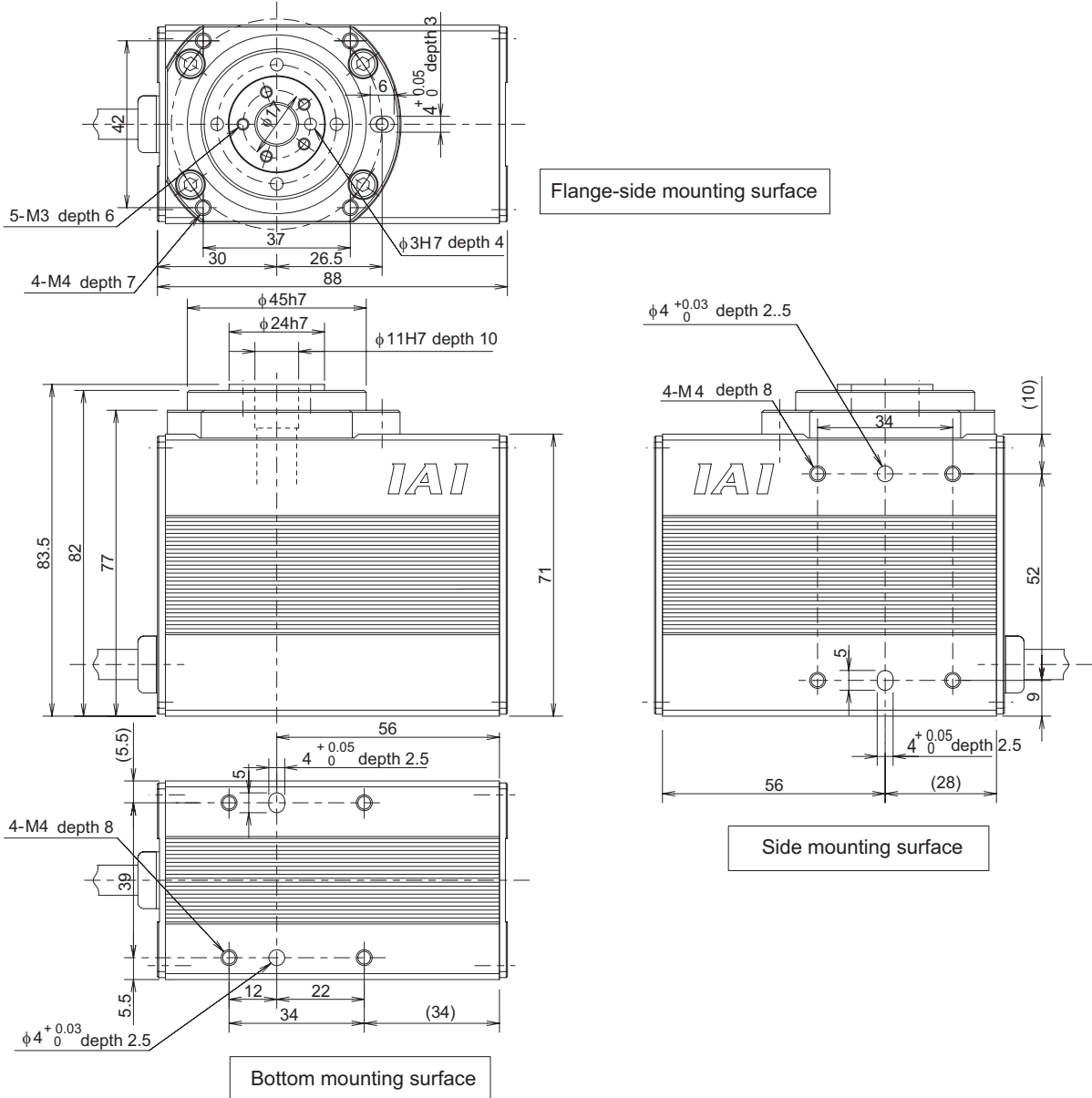
- 330-degree Rotation Specification RTCS, Multi-Rotation Specification RTCSL (Flat Type)



Caution: Some of the tapped mounting holes are through holes. Therefore, never use long screws whose effective thread length exceeds the maximum screw-in depth. They may damage the mechanical or electrical parts inside the actuator.

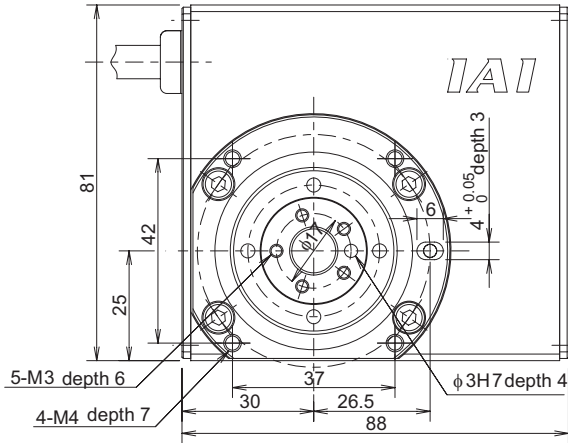
2.4.2 Medium Type

- 330-degree Rotation Specification RTB, Multi-Rotation Specification RTBL (Vertical Type)

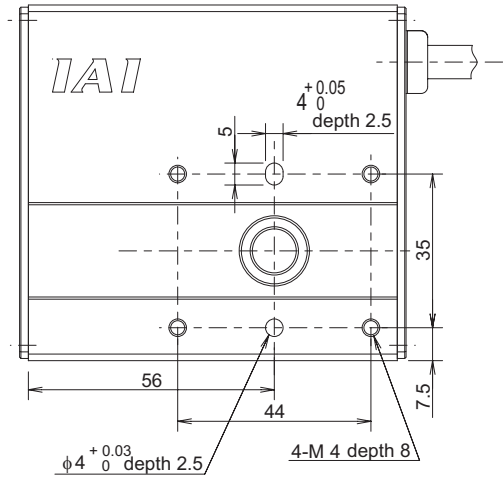


Caution: Some of the tapped mounting holes are through holes. Therefore, never use long screws whose effective thread length exceeds the maximum screw-in depth. They may damage the mechanical or electrical parts inside the actuator.

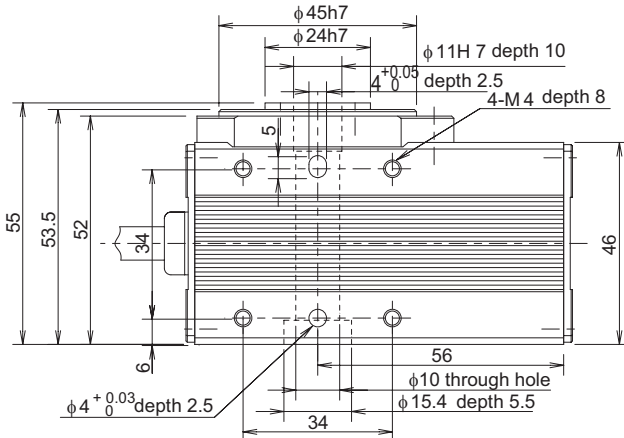
- 330-degree Rotation Specification RTC, Multi-Rotation Specification RTCL (Flat Type)



Flange-side mounting surface



Bottom mounting surface

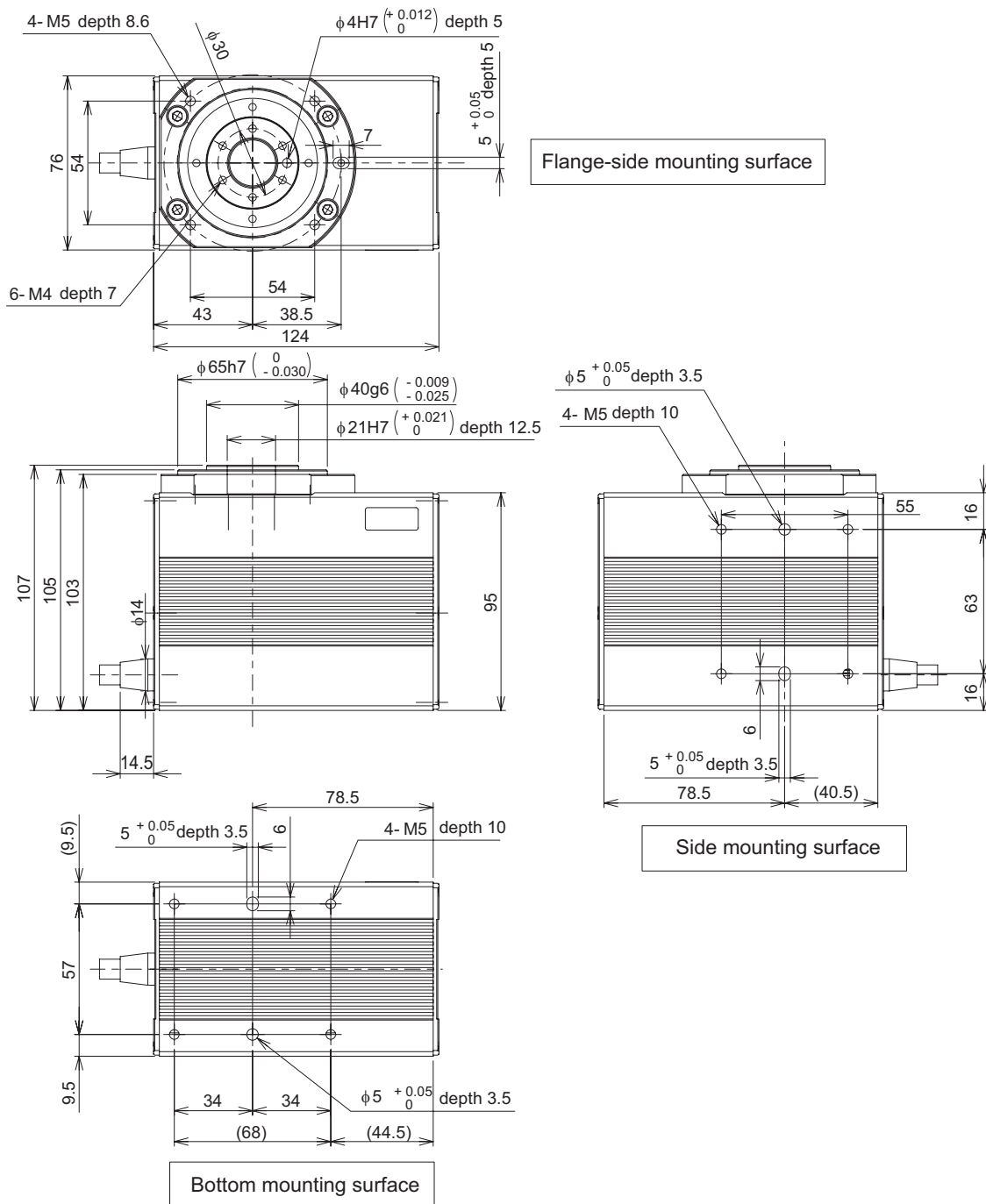


Side mounting surface

Caution: Some of the tapped mounting holes are through holes. Therefore, never use long screws whose effective thread length exceeds the maximum screw-in depth. They may damage the mechanical or electrical parts inside the actuator.

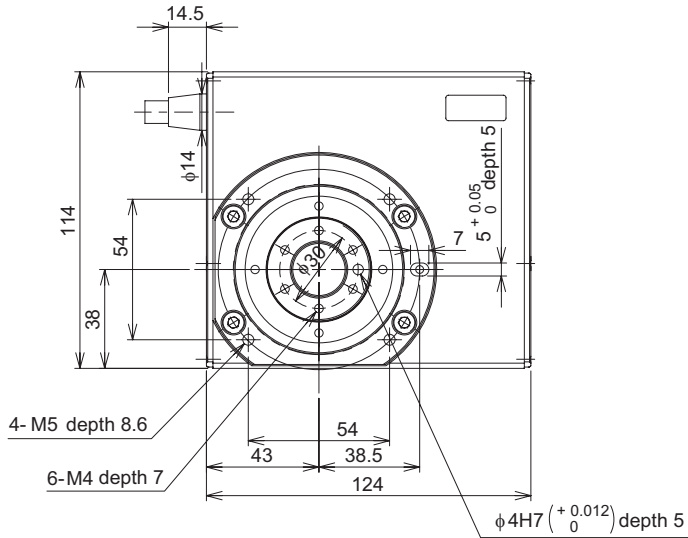
2.4.3 Large Type

- 330-degree Rotation Specification RTBB, Multi-Rotation Specification RTBBL (Vertical Type)

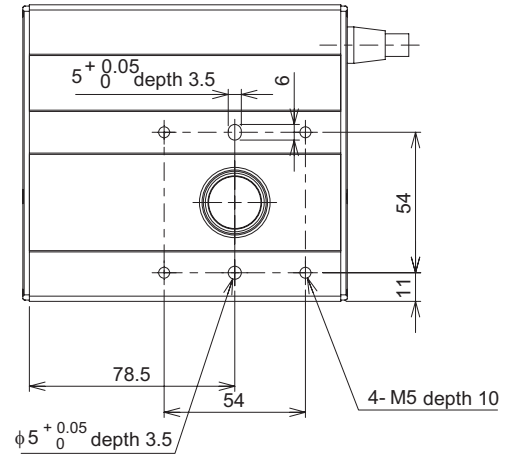


Caution: Some of the tapped mounting holes are through holes. Therefore, never use long screws whose effective thread length exceeds the maximum screw-in depth. They may damage the mechanical or electrical parts inside the actuator.

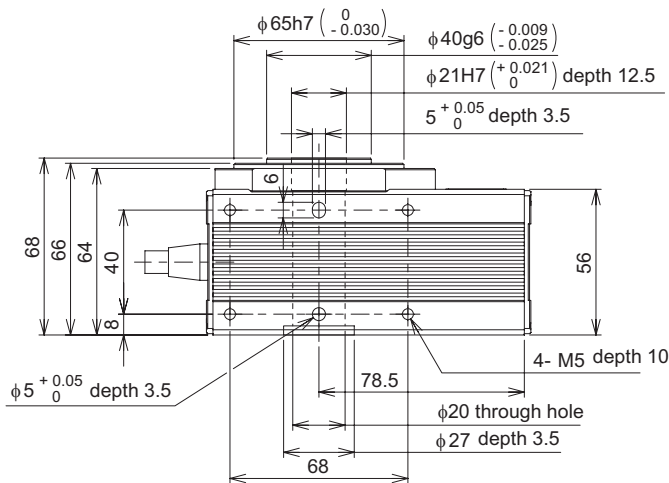
- 330-degree Rotation Specification RTCB, Multi-Rotation Specification RTCBL (Flat Type)



Flange-side mounting surface



Bottom mounting surface



Side mounting surface

Caution: Some of the tapped mounting holes are through holes. Therefore, never use long screws whose effective thread length exceeds the maximum screw-in depth. They may damage the mechanical or electrical parts inside the actuator.

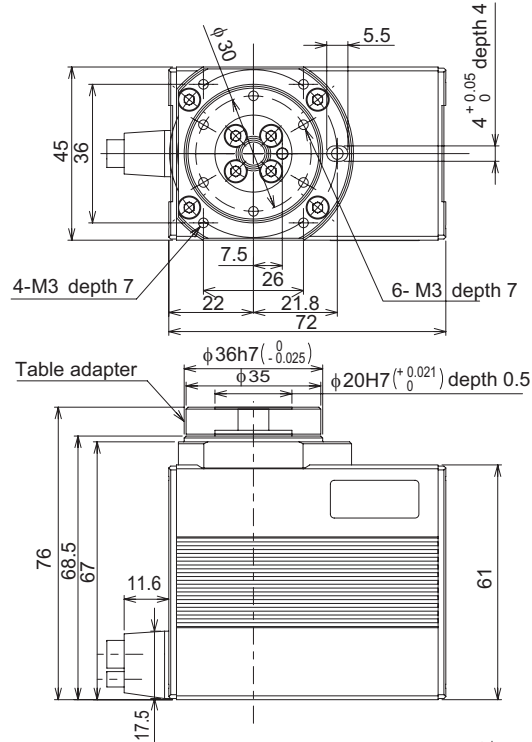
2.5 Output Shaft Adapters (Optional)

The external dimensions of adapters that can be installed on the actuator's output shaft are shown below.

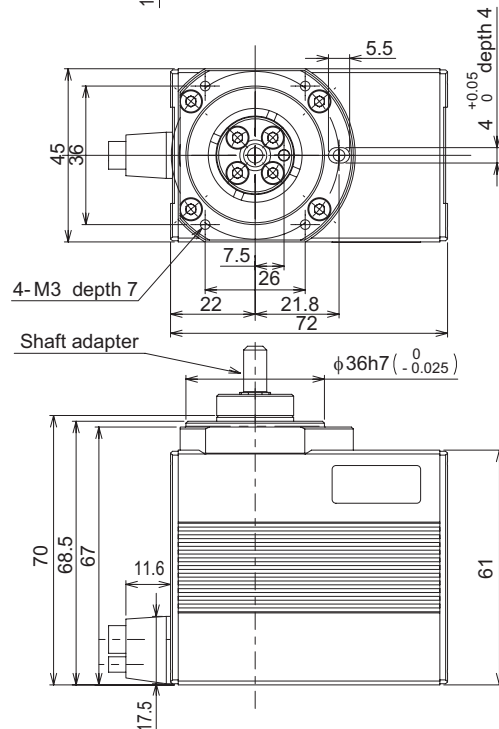
2.5.1 Small Type

- 330-degree Rotation Specification RTCB, Multi-Rotation Specification RTCBL (Vertical Type)

Table adapter

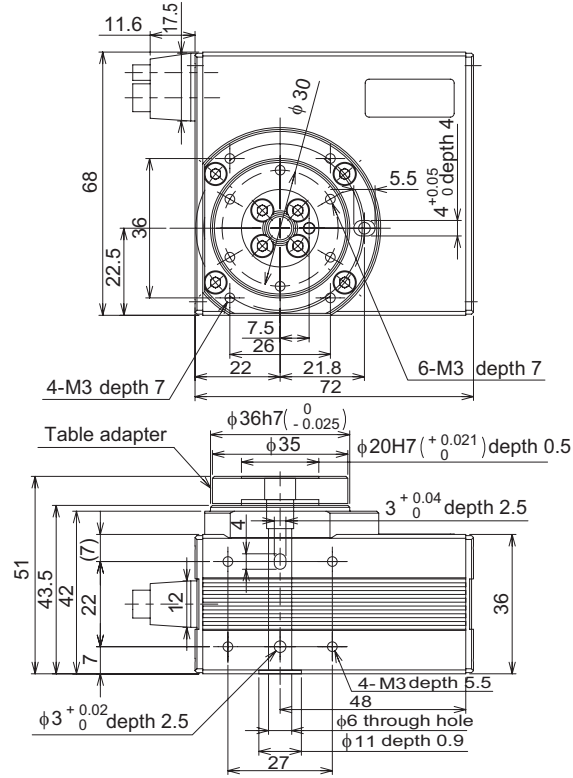


Shaft adapter

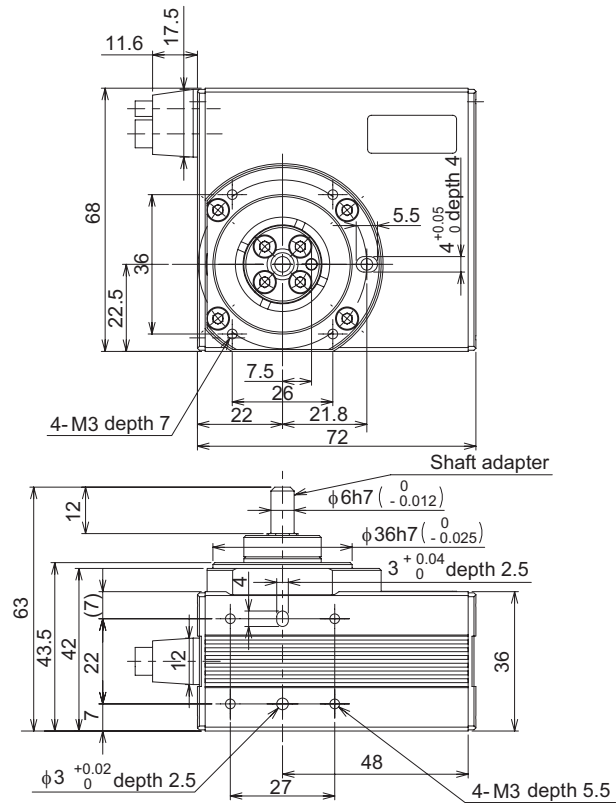


- 330-degree Rotation Specification RTCS, Multi-Rotation Specification RTCSL (Flat Type)

Table adapter



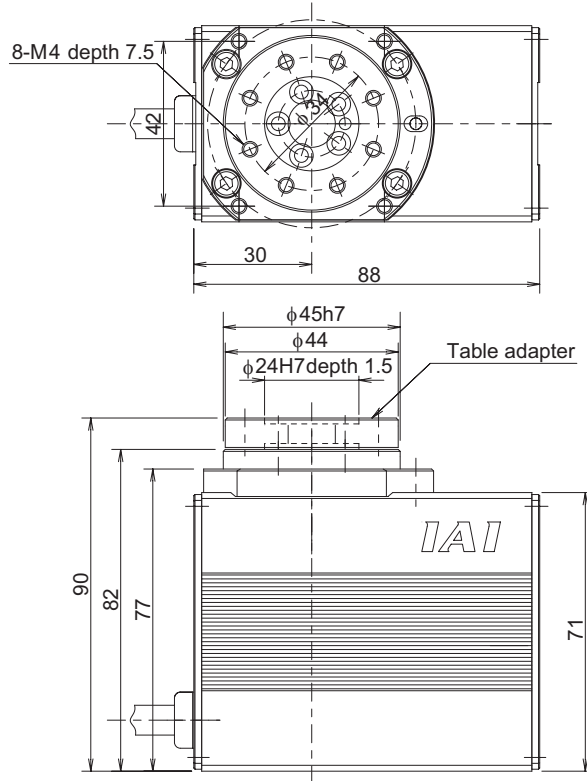
Shaft adapter



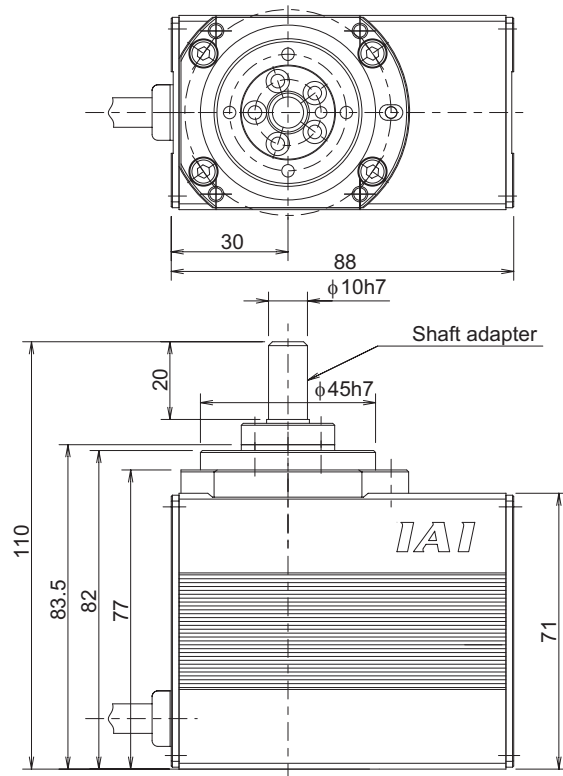
2.5.2 Medium Type

- 330-degree Rotation Specification RTB, Multi-Rotation Specification RTBL (Vertical Type)

Table adapter

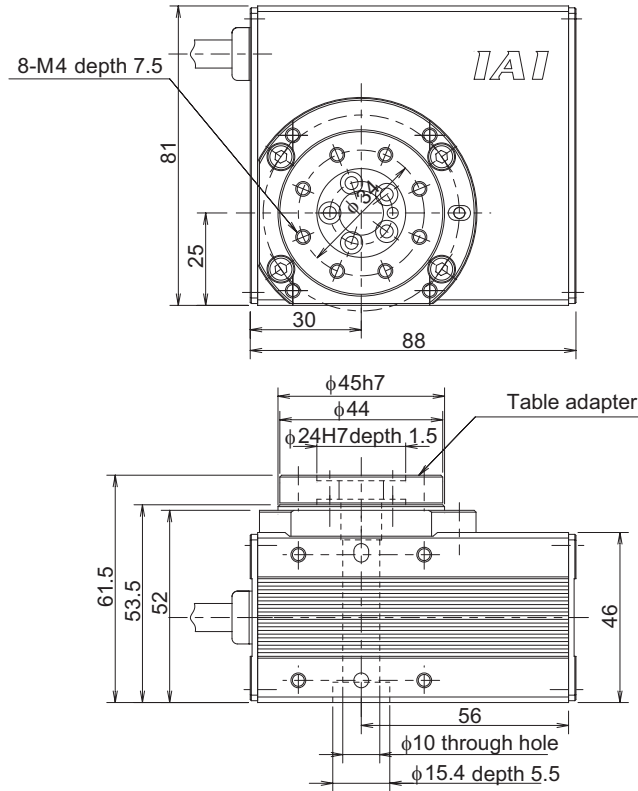


Shaft adapter

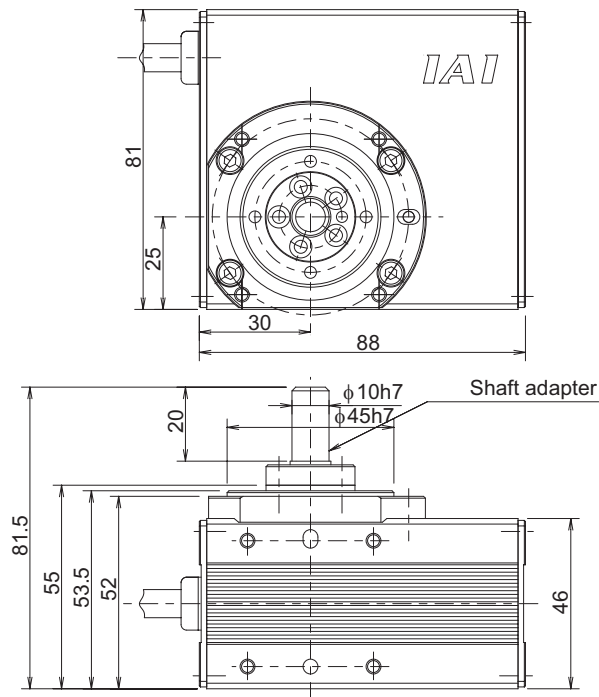


- 330-degree Rotation Specification RTC, Multi-Rotation Specification RTCL (Flat Type)

Table adapter



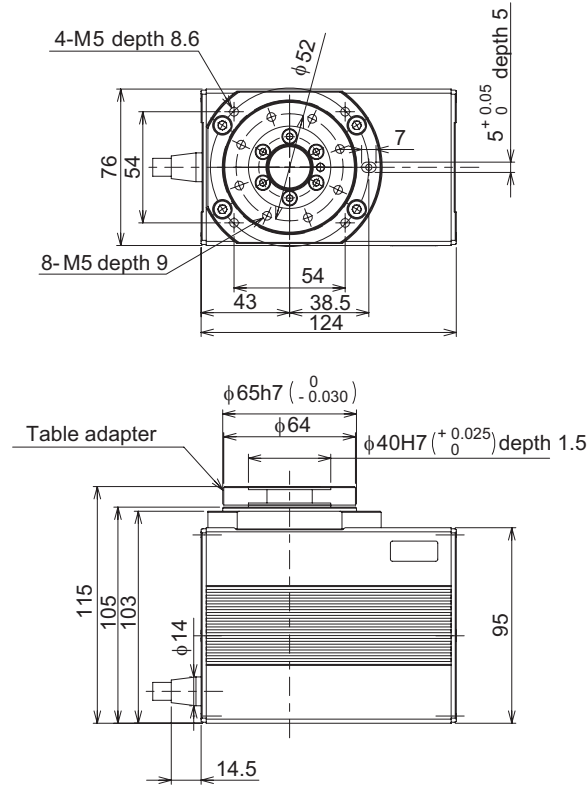
Shaft adapter



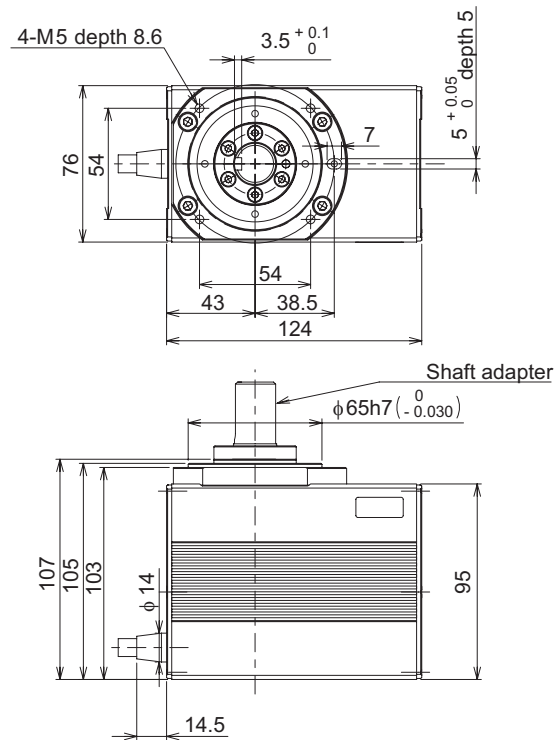
2.5.3 Large Type

- 330-degree Rotation Specification RTBB, Multi-Rotation Specification RTBBL (Vertical Type)

Table adapter

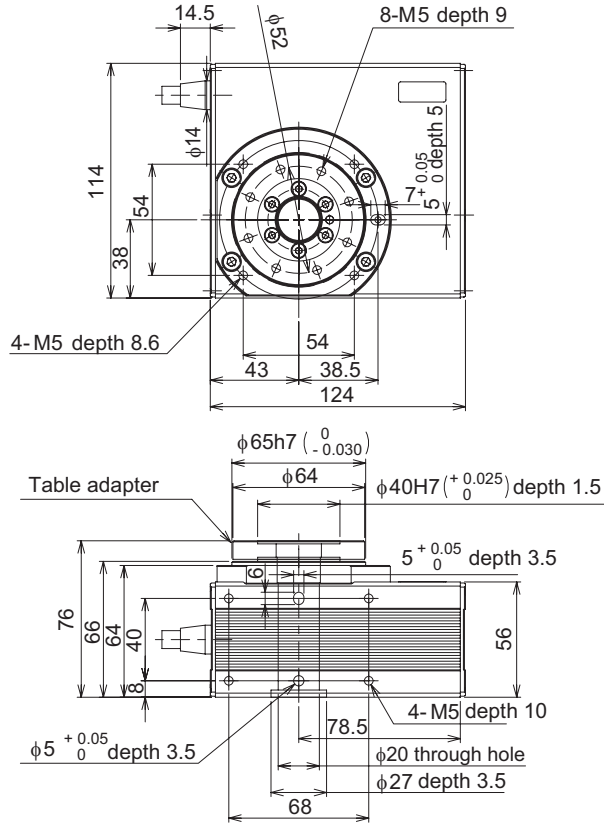


Shaft adapter

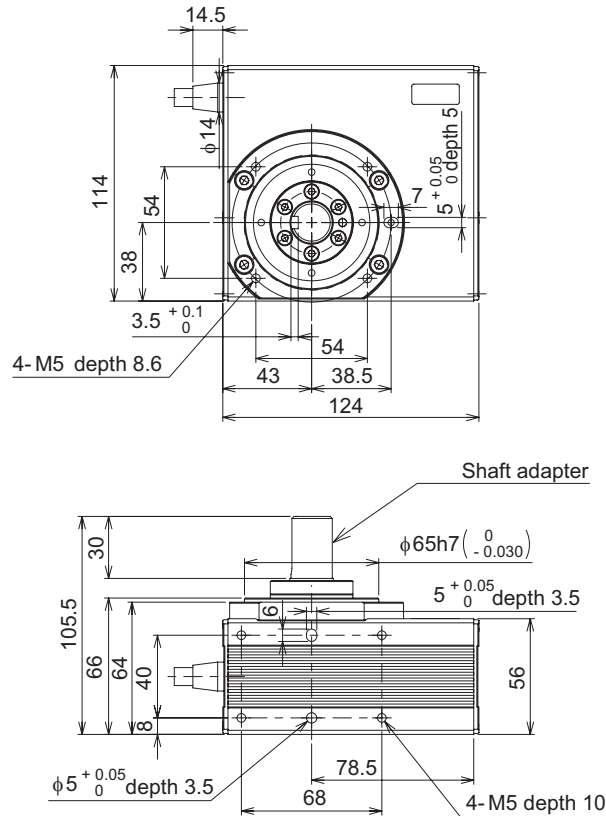


- 330-degree Rotation Specification RTCB, Multi-Rotation Specification RTCBL (Flat Type)

Table adapter



Shaft adapter



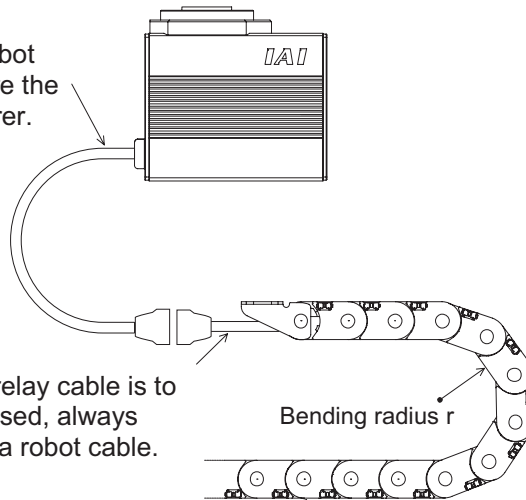
3. Connecting with the Controller

Use the IAI dedicated connection cable for the connection of the actuator to the controller.

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

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

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

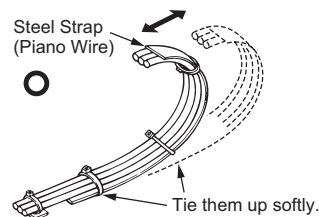
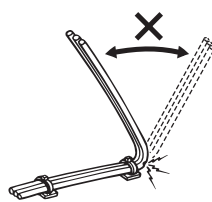


- If a relay cable is to be used, always use a robot cable.
- Use a cable bearer with its bending radius r set to 50 mm or greater.

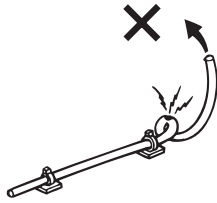


Warning: For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure,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

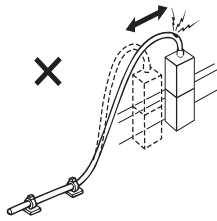
- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or re-joint it.
- Hold the dedicated cable to avoid mechanical force being applied to the terminals and connectors.
- Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
- In case a dedicated cable is to be used at a moving part, make sure to lay out the cable without applying any force to pull the connector or extreme bend on the cable. Do not attempt to use the cable with a bending radius below the allowable value.
- Make certain that the connectors are plugged properly. Insufficient connection may cause an operation error, thus it is extremely risky.
- Do not lay out the cables to where the machine runs over them.
- Pay attention to the cable layout so it would not hit peripherals during an operation. In case it does, have an appropriate protection such as a cable track.
- When a cable is used hanging on the ceiling, prevent an environment that the cable swings with acceleration or wind velocity.
- Make sure there is not too much friction inside the cable storage equipment.
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



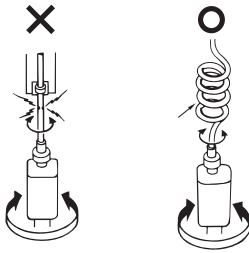
- Do not let the cable bend, kink or twist.



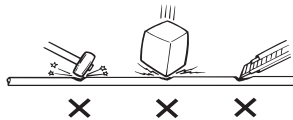
- Do not pull the cable with a strong force.



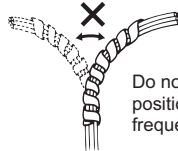
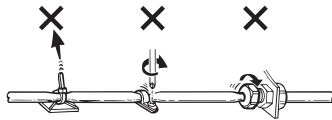
- Pay attention not to concentrate the twisting force to one point on a cable.



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

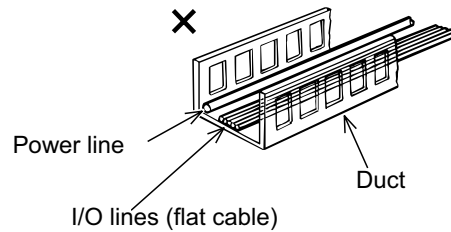


- When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.



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

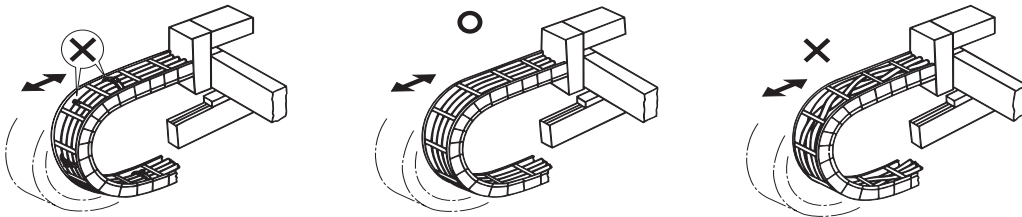
- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



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.



4. Maintenance and Inspection

4.1 Inspection Items and Schedule

Perform maintenance and inspection at the intervals specified below.

This schedule assumes that the actuator is operated eight hours a day.

If the actuator is operated at a higher utilization, such as when the machine is used continuously day and night, reduce the inspection intervals accordingly.

	Visual inspection of exterior	Greasing
Start-up inspection	○	
After 1 month of operation	○	
After 6 months of operation	○	○
After 1 year of operation	○	
Every 6 months thereafter	○	○
Every 1 year	○	

* Any adjustments requiring the following operations must be carried out at our factory. Do not disassemble the gripper or cut any of its cables in the location where the gripper is installed.

- Disassemble the motor
- Disassemble the gear area
- Disassemble the bearing
- Cut a cable

If the user has disassembled any of the above components or cut any of the gripper's cables, IAI will not be responsible for any malfunction or problem that may occur thereafter.

4.2 Visually Inspecting the Exterior

Visually check the exterior of the following items.

Actuator	Loosening of actuator mounting screws
Cables	Scratches, connector engagement
Overall	Noise, vibration

4.3 Cleaning

- Clean the exterior surface as necessary.
- Wipe dirty areas using a soft cloth, etc.
- Do not blow highly compressed air onto the actuator, as it may cause dust to enter the actuator through gaps between parts.
- Do not use petroleum-based solvent as it damages resin and coated surfaces.
- To remove stubborn stains, take neutral detergent or alcohol into a soft cloth, etc., and wipe the area gently.

4.4 Grease Supply

4.4.1 Grease to Apply

IAI uses the following grease in our plant.

Kyodo Yushi	AC-D No.2
-------------	-----------

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

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

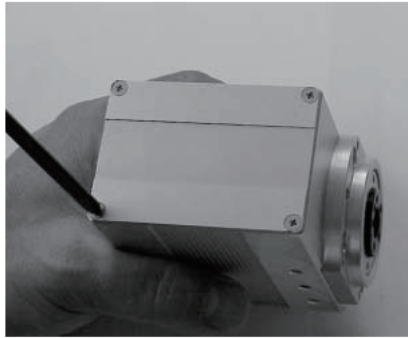


Warning: Never use any fluorine-based grease. Mixing with lithium-based grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

4.4.2 How to apply the grease

- 1) Remove the screws on the front cover (countersunk head screw M2.6 x 6), and take off the front cover.

RTBS, RTBSL
RTB, RTBL
RTBB, RTBBL (Vertical Type)

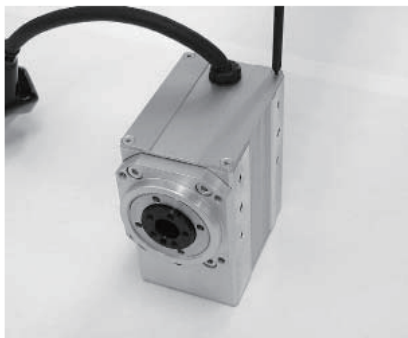


RTCS, RTCSL
RTC, RTCL
RTCB, RTCBL (Flat Type)



- 2) Remove the screws on the rear cover (countersunk head screw M2.6 x 6), and separate the rear cover from the actuator (do not forcibly pull the cables inside). The rear cover remains attached to the actuator through the cables.

RTBS, RTBSL
RTB, RTBL
RTBB, RTBBL (Vertical Type)



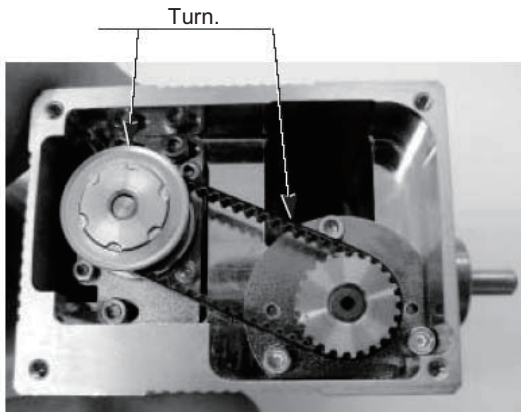
RTCS, RTCSL
RTC, RTCL
RTCB, RTCBL (Flat Type)



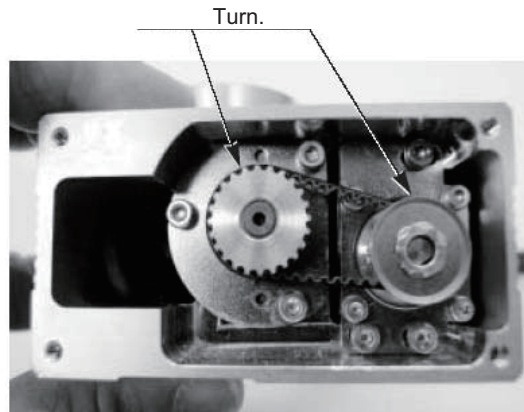
- 3) While turning the gear, add grease from the opening in the rear until the bottom of the teeth is covered with grease.
 (Turn the input shaft to turn the output gear.)
 Once a sufficient amount of grease has been added, move the gear back and forth several times to evenly spread grease.

• Small Type

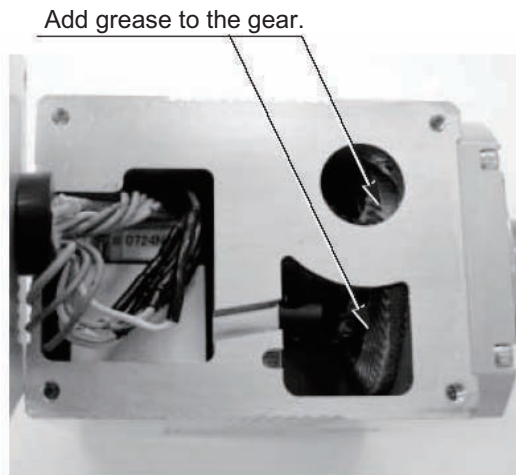
RTBS, RTBSL (Vertical Type)



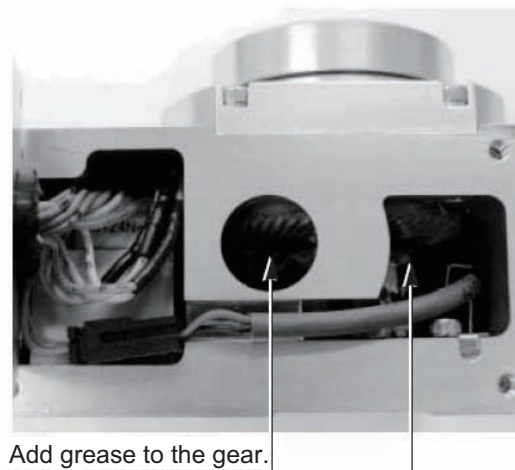
RTCS, RTCSL (Flat Type)



RTBS, RTBSL (Vertical Type)
(rear opening)



RTCS, RTCSL (Flat Type)
(rear opening)



⚠ Caution:

- The multi-rotation specification RTBL/RTCL has the home sensor installed on the rear opening side. Accordingly, apply grease on the gears by exercising caution not to let grease attach to the home sensor.
- 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.

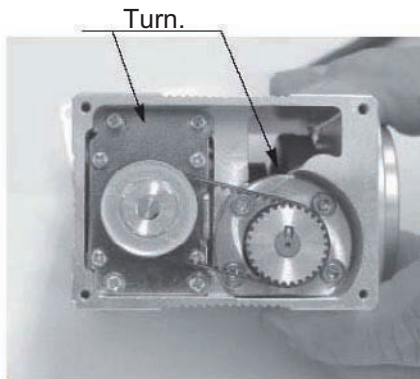
While turning the gear, add grease from the opening in the rear until the bottom of the teeth is covered with grease.

(Turn the input shaft to turn the output gear.)

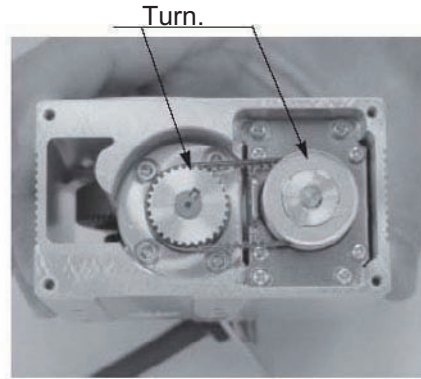
Once a sufficient amount of grease has been added, move the gear back and forth several times to evenly spread grease.

- Medium Type

RTB, RTBL (Vertical Type)

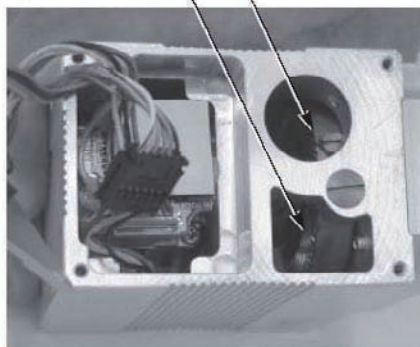


RTC, RTCL (Flat Type)



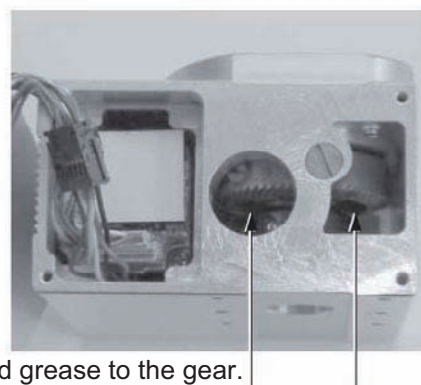
RTB, RTBL (Vertical Type) (rear opening)

Add grease to the gear.



RTC, RTCL (Flat Type) (rear opening)

Add grease to the gear.



- Caution:**
- The multi-rotation specification RTBL/RTCL has the home sensor installed on the rear opening side. Accordingly, apply grease on the gears by exercising caution not to let grease attach to the home sensor.
 - 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.

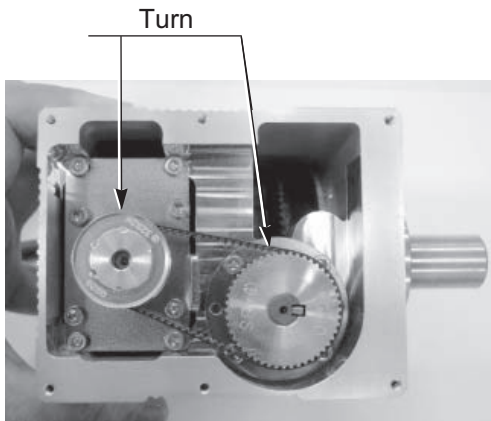
While turning the gear, add grease from the opening in the rear until the bottom of the teeth is covered with grease.

(Turn the input shaft to turn the output gear.)

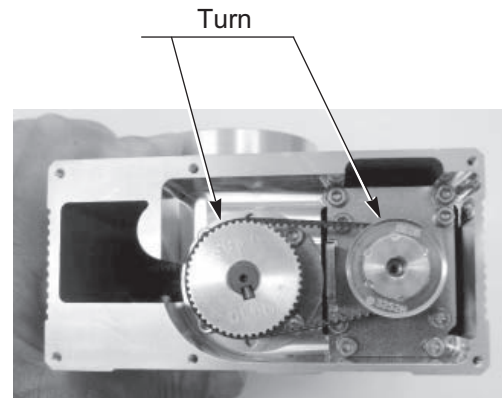
Once a sufficient amount of grease has been added, move the gear back and forth several times to evenly spread grease.

- Large Type

RTBB, RTBBL (Vertical Type)

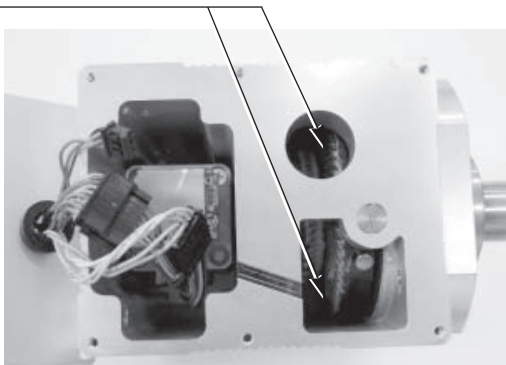


RTCB, RTCBL (Flat Type)

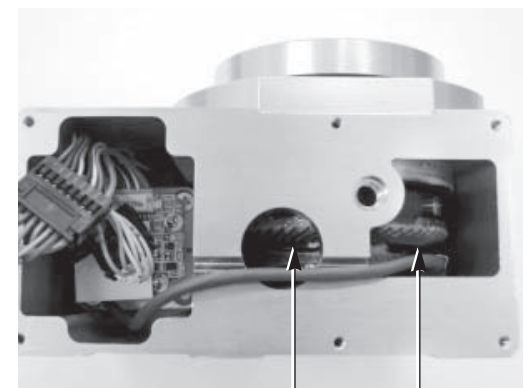


RTBB, RTBBL (Vertical Type) (rear opening)

Add grease to the gear.



RTCB, RTCLB (Flat Type) (rear opening)



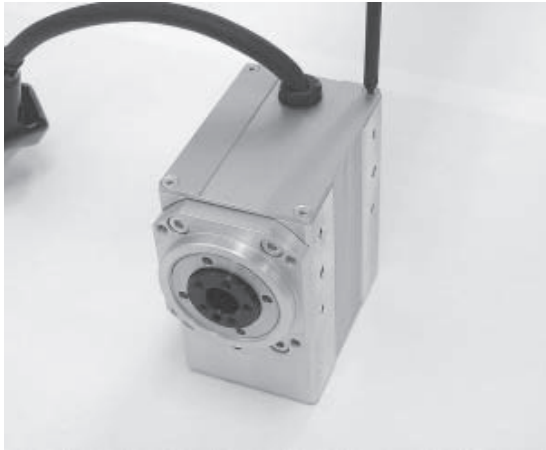
Add grease to the gear.



- Caution:**
- The multi-rotation specification RTBL/RTCL has the home sensor installed on the rear opening side. Accordingly, apply grease on the gears by exercising caution not to let grease attach to the home sensor.
 - 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.

4) Install the front cover and rear cover and securely tighten the screws.

When attaching the rear cover, exercise caution not to pinch the cables between the cover and actuator.




 Warning:

- Never use fluorine grease. If fluorine grease is mixed with lithium grease, the lubricating function of grease will drop and the machine may suffer damage due to increased friction.
- Do not add grease more than necessary. Excess grease may travel to the electronic components and cause them to malfunction.

 Warning:

- The encoder phase has been precisely adjusted to ensure accurate detection of rotational angle and home signal. To prevent actuator failure due to an offset encoder phase, never touch the encoder.
- When attaching the rear cover, exercise caution not to pinch the cables between the cover and actuator. Store the cables in the space provided in the upper section of the actuator. Do not forcibly tighten the screws when the panel is not properly aligned.

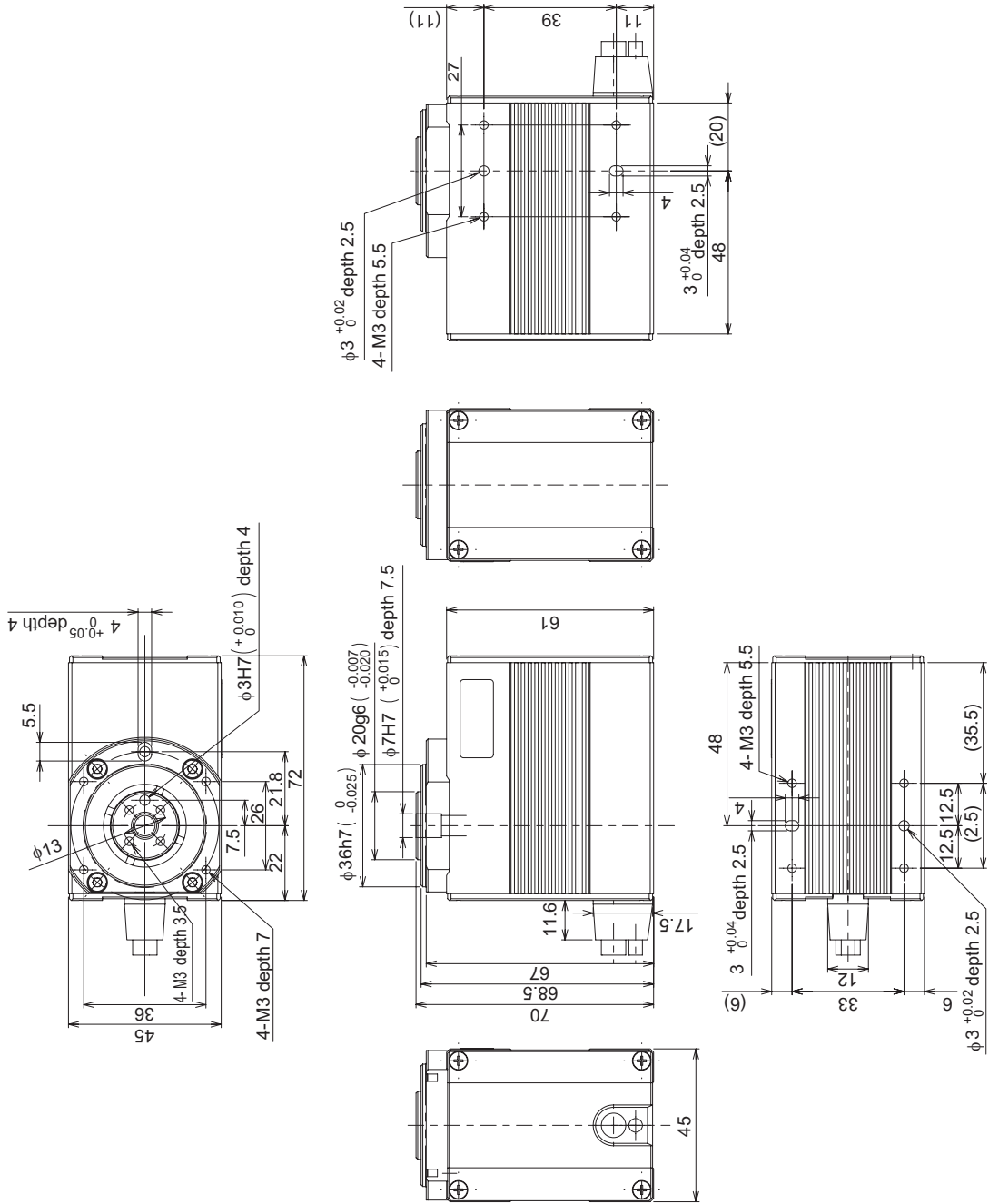
 Caution: In case the grease got into your eye, immediately go to see the doctor to get an appropriate care.
After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

5. External Dimensions

5.1 Small Type

5.1.1 Standard Specification

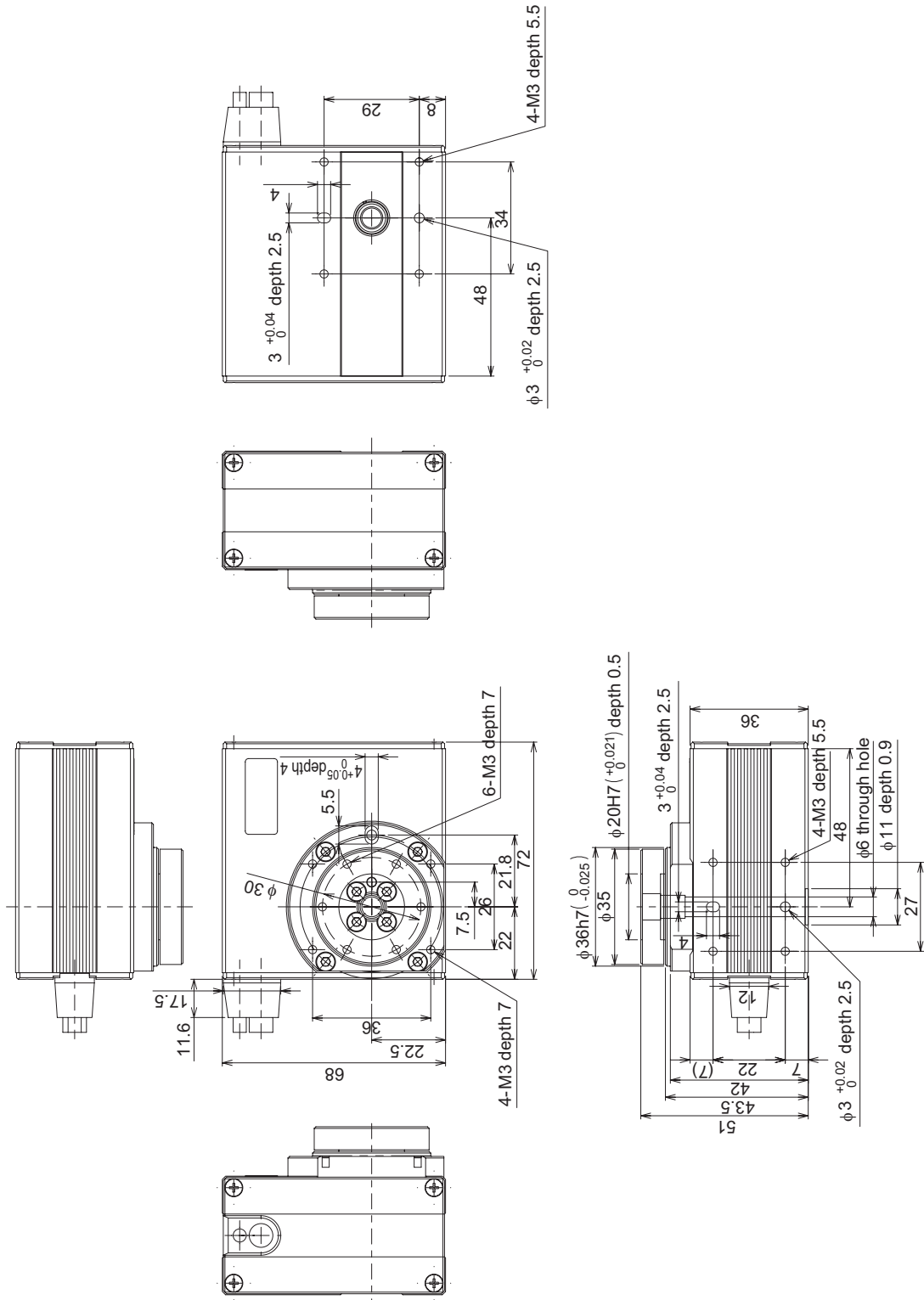
- 330-degree Rotation Specification RTBS, Multi-Rotation Specification RTBSL (Vertical Type)



Mass [kg]	0.52
-----------	------

- 330-degree Rotation Specification RTCS, Multi-Rotation Specification RTCSL (Flat Type)

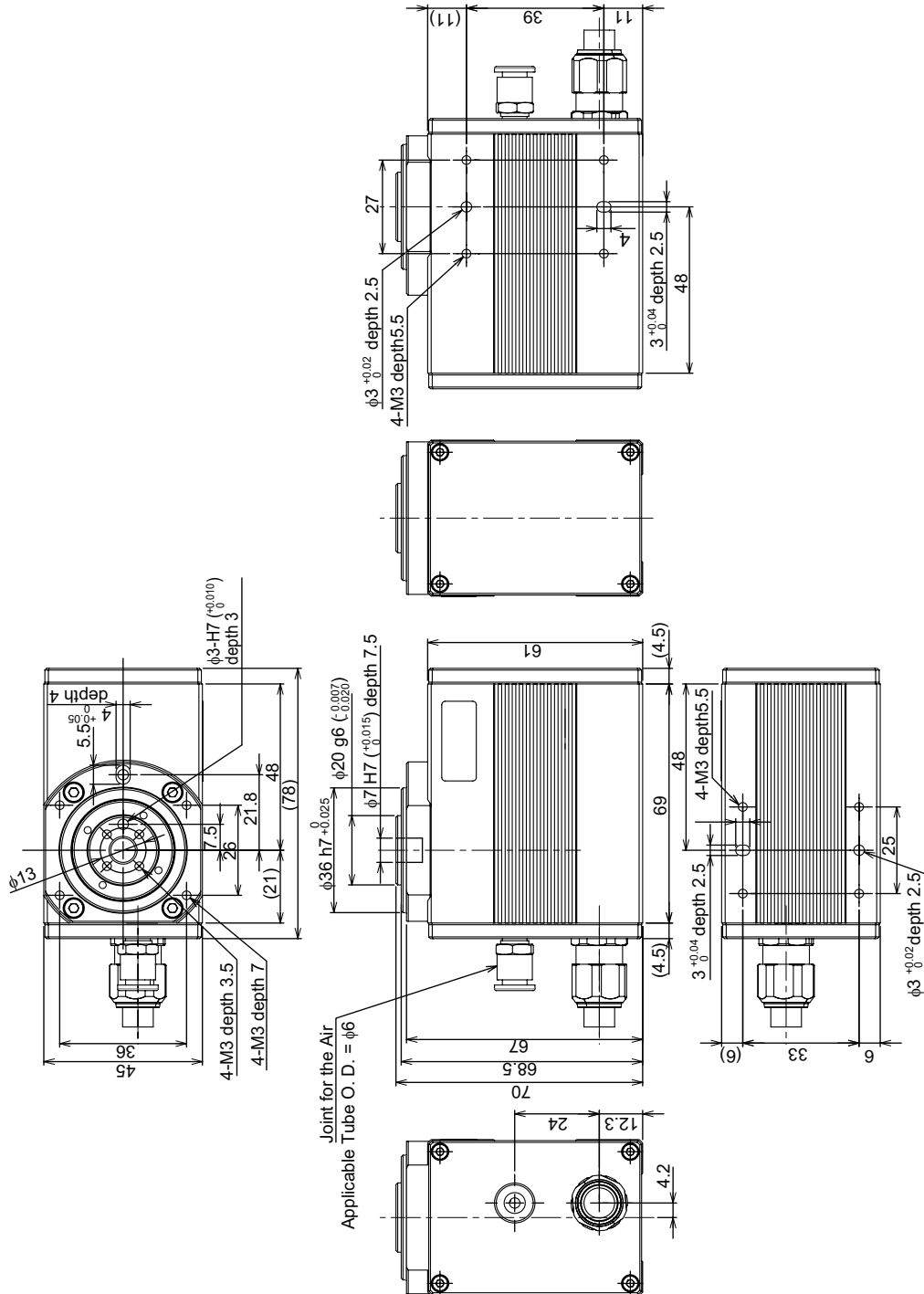
5. External Dimensions



Mass [kg]	0.48
-----------	------

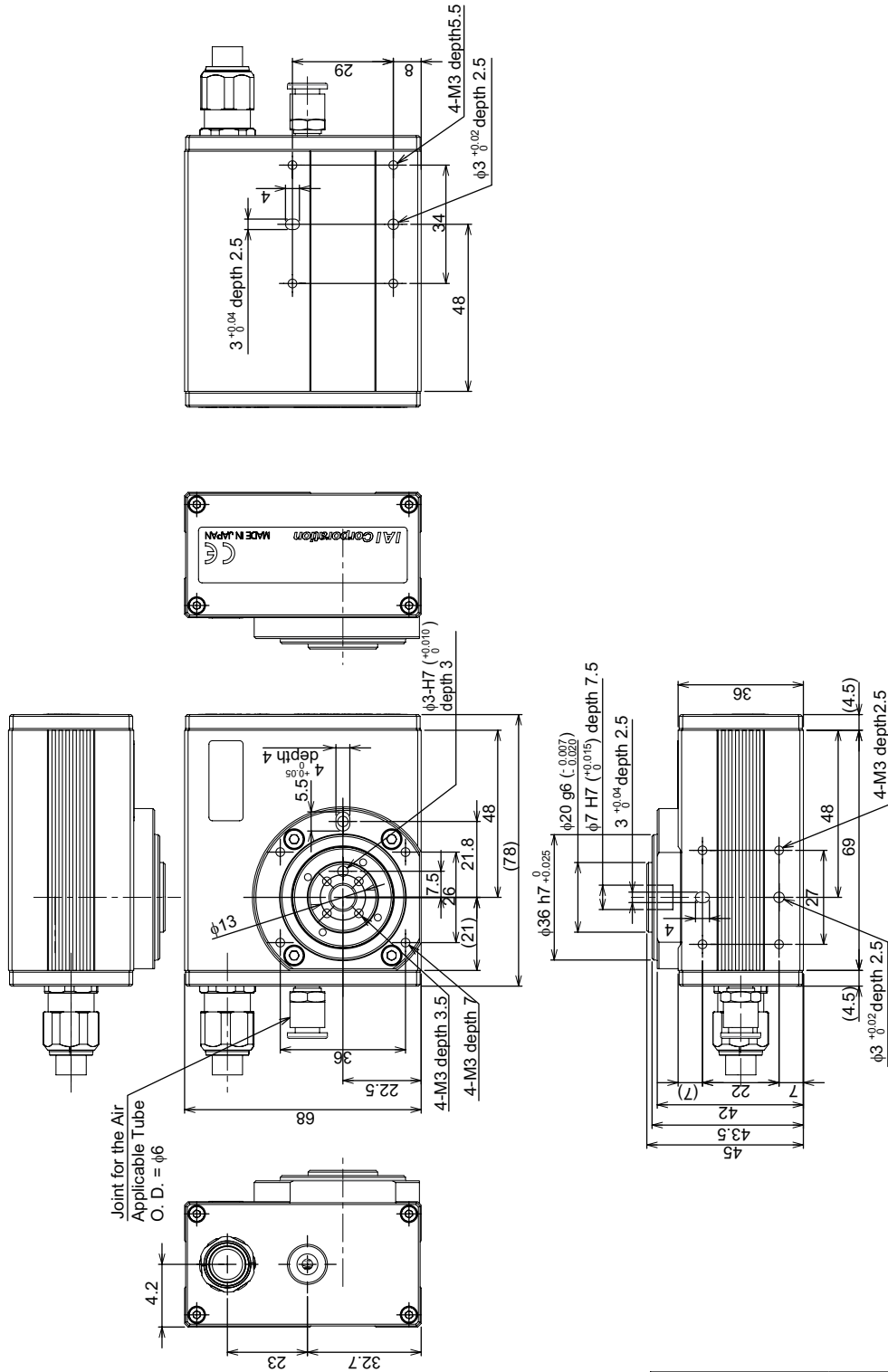
5.1.2 Dustproof/Splash proof • Cleanroom Specification

- 330-degree Rotation Specification RTBS, Multi-Rotation Specification RTBSL (Vertical Type)



Mass [kg]	0.6
-----------	-----

- 330-degree Rotation Specification RTCS, Multi-Rotation Specification RTCSL (Flat Type)

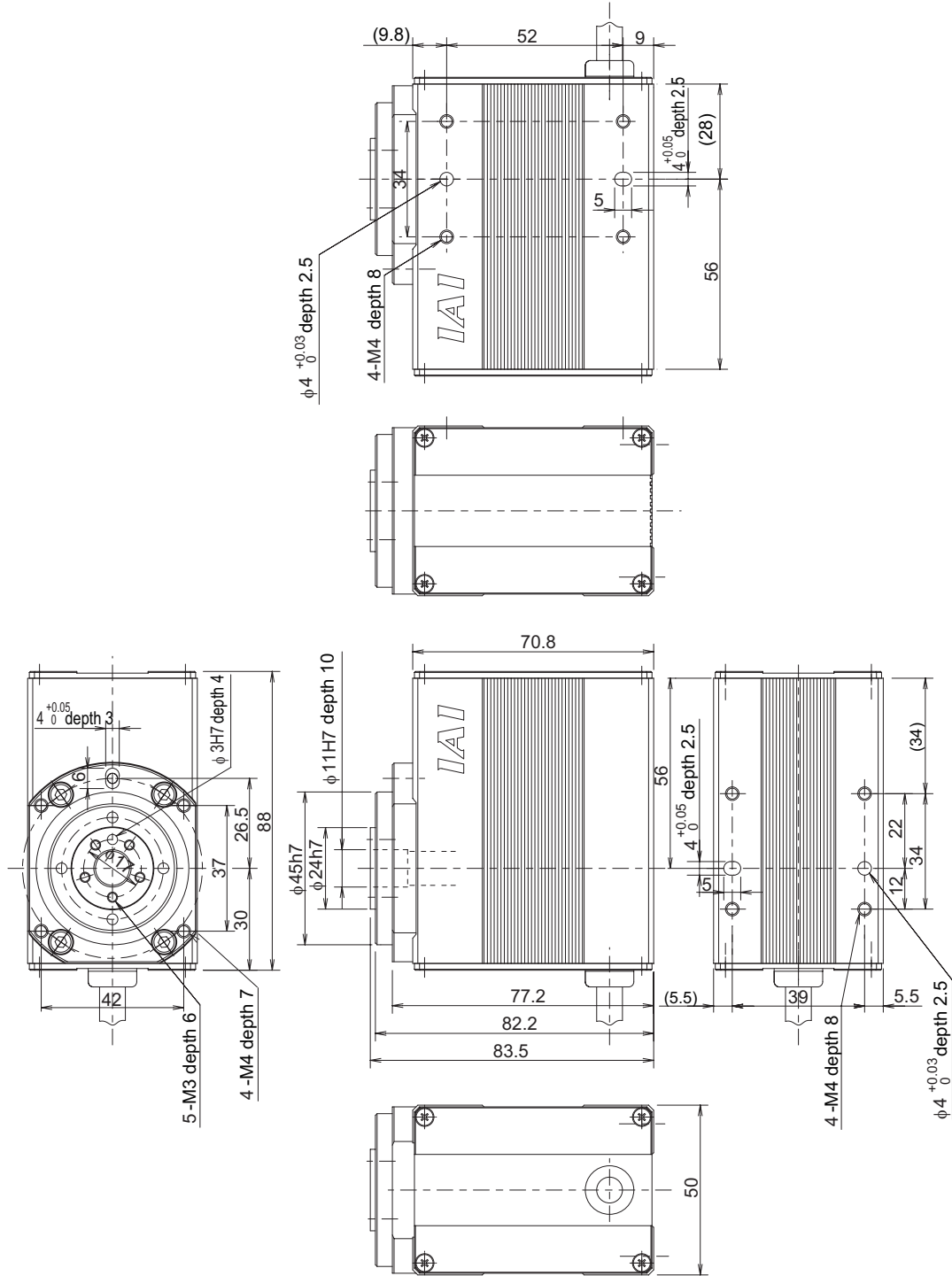


Mass [kg]	0.54
-----------	------

5.2 Medium Type

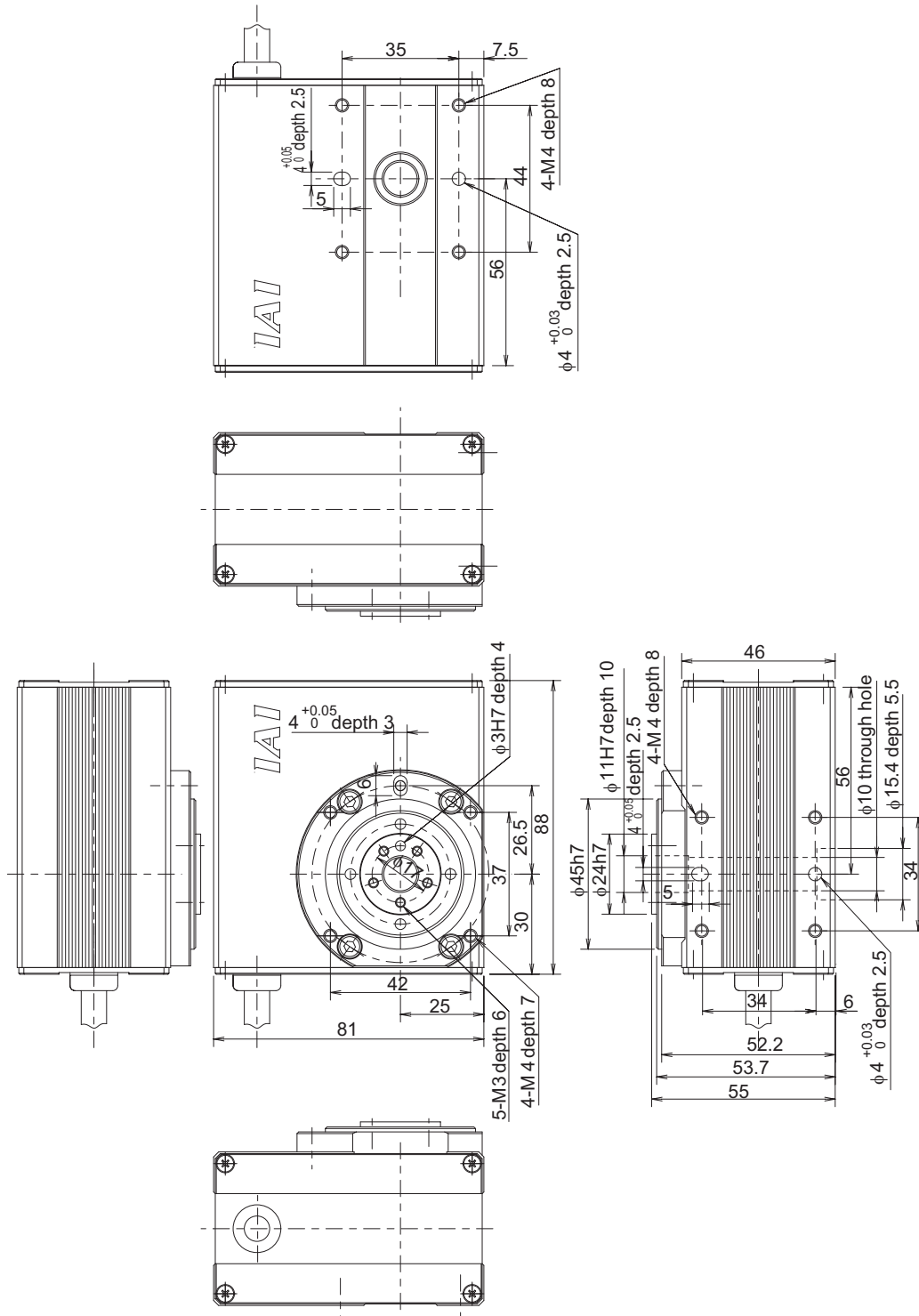
5.2.1 Standard Specification

- 330-degree Rotation Specification RTB, Multi-Rotation Specification RTBL (Vertical Type)



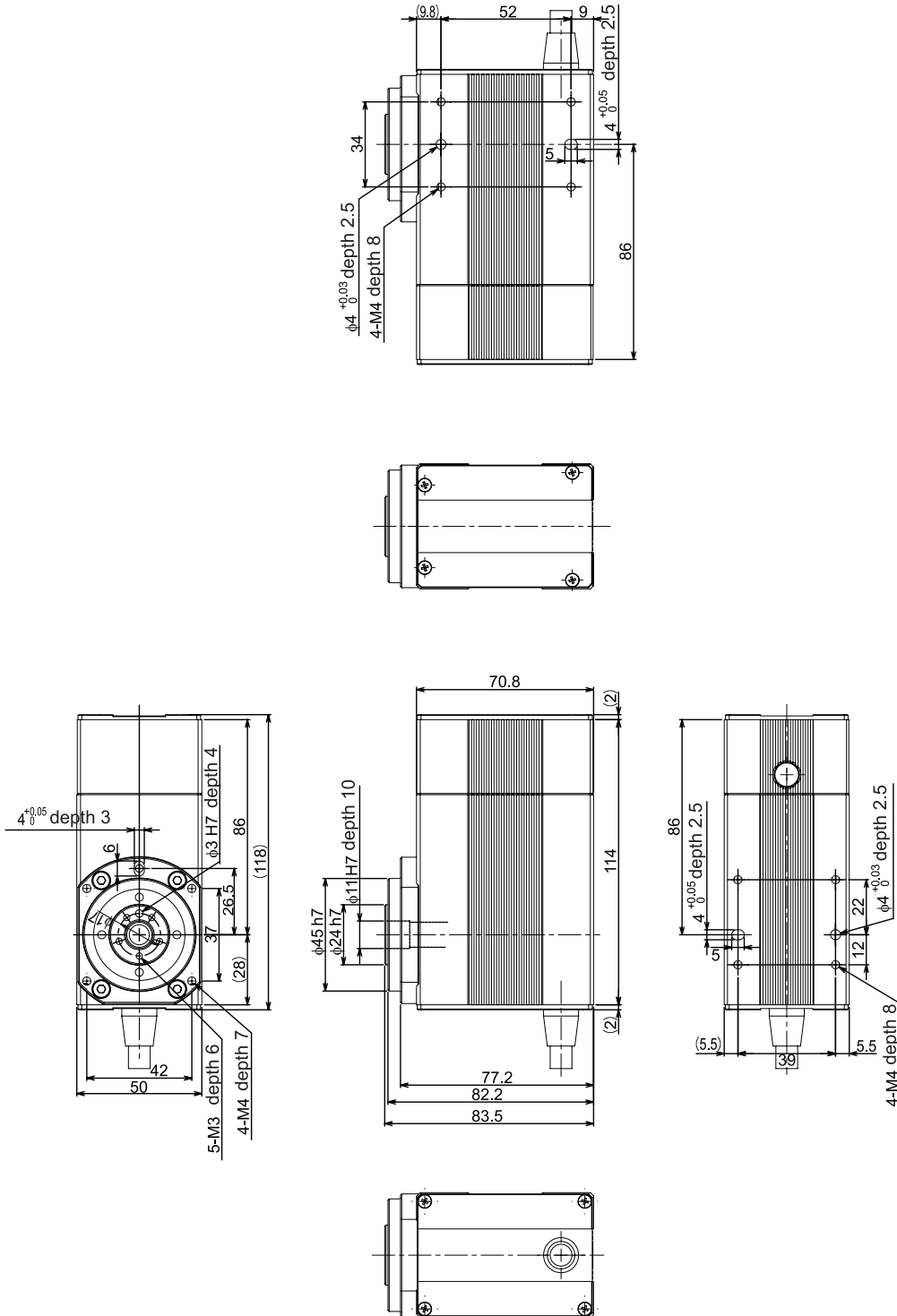
Mass [kg]	0.86
-----------	------

- 330-degree Rotation Specification RTC, Multi-Rotation Specification RTCL (Flat Type)



Mass [kg]	0.92
-----------	------

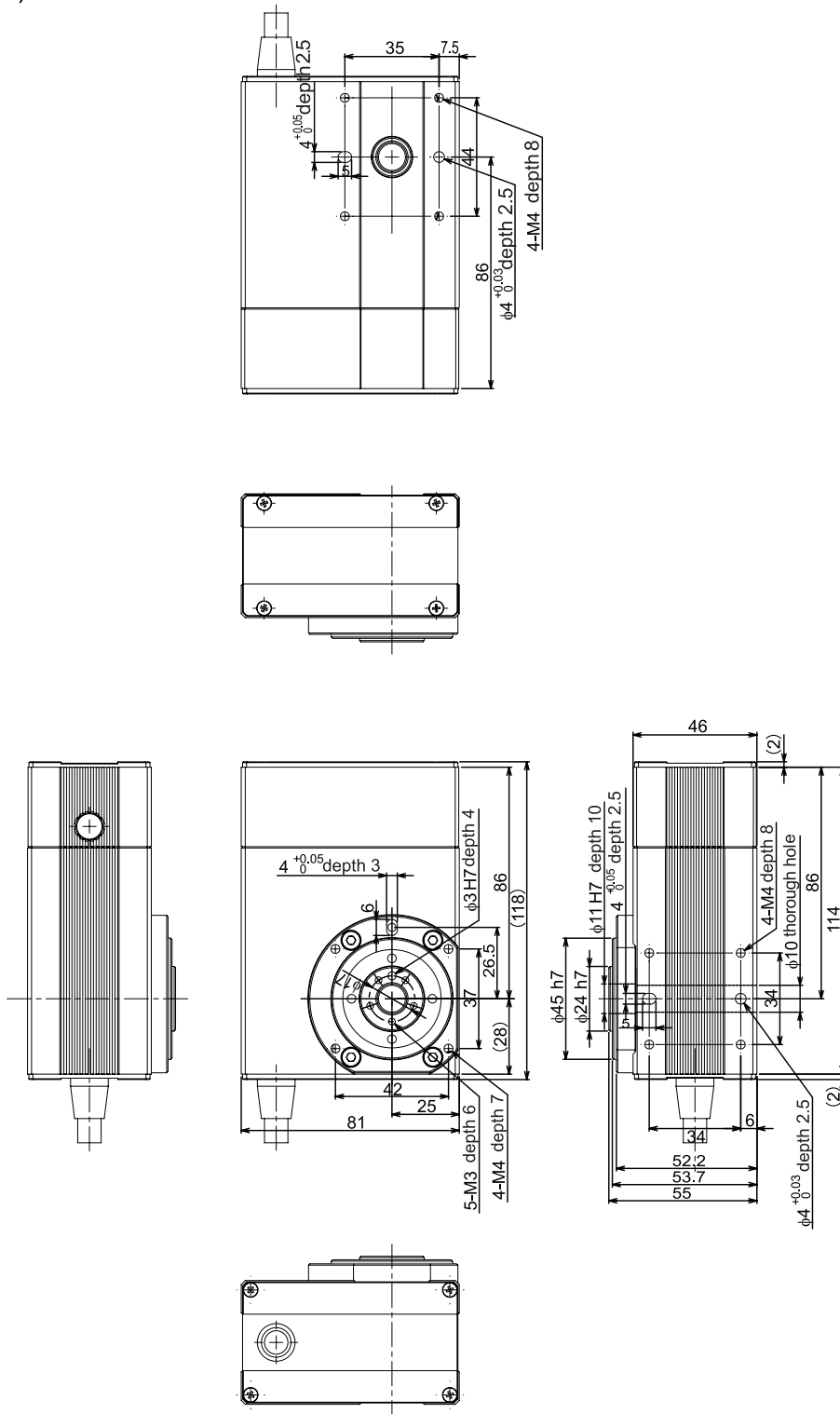
- Brake-Equipped 330deg-Rotation Specification RTB, Multi-Rotation Specification RTBL (Vertical Type)



Mass [kg]	1.2
-----------	-----

- Brake-Equipped 330deg-Rotation Specification RTC, Multi-Rotation Specification RTCL (Flat Type)

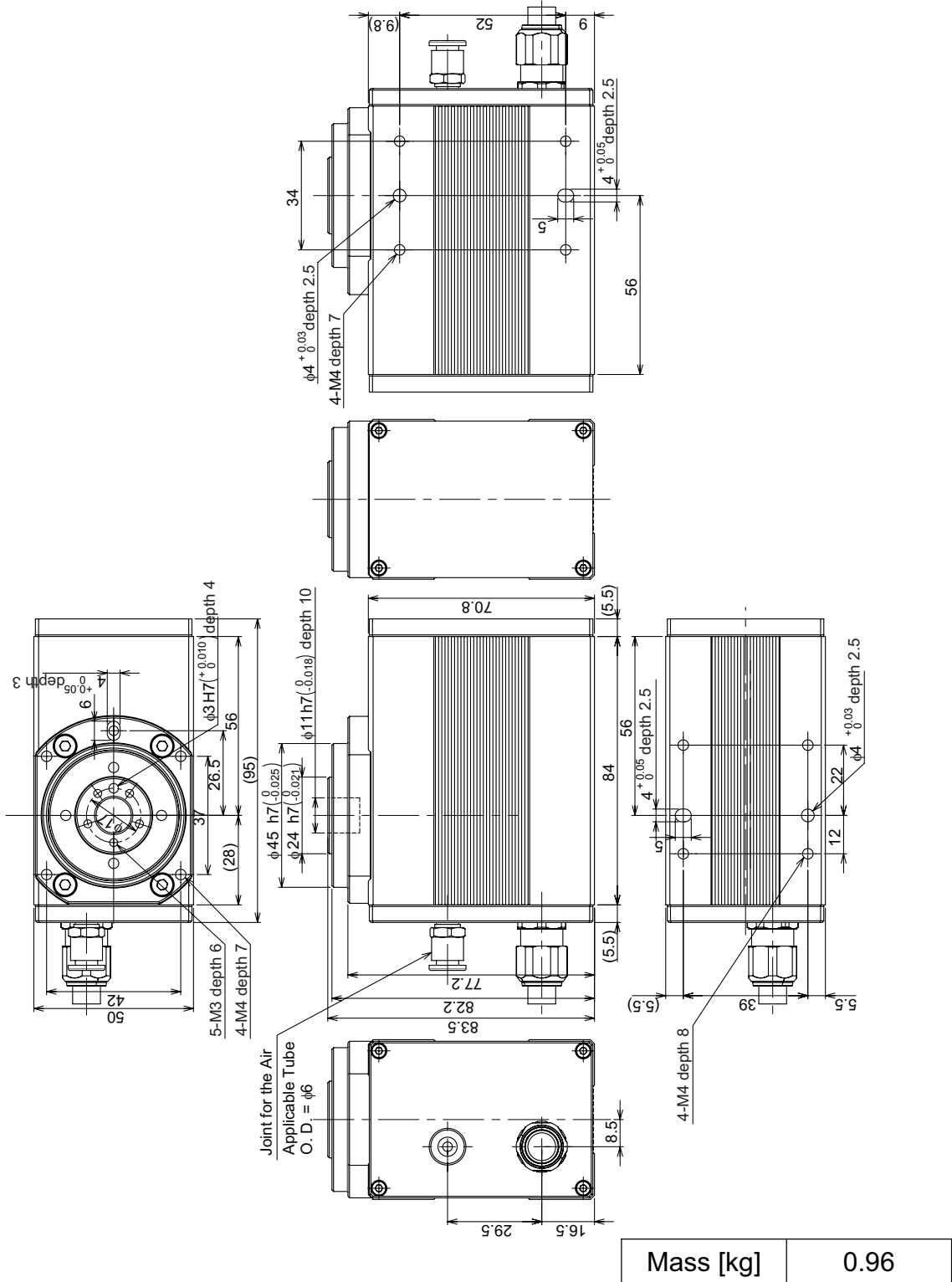
5. External Dimensions



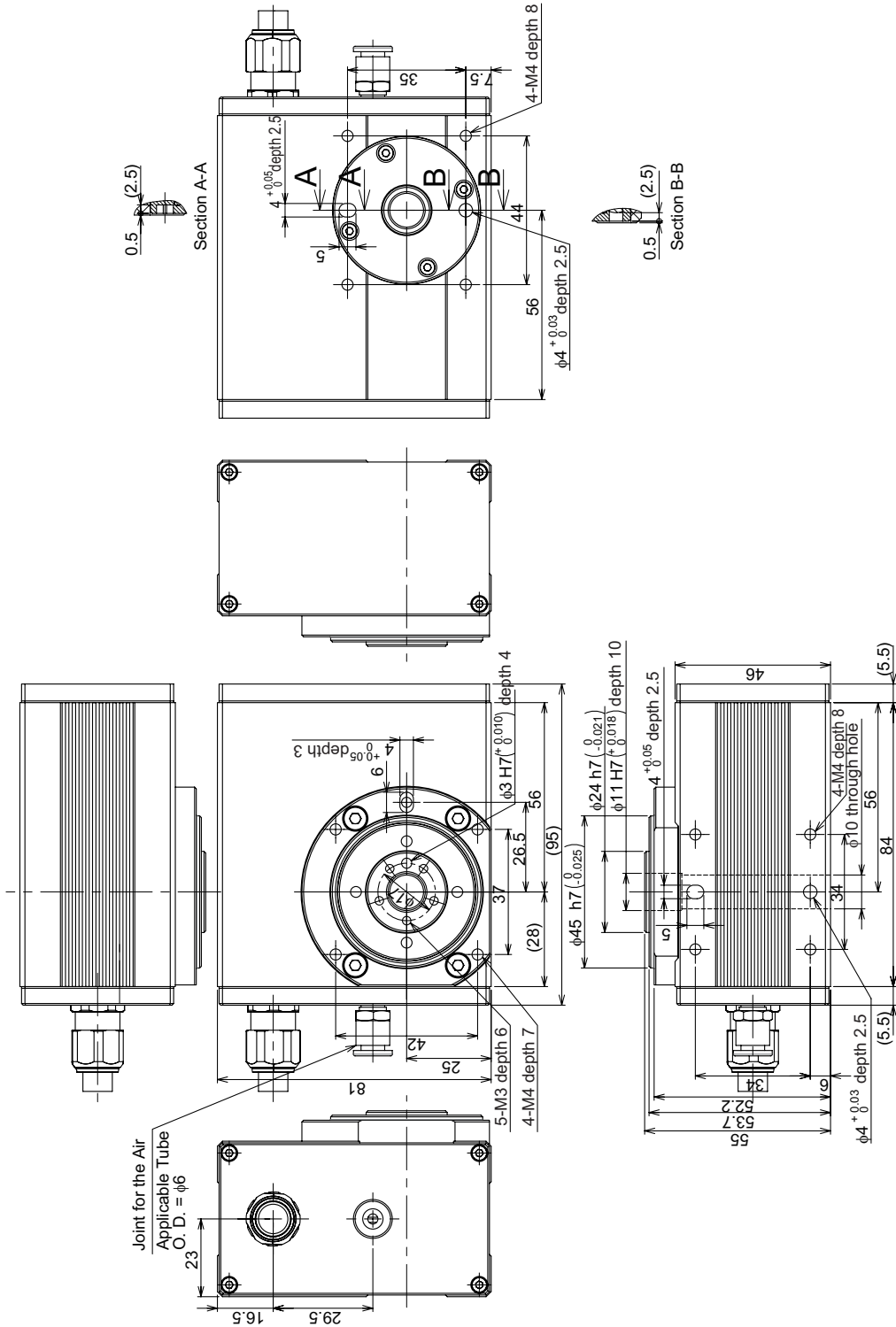
Mass [kg]	1.3
-----------	-----

5.2.2 Dustproof/Splash Proof • Cleanroom Specification

- 330-degree Rotation Specification RTB, Multi-Rotation Specification RTBL (Vertical Type)

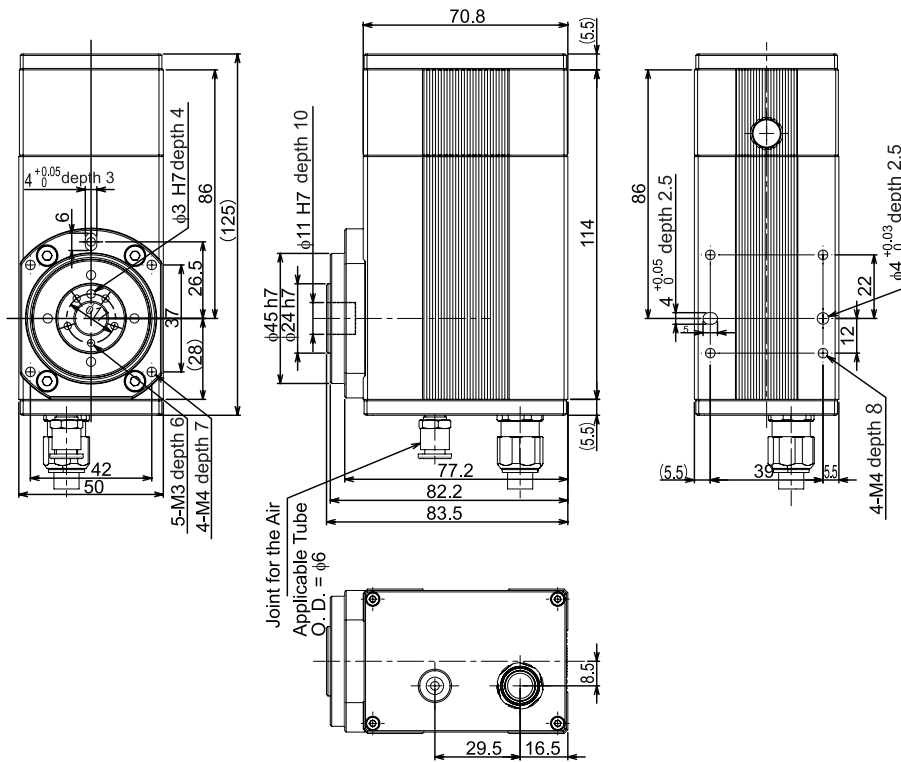
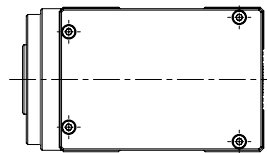
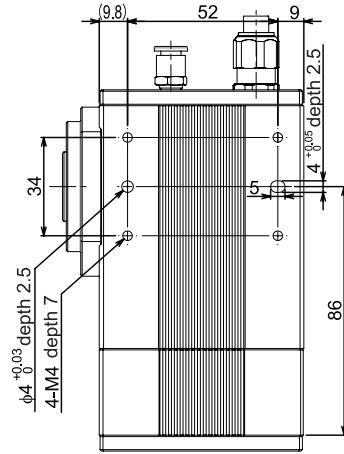


- 330-degree Rotation Specification RTC, Multi-Rotation Specification RTCL (Flat Type)



Mass [kg]	1.04
-----------	------

- Brake-Equipped 330deg-Rotation Specification RTB, Multi-Rotation Specification RTBL (Vertical Type)

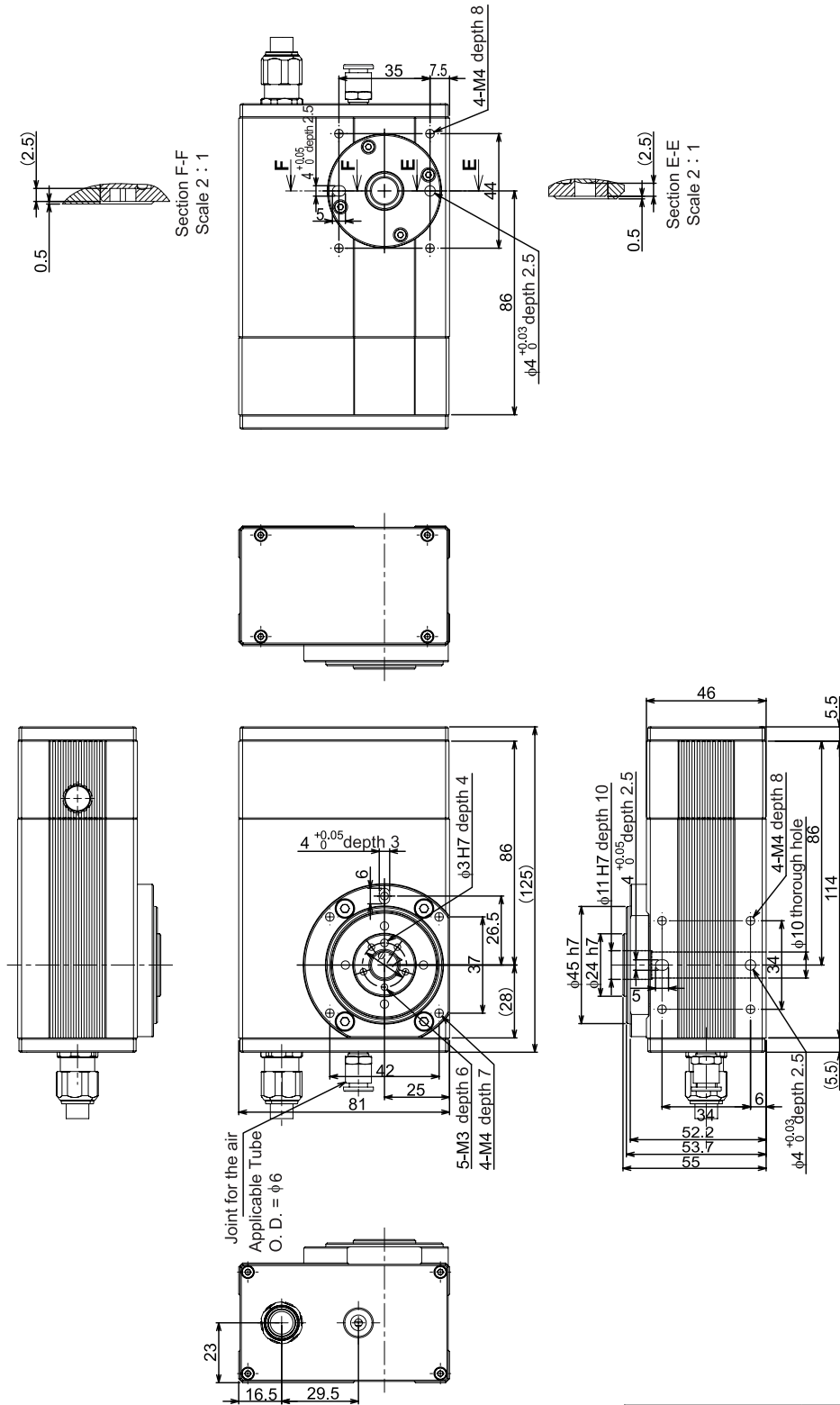


Joint for the Air
Applicable Tube
O. D. = $\phi 6$

Mass [kg]	1.2
-----------	-----

- Brake-Equipped 330deg-Rotation Specification RTC, Multi-Rotation Specification RTCL (Flat Type)

5. External Dimensions

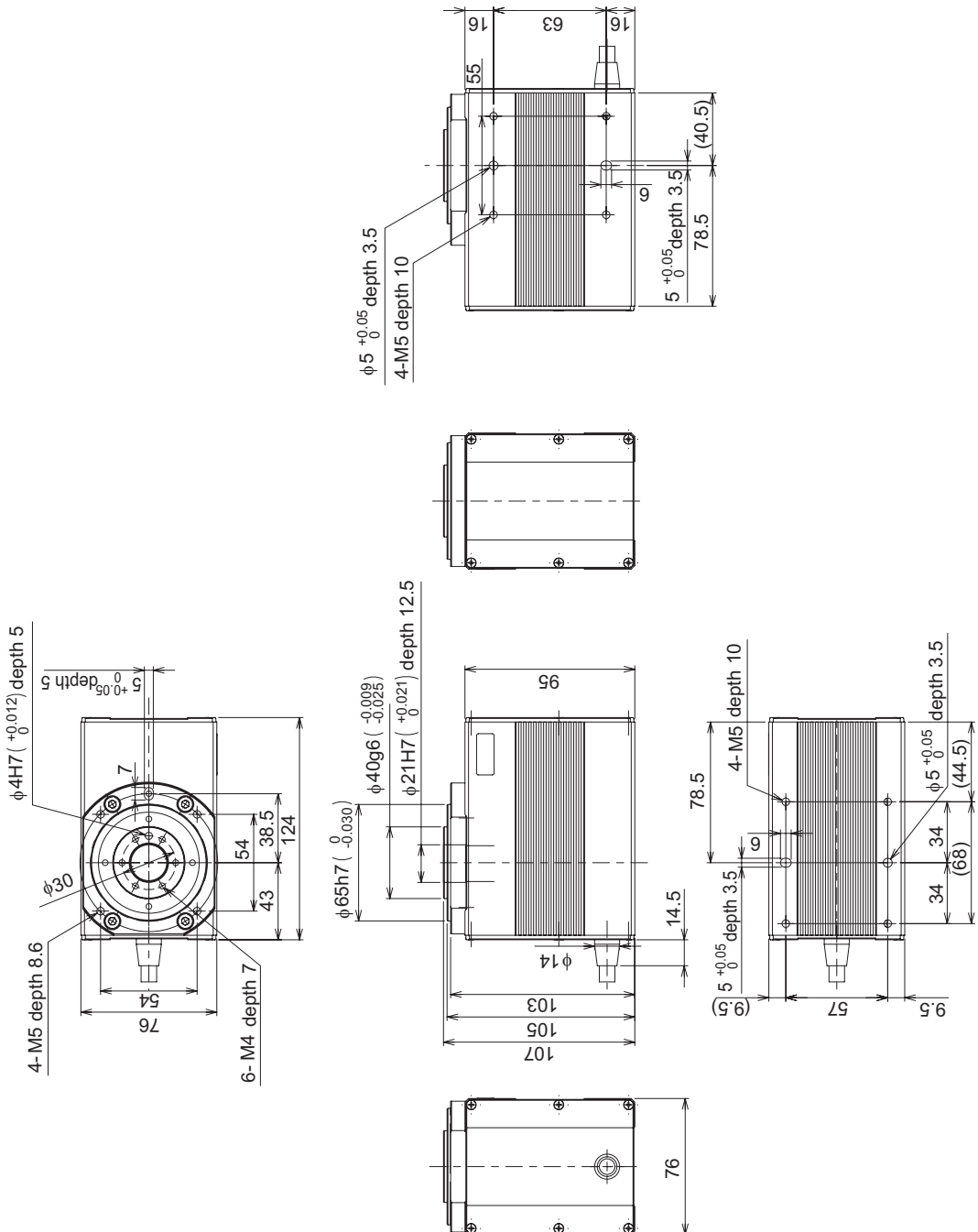


Mass [kg]	1.3
-----------	-----

5.3 Large Type

5.3.1 Standard Specification

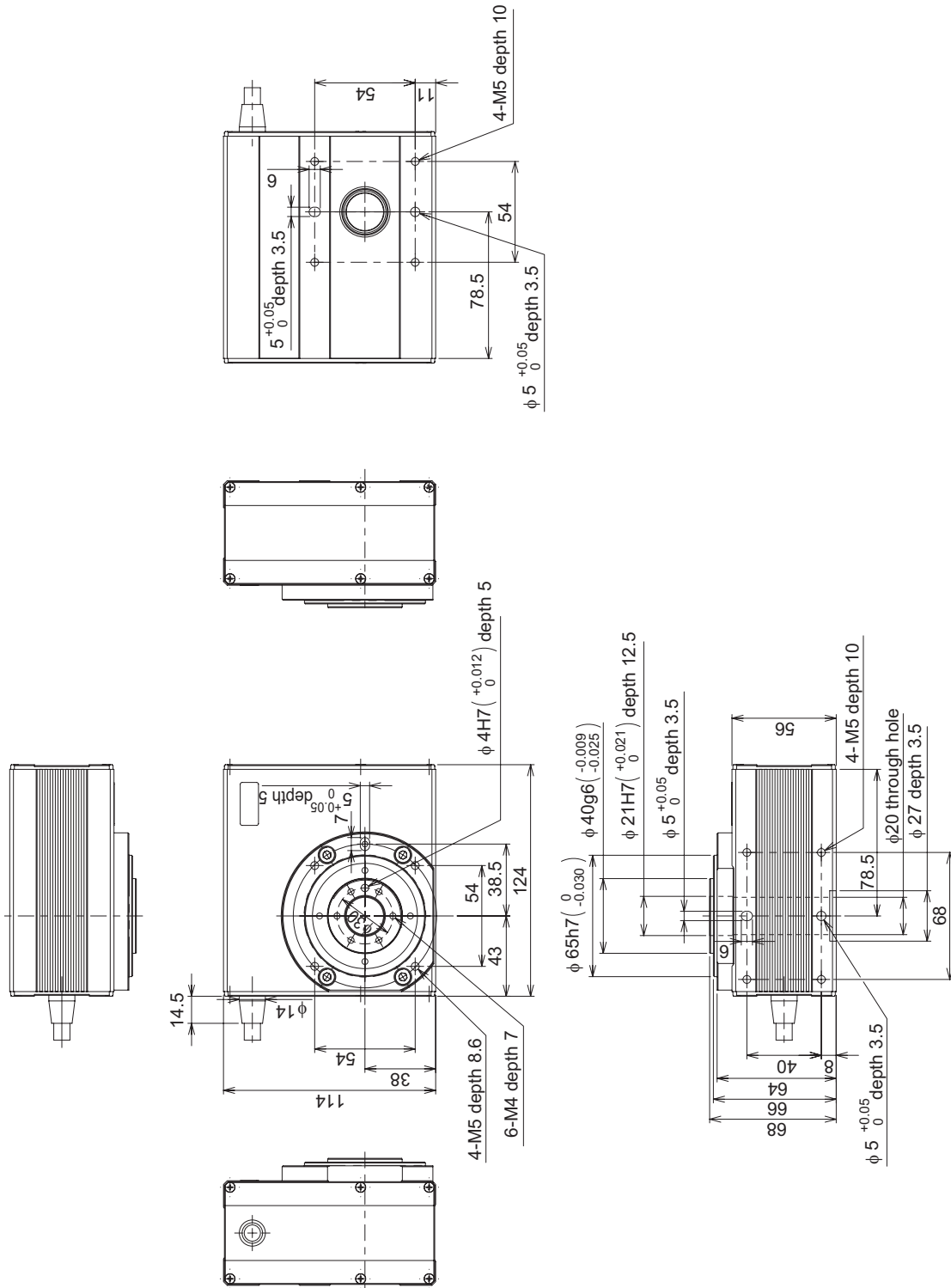
- 330-degree Rotation Specification RTBB, Multi-Rotation Specification RTBBL (Vertical Type)



Mass [kg]	2.3
-----------	-----

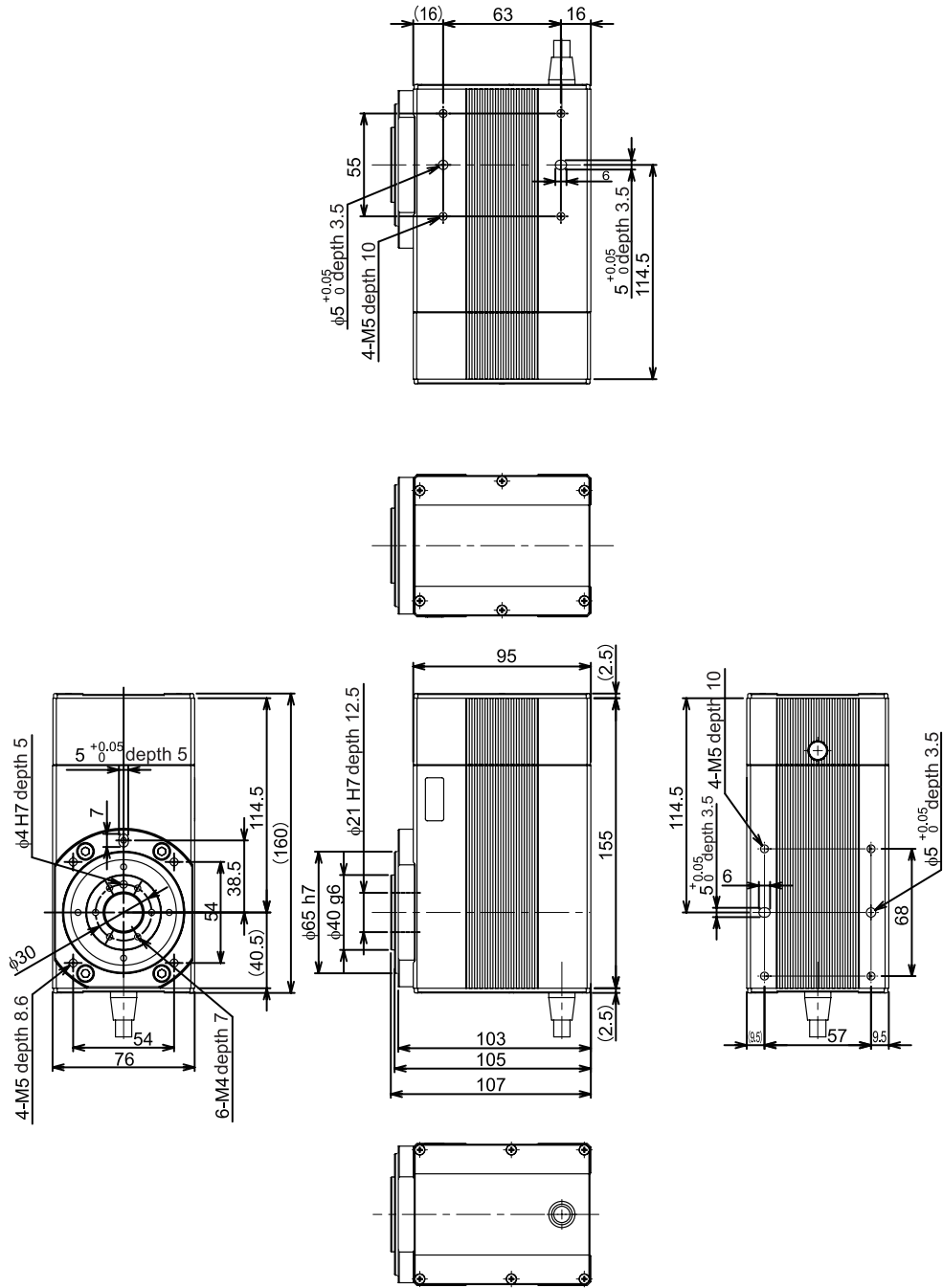
- 330-degree Rotation Specification RTCB, Multi-Rotation Specification RTCBL (Flat Type)

5. External Dimensions



Mass [kg]	2.2
-----------	-----

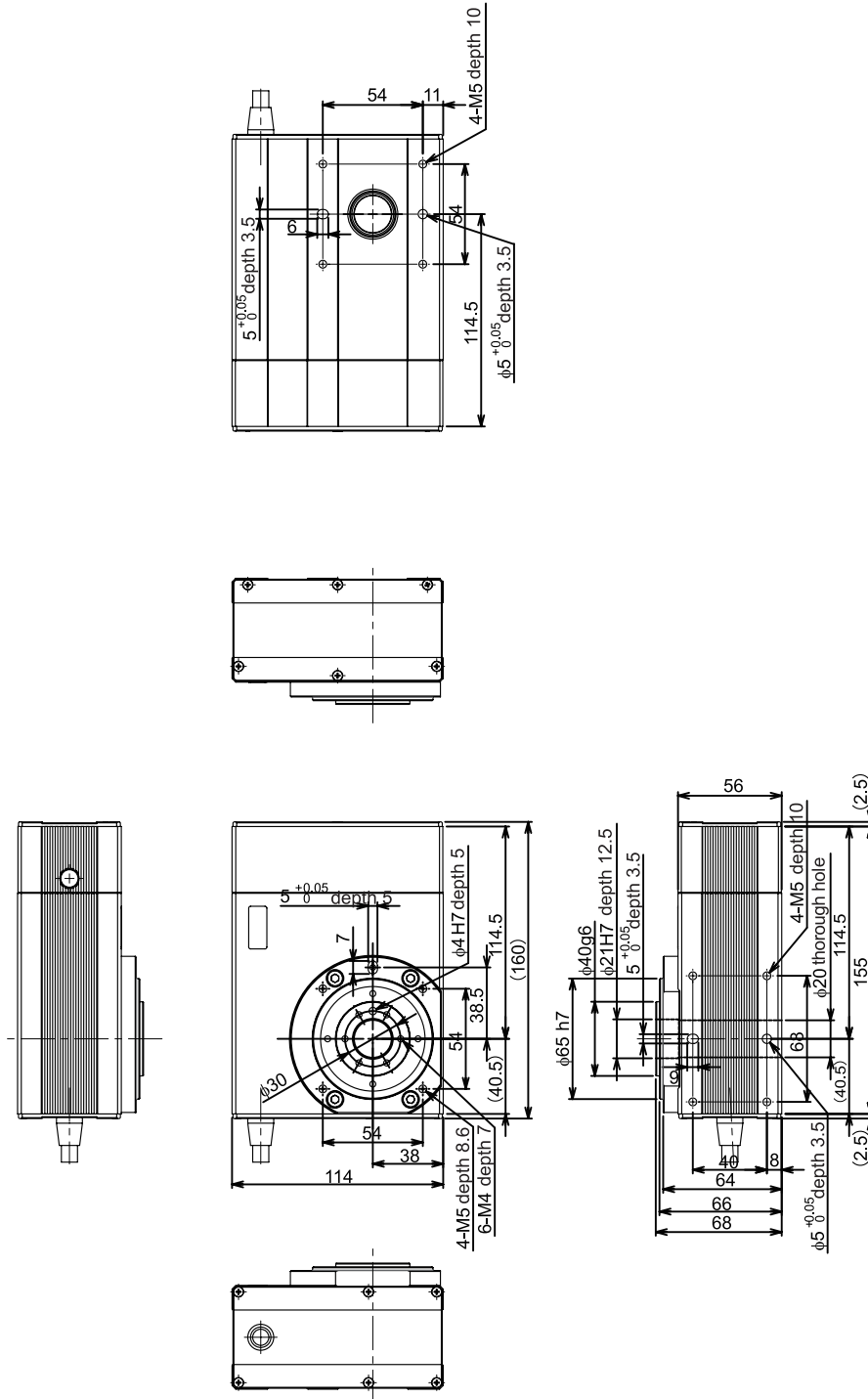
- Brake-Equipped 330deg-Rotation Specification RTBB, Multi-Rotation Specification RTBBL (Vertical Type)



Mass [kg]	3.0
-----------	-----

- Brake-Equipped 330deg-Rotation Specification RTCB, Multi-Rotation Specification RTCBL (Flat Type)

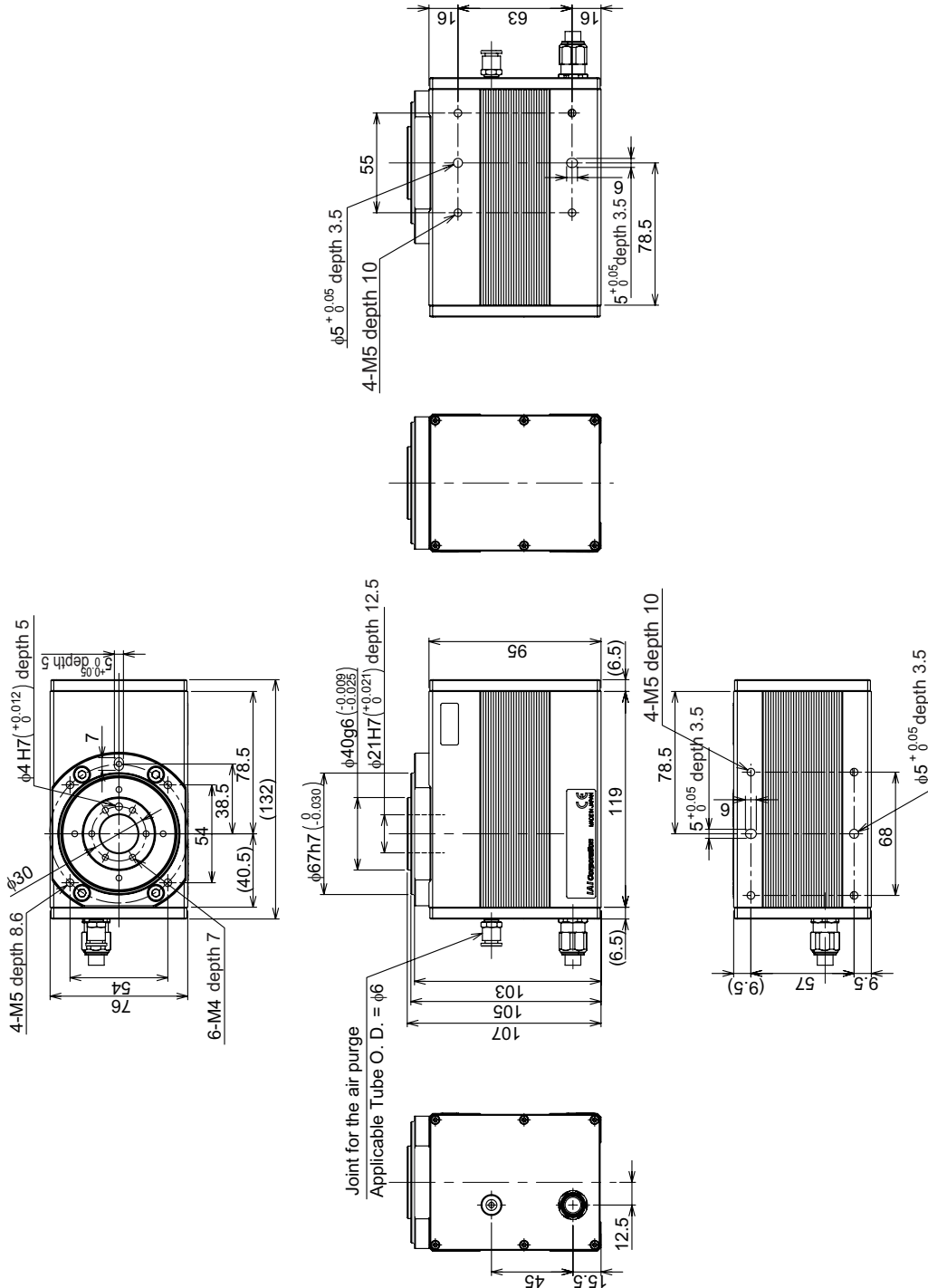
5. External Dimensions



Mass [kg]	2.9
-----------	-----

5.3.2 Dustproof/Splash Proof • Cleanroom Specification

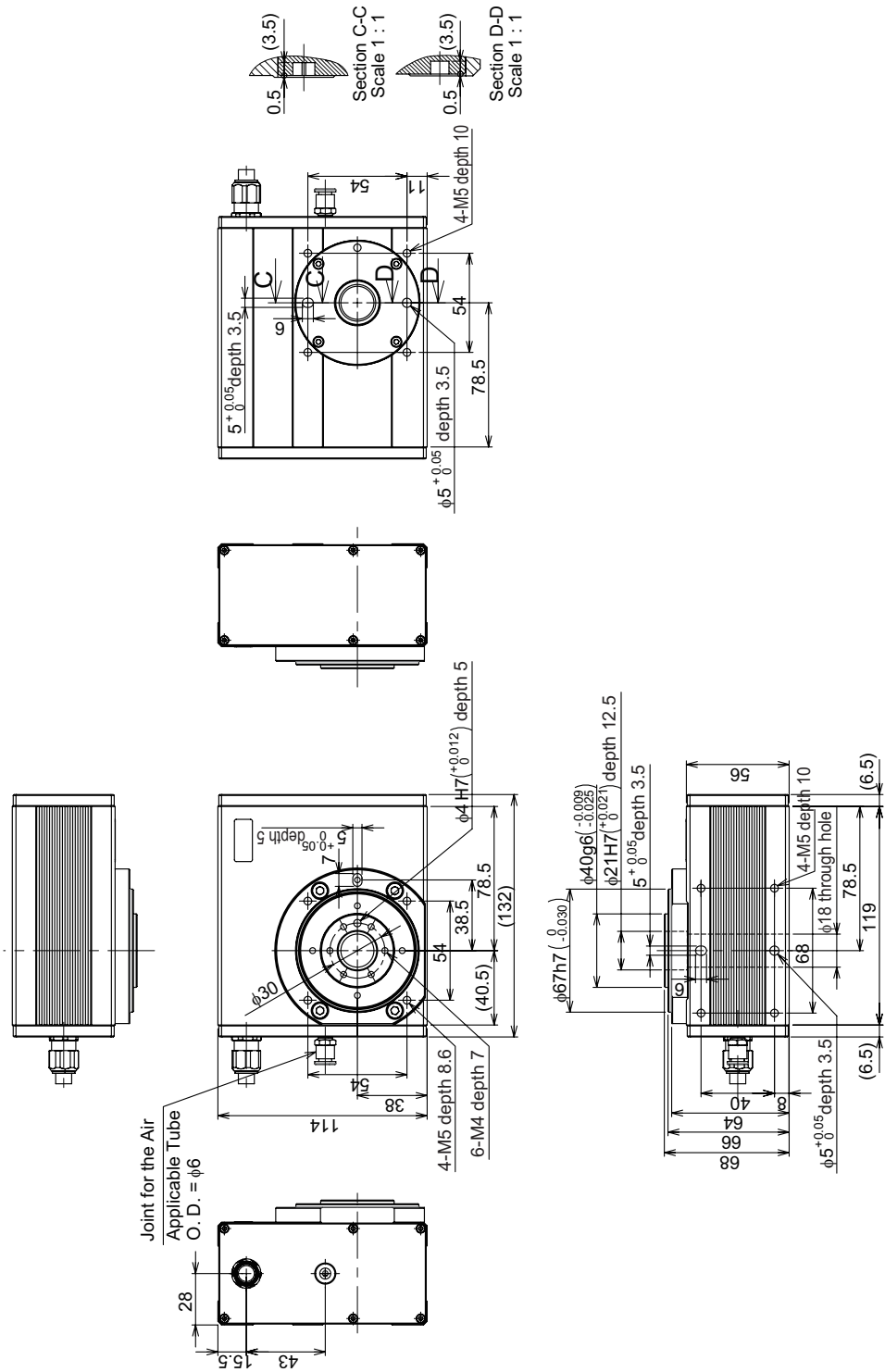
- 330-degree Rotation Specification RTBB, Multi-Rotation Specification RTBBL (Vertical Type)



Mass [kg]	2.5
-----------	-----

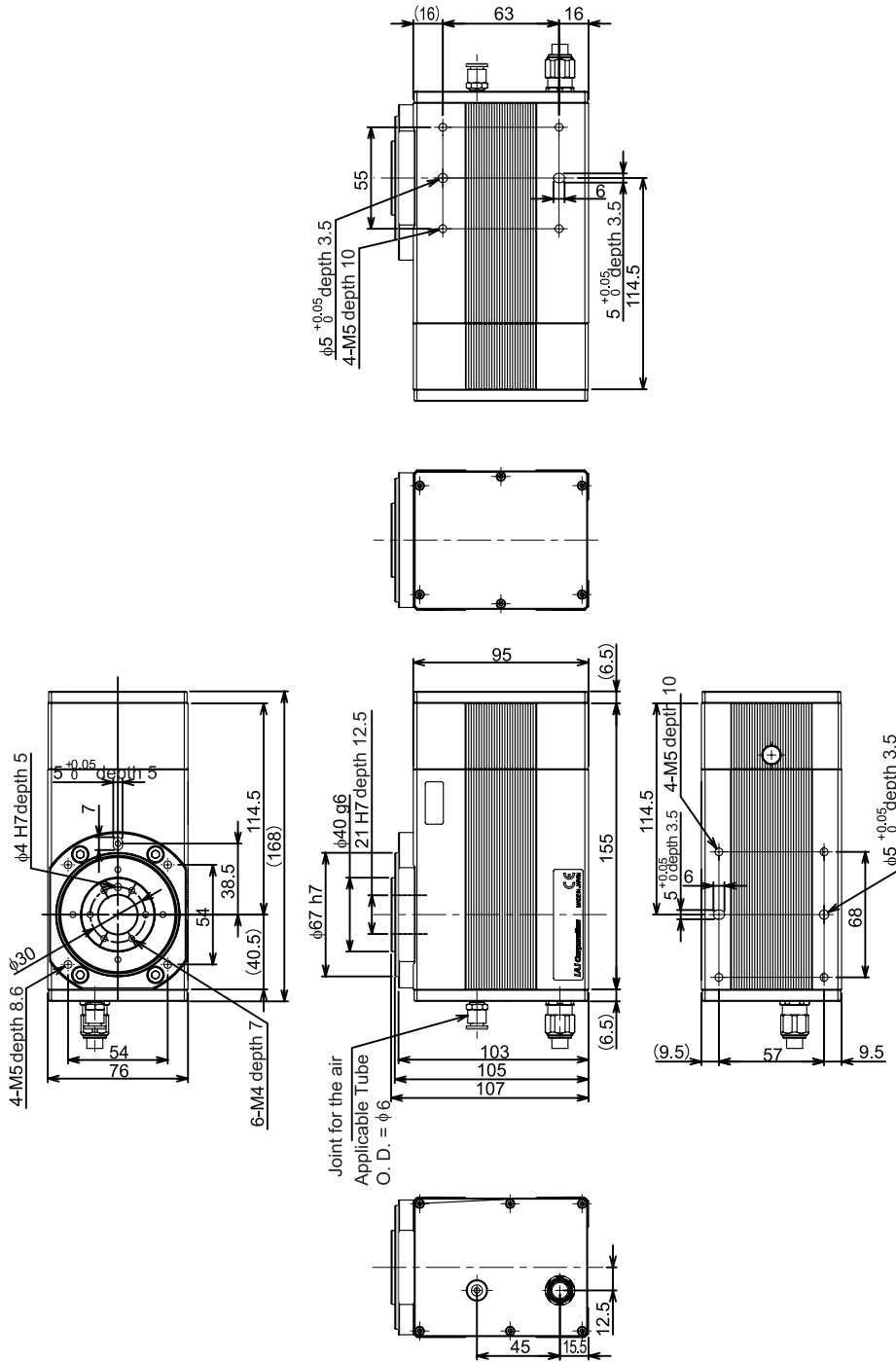
- 330-degree Rotation Specification RTCB, Multi-Rotation Specification RTCBL (Flat Type)

5. External Dimensions



Mass [kg]	2.4
-----------	-----

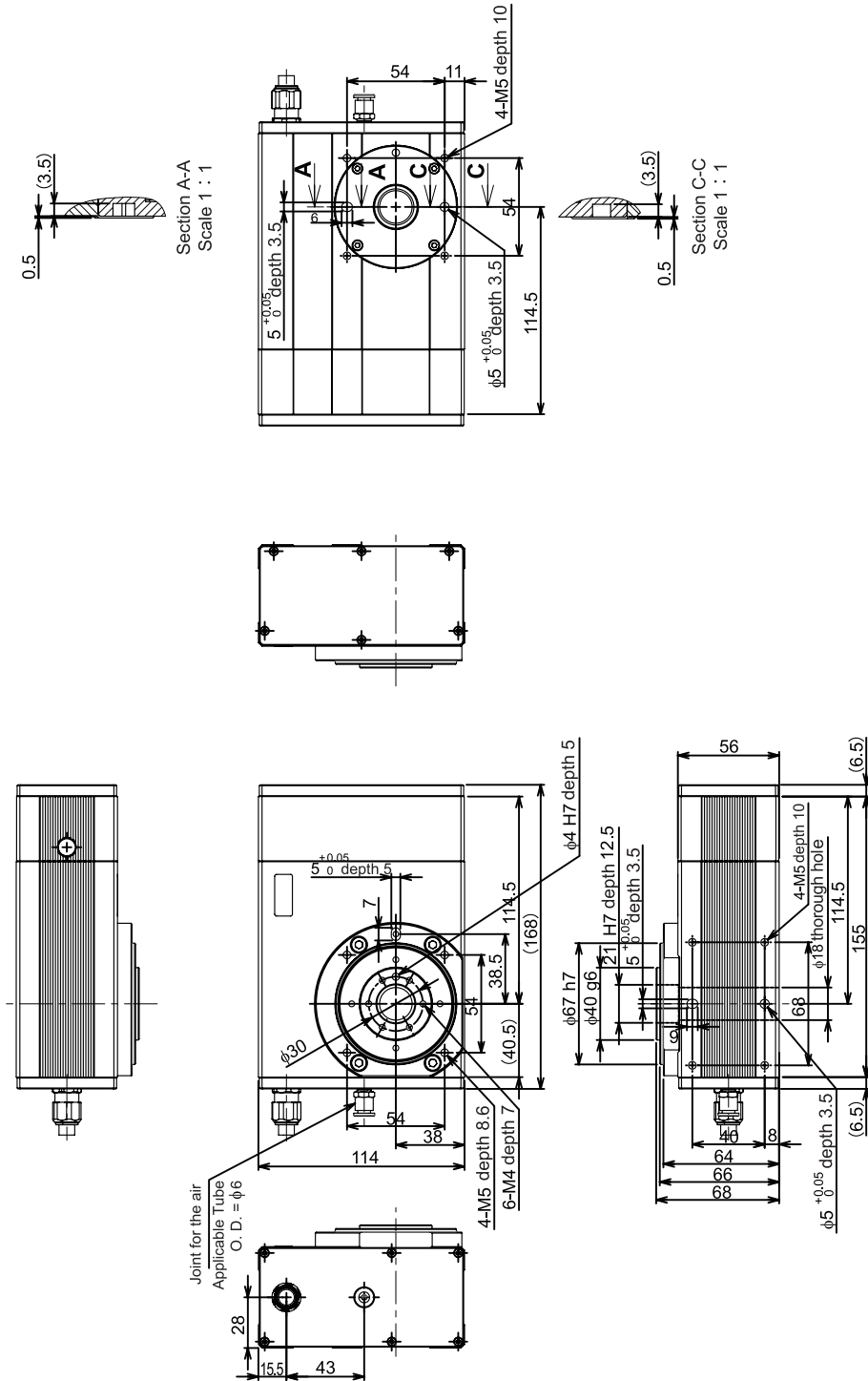
- Brake-Equipped 330deg-Rotation Specification RTBB, Multi-Rotation Specification RTBBL (Vertical Type)



Mass [kg]	3.0
-----------	-----

- Brake-Equipped 330deg-Rotation Specification RTCB, Multi-Rotation Specification RTCBL (Flat Type)

5. External Dimensions



Mass [kg]	2.9
-----------	-----

6. Life

The product life is set to 10,000,000 times (reference) of 360deg turns in the condition of maximum output torque, maximum acceleration and maximum deceleration.

7. Warranty

7.1 Warranty Period

One of the following periods, whichever is shorter:

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

7.2 Scope of the Warranty

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

- (1) The breakdown or 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 instruction 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.

7.3 Honoring the Warranty

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

7.4 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.

7.5 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 instruction manual.

7.6 Other Items Excluded from Warranty

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

- [1] Guidance for 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

Change History

Revision Date	Description of Revision
April 2011	Seventh edition A page for CE Marking added
March 2012	Eighth edition <ul style="list-style-type: none"> • 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 51 to 54 Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care. • P 60 to 65 Weight added to appearance drawing
March 2013	Ninth edition <ul style="list-style-type: none"> • P 51 to 53 Change in explanation of figure [Add grease.] → [Add grease to the gear.]
August 2013	9B edition <ul style="list-style-type: none"> • P 8 Sentence “3. Back and forth operation in a short distance may cause wear of grease.” deleted from Caution in Handling
May 2014	Tenth edition <ul style="list-style-type: none"> • P 20 Note of available and not available added to orientation of the installation. • P 38 Home return range (reference) in home-return operation added.
June 2014	10B edition <ul style="list-style-type: none"> • P 34 Note corrected. deg/sec → deg/s
October 2014	Eleventh edition Dustproof/Splash Proof • Cleanroom Specification added.
December 2014	Twelfth edition Note for caution in handling and diagram for cables added for Dust and Splash-Proof Type
March 2015	Thirteenth edition <ul style="list-style-type: none"> • Brake-equipped Type added. • P 24 Note corrected for air vacuum amount and air purge flow amount in RTBB/RTBBL/RTCBL
April 2015	Fourteenth edition P 12, 13, 31, 33, 35 “MSEL” is added as a applicable controller P 69, 70, 73, 74 Dimension correction



IAI Corporation

Head Office: 577-1 Obane Shimi-KU Shi-uoka City Shi-uoka 424-0103, Japan
TEL +81-54-364-5105 FAX +81-54-364-2589
website: www.iai-robot.co.jp/

Technical Support available in USA, Europe and China

IAI America, Inc.

Head Office: 2690 W. 237th Street, Torrance, CA 90505
TEL (310) 891-6015 FAX (310) 891-0815
Chicago Office: 110 East State Parkway, Schaumburg, IL 60173
TEL(847) 908-1400 FAX (847) 908-1399
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066
TEL (678) 354-9470 FAX (678) 354-9471
website: www.intelligentactuator.com

IAI Industrieroboter GmbH

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany
TEL 06196-88950 FAX 06196-889524

IAI (Shanghai) Co., Ltd.

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China
TEL 021-6448-4753 FAX 021-6448-3992
website: www.iai-robot.com

IAI Robot (Thailand) Co., Ltd.

825, Phairo-Ki Tower 12th Floor, Bangna-Trad RD., Bangna, Bangkok 10260, Thailand
TEL +66-2-361-4458 FAX +66-2-361-4456