

# **ZR Unit**

〔 Small Type : ZR-S  
Medium Type : ZR-M 〕

## **Operating Manual**

══════ Third Edition ══════



***IAI America, Inc.***



## **Please Read Before Use**

Thank you for purchasing our product.

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

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

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

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

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

### **[Important]**

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

## Safety Guide

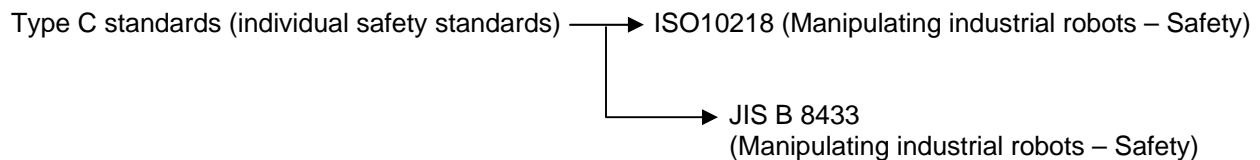
When designing and manufacturing a robot system, ensure safety by following the safety Guides provided below and taking the necessary measures.

### Regulations and Standards Governing Industrial Robots

Safety measures on mechanical devices are generally classified into four categories under the International Industrial Standard ISO/DIS 12100, "Safety of machinery," as follows:

- |                 |  |
|-----------------|--|
| Safety measures | <ul style="list-style-type: none"> <li>— Inherent safety design</li> <li>— Protective guards --- Safety fence, etc.</li> <li>— Additional safety measures --- Emergency stop device, etc.</li> <li>— Information on use --- Danger sign, warnings, operation manual</li> </ul> |
|-----------------|--|

Based on this classification, various standards are established in a hierarchical manner under the International Standards ISO/IEC. The safety standards that apply to industrial robots are as follows:



Also, Japanese laws regulate the safety of industrial robots, as follows:

#### Industrial Safety and Health Law Article 59

Workers engaged in dangerous or harmful operations must receive special education.

#### Ordinance on Industrial Safety and Health

Article 36 --- Operations requiring special education

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>— No. 31 (Teaching, etc.) ---</li> <li>— No. 32 (Inspection, etc.) ---</li> </ul> | <ul style="list-style-type: none"> <li>Teaching and other similar work involving industrial robots (exceptions apply)</li> <li>Inspection, repair, adjustment and similar work involving industrial robots (exceptions apply)</li> </ul> |
|--|--|

Article 150 --- Measures to be taken by the user of an industrial robot

## Requirements for Industrial Robots under Ordinance on Industrial Safety and Health

Work area	Work condition	Cutoff of drive source	Measure	Article
Outside movement range	During automatic operation	Not cut off	Signs for starting operation	Article 104
			Installation of railings, enclosures, etc.	Article 150-4
Inside movement range	During teaching, etc.	Cut off (including stopping of operation)	Sign, etc., indicating that work is in progress	Article 150-3
		Not cut off	Preparation of work rules	Article 150-3
			Measures to enable immediate stopping of operation	Article 150-3
			Sign, etc., indicating that work is in progress	Article 150-3
			Provision of special education	Article 36-31
			Checkup, etc., before commencement of work	Article 151
	During inspection, etc.	Cut off	To be performed after stopping the operation	Article 150-5
			Sign, etc., indicating that work is in progress	Article 150-5
		Not cut off (when inspection, etc., must be performed during operation)	Preparation of work rules	Article 150-5
			Measures to enable immediate stopping of operation	Article 150-5
			Sign, etc., indicating that work is in progress	Article 150-5
			Provision of special education (excluding cleaning and lubrication)	Article 36-32

## Applicable Models of IAI's Industrial Robots

Machines meeting the following conditions are not classified as industrial robots according to Notice of Ministry of Labor No. 51 and Notice of Ministry of Labor/Labor Standards Office Director (Ki-Hatsu No. 340):

- (1) Single-axis robot with a motor wattage of 80 W or less
- (2) Combined multi-axis robot whose X, Y and Z-axes are 300 mm or shorter and whose rotating part, if any, has the maximum movement range of within 300 mm<sup>3</sup> including the tip of the rotating part
- (3) Multi-joint robot whose movable radius and Z-axis are within 300 mm

Among the products featured in our catalogs, the following models are classified as industrial robots:

1. Single-axis ROBO Cylinders  
RCS2/RCS2CR-SS8□ whose stroke exceeds 300 mm
2. Single-axis robots  
The following models whose stroke exceeds 300 mm and whose motor capacity also exceeds 80 W:  
ISA/ISPA, ISDA/ISPDA, ISWA/ISPWA, IF, FS, NS
3. Linear servo actuators  
All models whose stroke exceeds 300 mm
4. Cartesian robots  
Any robot that uses at least one axis corresponding to one of the models specified in 1 to 3
5. IX SCARA robots  
IX-NNN (NNW, NNC) 3515 (H)  
IX-NNN (NNW, NNC) 50□□ (H) /60□□ (H) /70□□ (H) /80□□ (H)  
IX-NSN5016(H) /6016 (H)  
IX-TNN (UNN) 3015 (H)/3515 (H)  
IX-HNN (INN) 50□□ (H) /60□□ (H) /70□□ (H) /80□□ (H)

## Notes on Safety of Our Products

Common items you should note when performing each task on any IAI robot are explained below.





No.	Task	Note
1	Model selection	<ul style="list-style-type: none"> <li>● This product is not planned or designed for uses requiring high degrees of safety. Accordingly, it cannot be used to sustain or support life and must not be used in the following applications: <ul style="list-style-type: none"> <li>[1] Medical devices relating to maintenance, management, etc., of life or health</li> <li>[2] Mechanisms or mechanical devices (vehicles, railway facilities, aircraft facilities, etc.) intended to move or transport people</li> <li>[3] Important safety parts in mechanical devices (safety devices, etc.)</li> </ul> </li> <li>● Do not use this product in the following environments: <ul style="list-style-type: none"> <li>[1] Place subject to flammable gases, ignitable objects, flammables, explosives, etc.</li> <li>[2] Place that may be exposed to radiation</li> <li>[3] Place where the surrounding air temperature or relative humidity exceeds the specified range</li> <li>[4] Place subject to direct sunlight or radiated heat from large heat sources</li> <li>[5] Place subject to sudden temperature shift and condensation</li> <li>[6] Place subject to corrosive gases (sulfuric acid, hydrochloric acid, etc.)</li> <li>[7] Place subject to excessive dust, salt or iron powder</li> <li>[8] Place where the product receives direct vibration or impact</li> </ul> </li> <li>● Do not use this product outside the specified ranges. Doing so may significantly shorten the life of the product or result in product failure or facility stoppage.</li> </ul>
2	Transportation	<ul style="list-style-type: none"> <li>● When transporting the product, exercise due caution not to bump or drop the product.</li> <li>● Use appropriate means for transportation.</li> <li>● Do not step on the package.</li> <li>● Do not place on the package any heavy article that may deform the package.</li> <li>● When using a crane with a capacity of 1 ton or more, the crane must be operated by personnel qualified to operate cranes and perform slinging operations.</li> <li>● When using a crane or other equipment, never use it to hoist any article exceeding the rated load of the applicable crane, etc.</li> <li>● Use hoisting accessories suitable for the article to be hoisted. Select appropriate hoisting accessories by making sure there is an ample allowance for safety in their cutting load, etc.</li> <li>● Do not climb onto the article being hoisted.</li> <li>● Do not keep the article hoisted.</li> <li>● Do not stand under the hoisted article.</li> </ul>
3	Storage/preservation	<ul style="list-style-type: none"> <li>● The storage/preservation environment should conform to the installation environment. Among others, be careful not to cause condensation.</li> </ul>
4	Installation/startup	<ul style="list-style-type: none"> <li>(1) Installing the robot, controller, etc.</li> <li>● Be sure to firmly secure and affix the product (including its work part). If the product tips over, drops, malfunctions, etc., damage or injury may result.</li> <li>● Do not step on the product or place any article on top. The product may tip over or the article may drop, resulting in injury, product damage, loss of/drop in product performance, shorter life, etc.</li> <li>● If the product is used in any of the following places, provide sufficient shielding measures: <ul style="list-style-type: none"> <li>[1] Place subject to electrical noise</li> <li>[2] Place subject to a strong electric or magnetic field</li> <li>[3] Place where power lines or drive lines are wired nearby</li> <li>[4] Place subject to splashed water, oil or chemicals</li> </ul> </li> </ul>

No.	Task	Note
4	Installation/ startup	<p>(2) Wiring the cables</p> <ul style="list-style-type: none"> <li>● Use IAI's genuine cables to connect the actuator and controller or connect a teaching tool, etc.</li> <li>● Do not damage, forcibly bend, pull, loop round an object or pinch the cables or place heavy articles on top. Current leak or poor electrical continuity may occur, resulting in fire, electric shock or malfunction.</li> <li>● Wire the product correctly after turning off the power.</li> <li>● When wiring a DC power supply (+24 V), pay attention to the positive and negative polarities. Connecting the wires in wrong polarities may result in fire, product failure or malfunction.</li> <li>● Be sure to connect the cable connectors without fail and firmly. Failing to do so may result in fire, electric shock or product malfunction.</li> <li>● Do not cut and reconnect the cables of the product to extend or shorten the cables. Doing so may result in fire or product malfunction.</li> </ul> <p>(3) Grounding</p> <ul style="list-style-type: none"> <li>● Be sure to provide class D (former class 3) grounding for the controller. Grounding is required to prevent electric shock and electrostatic charges, improve noise resistance and suppress unnecessary electromagnetic radiation.</li> </ul> <p>(4) Safety measures</p> <ul style="list-style-type: none"> <li>● Implement safety measures (such as installing safety fences, etc.) to prevent entry into the movement range of the robot when the product is moving or can be moved. Contacting the moving robot may result in death or serious injury.</li> <li>● Be sure to provide an emergency stop circuit so that the product can be stopped immediately in case of emergency during operation.</li> <li>● Implement safety measures so that the product cannot be started only by turning on the power. If the product starts suddenly, injury or product damage may result.</li> <li>● Implement safety measures so that the product will not start upon cancellation of an emergency stop or recovery of power following a power outage. Failure to do so may result in injury, equipment damage, etc.</li> <li>● Put up a sign saying "WORK IN PROGRESS. DO NOT TURN ON POWER," etc., during installation, adjustment, etc. If the power is accidentally turned on, electric shock or injury may result.</li> <li>● Implement measures to prevent the work part, etc., from dropping due to a power outage or emergency stop.</li> <li>● Ensure safety by wearing protective gloves, protective goggles and/or safety shoes, as necessary.</li> <li>● Do not insert fingers and objects into openings in the product. Doing so may result in injury, electric shock, product damage, fire, etc.</li> <li>● When releasing the brake of a vertically installed actuator, be careful not to pinch your hand or damage the work part, etc., due to the slider dropping by its dead weight.</li> </ul>
5	Teaching	<ul style="list-style-type: none"> <li>● Whenever possible, perform teaching from outside the safety fences. If teaching must be performed inside the safety fences, prepare "work rules" and make sure the operator understands the procedures thoroughly.</li> <li>● When working inside the safety fences, the operator should carry a handy emergency stop switch so that the operation can be stopped any time when an abnormality occurs.</li> <li>● When working inside the safety fences, appoint a safety watcher in addition to the operator so that the operation can be stopped any time when an abnormality occurs. The safety watcher must also make sure the switches are not operated inadvertently by a third party.</li> <li>● Put up a sign saying "WORK IN PROGRESS" in a conspicuous location.</li> <li>● When releasing the brake of a vertically installed actuator, be careful not to pinch your hand or damage the work part, etc., due to the slider dropping by its dead weight.</li> </ul> <p>* Safety fences --- Indicate the movement range if safety fences are not provided.</p>

No.	Task	Note
6	Confirmation operation	<ul style="list-style-type: none"> <li>● After teaching or programming, carry out step-by-step confirmation operation before switching to automatic operation.</li> <li>● When carrying out confirmation operation inside the safety fences, follow the specified work procedure just like during teaching.</li> <li>● When confirming the program operation, use the safety speed. Failure to do so may result in an unexpected movement due to programming errors, etc., causing injury.</li> <li>● Do not touch the terminal blocks and various setting switches while the power is supplied. Touching these parts may result in electric shock or malfunction.</li> </ul>
7	Automatic operation	<ul style="list-style-type: none"> <li>● Before commencing automatic operation, make sure no one is inside the safety fences.</li> <li>● Before commencing automatic operation, make sure all related peripherals are ready to operate in the auto mode and no abnormalities are displayed or indicated.</li> <li>● Be sure to start automatic operation from outside the safety fences.</li> <li>● If the product generated abnormal heat, smoke, odor or noise, stop the product immediately and turn off the power switch. Failure to do so may result in fire or product damage.</li> <li>● If a power outage occurred, turn off the power switch. Otherwise, the product may move suddenly when the power is restored, resulting in injury or product damage.</li> </ul>
8	Maintenance/ inspection	<ul style="list-style-type: none"> <li>● Whenever possible, work from outside the safety fences. If work must be performed inside the safety fences, prepare "work rules" and make sure the operator understands the procedures thoroughly.</li> <li>● When working inside the safety fences, turn off the power switch, as a rule.</li> <li>● When working inside the safety fences, the operator should carry a handy emergency stop switch so that the operation can be stopped any time when an abnormality occurs.</li> <li>● When working inside the safety fences, appoint a safety watcher in addition to the operator so that the operation can be stopped any time when an abnormality occurs. The safety watcher must also make sure the switches are not operated inadvertently by a third party.</li> <li>● Put up a sign saying "WORK IN PROGRESS" in a conspicuous location.</li> <li>● Use appropriate grease for the guides and ball screws by checking the operation manual for each model.</li> <li>● Do not perform a withstand voltage test. Conducting this test may result in product damage.</li> <li>● When releasing the brake of a vertically installed actuator, be careful not to pinch your hand or damage the work part, etc., due to the slider dropping by its dead weight.</li> </ul> <p>* Safety fences --- Indicate the movement range if safety fences are not provided.</p>
9	Modification	<ul style="list-style-type: none"> <li>● The customer must not modify or disassemble/assemble the product or use maintenance parts not specified in the manual without first consulting IAI.</li> <li>● Any damage or loss resulting from the above actions will be excluded from the scope of warranty.</li> </ul>
10	Disposal	<ul style="list-style-type: none"> <li>● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste.</li> <li>● When disposing of the product, do not throw it into fire. The product may explode or generate toxic gases.</li> </ul>

## Indication of Cautionary Information

The operation manual for each model denotes safety guides under “Danger,” “Warning,” “Caution” and “Note,” as specified below.

Level	Degree of danger/loss	Symbol
Danger	Failure to observe the instruction will result in an imminent danger leading to death or serious injury.	 <b>Danger</b>
Warning	Failure to observe the instruction may result in death or serious injury.	 <b>Warning</b>
Caution	Failure to observe the instruction may result in injury or property damage.	 <b>Caution</b>
Note	The user should take heed of this information to ensure the proper use of the product, although failure to do so will not result in injury.	 <b>Note</b>

## Handling Precautions

### 1. Handling the Actuator Unit

#### 1.1 Handling the Packed Actuator

Unless otherwise specified, the actuator of single-axis configuration is packed individually and shipped. When transporting or handling the packed actuator, exercise due caution not to hit the package against other object or drop the package.

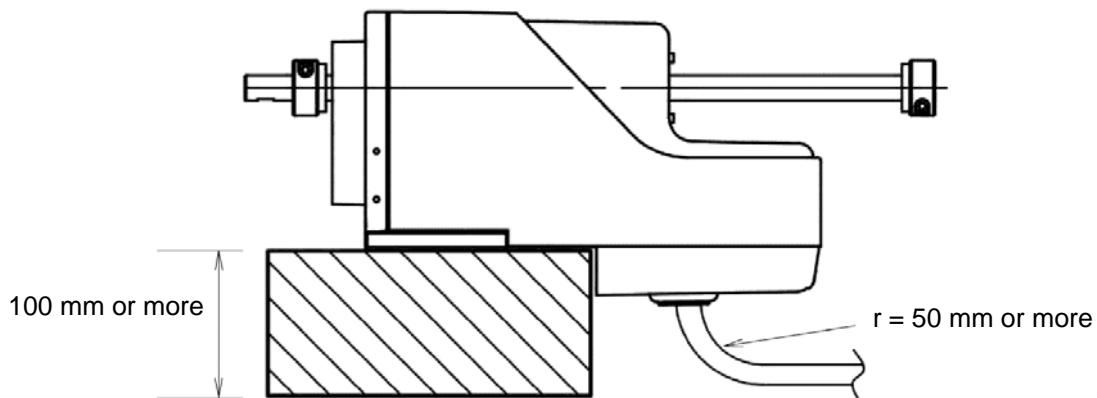
- If the packed actuator is to be let stand for a while, place it on a flat floor.
- Do not step onto the package.
- Do not place on the package any heavy article that may deform the package or have concentrated loads.

#### 1.2 Handling the Unpacked Actuator

When handling the unpacked actuator, hold it by the base at the bottom.  
(For the name of each part of the actuator, refer to 1, "Names of the Parts.")

- When transporting the actuator, be careful not to hit it against structures and objects or drop the actuator or otherwise apply any excessive impact or force on it.
- Do not transport the actuator by holding the cables or move it by pulling the cables.
- Do not transport the actuator by holding the ball screw or cover.

#### 1.3 Precautions for Tentative Set-down



When tentatively setting down the unpacked actuator, provide a pedestal, as shown below, to prevent the cables at the rear from receiving loads.

## **2. Handling the Actuator Assembly**

Pay attention to the following instructions when transporting the assembled actuator axes.

### **2.1 When Shipped Pre-assembled from IAI**

The specified machine assembly has been assembled by IAI, subjected to shipping test, and then packed inside a frame driven by nails onto a base of square timbers.

If the combined actuator unit is of slider type, the slider is secured during packaging so that it will not move accidentally during transport. In the case of a combined unit, the actuator ends are secured to prevent swinging due to external vibration.

- The package is not designed with special considerations for protection against impact due to dropping or collision. Handle the package with care. Also, do not place any heavy object on the outer frame, as it is not strong enough to withstand loads.
- When suspending the package using belts, etc., support it by the reinforced frame at the bottom of the base of square timbers. Also when lifting the package using a forklift, insert the forks below the base of square timbers.
- When unloading the package, do so without applying any impact.

### **2.2 Handling the Unpacked Actuator**

When transporting an unpacked machine that has been shipped pre-assembled from IAI, observe the following handling precautions:

- Secure each slider to prevent unexpected movement during transportation.
- If any actuator end is protruding, secure it to prevent swinging due to external vibration. If the actuator ends are not secured, do not apply any impact force exceeding 0.3 G during transportation.
- When suspending the actuator-assembled peripheral equipment using belts, etc., make sure the belts do not contact the actuators directly.
- Pass the belts over appropriate cushion materials, and make sure the loads from the belts will be received by the base of each actuator.
- Secure the end of the Y-axis using a separate belt to maintain the axis in a stable horizontal position. At this time, be careful not to apply loads on the screw cover.
- Be careful not to allow the brackets, covers and connector box of each actuator to receive loads. Also protect the cables from pinching or excessive deformation.

## **3. Handling after Assembly with Peripheral Equipment**

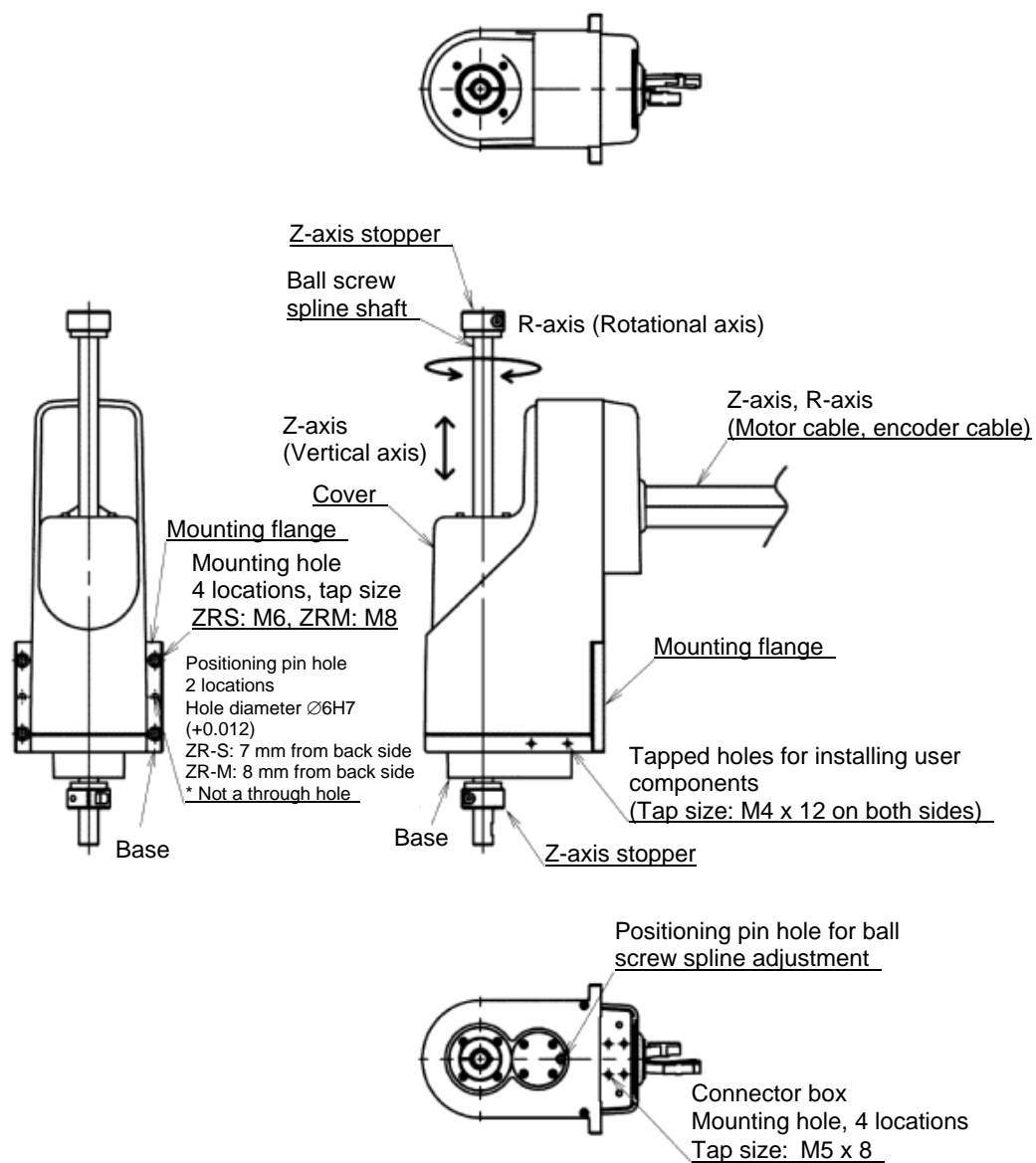
The precautions in 2, "Handling the Unpacked Actuator" also apply when the actuator has been assembled at your facility and transported in the assembled state. Handle the actuator according to the specified precautions.

## Table of Content

1.	Names of the Parts .....	1
2.	External Dimensions .....	3
2.1	ZR-S.....	3
2.2	ZR-M.....	5
3.	Accessories.....	7
4.	Options.....	9
4.1	Flanges .....	9
4.2	Absolute Reset Adjustment Jigs.....	10
5.	Cable Drawings.....	11
5.1	Types of Encoder Cables.....	11
5.2	About Incremental Type and Absolute Type .....	11
5.3	Motor cable .....	12
6.	Product Check.....	12
6.1	Operation Manuals Relating to This Product.....	12
6.2	How to Read Model Nameplate .....	13
6.3	ZR Unit model .....	13
7.	Specifications .....	14
8.	Installation Environment, Storage Environment .....	15
8.1	Installation Environment.....	15
8.2	Storage Environment .....	15
9.	Installation .....	16
9.1	Installation of the Unit.....	16
9.2	Actuator Installation Posture .....	16
9.3	Installation of Tool and Load .....	17
9.4	Installation of User Components .....	19
9.5	Mounting Holes for Connector Box .....	19
10.	Wiring.....	20
10.1	Wiring Diagram (Incremental).....	20
10.2	Wiring Diagram (Absolute).....	21
10.3	Wiring Method.....	22
10.4	Prohibited Wiring Practices.....	24
10.5	Notes on use of cable track .....	25
10.6	Wiring in the Duct .....	26
10.7	Checking after Installation and Wiring .....	26

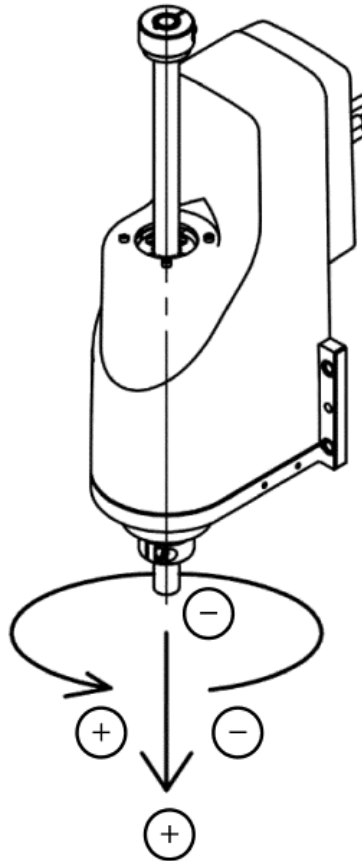
11.	Operation Adjustment .....	27
11.1	Guide for Acceleration Setting .....	27
11.2	Notes on Transferring Load .....	28
11.3	Push Force .....	28
12.	Notes on Operation .....	29
12.1	About Brake .....	29
12.2	About Home Return (Incremental Type) .....	29
12.3	Position Gain .....	30
13.	Maintenance and Inspection .....	31
13.1	Inspection Intervals and Items .....	31
13.2	Visual Inspection of Exterior .....	32
13.3	Cleaning .....	32
13.4	Inspection of Interior .....	32
13.5	Greasing .....	33
14.	Appendix .....	34
14.1	Absolute Reset Method (Absolute Type Only) .....	34
15.	Warranty.....	49
16.	Change History .....	50

## 1. Names of the Parts



\* For the detailed dimensions, refer to 2, "External Dimensions."

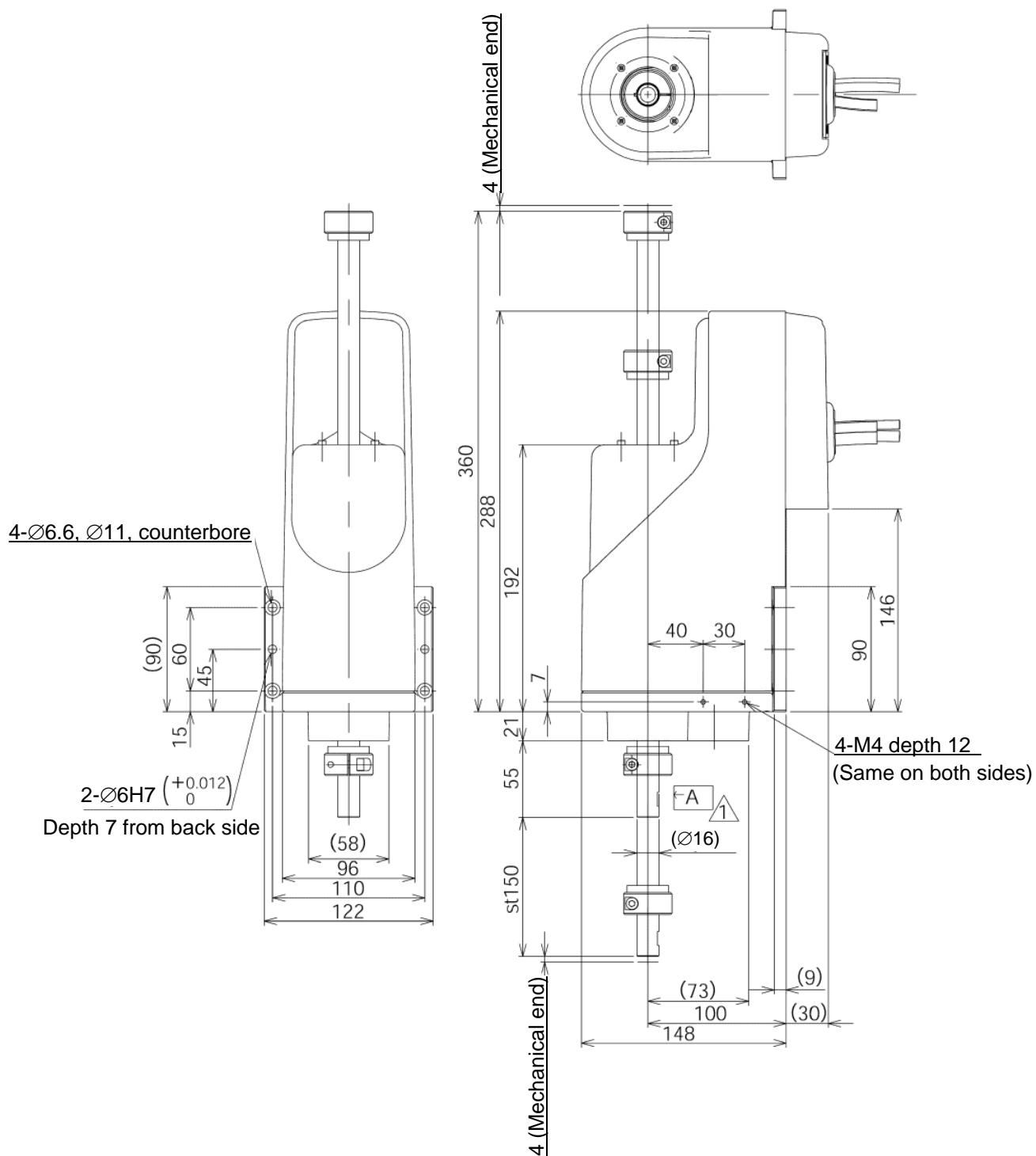
## Coordinate system

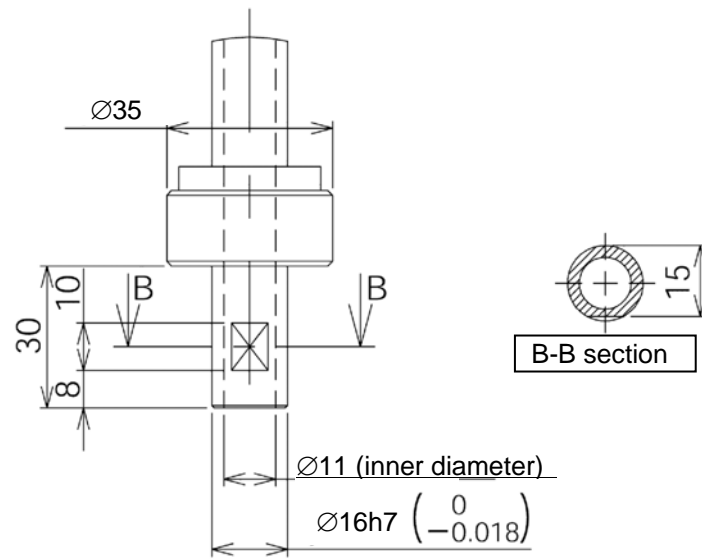


Z-axis (vertical axis): The downward direction represents the positive direction.  
R-axis (rotational axis): The clockwise direction as viewed from the bottom represents the positive direction.

## 2. External Dimensions

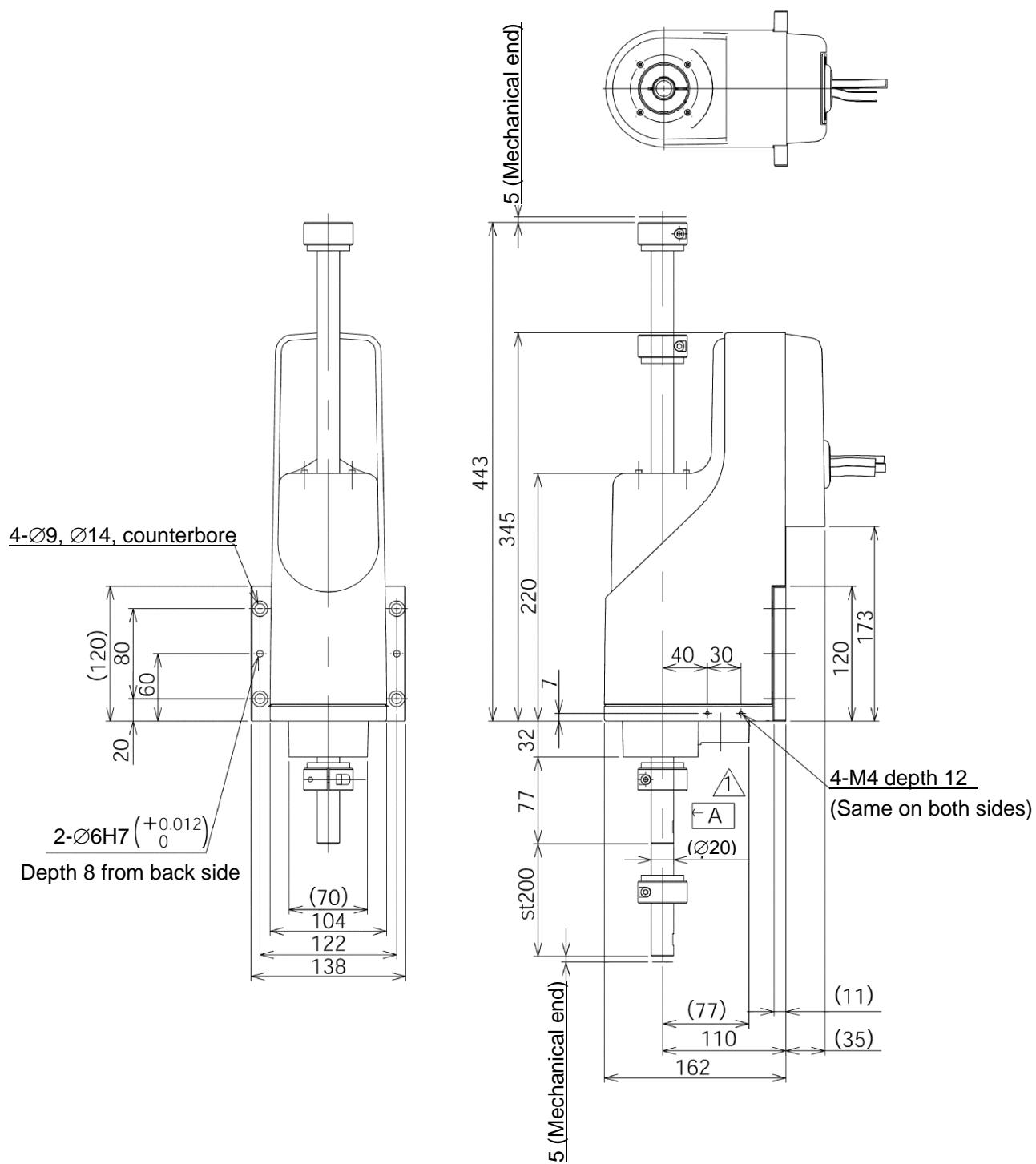
### 2.1 ZR-S

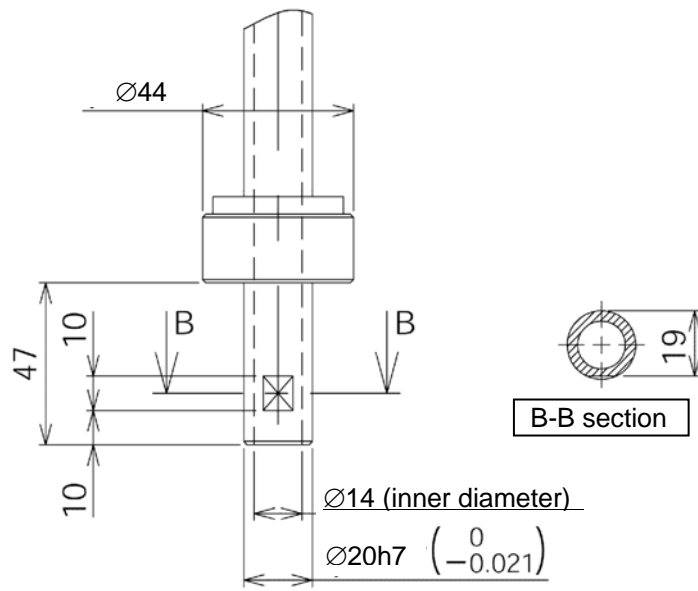




Detail View of Tip

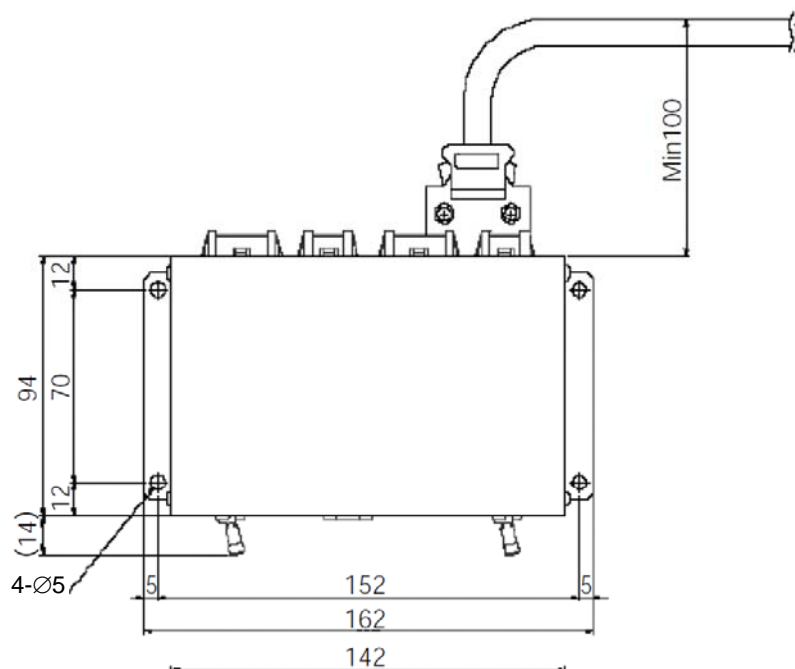
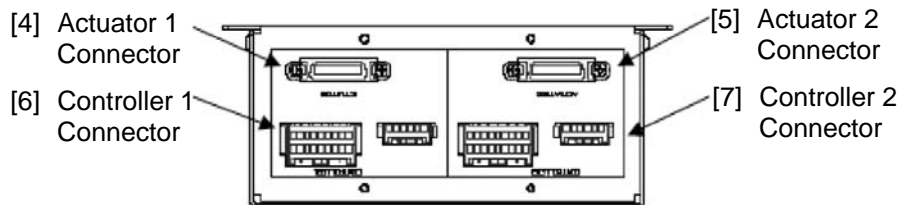
## 2.2 ZR-M



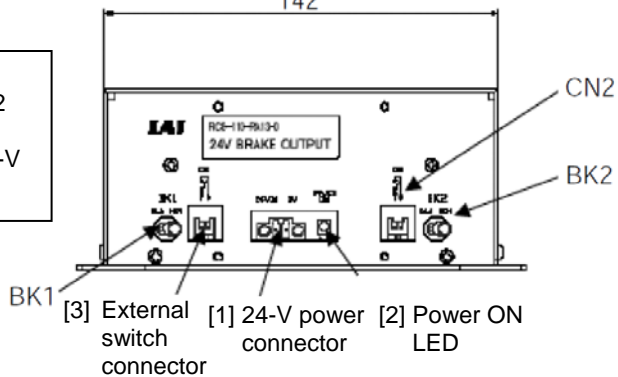


Detail View of Tip

## Brake box



**Note:**  
The BK1 and BK2 switches are not available for a 24-V brake.



[1] 24-V power connector

This connector is used to supply 24-V power to the external brake box.

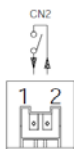
Applicable cable	AWG28~16	
Terminal	24 V	+24-V power input
	0 V	GND

[2] Power ON LED

The LED becomes lit when +24-V power is supplied to the external brake box.

[3] External switch connector

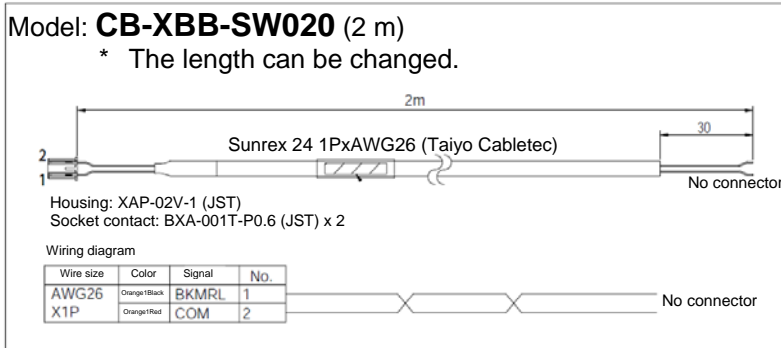
The brake can be forcibly released by connecting a switch to the external switch connector and then shorting pins 1 and 2.



Cable-end connector	XAP-02V-1 (Contact: BXA-001T-P0.6) (JST)		
Terminal	1	BKMRL	Brake release switch input
	2	COM	Power output for brake release switch input

\* An optional brake release switch cable is available for connecting the switch and external switch connector.

Brake release switch cable (optional)



[4] Actuator 1 connector [5] Actuator 2 connector

These connectors are used to connect the encoder cables on the actuator end.

[6] Controller 1 connector [7] Controller 2 connector

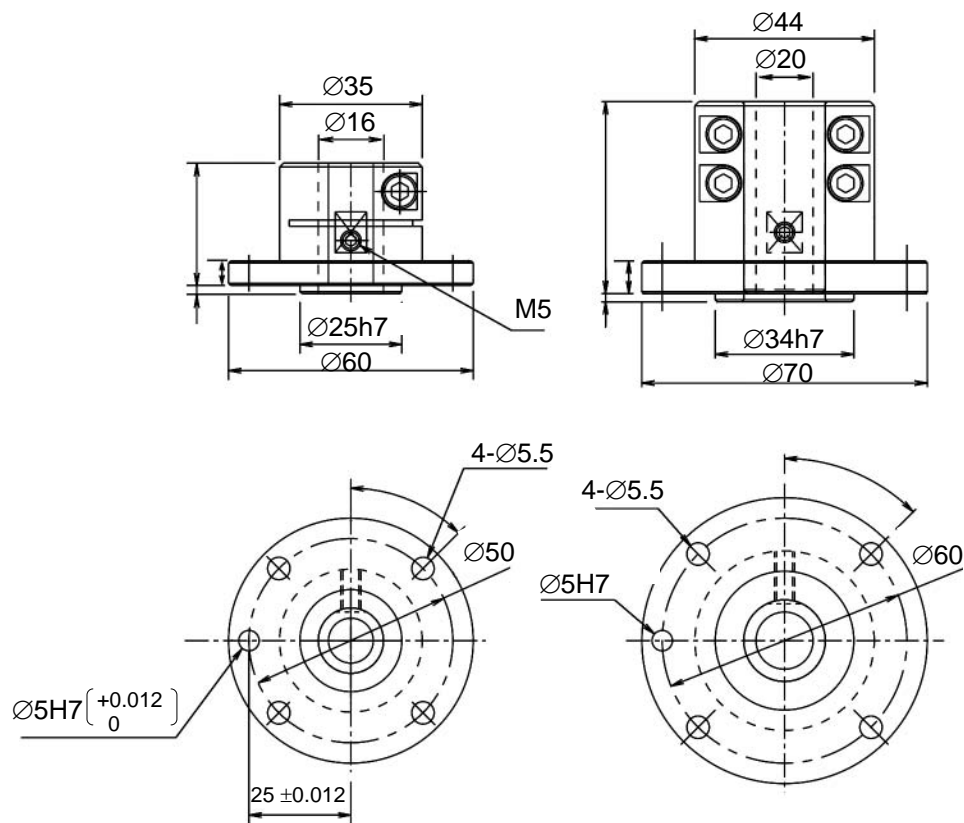
These connectors are used to connect the encoder cables on the controller end.

## 4. Options

### 4.1 Flanges

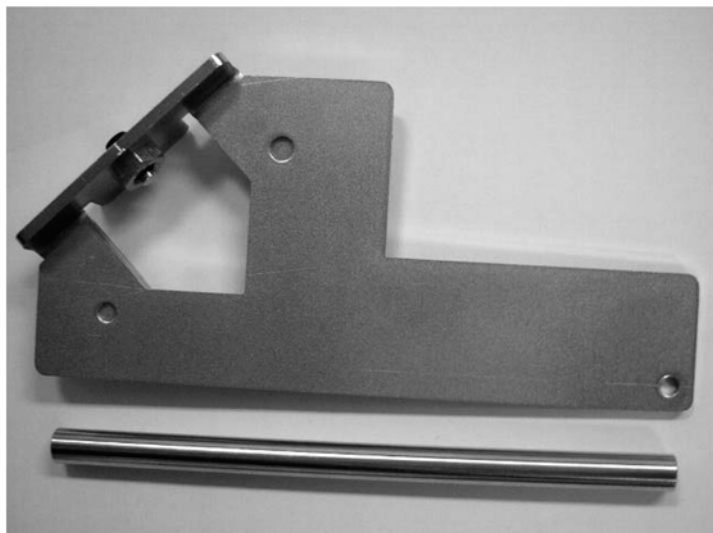
Use a flange to install a work at the tip of the Z-axis.

- ZR-S flange: IX-FL-2
- ZR-M flange: IX-FL-1



These jigs are used if an absolute reset is required due to loss of absolute encoder data.

\* For the absolute reset adjustment procedure, refer to the operation manual for the controller (XSEL-P/Q).



\* The size is different between the ZR-S and ZR-M types.

Absolute reset adjustment jig    Model: JG-ZRS (ZR-S)  
JG-ZRM (ZR-M)

## 5. Cable Drawings

### 5.1 Types of Encoder Cables

Different encoder cables are used for the absolute encoder and incremental encoder types.

- Incremental type  
Be sure to use the LS type encoder cable (CB-X1-PLA□□□) for the R-axis.
- Absolute type  
Either the normal type (CB-X1-PA□□□) or LS type (CB-X1-PLA□□□) can be used.

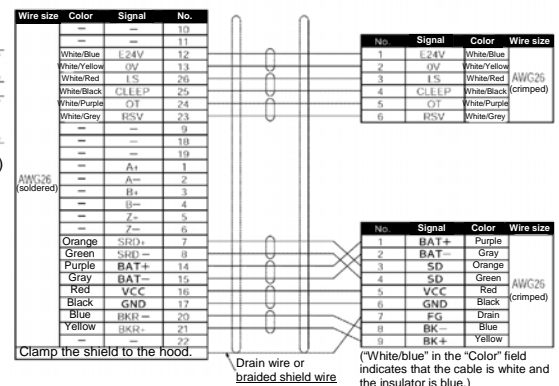
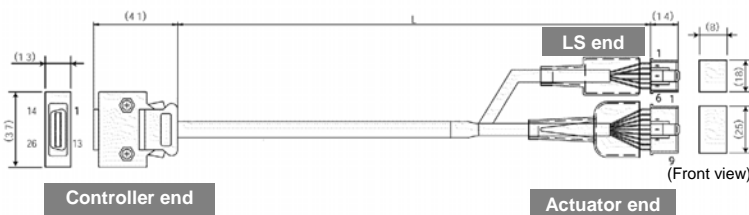
### 5.2 About Incremental Type and Absolute Type

- Incremental encoder type  
Since the position data is cleared when the power is turned off, home return is required every time the power is turned off and then on again.

Incremental cable

Model CB-X1-PLA□□□

\* Enter the applicable cable length (L) in □□□.  
A desired length up to 30 m can be specified.  
Example) 080 = 8 m

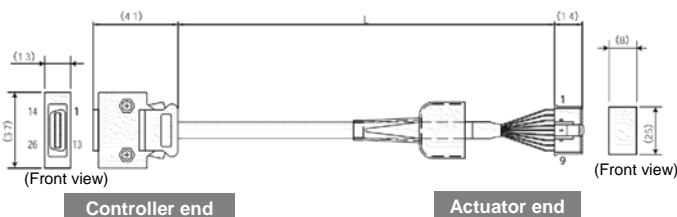


- Absolute encoder type  
Since the position data is retained even after the power is turned off, home return is not required when the power is turned off and turned on again.  
An absolute reset must be performed first.

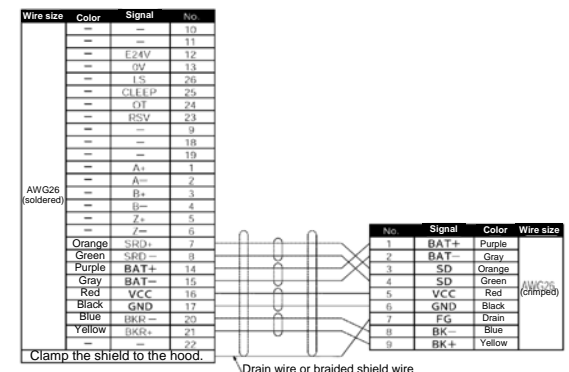
Absolute cable

Model CB-X1-PA□□□

\* Enter the applicable cable length (L) in □□□.  
A desired length up to 30 m can be specified.  
Example) 080 = 8 m



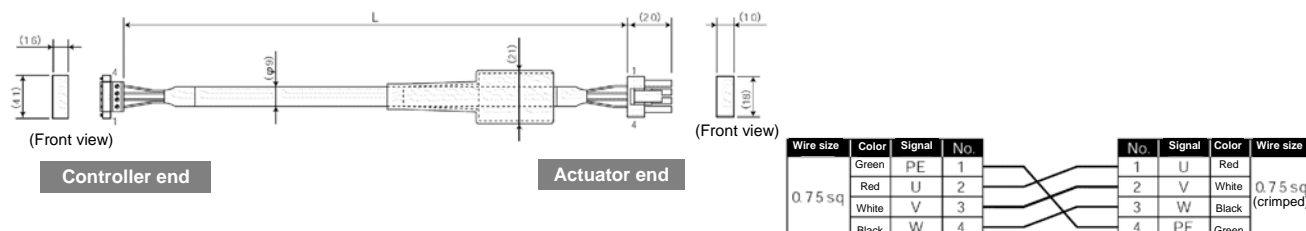
Plug housing: XMP-09V (JST)  
Socket contact: BXA-001T-P0.6 (JST) x 9  
Retainer: XMS-09V (JST)  
Note 6: Use the crimping machine recommended by the connector manufacturer.



### 5.3 Motor cable

Model CB-X-MA□□□

\* Enter the applicable cable length (L) in □□□.  
A desired length up to 30 m can be specified.  
Example) 080 = 8 m



## 6. Product Check

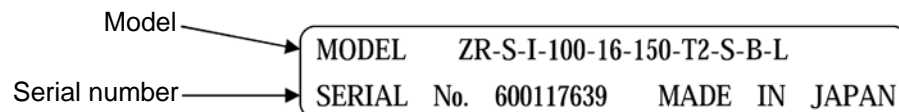
Check the condition of the unpacked product as well as the included items.

No.	Item	Model
1	Actuator	Refer to "How to Read Model Nameplate."
Accessories		
2	Brake box	RCB-110-RA13-0
3	Brake box-controller connection cable	CB-RCS2-PLA010
4	Operation manual	

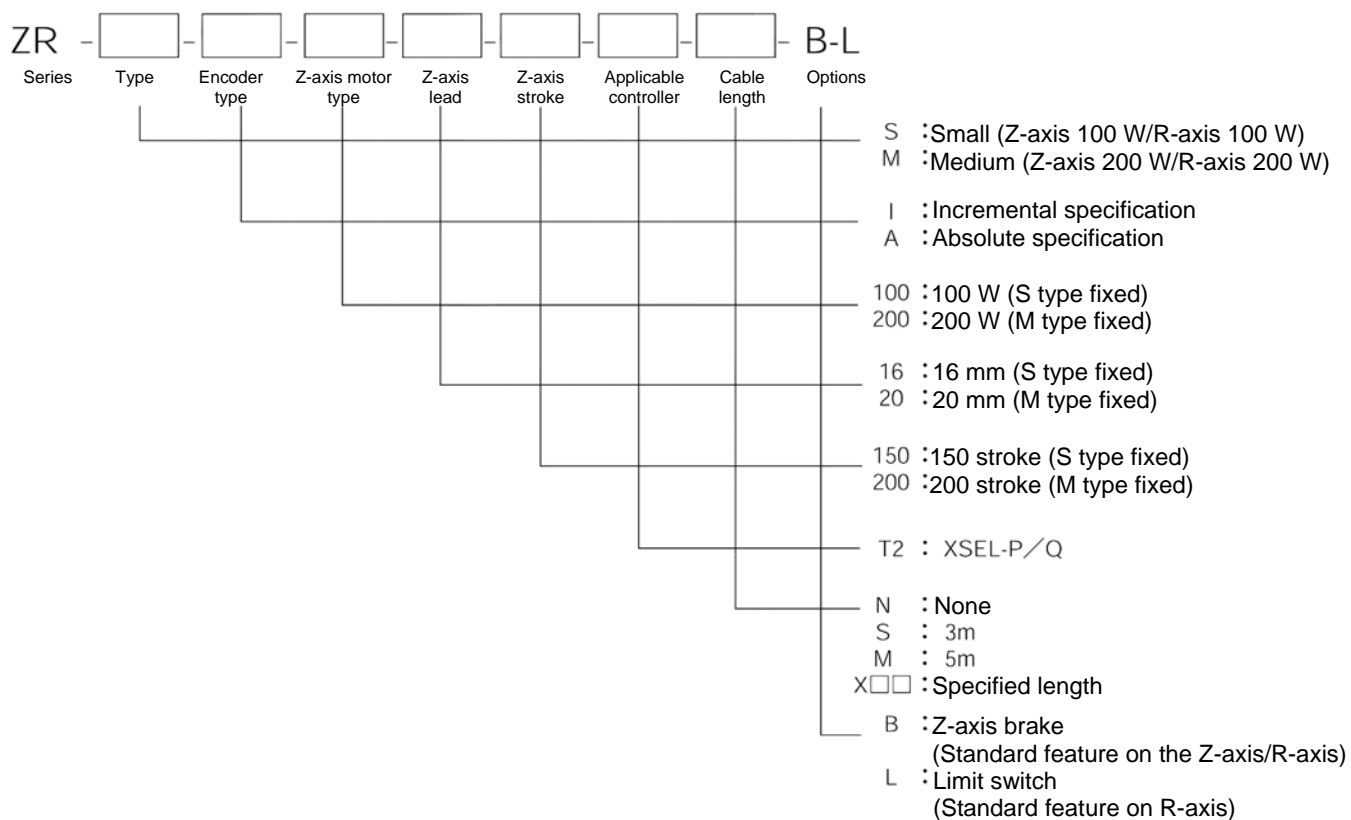
### 6.1 Operation Manuals Relating to This Product

No.	Item	Model
1	XSEL-P/Q Controller Operation Manual	ME0148
2	XSEL-Controller P/Q/PX/QX RC Gateway Function Operation Manual	ME0188
3	PC Software IA-101-X-MW/IA-101-X-USBMW Operation Manual	ME0154
4	Teaching Pendant SEL-T/TD Operation Manual	ME0183
5	Teaching Pendant IA-T-X/XD Operation Manual	ME0160
6	DeviceNet Operation Manual	ME0124
7	CC-Link Operation Manual	ME0123
8	ProfiBus-DP Operation Manual	ME0153
9	Ethernet Operation Manual	ME0140

## 6.2 How to Read Model Nameplate



## 6.3 ZR Unit model



## 7. Specifications

Item			Specification	
Model			ZR-S	ZR-M
Drive method	Z-axis (vertical axis)	-	AC servo motor with brake + Belt + Ball screw spline	
	R-axis (rotational axis)	-	AC servo motor + Belt + Gear reducer + Spline	
Motor capacity	Z-axis (vertical axis)	W	100	200
	R-axis (rotational axis)		100	200
Operation range	Z-axis (vertical axis)	mm	150	200
	R-axis (rotational axis)	degree	±360	
Maximum operating speed (Note 1)	Z-axis (vertical axis)	mm/s	1005	1256
	R-axis (rotational axis)	deg/s	2200	
Repeatability (Note 2)	Z-axis (vertical axis)	mm	±0.010	
	R-axis (rotational axis)	degree	±0.005	
Loading capacity	Rated	kg	1	2
	Maximum		3	6
Z-axis (vertical axis) maximum force	Positioning operation (Note 3)	N (kgf)	107 (10.9)	171 (17.4)
	Push-motion operation		74.8 (7.6)	120 (12.2)
R-axis allowable load	Allowable inertial moment (Note 4)	kg·m <sup>2</sup>	0.015	0.03
	Allowable torque	N·m (kgf·cm)	1.9 (19)	3.8 (38.8)
Home detection			Incremental encoder method/absolute encoder method	
Operating environment	Surrounding air temperature/humidity	-	Temperature 0 to 40°C, humidity 20 to 85% RH max. (non-condensing)	
Actuator weight	-	kg	5.5	8
Controller	Power supply	-	230 V 50/60 Hz 5 A	
	Allowable power supply	%	±10	
Note 1) Speed when each axis is moved independently to the target position at the specified speed. Note 2) When the surrounding temperature is constant at 20°C. Note 3) Forces up to three times the maximum force may generate momentarily. Note 4) Equivalent allowable inertial moment (maximum value) at the center of the rotational axis. (Refer to 9.3 (2), "Conditions of transferring load.")				

## **8. Installation Environment, Storage Environment**

### **8.1 Installation Environment**

Install the unit in an environment meeting the conditions listed below.

- Not be exposed to direct sunlight.
- Be free from irradiating heat coming from a heat treatment furnace or other equipment that generates a large amount of heat.
- Have surrounding air temperature of 0 to 40°C.
- Have humidity of 85% or below (non-condensing).
- Be free from corrosive or flammable gases.
- Be free from excessive dust and suitable for normal assembly work.
- Be free from oil mist or cutting oil.
- Be free from chemicals such as sulfuric acid and hydrochloric acid. (Chemical resistance is not considered in the design of this product.)
- Be free from impact or vibration.
- Be free from strong electromagnetic waves, ultraviolet light or radiation.

In general, the unit should be used in an environment where the operators can work without wearing any protective equipment or gear.

### **8.2 Storage Environment**

- The storage environment should basically conform to the installation environment.
- If the unit is to be stored for an extended period of time, provide appropriate measures to prevent dew condensation.
- The unit is not packed with drying agent, unless otherwise specified by the user. If the unit is to be stored in an environment where dew condensation may occur, take appropriate measures to protect the entire package, or the unit itself (after unpacking it), from the detrimental effects of dew condensation.
- The unit can withstand a surrounding air temperature of up to 60°C for a short period. If the unit must be stored for over a month, keep the surrounding air temperature at 50°C or below.

## 9. Installation

### 9.1 Installation of the Unit

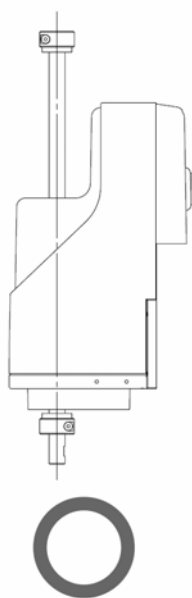
- Each mounting flange has mounting holes (refer to "Names of the Parts"). Install the flange using the specified screws.

Type	Specified screw	* Recommended tightening torque Bearing surface: Aluminum
ZR-S	M6	536 N·cm
ZR-M	M8	1,148 N·cm

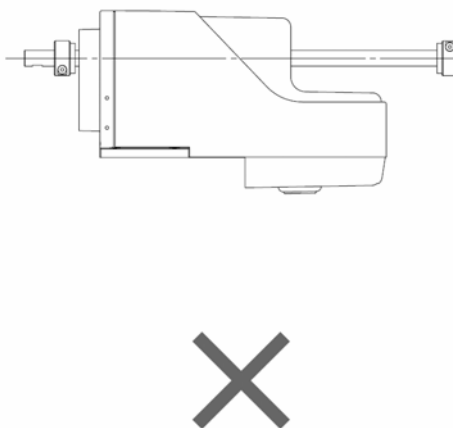
\* Hexagonal socket head bolt of strength category 10.9

### 9.2 Actuator Installation Posture

This actuator is of vertical type (= the ball screw is oriented vertically). It cannot be used in the horizontal direction.



Vertical installation



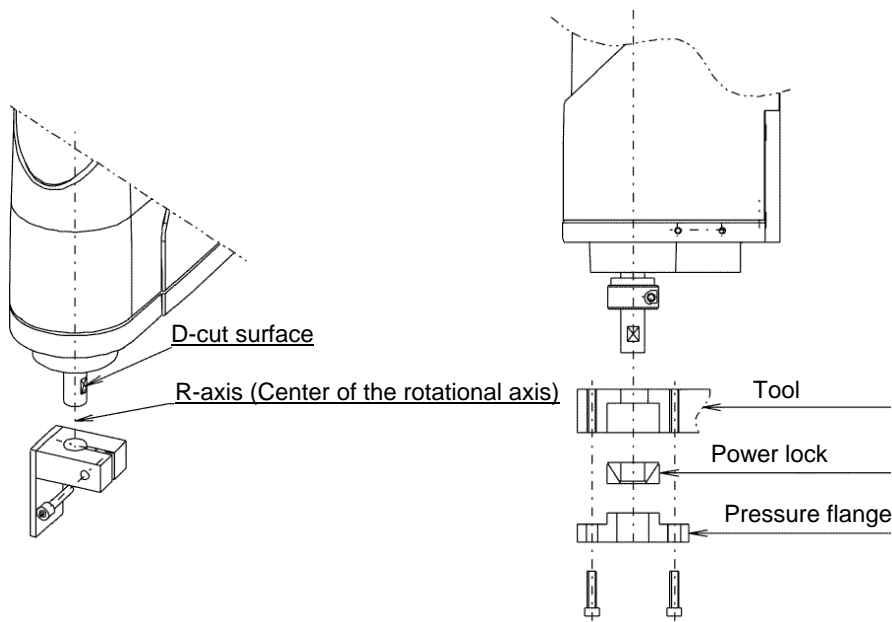
Horizontal installation

If each axis has been assembled at IAI, positioning pin holes are provided. Two positioning pins are available, so use them to position the actuator.

### 9.3 Installation of Tool and Load

#### (1) Installing the tool

- The tool mounting part must have sufficient strength and rigidity, along with adequate fastening power to prevent positional shift.
- It is recommended that a tool be installed over a split ring, power lock or other appropriate part. (The flanges specified in 4, "Options" are available.)
- To set the rotating direction using the D-cut surface and setscrews, be sure to use setscrews with resin or brass pad or set pieces made of soft material.
- An example of installation is shown below for your reference.



**⚠ Caution:** Use the D-cut surface at the tip of the R-axis (rotational axis) to position the R-axis. Avoid attachment of the tool at the D-cut surface via thread fastening. Doing so may damage the D-cut positioning surface. Design the tool so that it will not contact any device that secures the ZR unit.

## (2) Conditions of transferring load

### Transferring mass

Type	Rated transferring mass	Maximum transferring mass
ZR-S	1 kg	3 kg
ZR-M	2 kg	6 kg

### Allowable load inertial moment

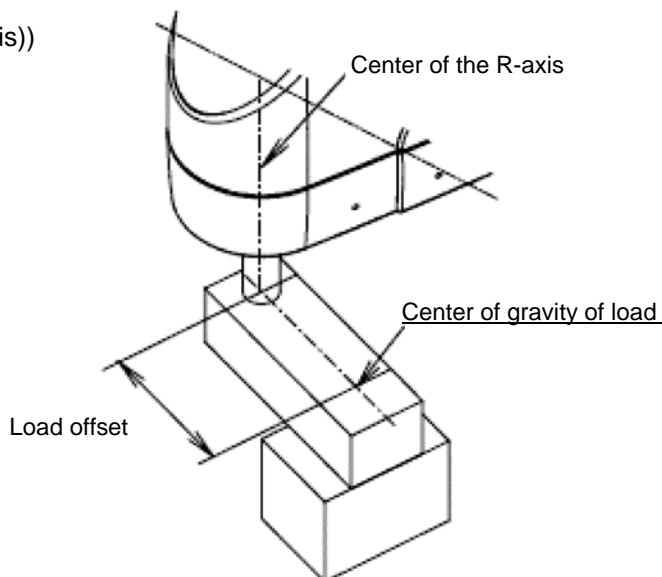
Type	Allowable inertial moment	Remarks
ZR-S	0.015 kg·m <sup>2</sup>	Maximum value
ZR-M	0.03 kg·m <sup>2</sup>	

\* If the load inertial moment exceeds one-third of the allowable inertial moment, vibration may occur depending on the operating conditions. In this case, adjust the acceleration to a lower level. Also note that adjusting the acceleration alone may affect the locus in case of interpolated operation. In this case, also adjust the speed.

### Load offset (from the center of the R-axis (rotational axis))

Type	Offset
ZR-S	40 mm
ZR-M	50 mm

\* If the load gets offset, the unit becomes more likely to cause vibration.  
Design the tools so that the load's center of gravity aligns with the center of the R-axis (rotational axis).  
If the load must be offset, make sure the applicable offset in the table is not exceeded.  
If vibration occurs, adjust the speed and acceleration to lower levels.



## 9.4 Installation of User Components

Tapped holes are provided on the side faces of the unit for installing user components. [Refer to 1, "Names of the Part."] Use these holes to install brackets for jigs or sensors provided by the user.

[For the detailed dimensions, refer to 2, "External Dimensions."]

Type	Tap size	Effective depth	* Recommended tightening torque Bearing surface: Aluminum	* Recommended tightening torque Bearing surface: Steel
ZR-S ZR-M	M4	12 mm	176 N·cm {18.0 kgf·cm}	359 N·cm {36.7 kgf·cm}

\* Hexagonal socket head bolt of strength category 10.9


## 9.5 Mounting Holes for Connector Box

Tapped holes are provided for installing the connector box. [Refer to 1, "Names of the Parts."]

- The connector box is already installed if the units have been shipped pre-assembled.
- The connector box is not supplied if only a single axis has been shipped.
- It is supplied if multiple axes have been shipped individually for subsequent assembly.
- If the connector box is not installed, you can use these mounting holes for any desired purpose.
- Use the specified screws.

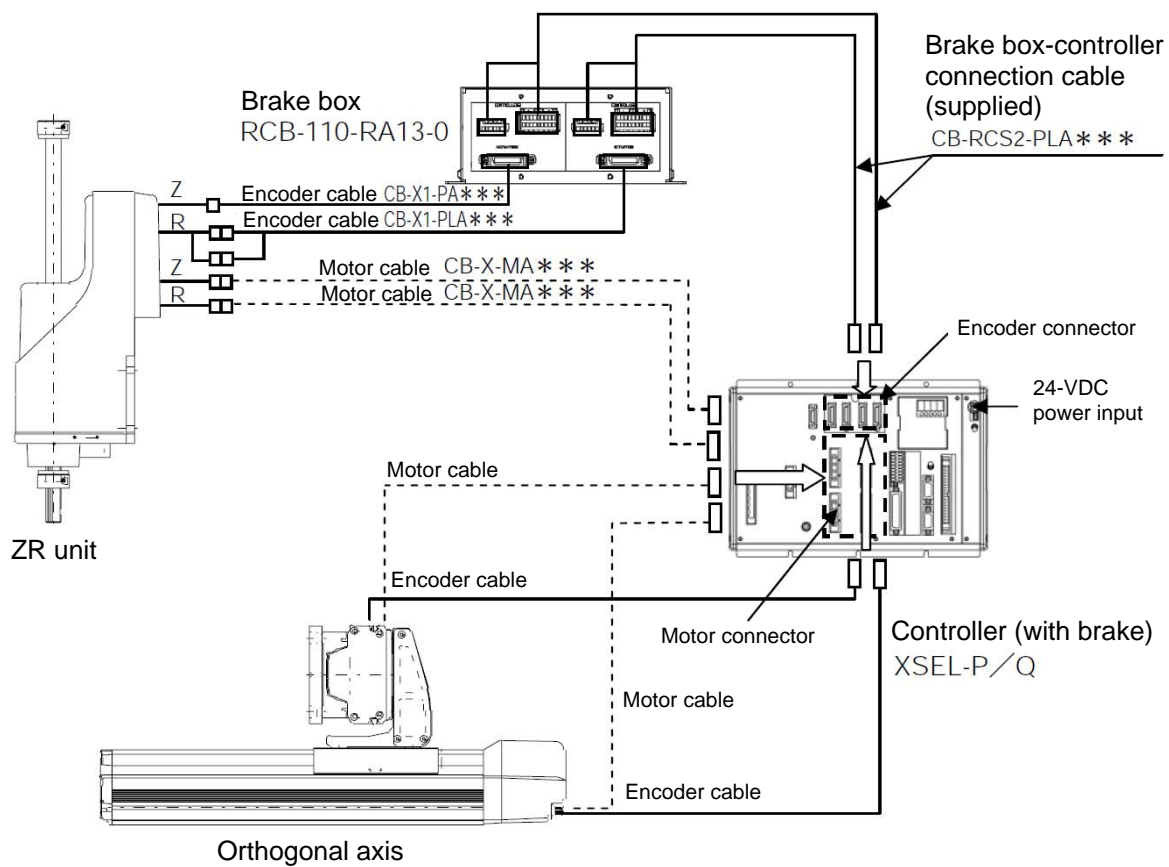
Type	Tap size	Maximum screw length	* Recommended tightening torque Bearing surface: Steel
ZR-S ZR-M	M5	8 mm	727 N·cm {74.2 kgf·cm}

\* Hexagonal socket head bolt of strength category 10.9

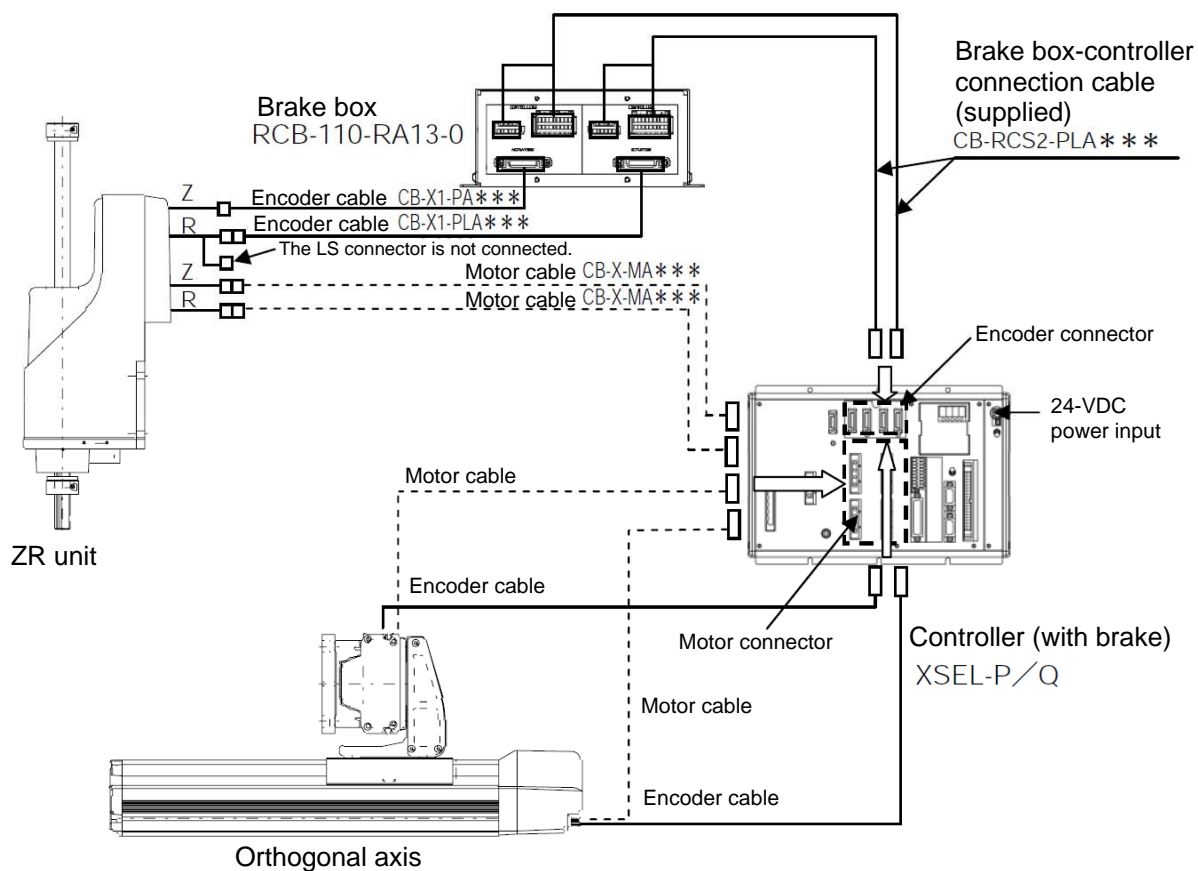
 **Caution:** The tapped holes are through holes, so pay attention to the maximum screw length at the time of installation. If the internal mechanism is contacted, failure may occur.

## 10. Wiring

### 10.1 Wiring Diagram (Incremental)



## 10.2 Wiring Diagram (Absolute)




### 10.3 Wiring Method

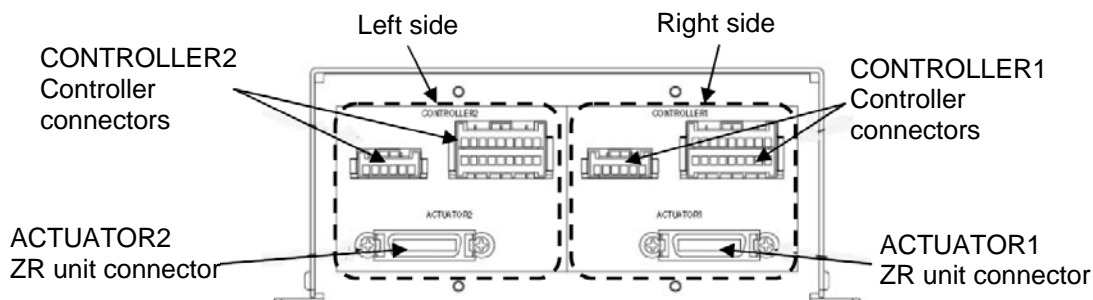
- (1) Determine the control axis number (Axis No.) of each actuator according to the system (program) and connect the actuator to the corresponding connector on the controller.

Encoder cable connector	
Control axis number (Axis No.)	Display on controller front panel
1	PG1
2	PG2
3	PG3
4	PG4
5	PG5
6	PG6

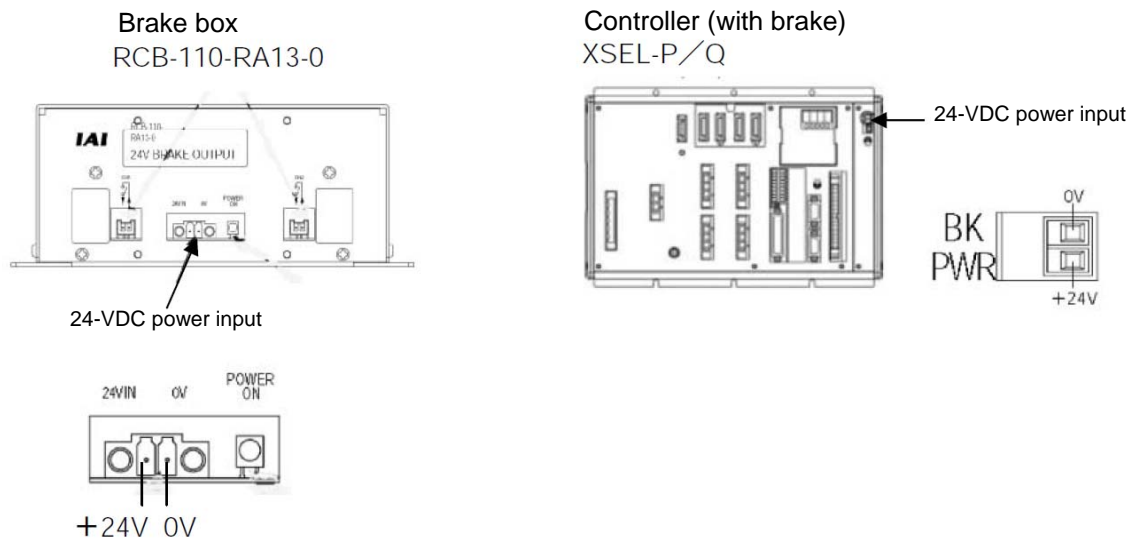
Motor cable connector	
Control axis number (Axis No.)	Display on controller front panel
1	M1
2	M2
3	M3
4	M4
5	M5
6	M6

 **Caution:** If connector numbers are not shown on the cables, mark the connector numbers or other identification information on the cables to prevent mis-wiring during maintenance. Wrong connections may result in damage or malfunction of the motor/board.

- (2) Both the left and right brake boxes are connected to one axis, respectively.  
The Z-axis and R-axis encoder cables can be connected to either side, but certain rules apply. If the Z-axis is connected to the connector (ACTUATOR2) on the left box, for example, the cable connecting the left brake box and XSEL controller should be the one whose axis number corresponds to the Z-axis on the X-SEL side, and accordingly this cable should be connected to the applicable connector (CONTROLLER2).



(3) Connect a 24-VDC power supply to the brake box and controller and supply the power.



- Caution:**
- Before connecting each cable/connector, confirm that the connector pins are not bent or broken and the cable is not damaged, and then plug in the connector firmly.
  - When connecting the encoder cable, be sure to confirm the orientation of the connector first.
  - Use a dedicated 24-VDC power supply for the brake power, because sharing the I/O power or secondary circuit power may cause noise to enter the I/O signals or otherwise the brake operation may become unstable.
  - The power supply for the brake must have an output voltage of 24 VDC  $\pm 10\%$  and power capacity of 20 to 30 W.

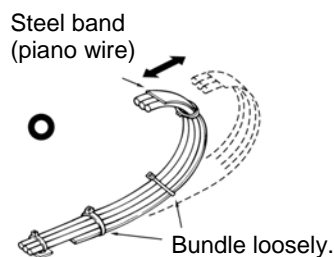
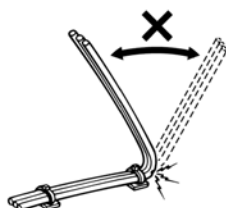
## 10.4 Prohibited Wiring Practices

Connect the connector at the end of the cable, to the controller.

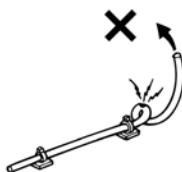
For the connection methods of the I/O cable, controller power cable, PC connection cable, etc., refer to the operation manuals for your controller and PC software.

When designing an application system using actuators and controllers, incorrect wiring or connection of each cable may cause unexpected problems such as a disconnected cable or poor contact. This section explains prohibited handling of cables.

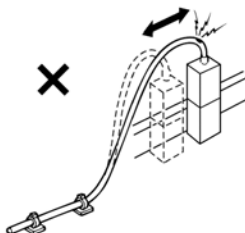
- Do not cut any of the cables to extend, reduce its length or reconnect the cut cable.
- If the cables cannot be mounted, connect them within the range in which the cables bend with their own weight or in a big radius of a standing cable hose, etc., so that the cable loads will be reduced.
- Do not let the cable flex at a single point.



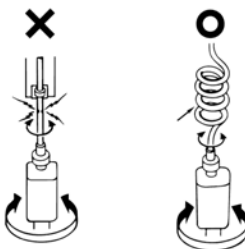
- Do not let the cable bend, kink or twist.



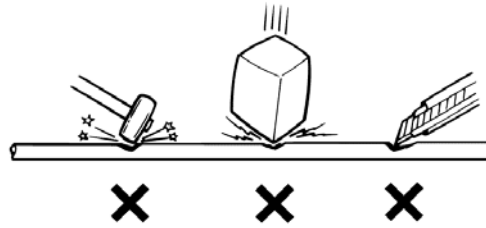
- Do not pull the cable with a strong force.



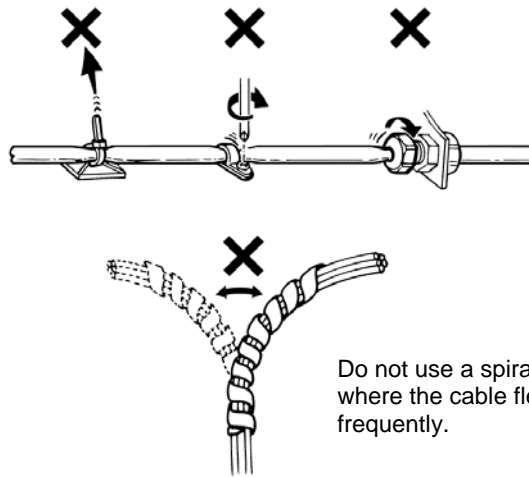
- Do not let the cable receive a turning force at a single point.



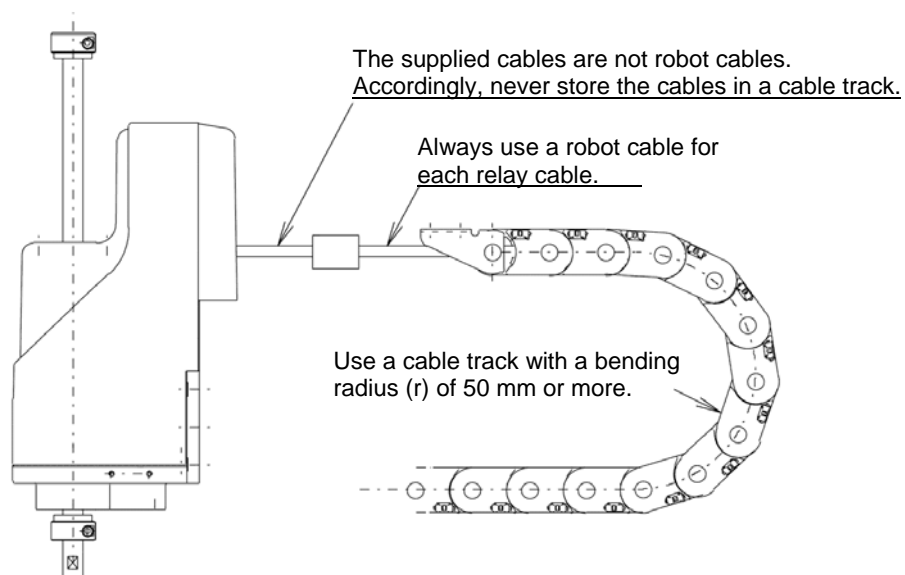
- Do not pinch, drop a heavy object onto or cut the cable.



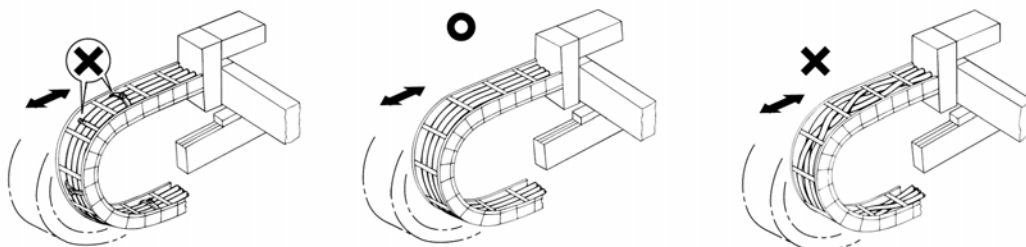
- When fixing the cable, provide a moderate slack and do not tension it too tight.



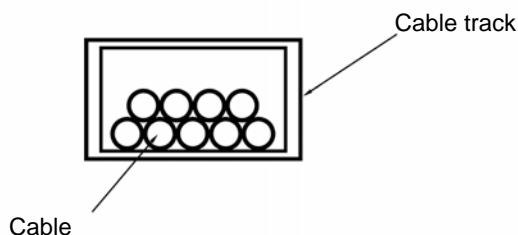
## 10.5 Notes on Use of Cable Track



- Do not let the cable get tangled or kinked in a cable track or flexible tube. Do not bundle the cables to allow a certain degree of flexibility (so that the cable will not become too taut when bent).

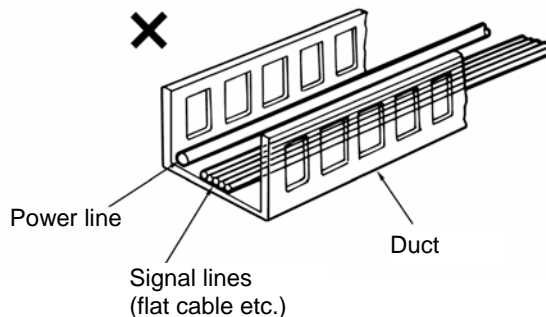


- Do not cause the cables to occupy more than 60% of the space in the cable track.



## 10.6 Wiring in the Duct

Separate the I/O and communication lines from the power and drive lines. Do not guide them together in the duct.



## 10.7 Checking after Installation and Wiring

Check the following items after installation and wiring:

- Visually examine the actuator, controller and cables for scratches, dents and other abnormalities.
- Confirm that the cables are connected correctly and the connectors are attached securely.

### Warning

- Before connecting or disconnecting any cable, be sure to turn off the controller power. If a cable is connected/disconnected while the controller power is on, the actuator may malfunction and cause serious injury accident or damage to the machine.
- Incompletely connected connectors may cause the actuator to malfunction and create a dangerous situation. Be sure to confirm that all connectors are connected properly.

## 11. Operation Adjustment

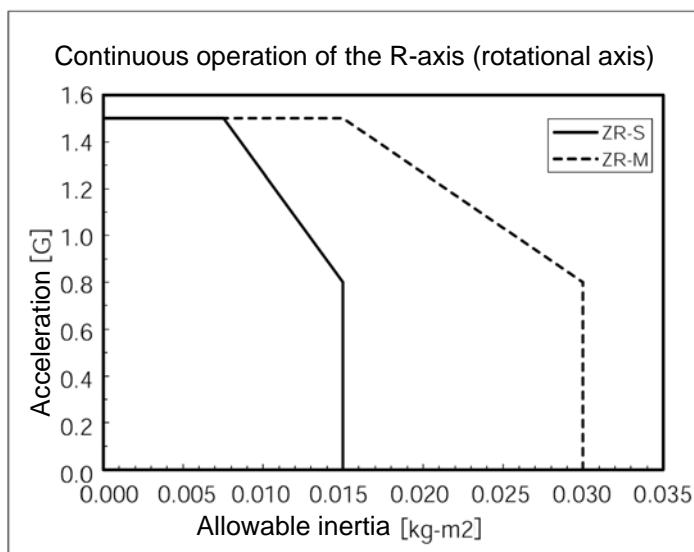
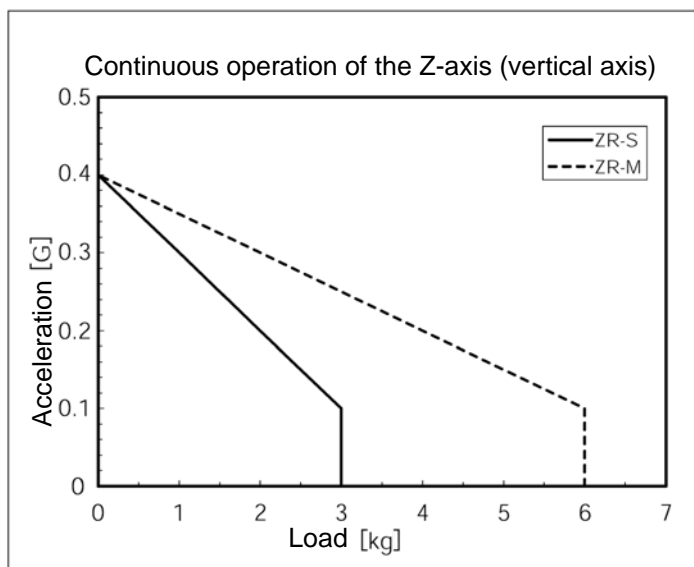
### 11.1 Guide for Acceleration Setting

When setting the acceleration, use the following graph as a guide.

- This graph provides a guide when each axis is operated separately. If interpolated operation is performed, adjust the acceleration according to the acceleration/deceleration of the slower axis.
- Continuous operation (duty: 100%)
- Refer to 11.2, "Notes on Transferring Load."
- Precautions for the R-axis

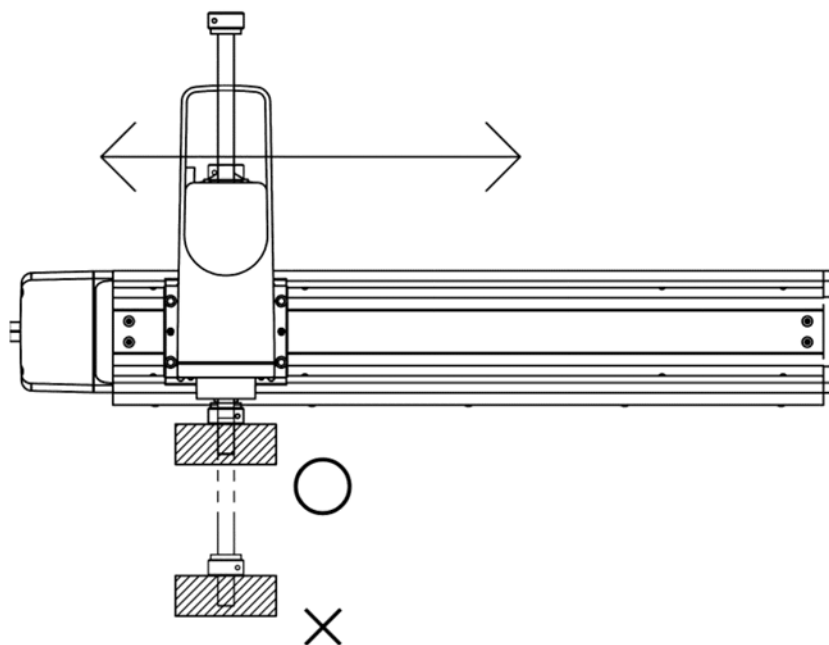
If the load inertial moment exceeds one-third of the allowable inertial moment, vibration may occur depending on the operating conditions.

In this case, adjust the acceleration to a lower level. Also note that adjusting the acceleration alone may affect the locus in case of interpolated operation. In this case, also adjust the speed.



## 11.2 Notes on Transferring Load

- Set an appropriate acceleration according to the mass and inertial moment at the tip.  
Failure to do so may result in premature consumption of life, damage or vibration of drive parts.
- If vibration occurs, lower the acceleration.
- To raise the acceleration, adjust it to an appropriate level by gradually raising the set value.
- If the load gets offset, the unit becomes more likely to cause vibration.  
Design the tools so that the load's center of gravity aligns with the center of the R-axis (rotational axis).
- If an overload error occurs, lower the acceleration setting or provide a stopping time following each acceleration/deceleration or perform other appropriate adjustment.
- The transferring load indicates a load above the rotational center of the R-axis (rotational axis).
- To move the robot horizontally at high speed, perform teaching so that the vertical axis stays as close to the top position as possible.  
To operate the unit with its vertical axis at the bottom position, the speed and acceleration must be reduced.



\* For other detailed adjustment methods, refer to the operation manual for your controller (XSEL-P/Q).

## 11.3 Push Force

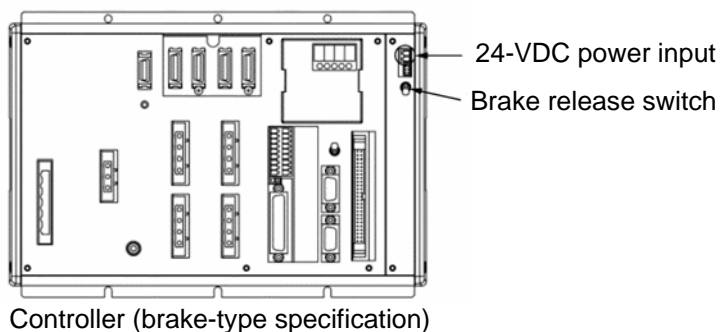
The push force can be adjusted using Driver Card Parameter No. 38 (Push Torque Limit during Positioning).  
(Max. 70%)

The R-axis cannot perform push operation. Only the Z-axis can perform this operation.

## 12. Notes on Operation

### 12.1 About Brake


- The brake is provided to retain the load in position should the servo turn off for some reason. It cannot be used as an emergency stop brake.
- Loads equivalent to or heavier than the maximum loading capacity cannot be retained. (For the maximum loading capacity, refer to 7, "Specifications.")
- Use the brake release switch on the controller to release the brake manually. No brake release switch is provided on the robot side.



### 12.2 About Home Return (Incremental Type)

The operating steps of home return are as follows:

- [1] Z-axis mechanical end search 1
- [2] Z-axis offset movement 1
- [3] R-axis LS search (CCW)
- [4] R-axis phase Z search (CW)
- [5] R-axis offset movement (CCW)
- [6] Z-axis mechanical end search 2
- [7] Z-axis offset movement 2
- [8] End

<p> <b>Caution:</b> During R-axis LS search in operating step [3], the axis always turns counterclockwise and does not take a short cut. Depending on the position before the home return, the axis may turn nearly one rotation, in which case the cables, etc., may be damaged if guided through the opening aperture. Pay attention to twisting and other forces that may exert upon the cables.</p>
--

### 12.3 Position Gain

If the position gain is different for each axis during CP operation (interpolated operation) involving an orthogonal axis and the Z-axis or R-axis of a ZR unit, the locus may be affected depending on the operating conditions.

Accordingly, it is recommended that the same position gain be set for all axes.

Adjust the position gain using Axis-specific Parameter No. 60 of your controller (XSEL-P/Q). For the method to change this parameter, refer to the operation manual for your PC software.

\* CP operation commands:

“PATH, CIR, ARC, PSPL, CIR2, ARC2, ARCD, ARCC, CIRS, ARCS, ARCH, PACH, MOVL, MVLI, PMVL, etc.”

However, each position gain must be the same for the Z-axis and R-axis of the ZR regardless of the operating conditions such as presence/absence of an orthogonal axis, CP operation, or PTP operation.

## 13. Maintenance and Inspection

Daily and periodic inspections are needed to make sure the actuator you purchased can be used safely and efficiently.

Perform the following maintenance and inspection items.

### 13.1 Inspection Intervals and Items


These inspection intervals assume that the actuator is operated eight hours a day. If the utilization ratio is higher, such as when the actuator is operated continuously 24 hours a day, reduce the inspection intervals according to the operating hours.

	Visual inspection of exterior	Inspection of interior	Greasing
Startup inspection	○		
1 month after start of operation	○		
6 months after start of operation	○	○	○
1 year after start of operation	○	○	
Every 6 months thereafter	○		○
Every year	○	○	

Do not inspect, adjust, repair, replace parts or perform any other item not specified in this operating manual.

Do not perform the following disassembly tasks or cut the cables. Any unwanted outcome resulting from such prohibited tasks is not covered by the warranty:

- Disassembly of servo motor
- Disassembly of reduction gears
- Disassembly of ball screw spline
- Disassembly of bearing
- Disassembly of brake
- Cutting of cable

 **Caution:**

- Before performing any inspection, thoroughly confirm safety.
- Periodic inspection may be performed with the controller power turned off or on. In either case, put up a sign that says, "Work in progress. Do Not Enter" or the like and disable power supply operations by other operators.

#### **Warning**

- Performing inspection or maintenance work without a thorough understanding of the specific tasks involved may result in a serious injury accident.
- If inspection is not carried out regularly, the drive part may reach its life prematurely.

## 13.2 Visual Inspection of Exterior

Inspect the following items before and after operating the robot every day.

Inspection location	Inspection item
Safety feature installed by the user (safety cage, etc.)	Correct the cage for deformation or displacement. Operation of safety circuits Whether interlock mechanisms operate normally
Robot	Looseness of robot installation bolts External abnormality (Check the cables for looseness, damage, dent, etc.) Abnormal operation, vibration or abnormal noise
Cables	Cable damage Looseness of cable securing points
Emergency stop switches	Whether emergency stop switches operate normally

Should you find any damage or abnormality of the robot, please contact IAI.

## 13.3 Cleaning

- Clean the exterior surface as deemed necessary.
- Wipe off soiling using a soft cloth, etc.
- Do not blow highly compressed air onto the unit, because it may cause dust to enter the interior through the gaps.
- Do not use petroleum-based solvents, because they can damage resin and coated surfaces.
- To remove any significant soiling, moisten a soft cloth, etc., with neutral detergent or alcohol and wipe the area with the cloth gently.

## 13.4 Inspection of Interior

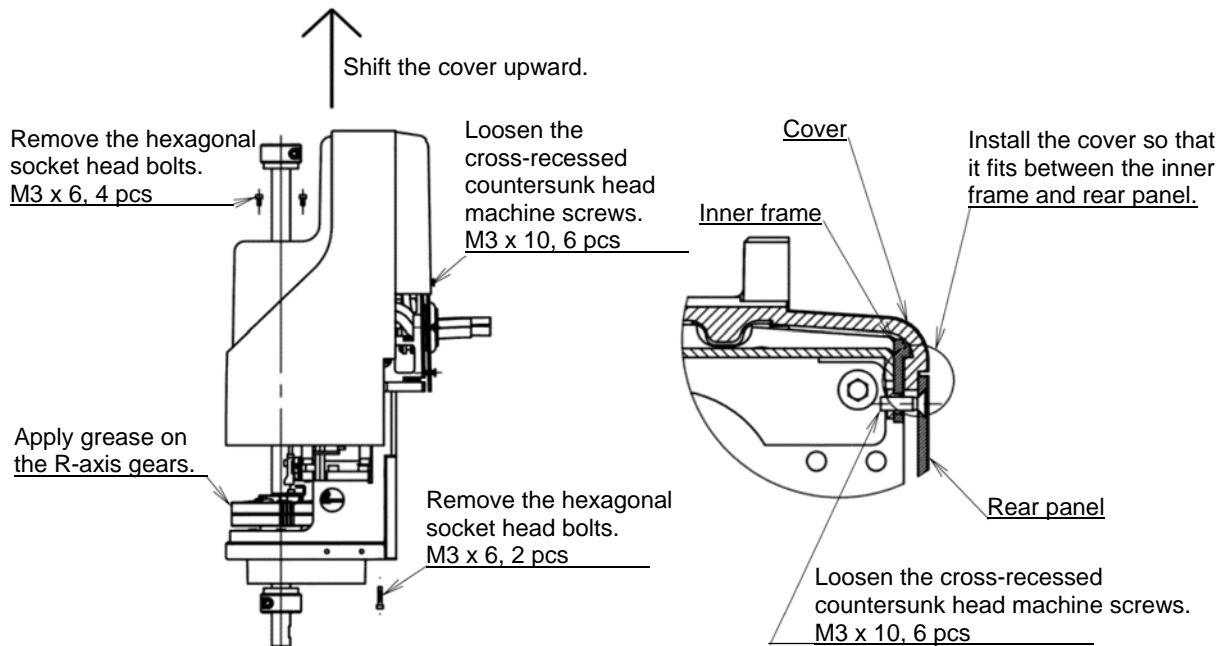
Inspect the robot for the following items every six months during the daily inspection.

Inspection location	Inspection item
Ball screw spline	<ul style="list-style-type: none"> <li>• Looseness of ball spline</li> <li>• Apply new grease after removing old grease with waste cloths, etc. (*1) Applicable grease: Multemp LRL No. 3 by Kyodo Yushi or equivalent</li> </ul>
R-axis reduction gears	<ul style="list-style-type: none"> <li>• Apply grease while turning the gears. After grease has been applied, move the gears back and forth several times to spread the grease evenly. Once the brake is released, the gears can be turned by manually rotating the output shaft. Release the brake using the switch on the controller.</li> <li>* Be sure to release the brake. If the R-axis is rotated without releasing the brake, failure may occur. Applicable grease: Multemp AC-D No. 2 by Kyodo Yushi or equivalent</li> </ul>
Connector	Looseness of connector

Contact IAI for any damage, looseness or any other abnormality of the robot.

## 13.5 Greasing

Greasing procedure for the R-axis (How to remove the cover)



### ● Procedure

- [1] Remove the hexagonal socket head bolts on the top and bottom faces.
- [2] Loosen the cross-recessed countersunk head machine screws on the rear face.
- [3] Shift the cover upward to remove.
- [4] Apply grease on the R-axis gears.
- [5] Install the cover.

\* Install the cover carefully by preventing it from catching the cables on the side face.

\* Install the cover so that it fits between the inner frame and rear panel.

- [6] Tighten all screws.

Store the cables within the available space by paying attention not to overlap each other. Do not forcibly secure them while the panel is still moving.

Tightening torque (M3 screw: 0.74 N·m, M4 screw: 1.76 N·m)

\* The Z-axis motor may be hot. Perform this task after confirming that the Z-axis has cooled sufficiently.

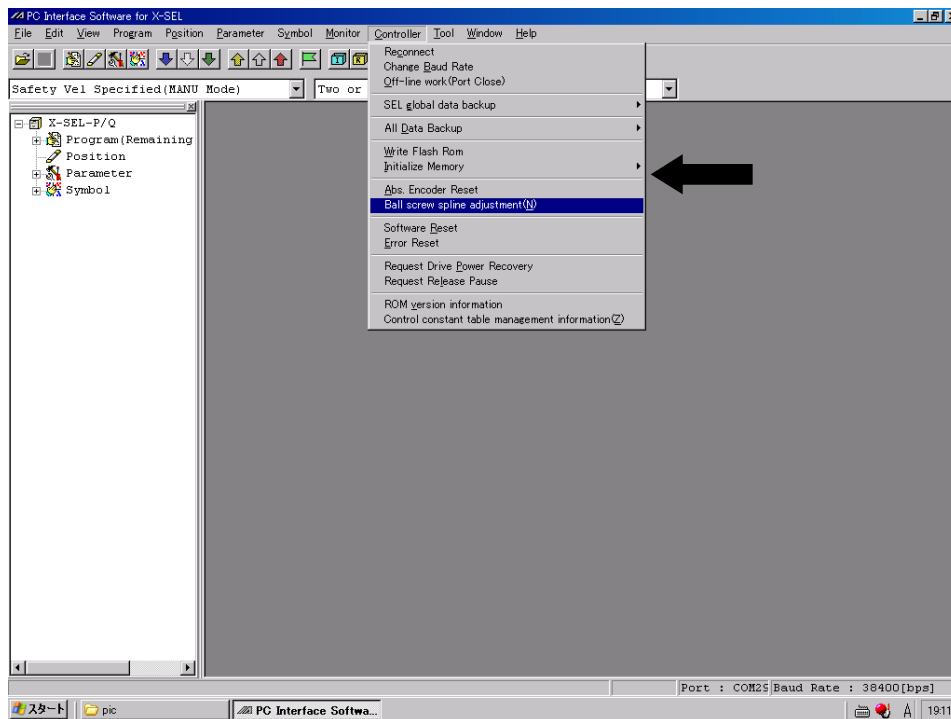
### Warning

Never use fluorine grease. If fluorine grease mixes with lithium grease, grease performance may be lost and in some cases the actuator may be damaged.

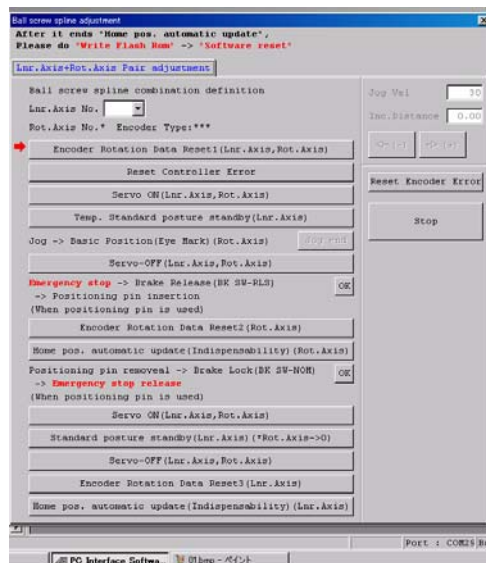


## 14.1.2 Starting the Absolute Reset Menu (Ball Screw Spline Adjustment Window)

- (1) Open the ball screw spline adjustment window in the PC software.

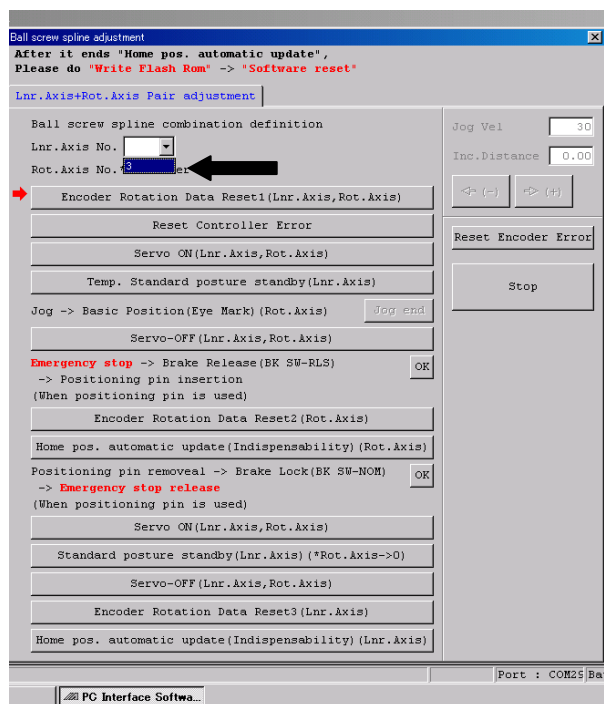


- (2) The ball screw spline adjustment window opens.  
When a linear movement axis number is selected, the “Rotational Movement Axis No. (Mating Axis No.)” and “Encoder Type” field appear.
  - Ball screw spline adjustment is performed for the linear movement axis and rotational movement axis as a pair. The adjustment procedure includes steps that require operation of the robot, so check the operating range of the actuator and confirm absence of obstructions, etc., to make the actuator ready to operate.

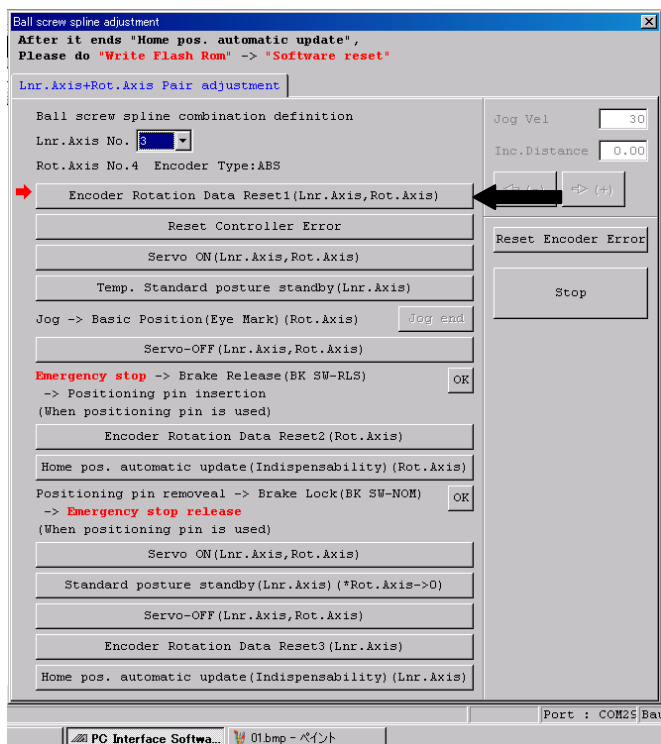


### 14.1.3 Absolute Reset (Ball Screw Spline Adjustment) Procedure

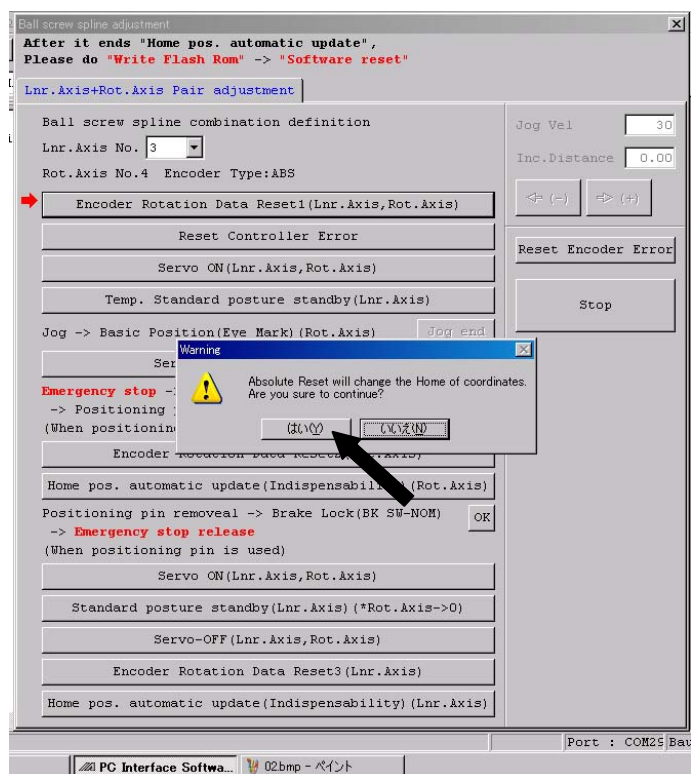
- (1) Select the “Linear Movement Axis No.” to implement an absolute reset (ball screw spline adjustment) for.



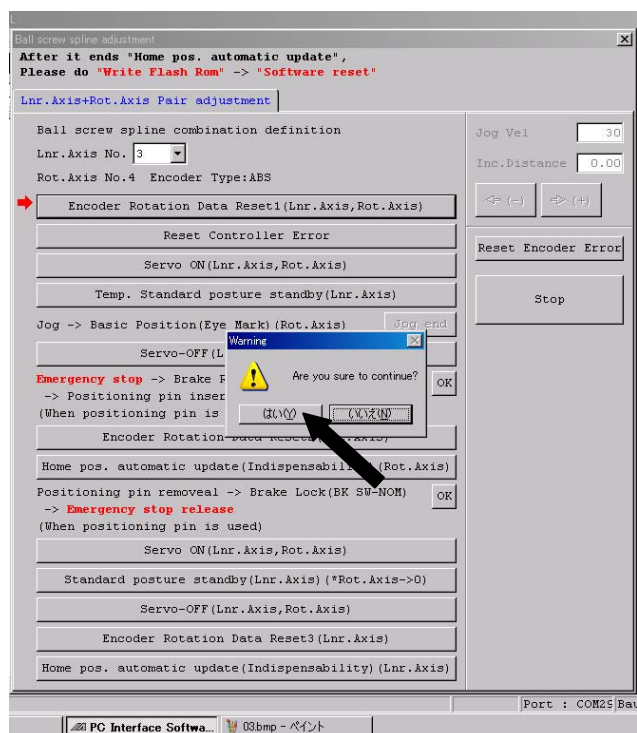
- (2) Click the “Reset Encoder Rotation Data 1 (Linear Movement Axis, Rotational Movement Axis)”



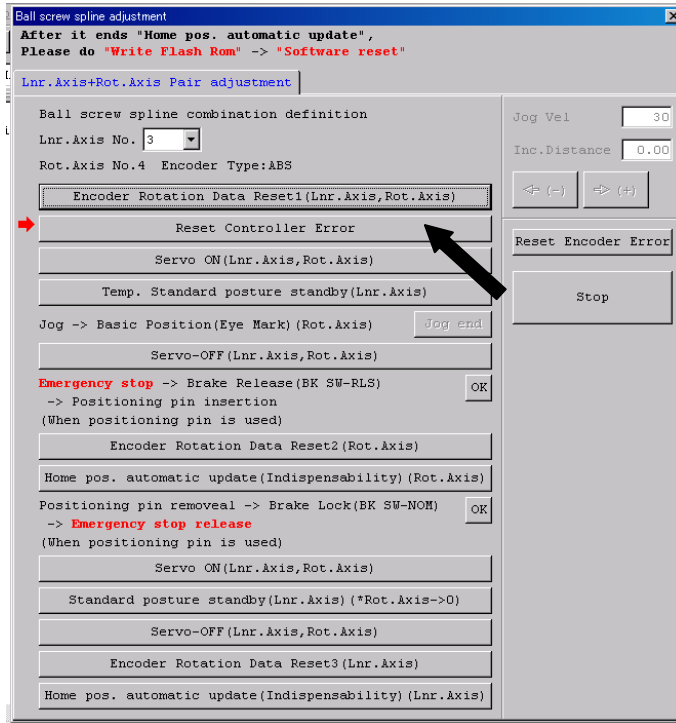
(3) When the dialog box appears, click the “Yes” button.



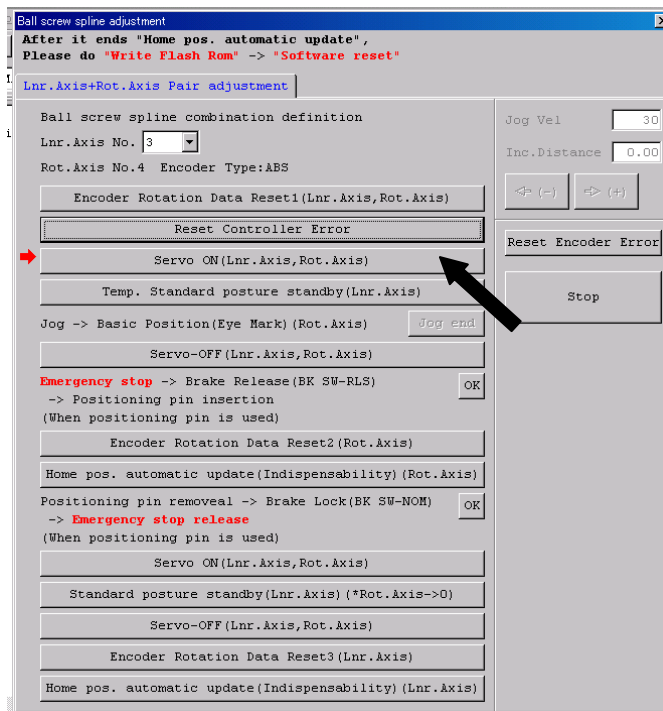
(4) When the dialog box appears, click the “Yes” button.



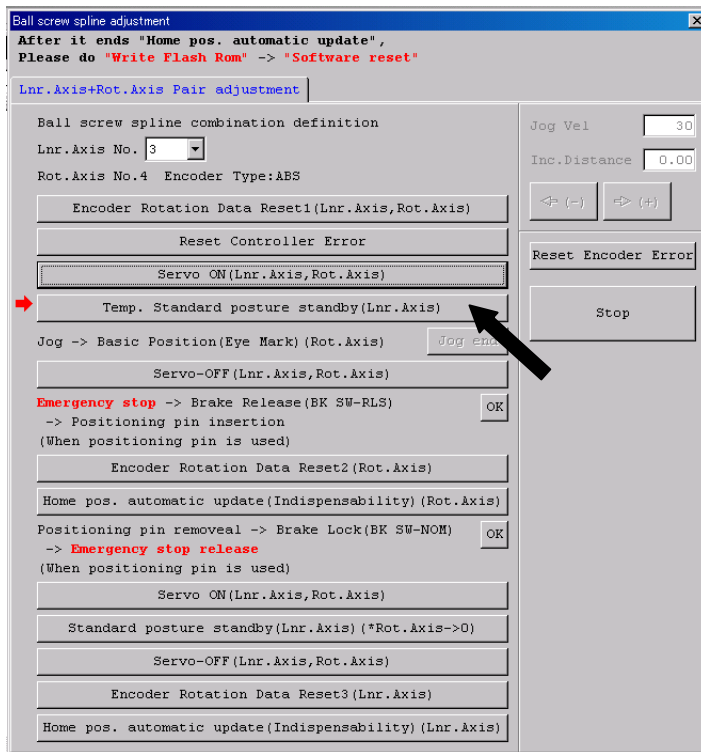
(5) Click the “Reset Controller Error” button.



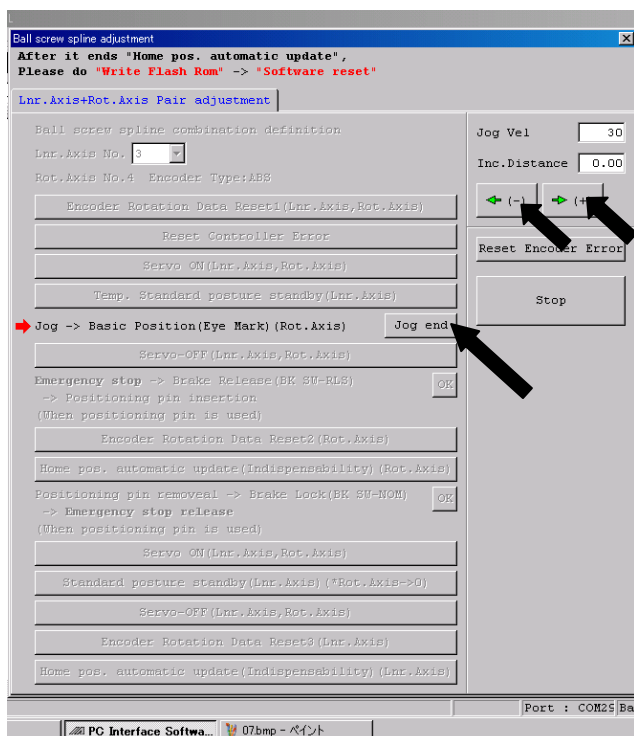
(6) Click the “Servo ON (Linear Movement Axis, Rotational Movement Axis)” button.



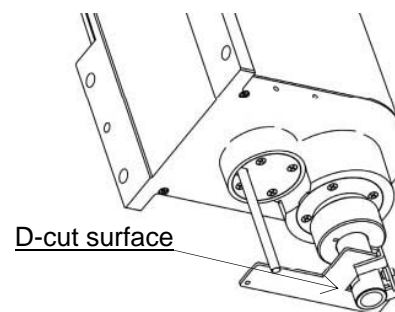
- (7) Click the "Wait in Tentative Reference Position (Linear Movement Axis)" Button.
- Exercise caution because the linear movement axis (Z-axis) will return home.



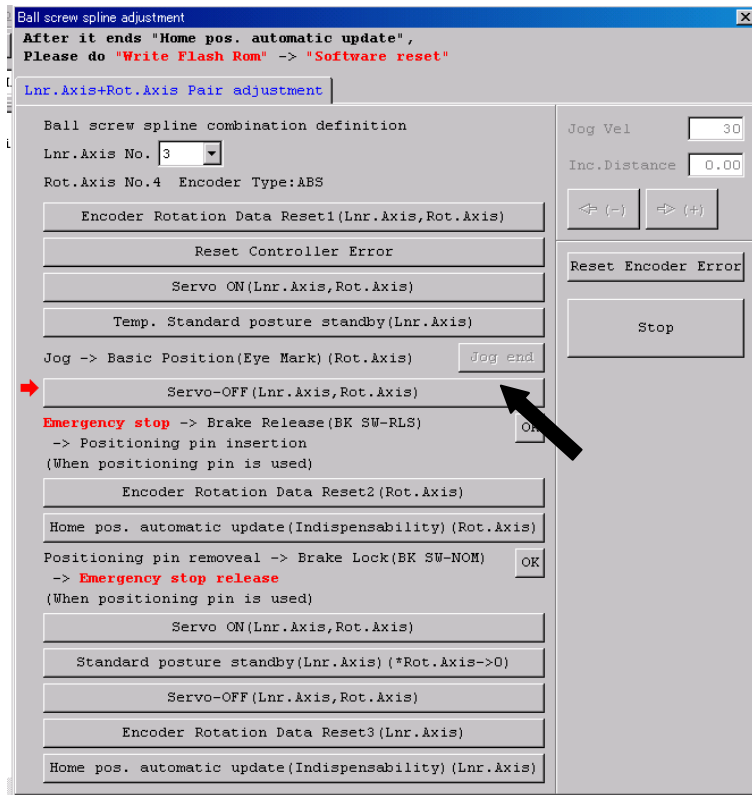
- (8) Jog the rotational movement axis (R-axis) to the reference position (see "Reference Position Drawing"), and then click the "End Jog" button.



Reference Position Drawing

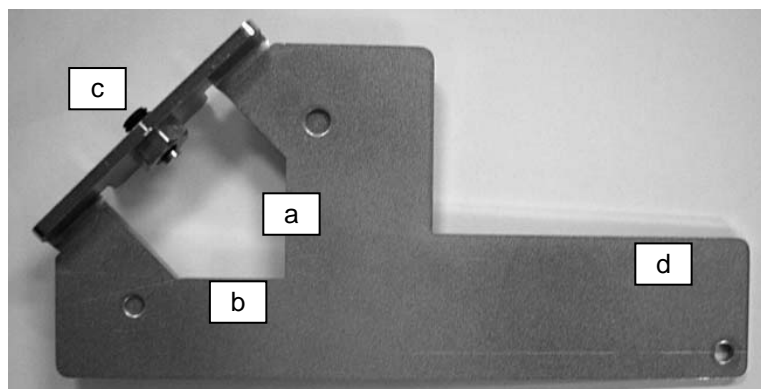
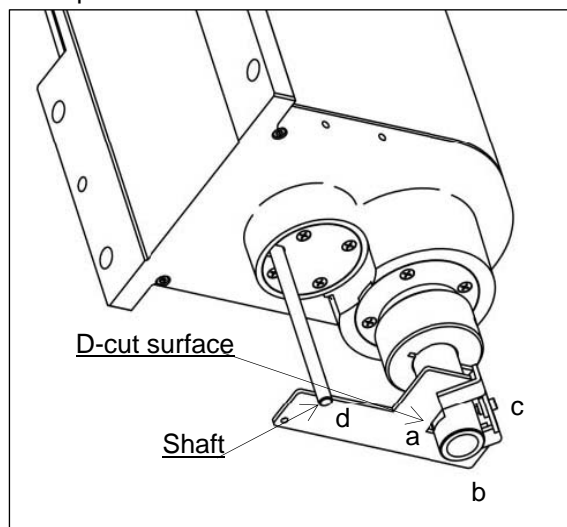


- (9) Click the “Servo OFF (Linear Movement Axis, Rotational Movement Axis)” button.



- (10) Press the emergency stop switch (emergency stop button on the PC cable).  
 (11) Release the brake. Release the brake using the switch on the controller.

- (12) Set the plate and pin constituting the adjustment jig as shown below to affix the axis in the reference position.



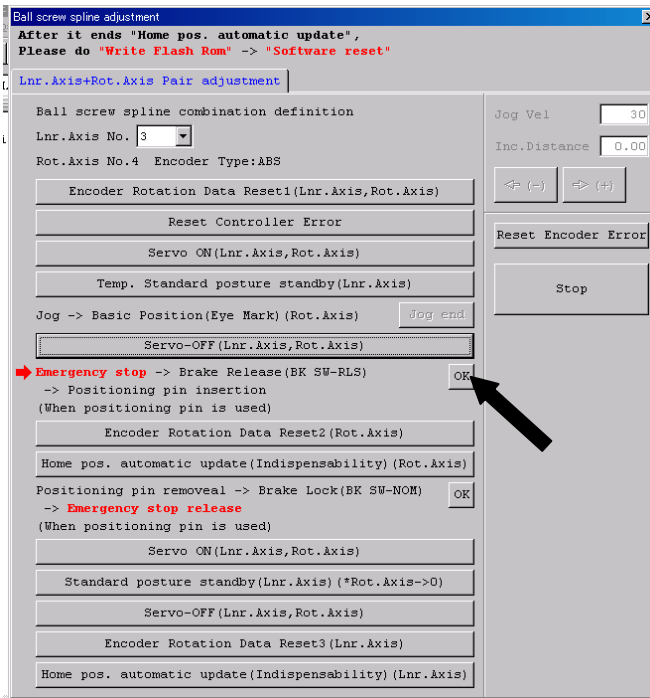
#### Installation method

- [1] Insert the ball screw spline into the hole in the jig from below.
- [2] Cause the D-cut surface of the ball screw spline to contact surface a.
- [3] Cause the side face of the ball screw spline to surface b.
- [4] Tighten screw c to affix the jig on the ball screw spline.
  - \* At this time, confirm that the adjustment jig is vertical to the ball screw spline and that the D-cut surface and surface a are in close contact with each other.
  - \* Applicable screw: Hexagonal socket head screw M5
  - \* Tightening torque: 20 [N·cm] (Reference)
- [5] Insert the supplied shaft into the hole in the ZR unit.
  - \* Keep holding the shaft, because the shaft will drop once you release your hand.
- [6] Turn the ball screw spline until the supplied shaft lightly contact surface d of the jig.

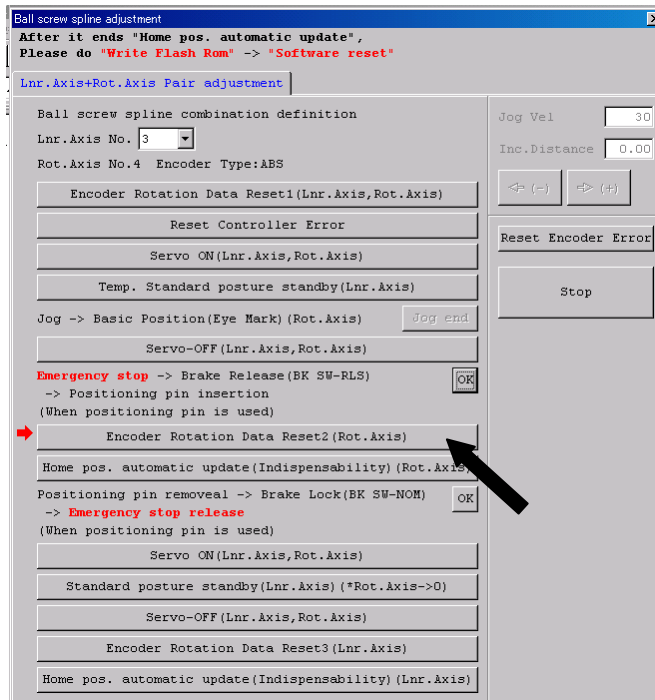
#### Warning

- Be sure to press the emergency stop switch before setting the adjustment jig. If not, the robot may malfunction and a serious accident causing injury or death may occur.

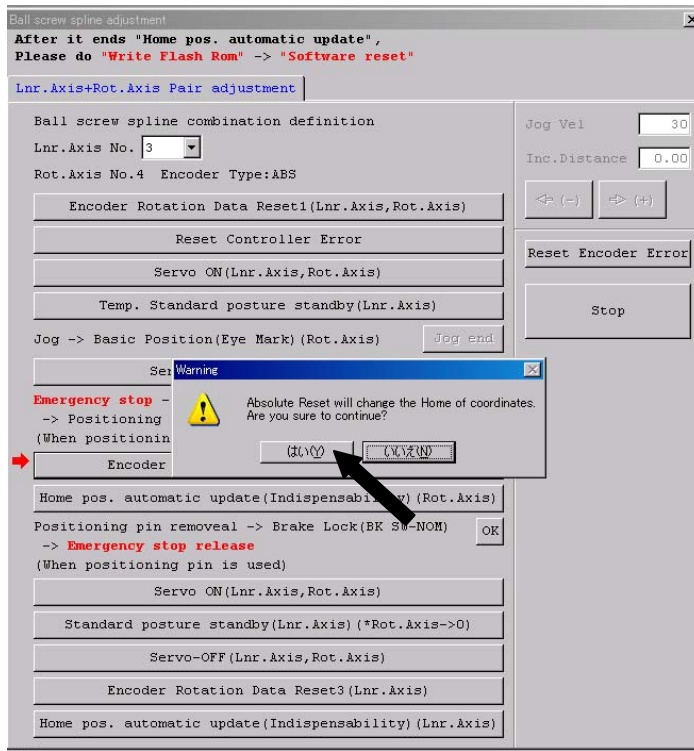
(13) Click the “Confirm” button.



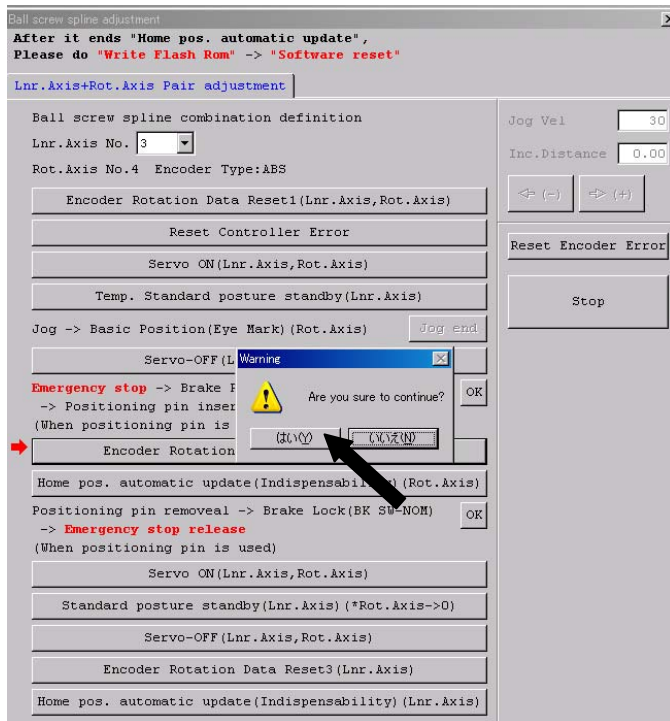
(14) Click the “Reset Encoder Rotation Data 2 (Rotational Movement Axis)” button.



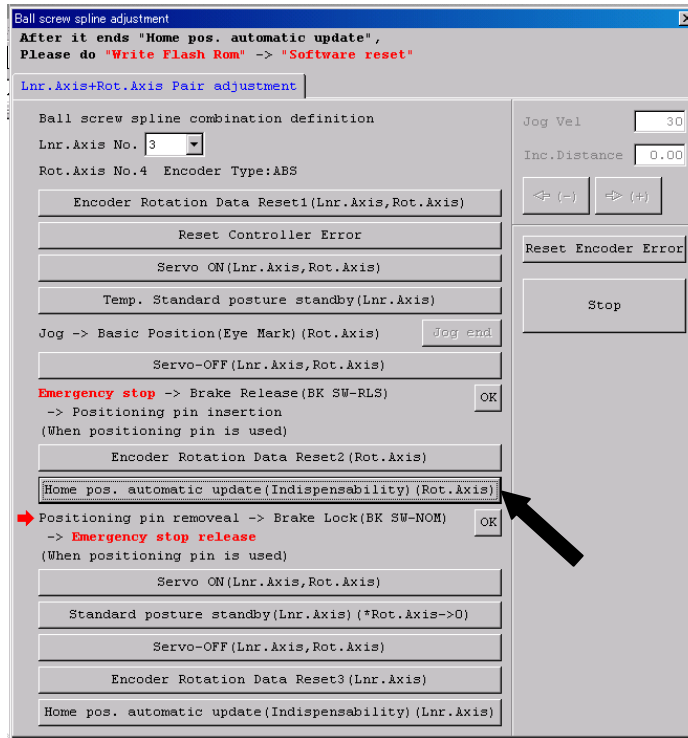
(15) When the dialog box appears, click the “Yes” button.



(16) When the dialog box appears, click the “Yes” button.



(17) Click the “Auto Refresh of Home Preset (Required) (Rotational Movement Axis)” button.

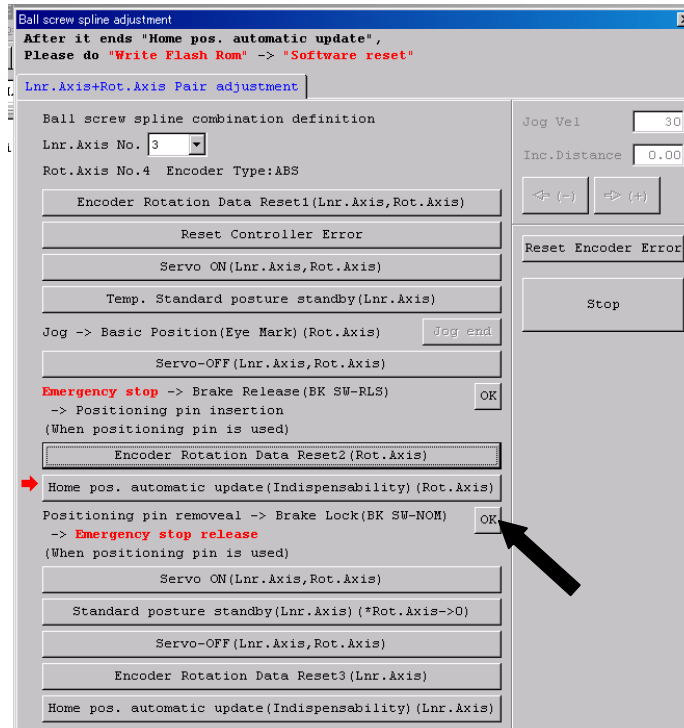


(18) Remove the adjustment jig.

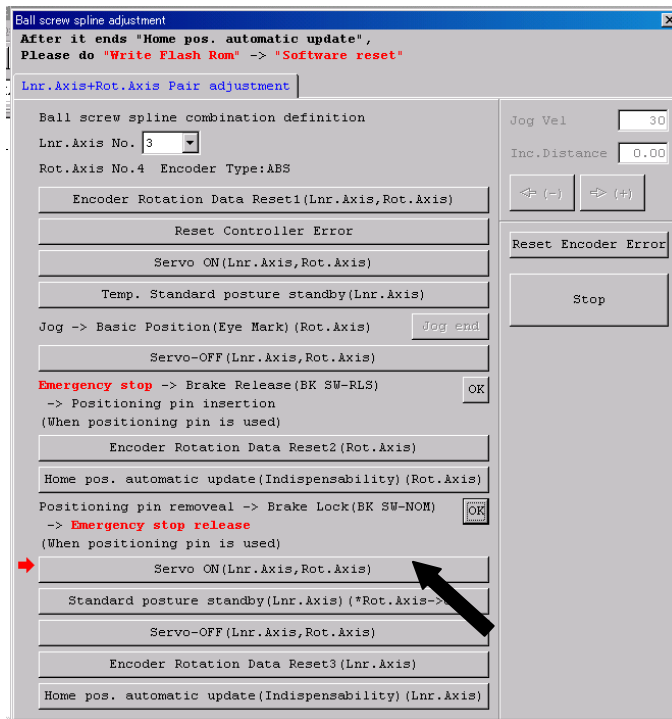
(19) Lock the brake (on the front panel of the controller).

(20) Cancel the emergency stop (by releasing the emergency stop button on the PC cable).

(21) Click the “Confirm” button.

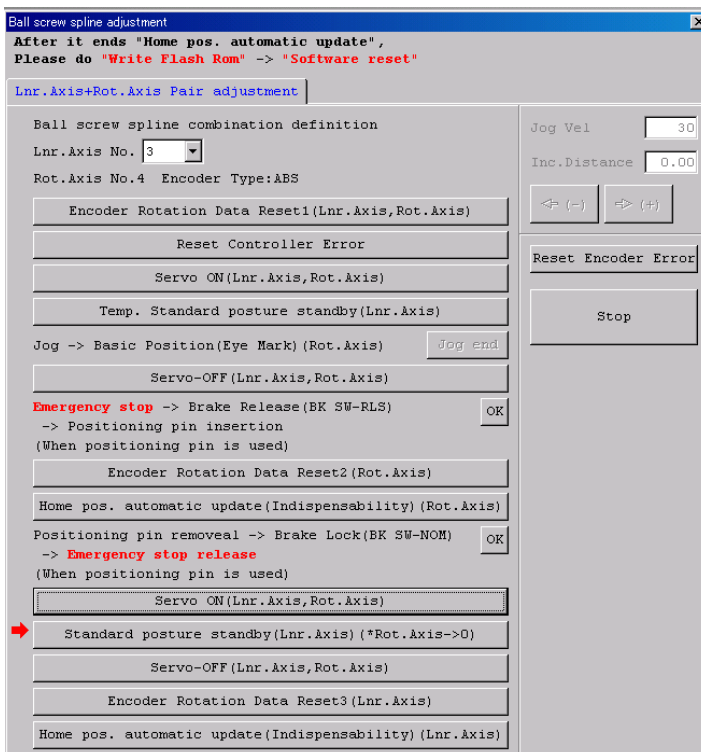


(22) Click the “Servo ON (Linear Movement Axis, Rotational Movement Axis)” button.

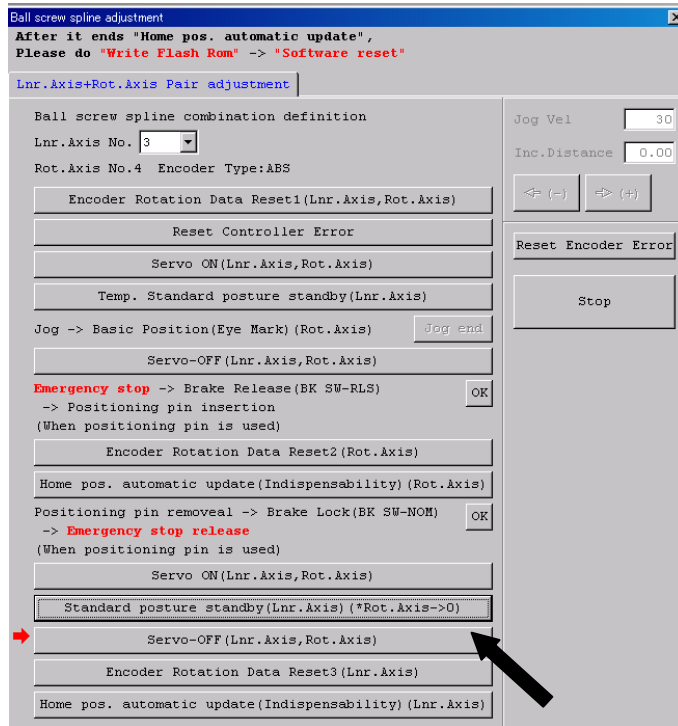


(23) Click the “Wait in Reference Position (Linear Movement Axis) (Rotational Movement Axis → 0)” button.

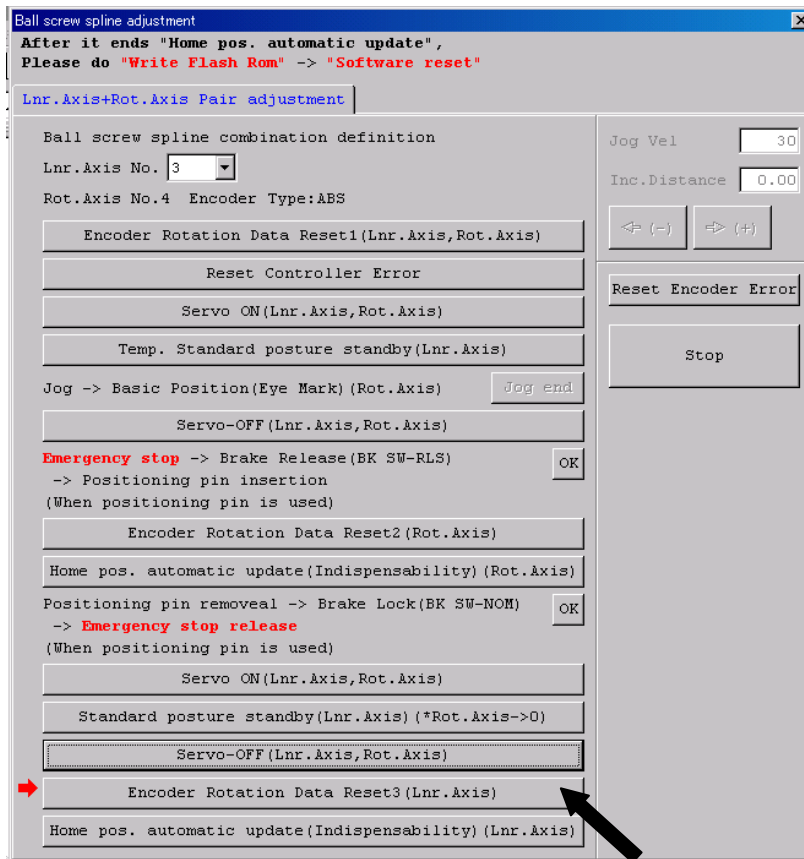
- Exercise caution because once the rotational movement axis (R-axis) moves to the zero point, the linear movement axis (Z-axis) will return home.



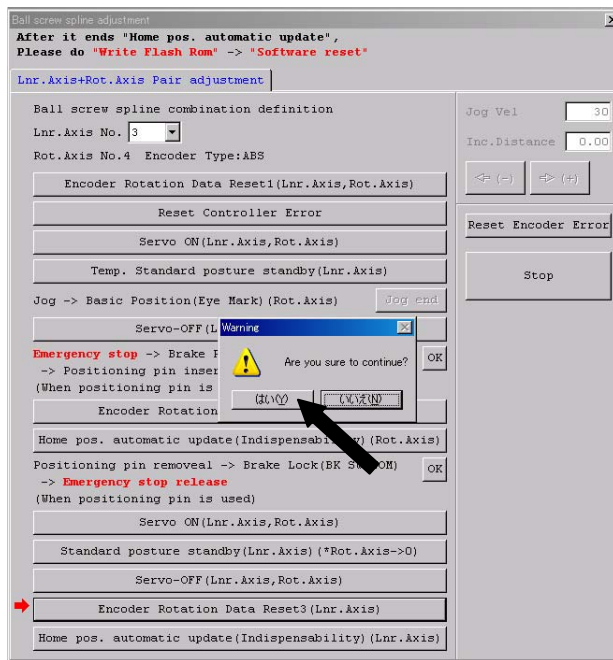
(24) Click the “Servo OFF (Linear Movement Axis, Rotational Movement Axis)” button.



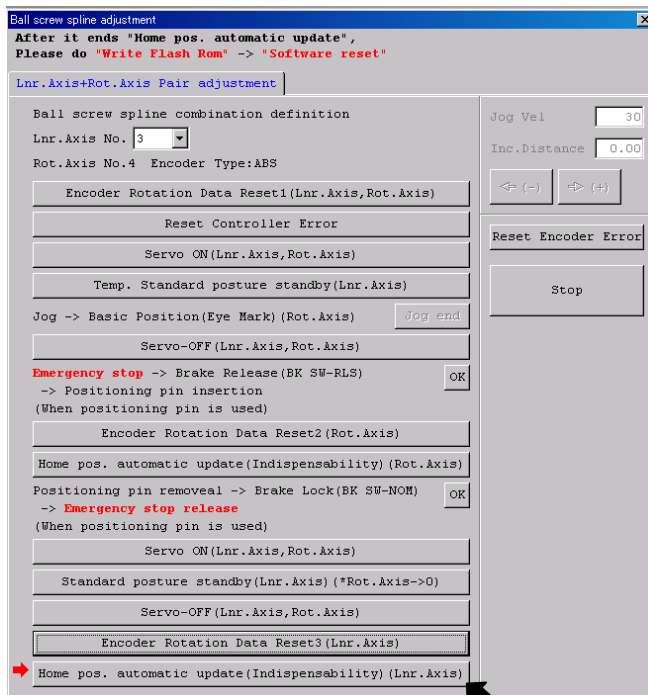
(25) Click the “Reset Encoder Rotation Data 3 (Linear Movement Axis)” button.



(26) When the dialog box appears, click the “Yes” button.



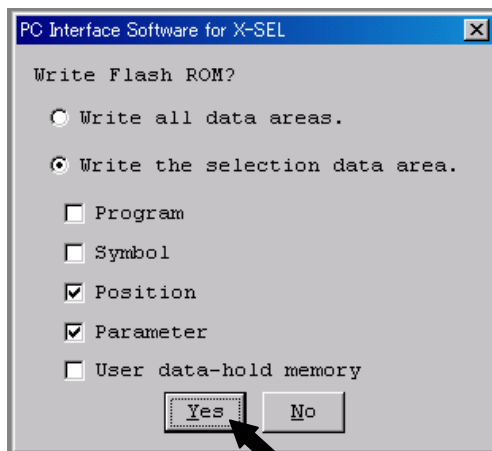
(27) Click the “Auto Refresh of Home Preset (Required) (Linear Movement Axis)” button, and then click “x” in the top right-hand corner of the window to close the window.



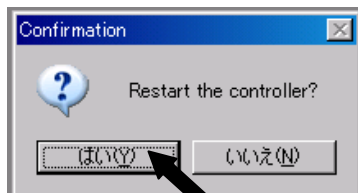
### Warning

- Be careful not to deviate from the specified steps, because it may result in position deviation.

- (28) When the ball screw spline adjustment window is closed after performing ball screw spline adjustment, the following screen appears. Click the “Yes” button.



- (29) When all data has been written to the flash ROM, the following screen appears. Click the “Yes” button.



## 15. Warranty

The ZR-series robot you have purchased passed IAI's strict shipping inspection. The warranty information is provided below.

### (1) Warranty period

One of the following periods, whichever expires first:

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

### (2) Scope of warranty

The warranty covers only the purchased and delivered IAI product.

If any failure is found during the warranty period despite use in appropriate conditions and such failure is clearly attributable to IAI, IAI will provide a replacement or repair the defective product free of charge.

However, failures due to the following causes are excluded from the scope of warranty:

- [1] Handling or use in any condition or environment not specified in the catalog, operation manual, etc.
- [2] Anything other than IAI's product
- [3] Modification or repair not performed by IAI or its agent
- [4] Not foreseeable at the science and technology standards available at the time of shipment from IAI
- [5] Act of God, natural disaster, accident or any other cause beyond IAI's control
- [6] Natural discoloration of paint or other aging
- [7] Wear of consumable parts (stainless sheet, etc.)
- [8] Sound or other subjective feeling not affecting the facility

Take note that the warranty specified herein covers only the delivered product. Any losses arising from a failure of the delivered product are excluded from the scope of warranty.

The defective product is delivered to IAI for repair service.

### (3) Limited liability

IAI shall under no circumstance be held liable for any special, indirect or passive losses arising from its product.

### (4) Scope of service

The price of the delivered product does not include the costs of programming, dispatching engineers, etc.

Accordingly, separate fees are charged for the following services even during the warranty period:

- Guidance of installation and adjustment, and witnessing of test operation
- Maintenance and inspection
- Technical guidance and training relating to operating methods, wiring methods, etc.
- Technical guidance and training relating to programming and other matters relating to programs
- Other services and tasks that are deemed subject to fees by IAI

## 16. Change History

Revision Date	Description of Revision
January 2009	First edition
December 2009	Added 14, "Appendix" and 14.1, "Absolute Reset Method."
April 2010	Added wiring diagrams for incremental and absolute specifications in 10, "Wiring."







## ***IAI America, Inc.***

Head Office: 2690 W. 237th Street, Torrance, CA 90505  
TEL (310) 891-6015 FAX (310) 891-0815  
Chicago Office: 1261 Hamilton Parkway, Itasca, IL 60143  
TEL (630) 467-9900 FAX (630) 467-9912  
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066  
TEL (678) 354-9470 FAX (678) 354-9471

website: [www.intelligentactuator.com](http://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 FX 021-6448-3992  
website: [www.iai-robot.com](http://www.iai-robot.com)