Quality and Innovation

Horizontal Articulated Robot - IXA Series

Standard Type / High Speed Type, Arm Length 180/300/450/600

IXA-3NNN1805 / 4NNN1805
-3N□N3015 / 4N□N3015
-3N□N45□□ / 4N□N45□□
-3N□N60□□ / 4N□N60□□

Instruction Manual

Second Edition ME3776-2B

IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

This Instruction Manual explains the handling methods, structure and maintenance of this product, 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.
- The product cannot be operated in any way unless expressly specified in this Instruction Manual.
  IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Instruction 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.
-
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

IXA SCARA Robot Instruction Manual Configuration

Product Name	Instruction Manual Name	Control Number
IXA SCARA Robot	First Step Guide	ME3777
IXA SCARA Robot	Instruction Manual (this document)	ME3776
XSEL-RAX/SAX Controller	XSEL-RA/SA/RAX/SAX/RAXD/SAXD Controller Instruction Manual	ME0359
PC Compatible Software for XSEL	IA-101-X-MW/IA-101-X-USBMW Instruction Manual	ME0154
Touch Panel Teaching	TB-01/01D/01DR Applicable for Program Controller Instruction Manual	ME0325
Touch Panel Teaching Pendant	TB-02/02D Applicable for Program Controller Instruction Manual	ME0356
Touch Panel Teaching	TB-03 Applicable for Program Controller Instruction Manual	ME0377

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Chapter 3 Wiring and Tubing

Chapter 4 Maintenance and Inspection

Chapter 5 External Dimensions

Chapter 6 Warranty

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Safety Guide

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

Industrial Robot Category of IAI Product

The industrial robot described in EU Directive is determined synonymous with “partly completed machinery” defined in Machinery Directive.
That is to say "an assembly, fitted with or intended to be fitted with a drive system other than directly applied human or animal effort, consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application".

In the product lineup in IAI catalog, all of the axes and controllers consisting of two or more axes in Cartesian Robot, IX/IXA/IXP SCARA Robot and TT/TTA Table Top Robot are applicable.

Safety Precautions for Our Products

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

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

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

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

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

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

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

Precaution Indications

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

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

Precautions for Handling

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

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

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

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

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

   Operation outside the warranty could cause decreased performance or product breakdown.

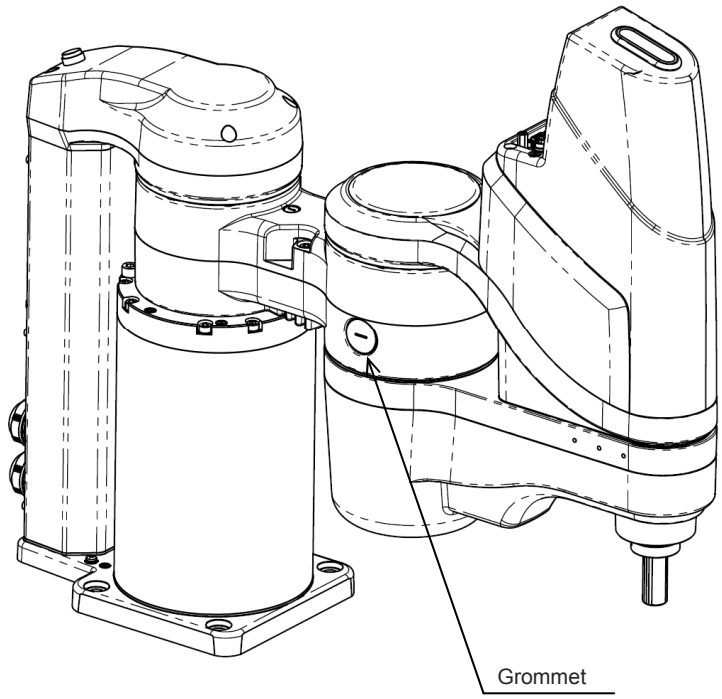
   Use within the allowable range for each item.

Item	Cautions for use	Problems or breakdowns which may occur if the allowable range is exceeded
Speed and acceleration/deceleration	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life.
Allowable moment of inertia	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life. Also, there is a concern of loss of robot control.
Tool diameter		A tool could interfere to the robot in the moving range.

5. Do not attempt to take off the grommet (hole cap) on the side of J1 Arm except for an occasion to replace the motor on J2 Axis for IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□.

There is a hole on the side of J1 Arm to put a tool in and tighten a screw, and the grommet is attached in order to cover up this hole.

Also, avoid to store or operate the robot with the grommet detached as it could cause critical damage to the robot due to contamination getting inside the robot.



⚠Warning: Do not attempt to turn J2 arm while the grommet is removed and a finger is put in the hole as it may cause a serious injury.

6. Change in the positioning width would not give any change to the positioning accuracy repeatability.

Change in the positioning width would not give any change to the positioning accuracy repeatability. In case you get the positioning width narrower than it was when delivered, even though there will be no change to the positioning accuracy repeatability, the time will be longer before the positioning complete signal gets issued. It could make the next operation command (such as MOVP and MOVL) late to be executed, thus the tact time of the entire cycle may become longer.

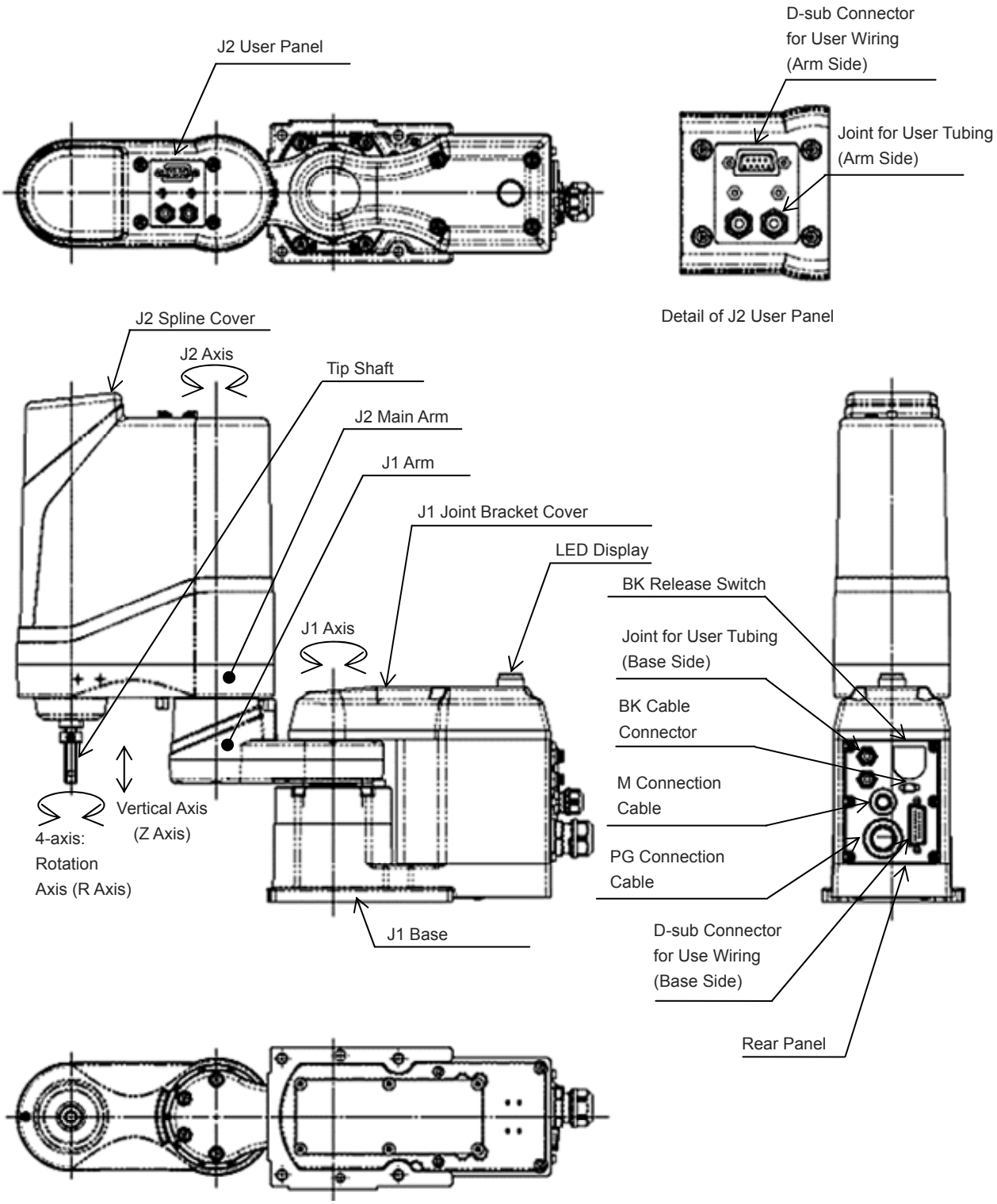
International Standard Compliance

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

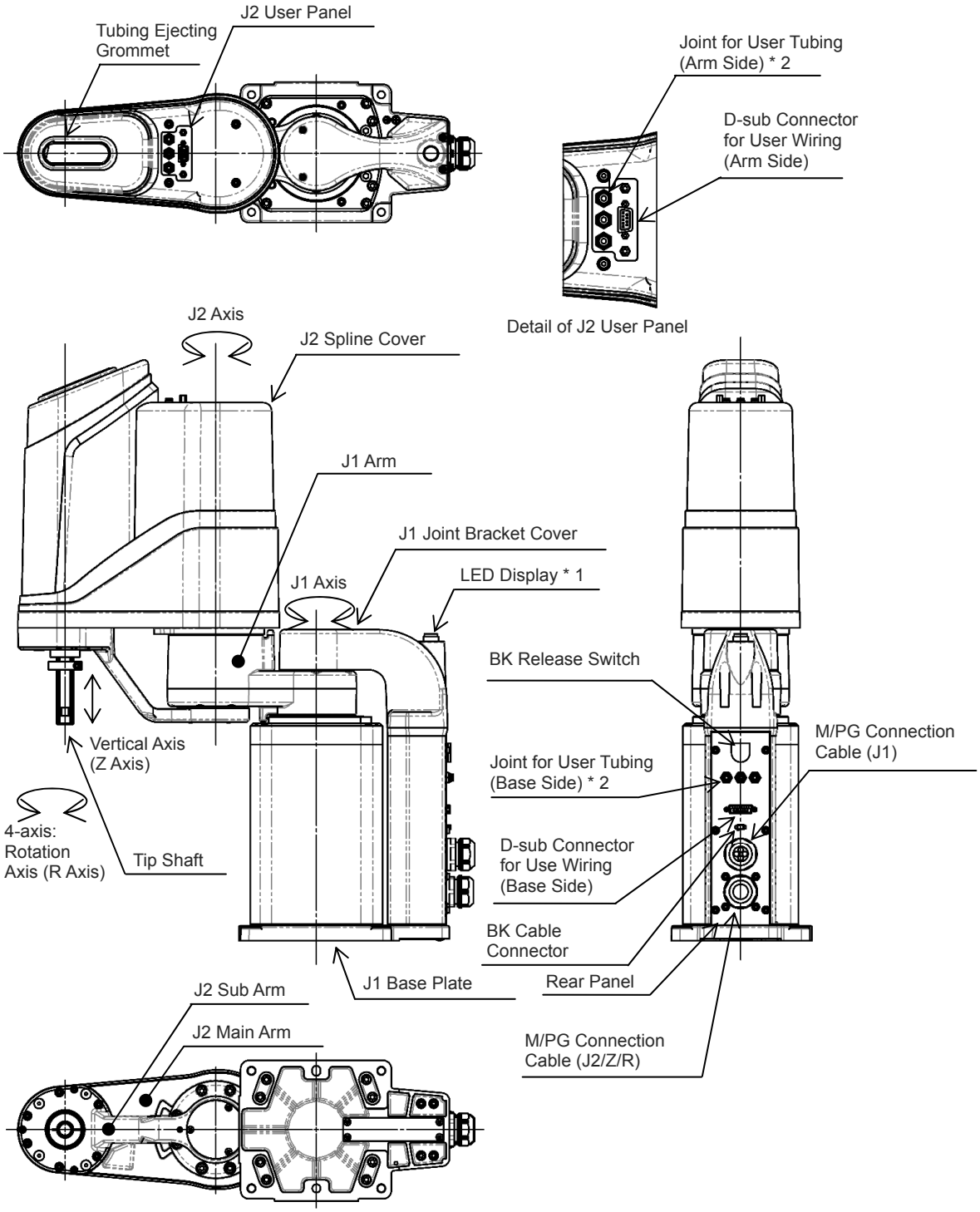
CE Marking	RoHS Directive
○	○

Names of the Parts

IXA-3NNN1805/4NNN1805

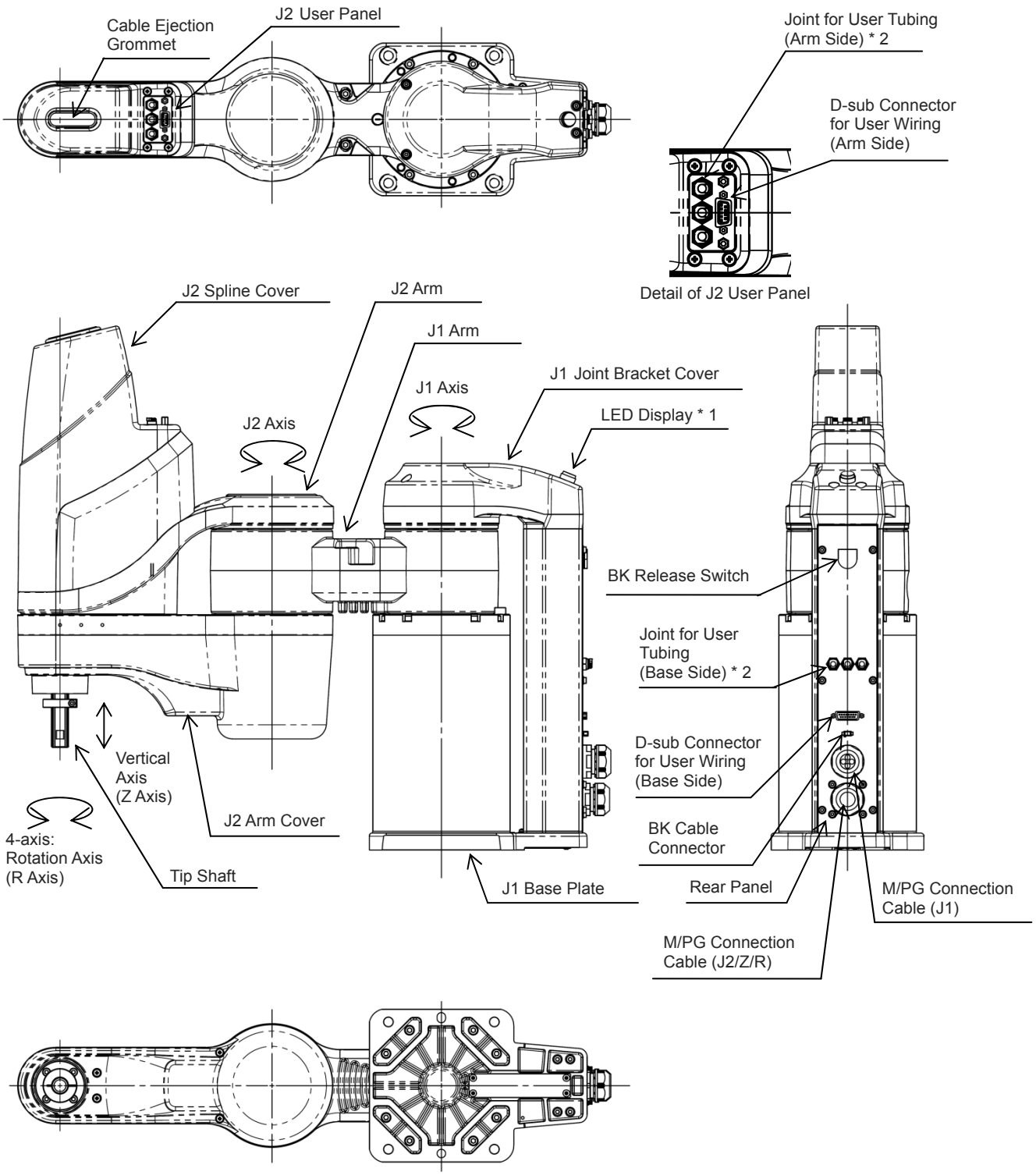


IXA-3NNN3015/3NSN3015/4NNN3015/4NSN3015



* 1 It should be equipped as an option (Model: LED) for the standard type NNN, and as a standard for the high-speed type NSN.
* 2 The standard type NNN should be equipped with a grommet, and the high-speed type NSN with a joint.
The standard type NNN should be equipped with an air tube stored inside the robot.

IXA-3NNN45□□/3NSN45□□/4NNN45□□/4NSN45□□
IXA-3NNN60□□/3NSN60□□/4NNN60□□/4NSN60□□

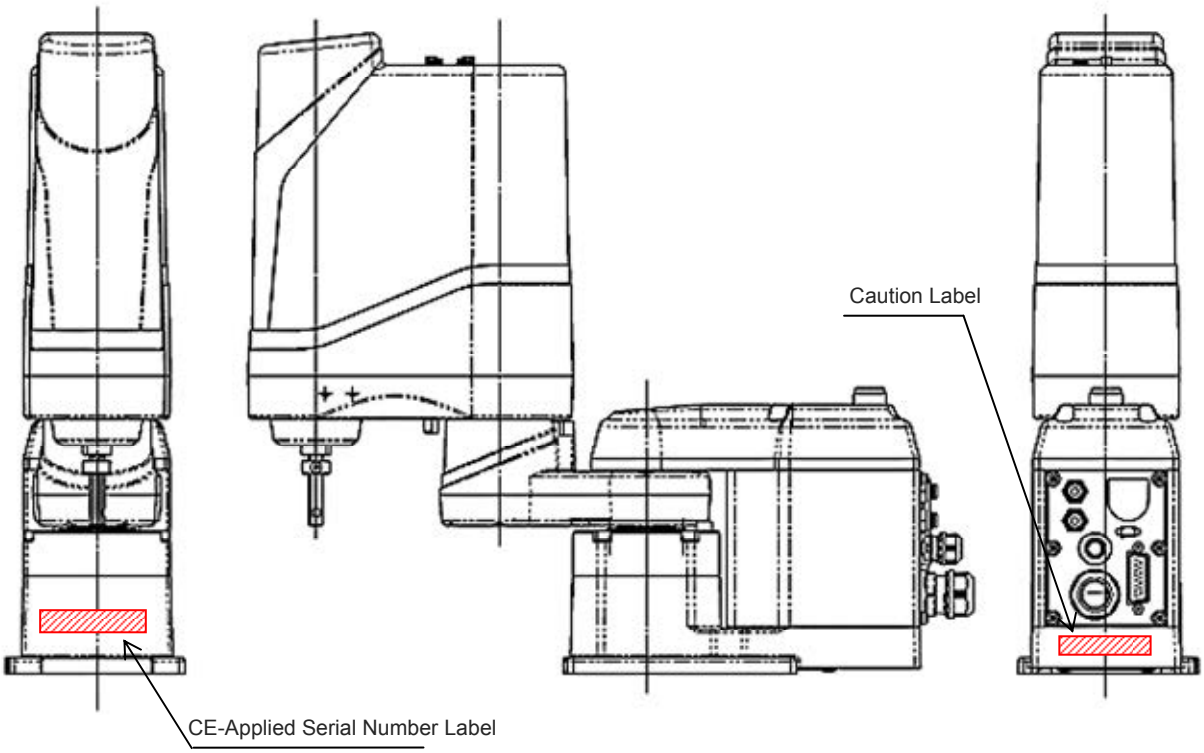


* 1 It should be equipped as an option (Model: LED) for the standard type NNN, and as a standard for the high-speed type NSN.
* 2 The standard type NNN should be equipped with a grommet, and the high-speed type NSN with a joint.
The standard type NNN should be equipped with an air tube stored inside the robot.

Display Labels

IXA-3NNN1805/4NNN1805

On the unit body, there are some labels attached as shown in the figures below. Caution and warning labels describe the necessary things in order to use the robot safely.

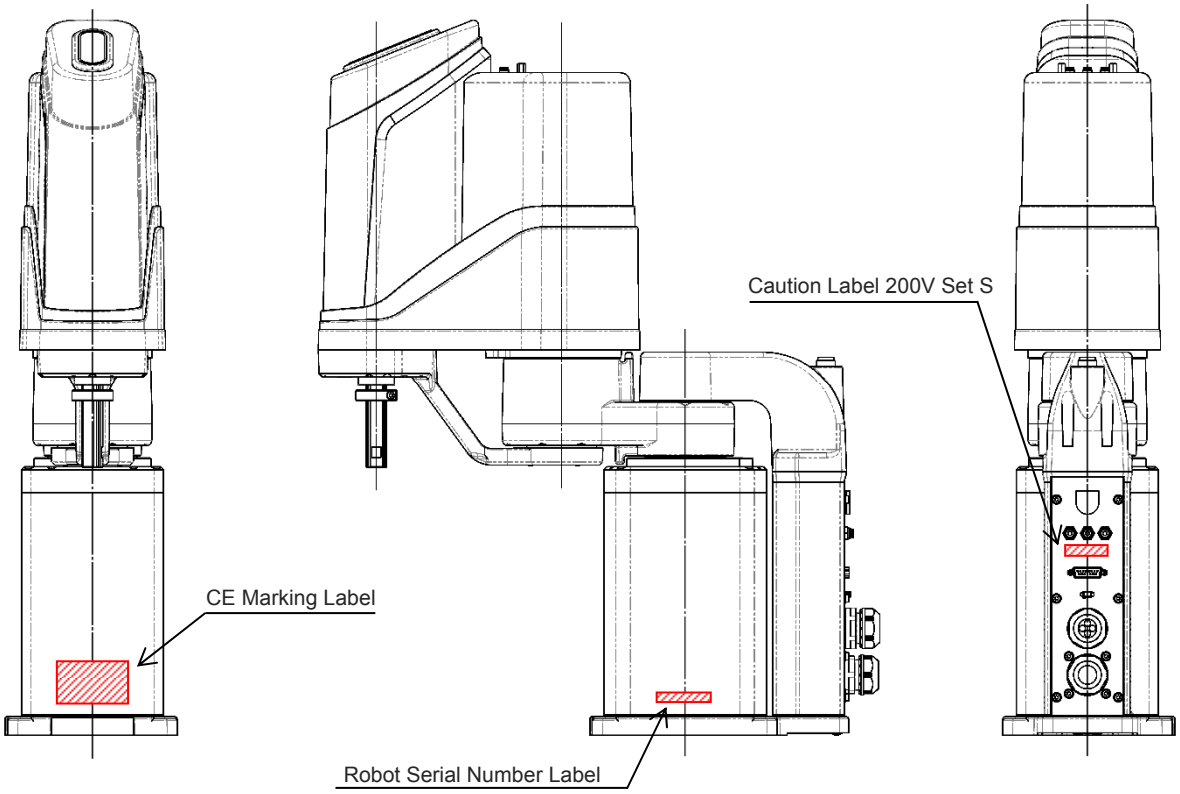


Prohibition Label of Entry into the Operation Area

* This label is enclosed. Attach it to a place on the device where it is easy to see.

IXA-3NNN3015/3NSN3015/4NNN3015/4NSN3015

On the unit body, there are some labels attached as shown in the figures below. Caution and warning labels describe the necessary things in order to use the robot safely.

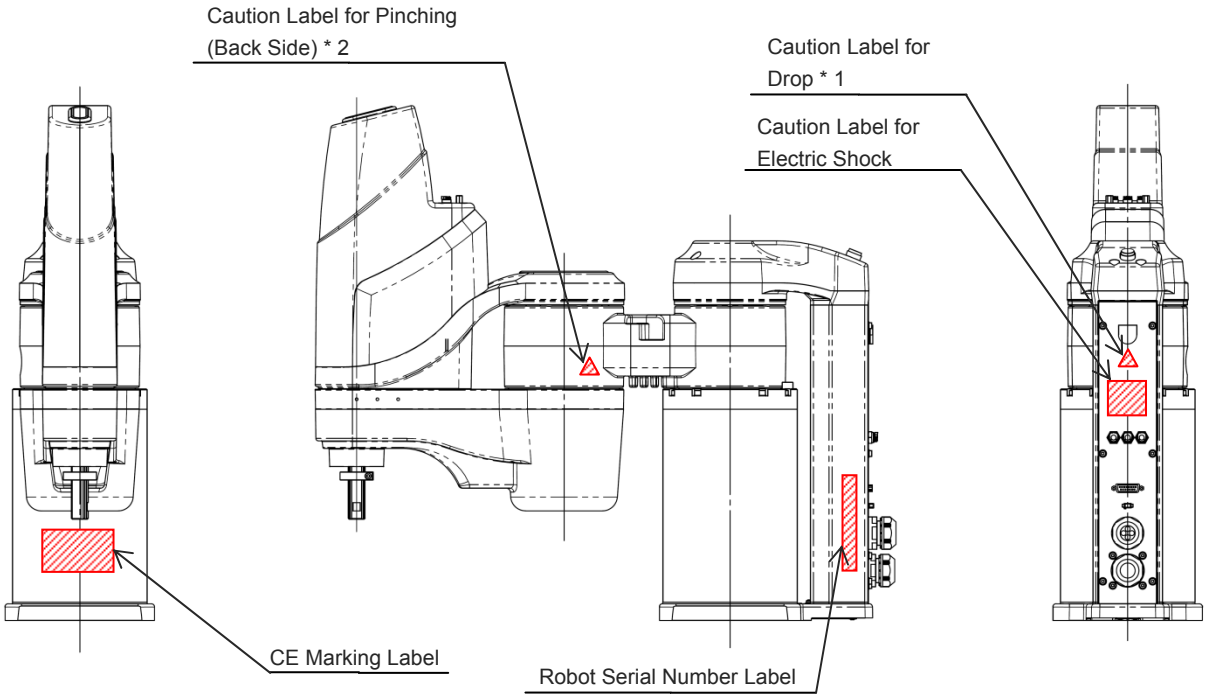


Prohibition Label of Entry into the Operation Area

* This label is enclosed. Attach it to a place on the device where it is easy to see.

IXA-3NNN45□□/3NSN45□□/4NNN45□□/4NSN45□□

On the unit body, there are some labels attached as shown in the figures below. Caution and warning labels describe the necessary things in order to use the robot safely.



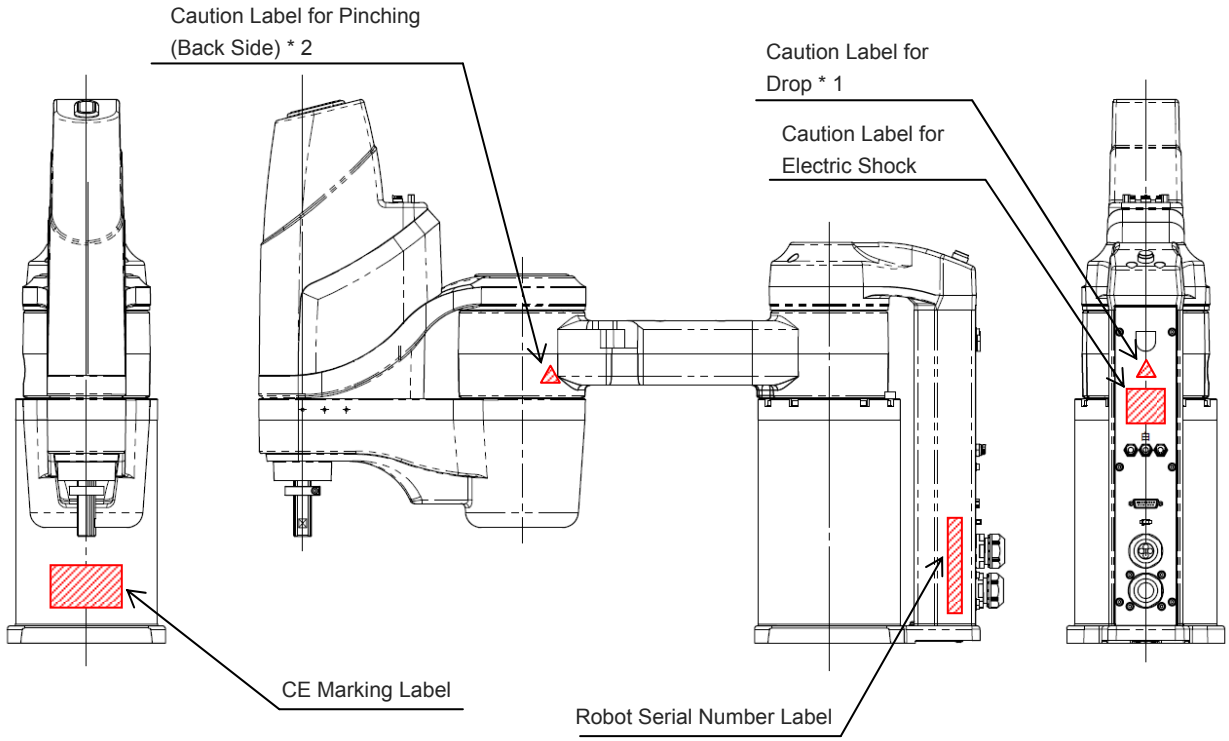
Prohibition Label of Entry into the Operation Area

* This label is enclosed. Attach it to a place on the device where it is easy to see.

* 1 [Refer to 3.3 Brake Switch for details]
* 2 [Refer to Precautions for Handling 5 for details]

IXA-3NNN60□□/3NSN60□□/4NNN60□□/4NSN60□□

On the unit body, there are some labels attached as shown in the figures below. Caution and warning labels describe the necessary things in order to use the robot safely.



Prohibition Label of Entry into the Operation Area

* This label is enclosed. Attach it to a place on the device where it is easy to see.

*1 [Refer to 3.3 Brake Switch for details]
*2 [Refer to Precautions for Handling 5 for details]

IXA SCARA Robot

Chapter 1

Specifications

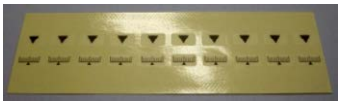
1.1 Product Check

Parts

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

<table>
<tr><th>Body</th><th colspan="2">Accessories</th></tr>
<tr><td>Actuator Quantity 1
  </td><td>Motor Cable
4-axis Type: Quantity 4
3-axis Type: Quantity 3
  </td><td>Encoder Cable
4-axis Type: Quantity 4
3-axis Type: Quantity 3
  </td></tr>
<tr><th colspan="3">Accessories</th></tr>
<tr><td>Brake Cable Quantity 1
  </td><td>Hex Socket Head Screw
Models Except for
IXA-□NNN1805: M8×8
IXA-□NNN1805: M5×5
Quantity 2

J1 Turning Limiting Stopper
  </td><td>Hex Socket Set Screw
Models Except for
IXA-□NNN1805: M8×10
IXA-□NNN1805: M5×5
Quantity 2

J1 Rotation Restriction Stopper
Screw Hole Plug
  </td></tr>
<tr><th colspan="3">Accessories</th></tr>
<tr><td>Positioning Mark Label
Quantity 1
  </td><td>Prohibition Label of Entry into
the Operation Area
Quantity 2
  </td><td>Cable Tie Quantity 10

To tie up connector covers on cables
  </td></tr>
</table>

Accessories (Documents/DVD)		
First Step Guide Quantity 1	Safety Guide Quantity 1	Instruction Manual DVD Quantity 1
		

How to Read the Model Nameplate

Model Code →
Serial Number →

MODEL IXA-4NSN3015-5L-T2-**-**
SERIAL No. xxxxxxxxx MADE IN JAPAN

[Nameplate Position]

[IXA-□NNN1805]

[IXA-□NNN/NSN3015]

[IXA-□NNN/NSN45□□]
[IXA-□NNN/NSN60□□]

How to Read the Model Number

IXA - 4NSN3015 - 5L - T2 - ** - **

<Series Name>
IXA SCARA Robot

< Degrees of Freedom >
3: 3-axis Type (With No R-axis)
4: 4-axis Type (With R-axis)

<Type>
NNN: Standard
NSN: High Speed

<Arm Length / Vertical Axis>
1805: Arm length 180mm / Vertical axis 50mm
3015: Arm length 300mm / Vertical axis 150mm
4518: Arm length 450mm / Vertical axis 180mm
4533: Arm length 450mm / Vertical axis 330mm
6018: Arm length 600mm / Vertical axis 180mm
6033: Arm length 600mm / Vertical axis 330mm

<Cable Length>
N : None
5L : 5m, 10L: 10m,
1805 : 3L: 3m, 5L: 5m,
□L : Length specification
(Maximum 15m)

<Applicable Controller>
T2: XSEL-RAX/SAX

<Option>
LED: Display (Note 2)

Identification for IAI use only (Note 1)

(Note 1) Identification for IAI use only: This may be marked for the purpose of IAI. It is not an ID to describe the model code.
(Note 2) It is an option for NNN3015, NNN4518, NNN4533, NNN6018 and NNN6033.

Product List

Type	Model Code	Axis Number	Arm Length (mm)		Vertical Stroke (mm)	Standard Cycle Time (s)	Continuous Cycle Time (s)	Max. Payload (kg)
			1st Arm	2nd Arm				
Standard Type	IXA-3NNN1805	3-axis	80	100	50	0.26	0.45	1
	IXA-4NNN1805	4-axis						
	IXA-3NNN3015	3-axis	120	180	150	0.38	0.55	3
	IXA-4NNN3015	4-axis						
	IXA-3NNN4518	3-axis	200	250	180			3
	IXA-4NNN4518	4-axis						
	IXA-3NNN4533	3-axis			330			
	IXA-4NNN4533	4-axis						
	IXA-3NNN6018	3-axis	350	250	180			6
	IXA-4NNN6018	4-axis						
	IXA-3NNN6033	3-axis			330			
	IXA-4NNN6033	4-axis						
High Speed Type	IXA-3NSN3015	3-axis	120	180	150	0.26	0.45	8
	IXA-4NSN3015	4-axis						
	IXA-3NSN4518	3-axis	200	250	180			10
	IXA-4NSN4518	4-axis						
	IXA-3NSN4533	3-axis			330			
	IXA-4NSN4533	4-axis						
	IXA-3NSN6018	3-axis	350	250	180			12
	IXA-4NSN6018	4-axis						
	IXA-3NSN6033	3-axis			330			
	IXA-4NSN6033	4-axis						

1.2 Specifications

Specifications

[1] Standard Type: IXA-□NNN1805

Axis Construction		Arm Length (mm)	Motor Wattage (W)	Movement Range	Positioning Repeatability Precision (mm) (Note 1)	Max. Operation Speed in PTP Operation (Note 2)
1 axis	1st Arm	80	50	±125degree	±0.01 (XY)	2638mm/s (Composite Speed)
2 axis	2nd Arm	100	50	±145degree		
3 axis	Vertical Axis	-	50	50mm	±0.01	850mm/s
4 axis * 1	Rotation Axis	-	50	±360degree	±0.01	1600degree/s

* 1 It is not available for 3-axis type.

Standard Cycle Time (s) (Note 3)	Continuous Cycle Time (s) (Note 3)	Payload (kg) (Note 4)	3rd Axis (Vertical Axis) Pressing Force Control Range (N)		4th Axis Allowable Load	
		Maximum	Upper Limit (Note 5)	Lower Limit (Note 5)	Allowable Inertia Moment (kg·m^2) (Note 6)	Allowable Torque (N·m)
0.26	0.45	1	40	5	0.004	0.35

Item	Contents
Encoder Type	Battery-less absolute encoder
User Wiring	10-core (9-core + Shield) AWG25 (Rating 30V/MAX1A)
User Tubing	2 Pieces of Air Tube with O.D. ϕ4 and I.D. ϕ2.5 (Max. Pressure 0.6MPa)
Alarm Display (Note 7)	1 Piece of Amber LED Small Display Lamp (Necessary to Supply 24V DC)
Brake Release Switch (Note 8)	Brake Release Switch to Prevent Vertical Axis Drop (Necessary to Supply 24V DC)
Surrounding Air Temperature/Humidity	Air temperature: 0 to 40°C Humidity: 20 to 85%RH or less (non-condensing)
Protection Class	IP20
Unit Mass	3-axis type: 5.8kg 4-axis type: 6.2kg
Noise (Note 9)	80dB or less
Cable Length	3L: 3m 5L: 5m ( ) L: Length specification Maximum 15m

*** Refer to Caution Note for those from (Note 1) to (Note 9).**

[2] Standard Type: IXA-□NNN3015

Axis Construction		Arm Length (mm)	Motor Wattage (W)	Movement Range	Positioning Repeatability Precision (mm) (Note 1)	Max. Operation Speed in PTP Operation (Note 2)
1 axis	1st Arm	120	400	±135degree	±0.01 (XY)	5529mm/s (Composite Speed)
2 axis	2nd Arm	180	200	±142degree		
3 axis	Vertical Axis	-	100	150mm	±0.01	1400mm/s
4 axis *1	Rotation Axis	-	100	±360degree	±0.005	1600degree/s

* 1 It is not available for 3-axis type.

Standard Cycle Time (s) (Note 3)	Continuous Cycle Time (s) (Note 3)	Payload (kg) (Note 4)	3rd Axis (Vertical Axis) Pressing Force Control Range (N)		4th Axis Allowable Load	
		Maximum	Upper Limit (Note 5)	Lower Limit (Note 5)	Allowable Inertia Moment (kg·m^2) (Note 6)	Allowable Torque (N·m)
0.38	0.55	3	60 or more	10 or more	0.06	3.2

Item	Contents
Encoder Type	Battery-less absolute encoder
User Wiring	10-core (9-core + Shield) AWG24 (Rating 30V/MAX1A)
User Tubing	3 Pieces of Air Tube with O.D. ϕ4 and I.D. ϕ2.5 (Max. Pressure 0.6MPa)
Alarm Display *2 (Note 7)	1 Piece of Amber LED Small Display Lamp (Necessary to Supply 24V DC)
Brake Release Switch (Note 8)	Brake Release Switch to Prevent Vertical Axis Drop (Necessary to Supply 24V DC)
Surrounding Air Temperature/Humidity	Air temperature: 0 to 40°C Humidity: 20 to 85%RH or less (non-condensing)
Protection Class	IP20
Unit Mass	3-axis type: 21.0kg 4-axis type: 22.0kg
Noise (Note 9)	80dB or less
Cable Length	5L: 5m 10L: 10m ( ) L: Length specification Maximum 15m

* 2 It should be equipped with the alarm display lamp when the option LED has been chosen.

*** Refer to Caution Note for those from (Note 1) to (Note 9).**

[3] Standard Type: IXA-□NNN45□□

Axis Construction		Arm Length (mm)	Motor Wattage (W)	Movement Range	Positioning Repeatability Precision (mm) (Note 1)	Max. Operation Speed in PTP Operation (Note 2)
1 axis	1st Arm	200	400	±137degree	±0.01 (XY)	7453mm/s (Composite Speed)
2 axis	2nd Arm	250	200	±137degree		
3 axis	Vertical Axis	-	100	180mm	±0.01	1200mm/s
				330mm		
4 axis * 1	Rotation Axis	-	100	±360degree	±0.005	2000degree/s

* 1 It is not available for 3-axis type.

Standard Cycle Time (s) (Note 3)	Continuous Cycle Time (s) (Note 3)	Payload (kg) (Note 4)	3rd Axis (Vertical Axis) Pressing Force Control Range (N)		4th Axis Allowable Load	
		Maximum	Upper Limit (Note 5)	Lower Limit (Note 5)	Allowable Inertia Moment (kg·m^2) (Note 6)	Allowable Torque (N·m)
0.38	0.55	3	55 or more	10 or more	0.05	3.2

Item		Contents
Encoder Type		Battery-less absolute encoder
User Wiring		10-core (9-core + Shield) AWG24 (Rating 30V/MAX1A)
User Tubing		3 Pieces of Air Tube with O.D. ϕ6 and I.D. ϕ4 (Max. Pressure 0.6MPa)
Alarm Display * 2 (Note 7)		1 Piece of Amber LED Small Display Lamp (Necessary to Supply 24V DC)
Brake Release Switch (Note 8)		Brake Release Switch to Prevent Vertical Axis Drop (Necessary to Supply 24V DC)
Surrounding Air Temperature/Humidity		Air temperature: 0 to 40°C Humidity: 20 to 85%RH or less (non-condensing)
Protection Class		IP20
Unit Mass	Arm Length 180mm	3-axis type: 25.5kg 4-axis type: 27.0kg
	Arm Length 330mm	3-axis type: 26.0kg 4-axis type: 27.5kg
Noise (Note 9)		80dB or less
Cable Length		5L: 5m 10L: 10m ( ) L: Length specification Maximum 15m

* 2 It should be equipped with the alarm display lamp when the option LED has been chosen.

*** Refer to Caution Note for those from (Note 1) to (Note 9).**

[4] Standard Type: IXA-□NNN60□□

Axis Construction		Arm Length (mm)	Motor Wattage (W)	Movement Range	Positioning Repeatability Precision (mm) (Note 1)	Max. Operation Speed in PTP Operation (Note 2)
1 axis	1st Arm	350	600	±137degree	±0.01 (XY)	5934mm/s (Composite Speed)
2 axis	2nd Arm	250	200	±140degree		
3 axis	Vertical Axis	-	200	180mm	±0.01	1600mm/s
				330mm		
4 axis * 1	Rotation Axis	-	100	±360degree	±0.005	2000degree/s

* 1 It is not available for 3-axis type.

Standard Cycle Time (s) (Note 3)	Continuous Cycle Time (s) (Note 3)	Payload (kg) (Note 4)	3rd Axis (Vertical Axis) Pressing Force Control Range (N)		4th Axis Allowable Load	
		Maximum	Upper Limit (Note 5)	Lower Limit (Note 5)	Allowable Inertia Moment (kg·m^2) (Note 6)	Allowable Torque (N·m)
0.38	0.55	6	110 or more	25 or more	0.06	3.2

Item		Contents
Encoder Type		Battery-less absolute encoder
User Wiring		10-core (9-core + Shield) AWG24 (Rating 30V/MAX1A)
User Tubing		3 Pieces of Air Tube with O.D. ϕ6 and I.D. ϕ4 (Max. Pressure 0.6MPa)
Alarm Display * 2 (Note 7)		1 Piece of Amber LED Small Display Lamp (Necessary to Supply 24V DC)
Brake Release Switch (Note 8)		Brake Release Switch to Prevent Vertical Axis Drop (Necessary to Supply 24V DC)
Surrounding Air Temperature/Humidity		Air temperature: 0 to 40°C Humidity: 20 to 85%RH or less (non-condensing)
Protection Class		IP20
Unit Mass	Arm Length 180mm	3-axis type: 30.5kg 4-axis type: 32.0kg
	Arm Length 330mm	3-axis type: 31.0kg 4-axis type: 32.5kg
Noise (Note 9)		80dB or less
Cable Length		5L: 5m 10L: 10m ( ) L: Length specification Maximum 15m

* 2 It should be equipped with the alarm display lamp when the option LED has been chosen.

*** Refer to Caution Note for those from (Note 1) to (Note 9).**

[5] High Speed Type: IXA-□NSN3015

Axis Construction		Arm Length (mm)	Motor Wattage (W)	Movement Range	Positioning Repeatability Precision (mm) (Note 1)	Max. Operation Speed in PTP Operation (Note 2)
1 axis	1st Arm	120	600	±135degree	±0.01 (XY)	6032mm/s (Composite Speed)
2 axis	2nd Arm	180	400	±142degree		
3 axis	Vertical Axis	-	150	150mm	±0.01	1600mm/s
4 axis *1	Rotation Axis	-	100	±360degree	±0.005	1600degree/s

* 1 It is not available for 3-axis type.

Standard Cycle Time (s) (Note 3)	Continuous Cycle Time (s) (Note 3)	Payload (kg) (Note 4)	3rd Axis (Vertical Axis) Pressing Force Control Range (N)		4th Axis Allowable Load	
		Maximum	Upper Limit (Note 5)	Lower Limit (Note 5)	Allowable Inertia Moment (kg·m^2) (Note 6)	Allowable Torque (N·m)
0.26	0.45	8	100 or more	25 or more	0.12	3.2

Item	Contents
Encoder Type	Battery-less absolute encoder
User Wiring	10-core (9-core + Shield) AWG24 (Rating 30V/MAX1A)
User Tubing	3 Pieces of Air Tube with O.D. ϕ4 and I.D. ϕ2.5 (Max. Pressure 0.6MPa)
Alarm Display (Note 7)	1 Piece of Amber LED Small Display Lamp (Necessary to Supply 24V DC)
Brake Release Switch (Note 8)	Brake Release Switch to Prevent Vertical Axis Drop (Necessary to Supply 24V DC)
Surrounding Air Temperature/Humidity	Air temperature: 0 to 40°C Humidity: 20 to 85%RH or less (non-condensing)
Protection Class	IP20
Unit Mass	3-axis type: 26.5kg 4-axis type: 27.5kg
Noise (Note 9)	80dB or less
Cable Length	5L: 5m 10L: 10m ( ) L: Length specification Maximum 15m

*** Refer to Caution Note for those from (Note 1) to (Note 9).**

[6] High Speed Type: IXA-□NSN45□□

Axis Construction		Arm Length (mm)	Motor Wattage (W)	Movement Range	Positioning Repeatability Precision (mm) (Note 1)	Max. Operation Speed in PTP Operation (Note 2)
1 axis	1st Arm	200	600	±137degree	±0.01 (XY)	8282mm/s (Composite Speed)
2 axis	2nd Arm	250	400	±137degree		
3 axis	Vertical Axis	-	200	180mm	±0.01	1600mm/s
				330mm		
4 axis *1	Rotation Axis	-	100	±360degree	±0.005	2000degree/s

* 1 It is not available for 3-axis type.

Standard Cycle Time (s) (Note 3)	Continuous Cycle Time (s) (Note 3)	Payload (kg) (Note 4)	3rd Axis (Vertical Axis) Pressing Force Control Range (N)		4th Axis Allowable Load	
		Maximum	Upper Limit (Note 5)	Lower Limit (Note 5)	Allowable Inertia Moment (kg·m^2) (Note 6)	Allowable Torque (N·m)
0.26	0.45	10	110 or more	25 or more	0.12	3.2

Item		Contents
Encoder Type		Battery-less absolute encoder
User Wiring		10-core (9-core + Shield) AWG24 (Rating 30V/MAX1A)
User Tubing		3 Pieces of Air Tube with O.D. ϕ6 and I.D. ϕ4 (Max. Pressure 0.6MPa)
Alarm Display (Note 7)		1 Piece of Amber LED Small Display Lamp (Necessary to Supply 24V DC)
Brake Release Switch (Note 8)		Brake Release Switch to Prevent Vertical Axis Drop (Necessary to Supply 24V DC)
Surrounding Air Temperature/Humidity		Air temperature: 0 to 40°C Humidity: 20 to 85%RH or less (non-condensing)
Protection Class		IP20
Unit Mass	Arm Length 180mm	3-axis type: 31.0kg 4-axis type: 32.5kg
	Arm Length 330mm	3-axis type: 31.5kg 4-axis type: 33.0kg
Noise (Note 9)		80dB or less
Cable Length		5L: 5m 10L: 10m ( ) L: Length specification Maximum 15m

*** Refer to Caution Note for those from (Note 1) to (Note 9).**

[7] High Speed Type: IXA-□NSN60□□

Axis Construction		Arm Length (mm)	Motor Wattage (W)	Movement Range	Positioning Repeatability Precision (mm) (Note 1)	Max. Operation Speed in PTP Operation (Note 2)
1 axis	1st Arm	350	750	±137degree	±0.01 (XY)	6414mm/s (Composite Speed)
2 axis	2nd Arm	250	400	±140degree		
3 axis	Vertical Axis	-	200	180mm	±0.01	1600mm/s
				330mm		
4 axis *1	Rotation Axis	-	100	±360degree	±0.005	2000degree/s

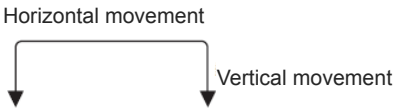
* 1 It is not available for 3-axis type.

Standard Cycle Time (s) (Note 3)	Continuous Cycle Time (s) (Note 3)	Payload (kg) (Note 4)	3rd Axis (Vertical Axis) Pressing Force Control Range (N)		4th Axis Allowable Load	
		Maximum	Upper Limit (Note 5)	Lower Limit (Note 5)	Allowable Inertia Moment (kg·m^2) (Note 6)	Allowable Torque (N·m)
0.26	0.45	12	110 or more	25 or more	0.12	3.2

Item		Contents
Encoder Type		Battery-less absolute encoder
User Wiring		10-core (9-core + Shield) AWG24 (Rating 30V/MAX1A)
User Tubing		3 Pieces of Air Tube with O.D. ϕ6 and I.D. ϕ4 (Max. Pressure 0.6MPa)
Alarm Display (Note 7)		1 Piece of Amber LED Small Display Lamp (Necessary to Supply 24V DC)
Brake Release Switch (Note 8)		Brake Release Switch to Prevent Vertical Axis Drop (Necessary to Supply 24V DC)
Surrounding Air Temperature/Humidity		Air temperature: 0 to 40°C Humidity: 20 to 85%RH or less (non-condensing)
Protection Class		IP20
Unit Mass	Arm Length 180mm	3-axis type: 31.5kg 4-axis type: 33.0kg
	Arm Length 330mm	3-axis type: 32.0kg 4-axis type: 33.5kg
Noise (Note 9)		80dB or less
Cable Length		5L: 5m 10L: 10m ( ) L: Length specification Maximum 15m

*** Refer to Caution Note for those from (Note 1) to (Note 9).**

Caution Note

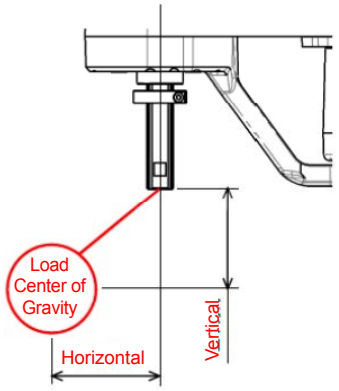
(Note 1) Positioning Repeatability Precision	It shows the positioning accuracy repeatability under condition of operating repeatedly in the same velocity, acceleration and deceleration in the same arm system between the two points of the operation start position and the positioning position (at a constant surrounding air temperature of 20degC). Please note that it is not positioning accuracy. Also, please be aware that the positioning accuracy repeatability may get out of the specification if the arm system was switched, positioning was held from multiple positions or the operation condition such as operation velocity, acceleration and deceleration was changed.
(Note 2) Max. Operation Speed in PTP Operation	The maximum operation velocity in the specification shows the movement in PTP command operation. Please note that there is a restriction in high-speed operation when in CP operation command (interpolation operation).
(Note 3) Standard Cycle Time Continuous Cycle Time	The standard cycle time and the continuous cycle time should be shown in the condition of driving round trip in the maximum speed. • IXA-□NNN1805 Carrying 0.2kg, vertical movement for 25mm and horizontal movement for 100mm • Models Except for IXA-□NNN1805 Carrying 2kg, vertical movement for 25mm and horizontal movement for 300mm  [Standard Cycle Time] It should be the time spent in maximum velocity operation. It should be referenced generally for the high-speed performance. Please note that continuous operation cannot be performed in high-speed operation. [Continuous Cycle Time] It shows the cycle time when performing in continuous operation.
(Note 4) Payload	Payload shows the maximum weight available for transportation. The optimum acceleration setting can be automatically established by setting the loaded weight and the moment of inertia. The acceleration gets smaller as the loaded weight gets larger.
(Note 5) 3rd Axis Pressing Force Control Range	The pressing force control range of the 3rd axis shows the pressing force to press an object on the tip of the vertical axis. It shows the pressing force of when there is no load attached on the 3rd axis. The upper limit shows the pressing force of when the pressing force setting (Driver Parameter No. 38) is 70%. The lower limit shows the pressing force of when the same setting is 20%. The pressing force is the value the pressing velocity is 10mm/s. (Note) Use PUSH Command for the pressing operation with vertical axis. (Note) The pressing velocity should be 10mm/s or less.

(Note 6) 4th Axis Allowable Inertia Moment

The allowable inertia moment of the 4th axis shows the value calculated at the center of rotation of the 4th axis of SCARA Robot(rotation axis).
Make sure to set the offset of the center of a tool gravity from the rotation center of the 4th axis should be within the value shown below. It is necessary to decrease the velocity and acceleration every time the distance between the position of a tool gravity and the center position of the 4th axis gets further.

(Note) It may be necessary to set the offset value in the horizontal direction smaller than the value stated in the table below depending on the setting of the payload, velocity and acceleration.
Refer to the graphs shown in 2.3 How to Install Attachment of the Load.

Model	Horizontal	Vertical
IXA-□NNN1805	30mm or less	20mm or less
IXA-□NNN3015 IXA-□NSN3015	150mm or less	100mm or less
IXA-□NNN45□□ IXA-□NNN60□□	120mm or less	100mm or less
IXA-□NSN45□□ IXA-□NSN60□□	180mm or less	100mm or less

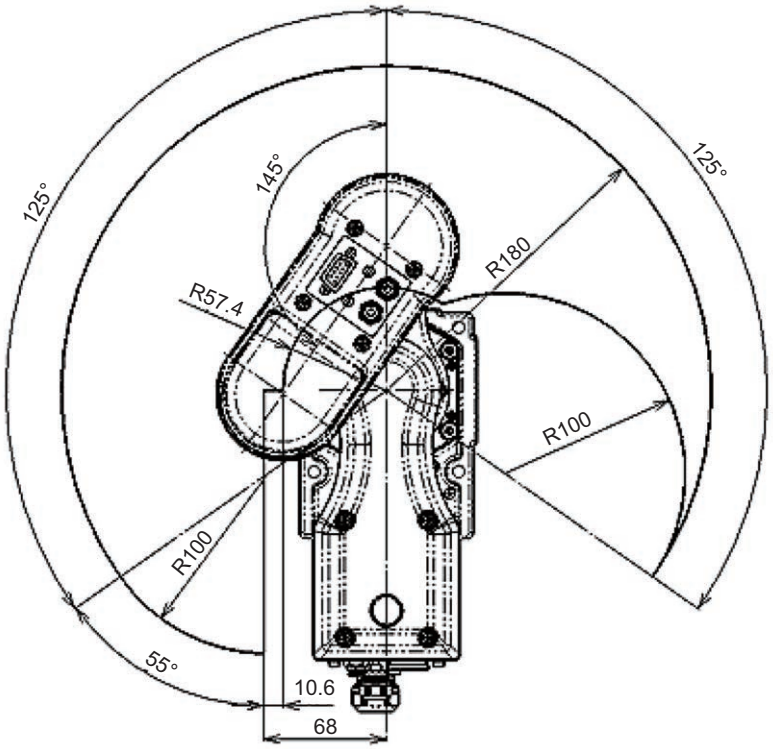


(Note 7) **Alarm Display**	Alarm display lamp is allocated on the top of the 1st axis (J1) base in SCARA Robot. It should be an option for the standard type NNN except for IXA-□NNN1805. (Option model code: LED) It can be turned on in such case as an error occurred in a controller. It needs to be activated by applying 24V DC to the LED terminal allocated in the user wiring by using the I/O output signal in the controller.
(Note 8) **Brake Release Switch**	The brake release switch is allocated in the back side of the 1st axis (J1) base. In order to release the brake, it is necessary to have 24V DC power supplied to the controller no matter if a brake release switch is to be used or not.
(Note 9) **Noise**	It is the measured value when all the axes are operated in the maximum velocity. The noise may change depending on the operational conditions and ambient reflection environment.

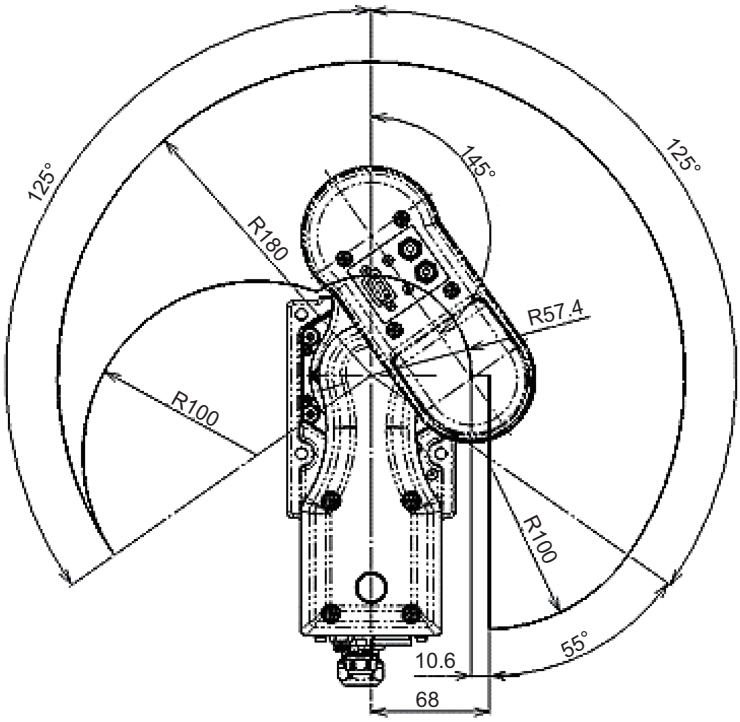
Operation Range

[IXA-□NNN1805]

● Right arm System

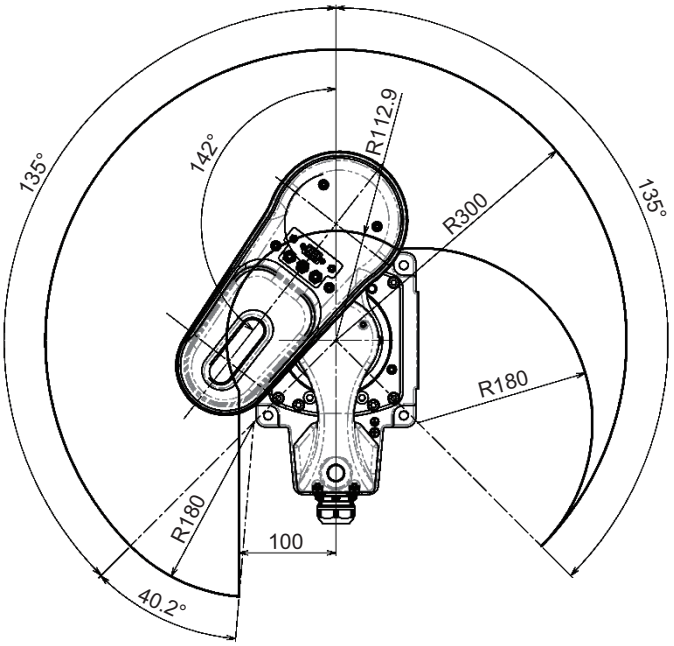


● Left arm System



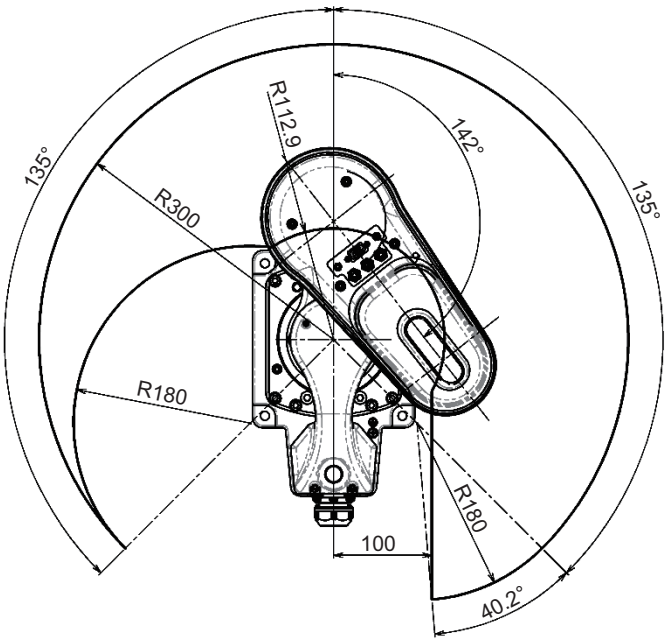
[IXA-□NNN3015/□NSN3015]

● Right arm System



Right Arm System Operation Range

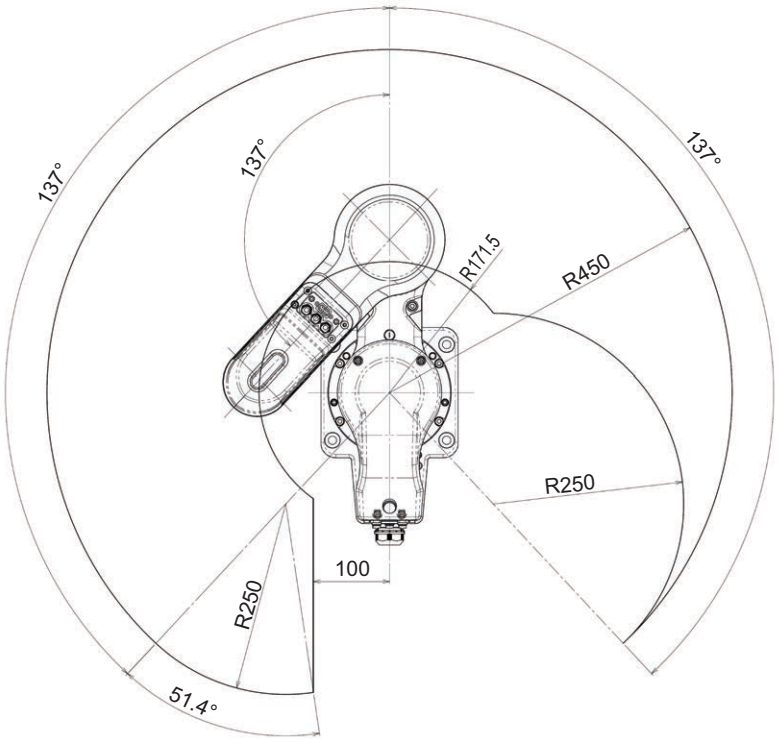
● Left arm System



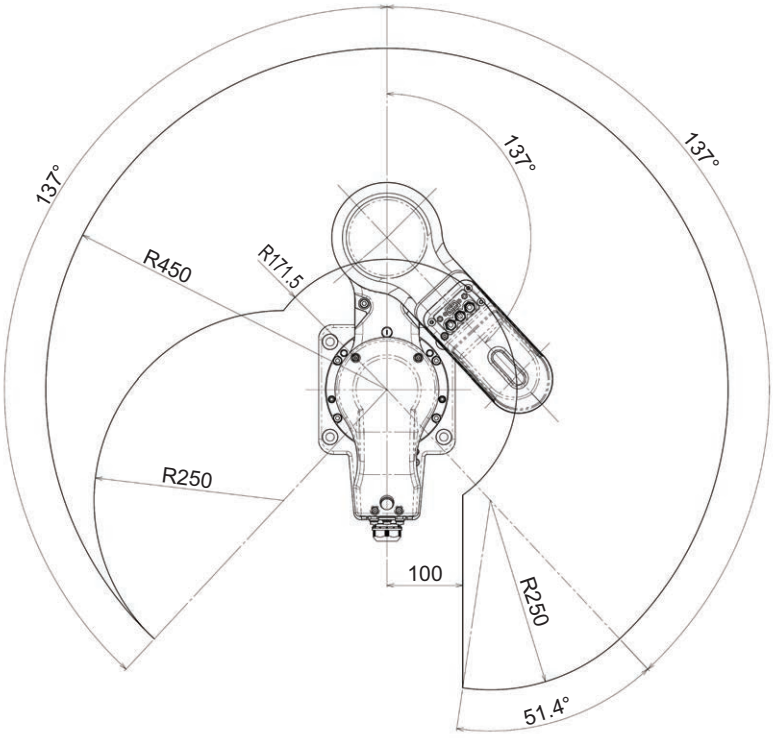
Left Arm System Operation Range

[IXA-□NNN45□□/□NSN45□□]

● Right arm System

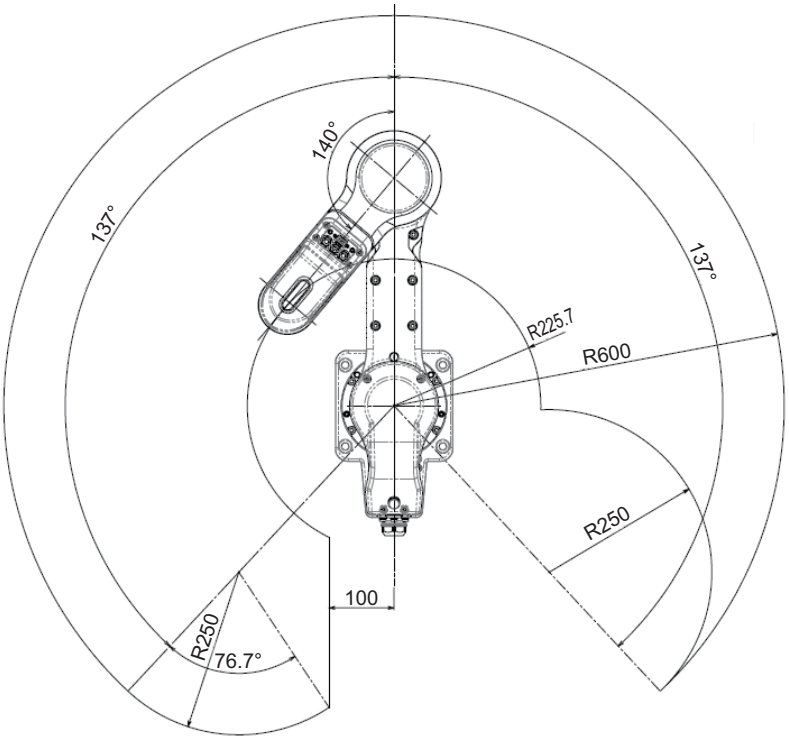


● Left arm System



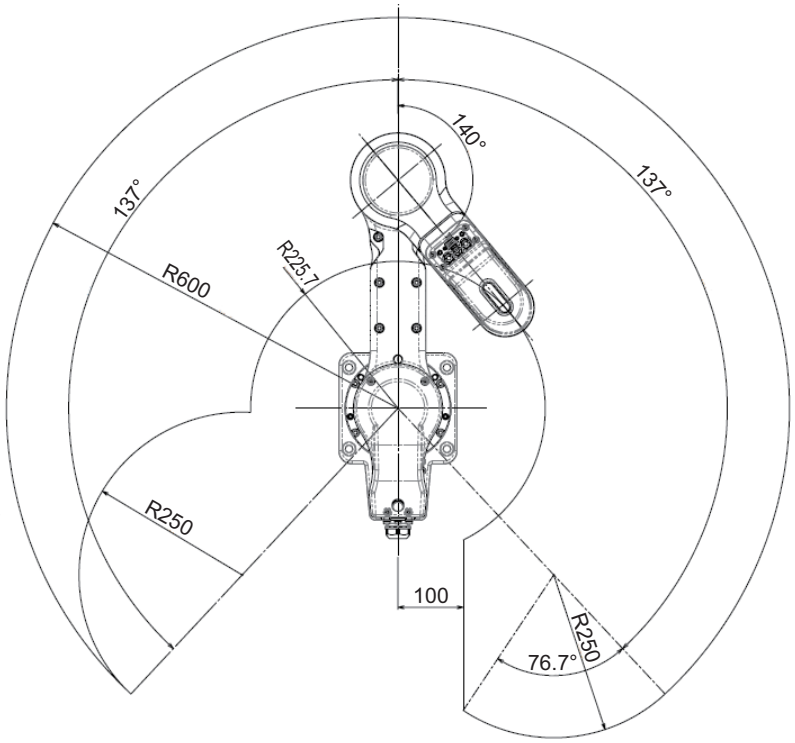
[IXA-□NNN60□□/□NSN60□□]

● Right arm System



Right Arm System Operation Range

● Left arm System



Left Arm System Operation Range

Operation Limit

When the load or the arm interferes with peripheral equipment or the absolute reset posture is to be changed, attach the enclosed hex socket head cap screw to the tapped hole for turning limitation on J1 axis. At this time, make sure to change the soft limit value certainly.
Also, there is no tapped hole for rotation limit equipped on the J2 axis.

● J1 Axis Turning Limit

[Procedure]

1) Attach the enclosed hex socket head cap screw to the tapped hole for turning limitation on J1 axis at the targeted position.

Model	Hex socket head cap screw
IX-□NNN1805	M5×5
Models Except for IXA-□NNN1805	M8×8

2) Select the “soft limit value (1st axis) in Each Axis Parameter No. 7 or No. 8” from table for each model and change the value.
3) It is available to change the home-return direction in “Home-Return End Search Direction Select in Each Parameter No. 11”. At this time, make sure to secure operation area enough to have the home-return posture so the axis would not have anything around it that interferes.

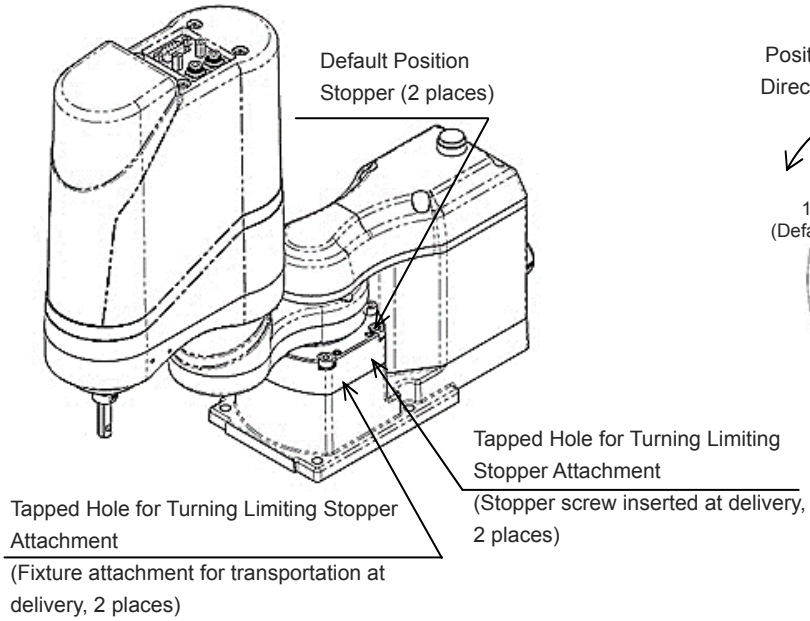
Caution

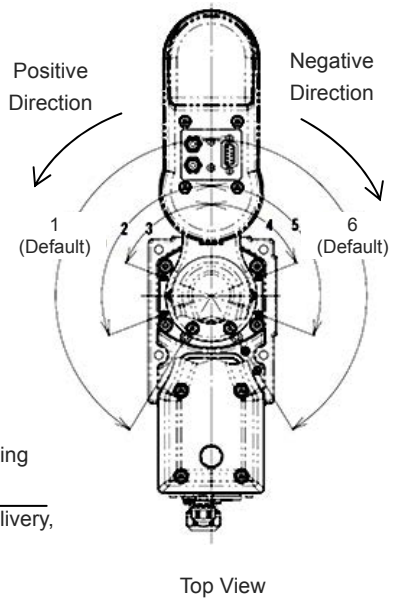
There may be a risk of robot malfunction or critical operational error such as crash to the stopper or unavailability of expected operation if the change of the soft limit value is not conducted after the turning limiting stopper is attached.

[IXA-□NNN1805]

Angle of J1 Axis Turning Limit and Parameters

No.	Stopper Position (ME) [degree]	Software Limitation [degree]	Angle from Software Limitation to ME [degree]	Parameter (Each Axis No. 7/No. 8, 1st Axis)
1	127	125	(2)	215000
2	91	89	(2)	179000
3	49	47	(2)	137000
4	-49	-47	(2)	43000
5	-91	-89	(2)	-1000
6	-127	-125	(2)	-35000



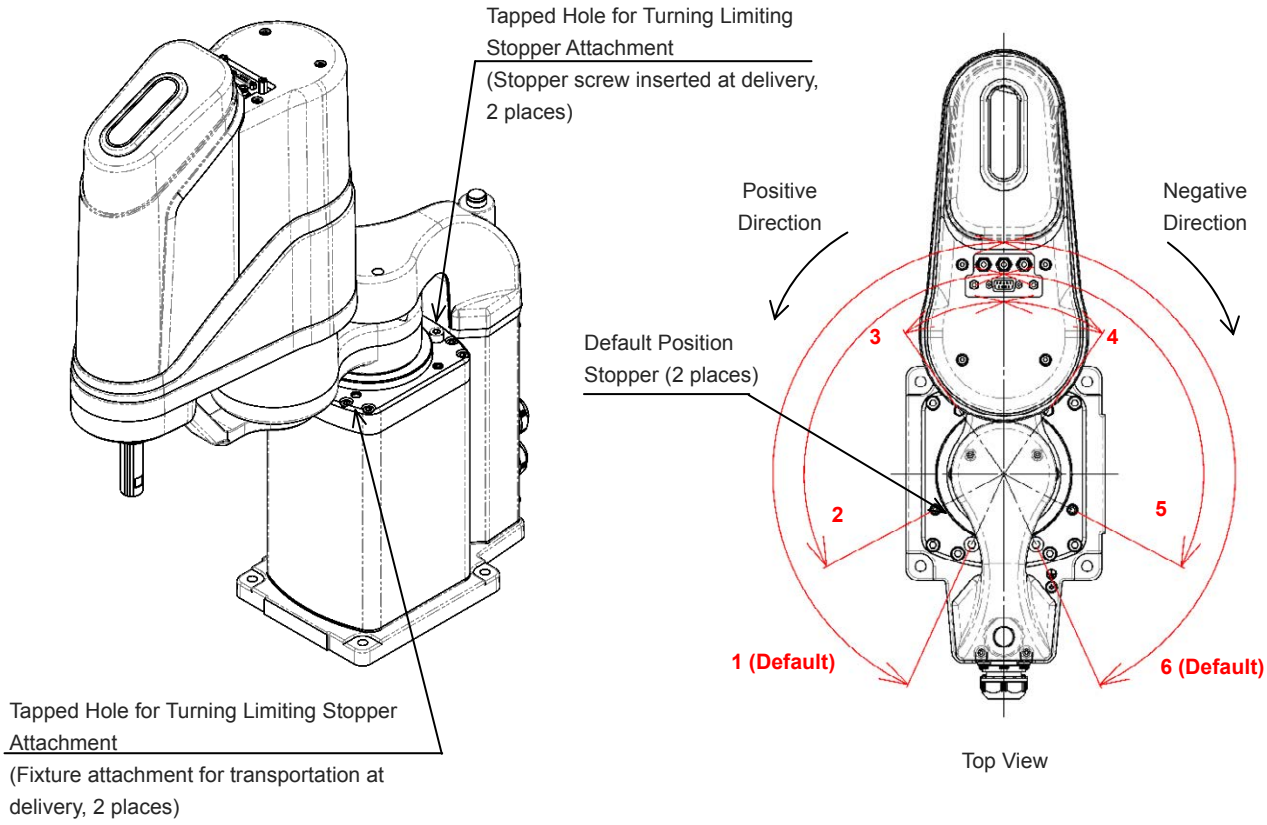


Top View

[IXA-□NNN3015/□NSN3015]

Angle of J1 Axis Turning Limit and Parameters

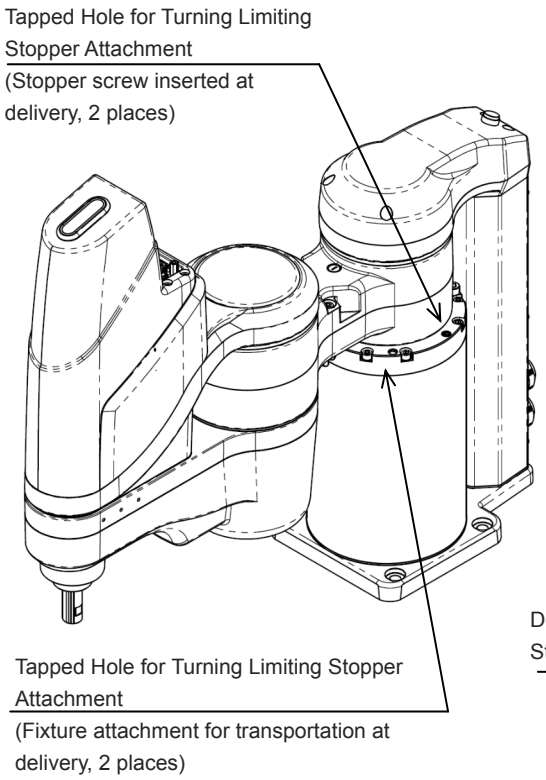
No.	Stopper Position (ME) [degree]	Software Limitation [degree]	Angle from Software Limitation to ME [degree]	Parameter (Each Axis No. 7/No. 8, 1st Axis)
1	138	135	(3)	225000
2	100	97	(3)	187000
3	17.5	14.5	(3)	104500
4	-17.5	-14.5	(3)	75500
5	-100	-97	(3)	-7000
6	-138	-135	(3)	-45000

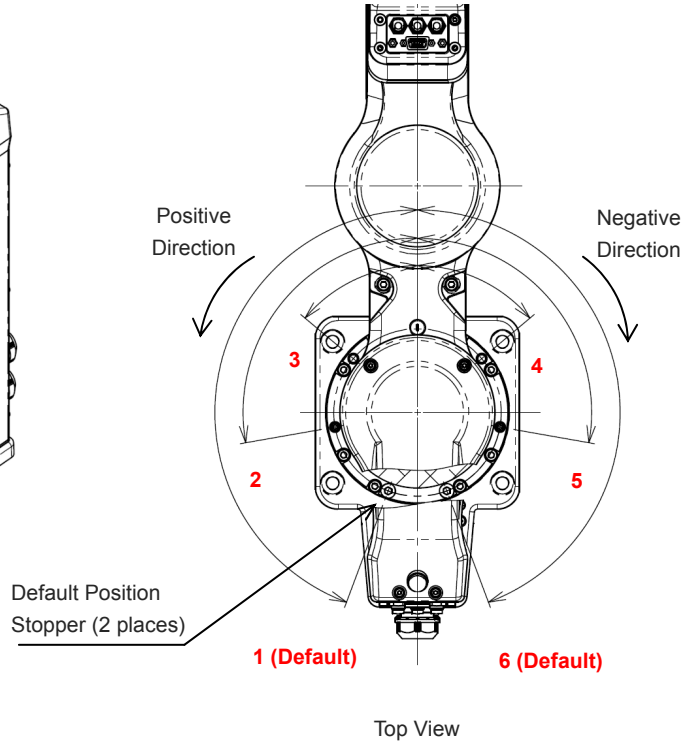


[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]

Angle of J1 Axis Turning Limit and Parameters

No.	Stopper Position (ME) [degree]	Software Limitation [degree]	Angle from Software Limitation to ME [degree]	Parameter (Each Axis No. 7/No. 8, 1st Axis)
1	140	137	(3)	227000
2	81.5	78.5	(3)	168500
3	31.5	28.5	(3)	118500
4	-31.5	-28.5	(3)	61500
5	-81.5	-78.5	(3)	11500
6	-140	-137	(3)	-47000





Speed/Acceleration and Transfer Load

● PTP Operation

Refer to the graphs for acceleration/deceleration velocity settings in the following pages as a reference to set the acceleration/deceleration velocity suitable to the payload.
The optimum velocity and optimum acceleration/deceleration feature adjusts the acceleration (ACCS Command) and deceleration (DCLS Command) set in values (%) to the velocity and acceleration/deceleration settings that are available for operation considering the payload and operation posture.
Adjust it to the velocity and acceleration/deceleration that you would like to target to.
The calculation formats of PTP acceleration and deceleration in PTP optimum acceleration/deceleration are as shown below:
The payload should be set with WGHT Command.

- PTP acceleration = Maximum acceleration determined by the load mass, etc. × ACCS command [%]
- PTP deceleration = Maximum deceleration determined by the load mass, etc. × DCLS command [%]

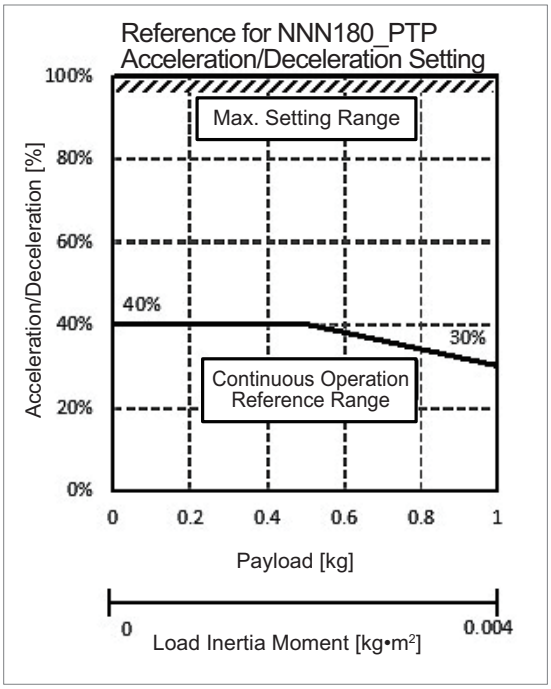
(Note) Some models such as IXA-□NNN45□□ are available to set the acceleration/deceleration high when the payload [kg] gets high. However, even if it is available to have the settings high, the optimum acceleration/deceleration feature will make the acceleration/deceleration low in the actual operation if the payload [kg] is high.

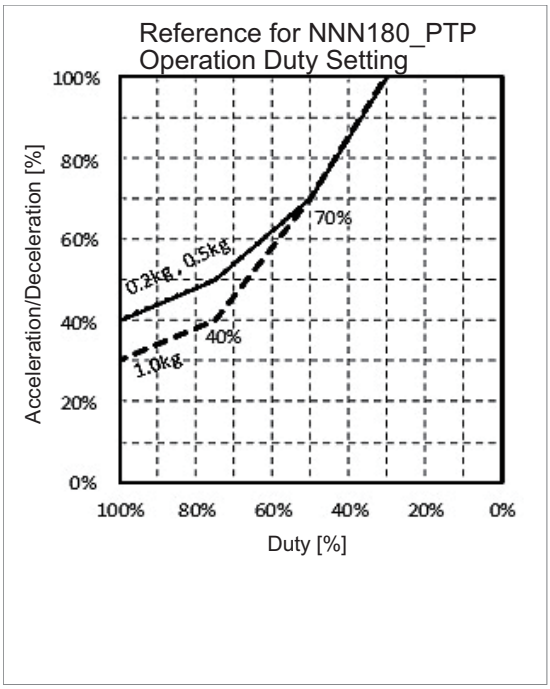
Caution

- Optimum acceleration/deceleration function is not what guarantees the availability of operation with any operational pattern.
- In case of remarkable vibration, decrease the speed and acceleration/deceleration to appropriate values, or it may cause malfunction or drop of product life.
  Follow the specified value for the offset from the shaft tip to the center of the load gravity.
  [Refer to “Attachment of the Load” in 2.3 How to Install]
- There may be a concern of vibration on the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Decrease the speed and acceleration / deceleration to appropriate values.
- Establish the appropriate settings for the load mass and the moment of inertia by using WGHT Command in a program.
  [Refer to SEL Language Programming Manual for how to establish settings]

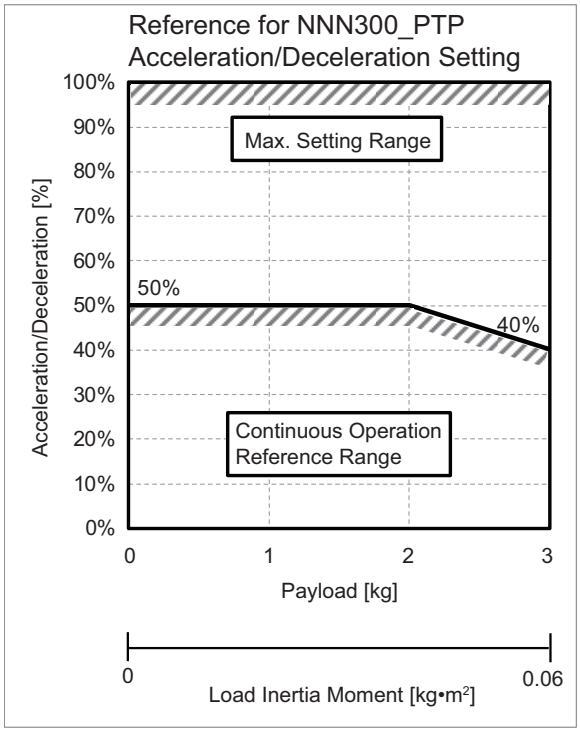
★ Reference for the Acceleration/Deceleration Setting

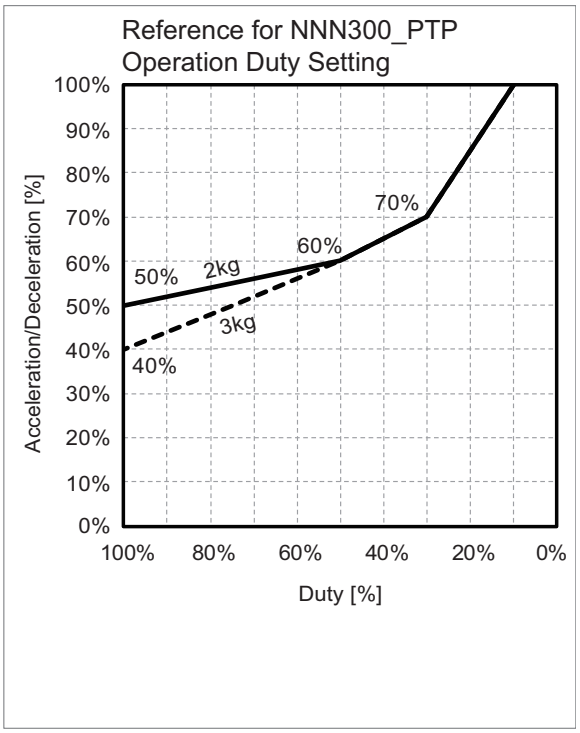
[IXA-□NNN1805]



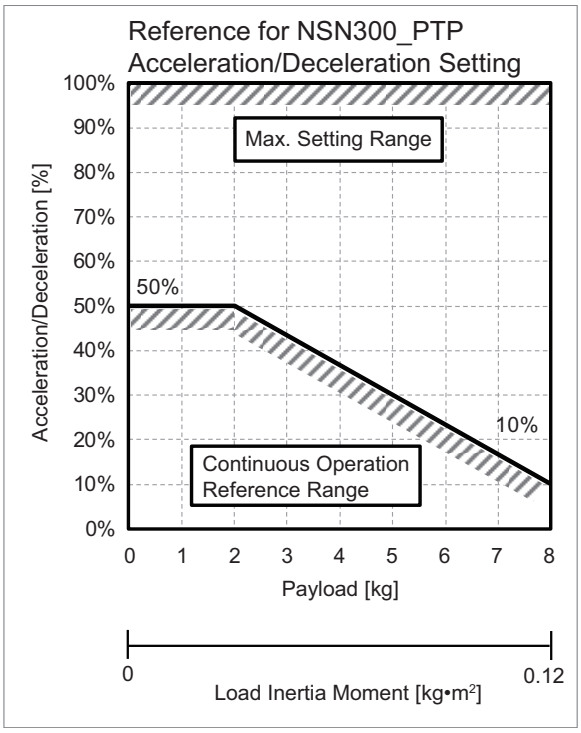


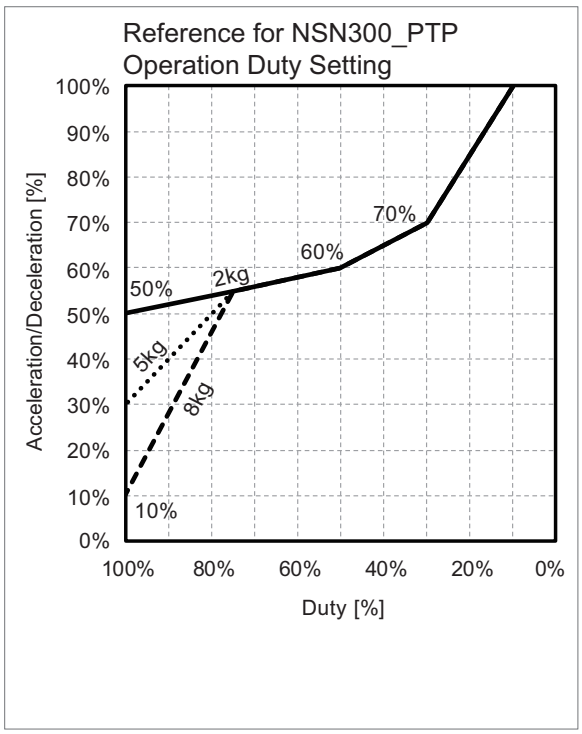
[IXA-□NNN3015]



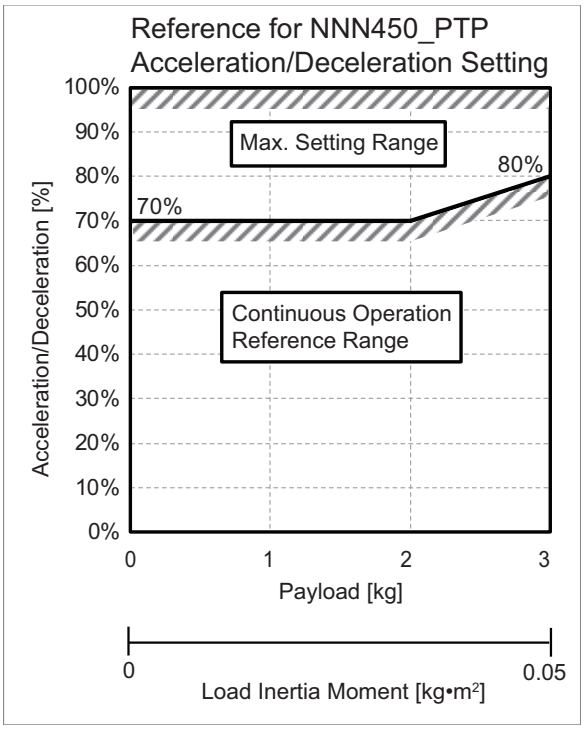


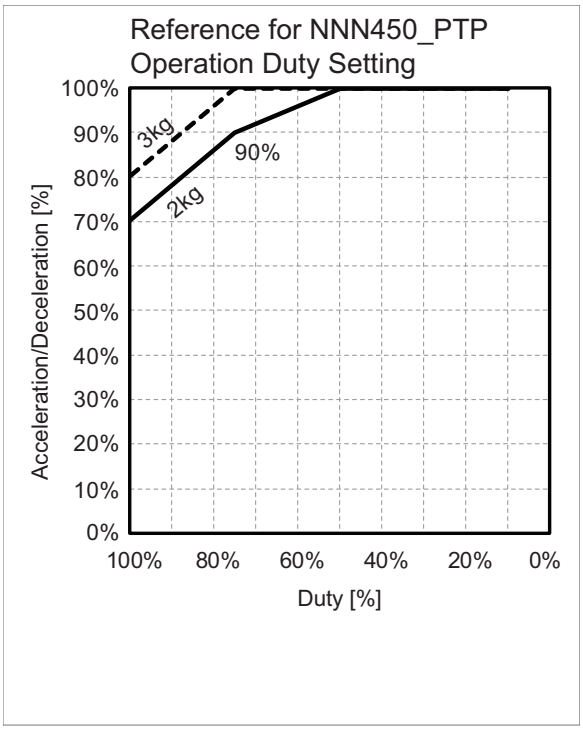
[IXA-□NSN3015]



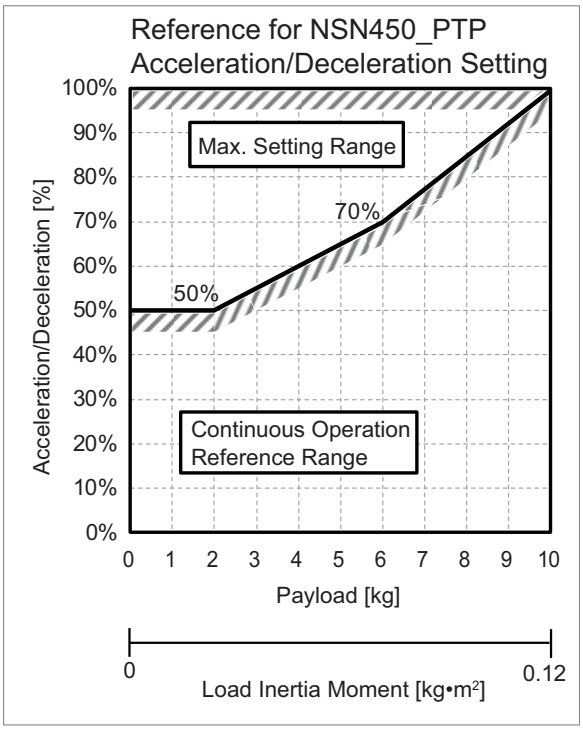


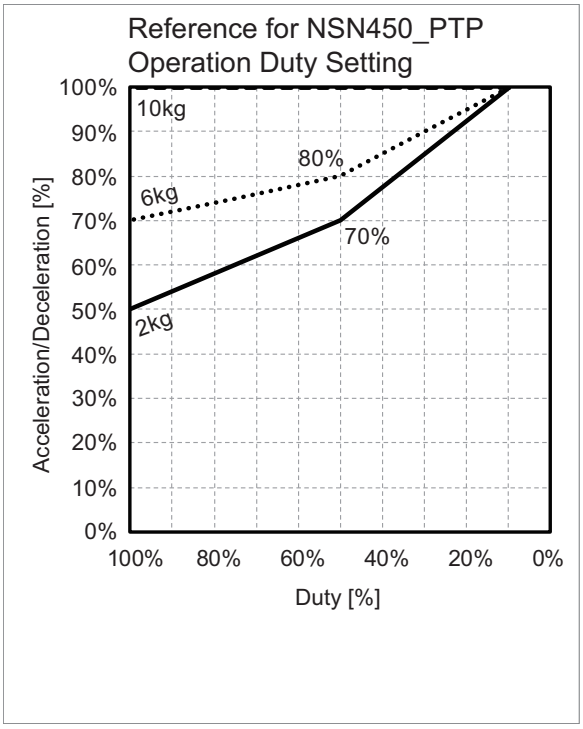
[IXA-□NNN45□□]



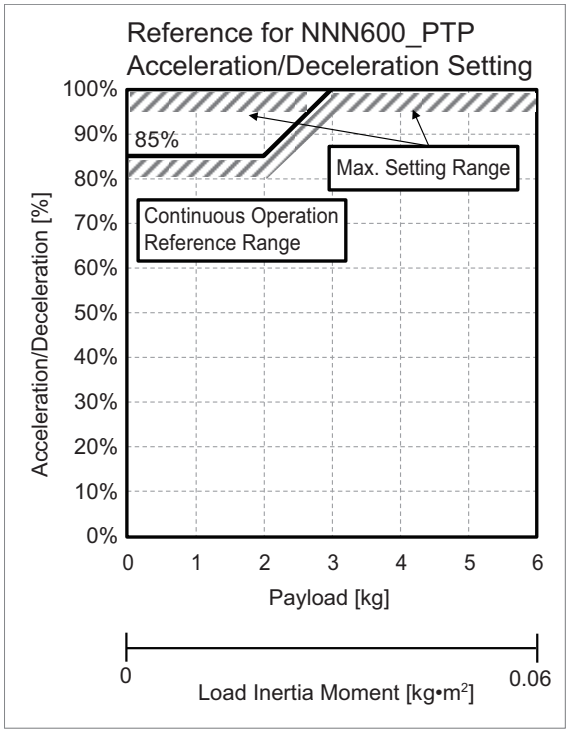


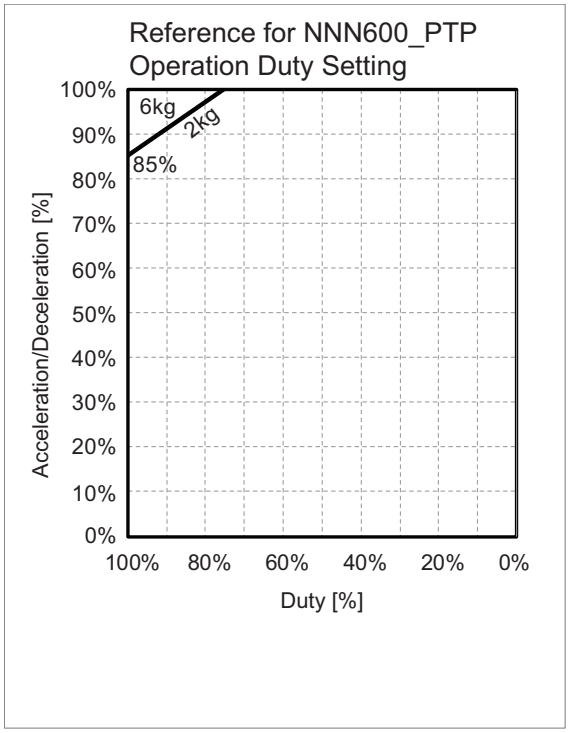
[IXA-□NSN45□□]



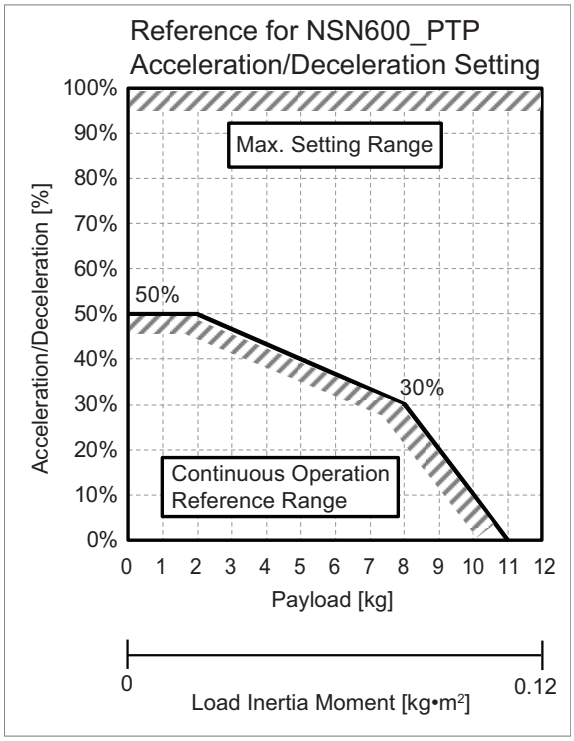


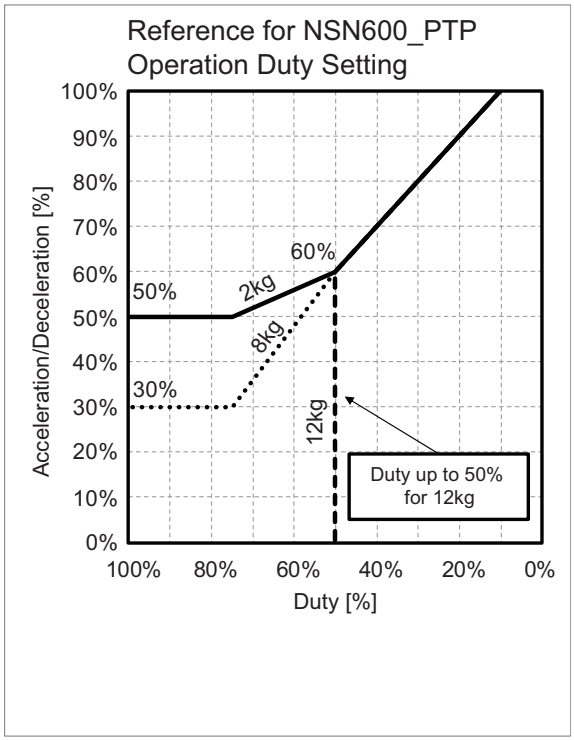
[IXA-□NNN60□□]





[IXA-□NSN60□□]





● CP Operation

Set the values in the graph in the next page as the upper limit for the velocity and acceleration/deceleration. Also, by setting the load weight and moment of inertia in WGHT Command in the program, it is available to make disabled to set any value above the value in the graph in the next page for the acceleration/deceleration.

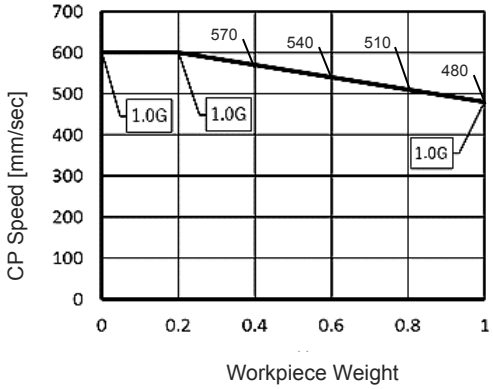
Caution

- In case of remarkable vibration, decrease the speed and acceleration/deceleration to appropriate values, or it may cause malfunction or drop of product life.
  Follow the specified value for the offset from the shaft tip to the center of the load gravity.
  [Refer to “Attachment of the Load” in 2.3 How to Install]
- There may be a concern of vibration on the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Decrease the speed and acceleration / deceleration to appropriate values.
- Establish the appropriate settings for the load mass and the moment of inertia by using WGHT Command in a program.
  [Refer to SEL Language Programming Manual for how to establish settings]

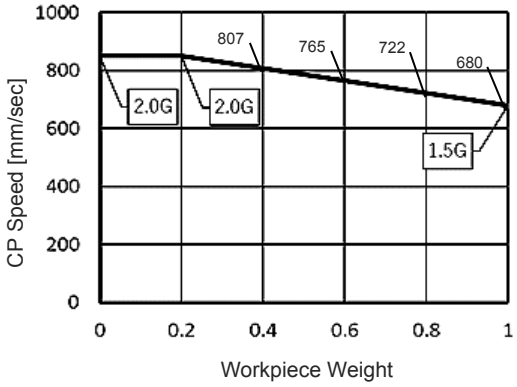
★ Limitation for Velocity and Acceleration/Deceleration

[IXA-□NNN1805]

Horizontal Operation with
No Vertical Axis (Z-Axis) Operation



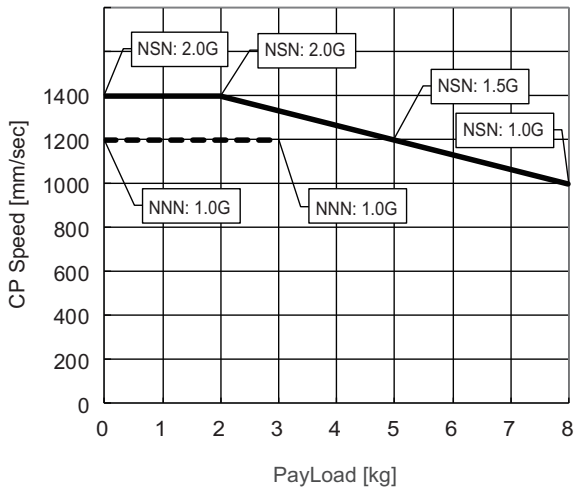
Operation Only in
Vertical Axis (Z-Axis) Operation



(Note) The acceleration/deceleration (G) in the range from 0.2kg to 1.0kg of the transportation payload should be the proportional values.

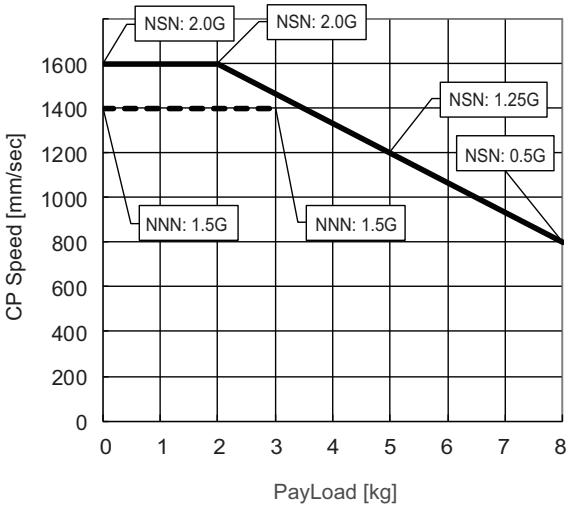
[IXA-□NNN3015/□NSN3015]

Horizontal Operation with
No Vertical Axis (Z-Axis) Operation



(Note) The acceleration/deceleration (G) in the range from 2kg to 8kg of the transportation payload for NSN should be the proportional values.

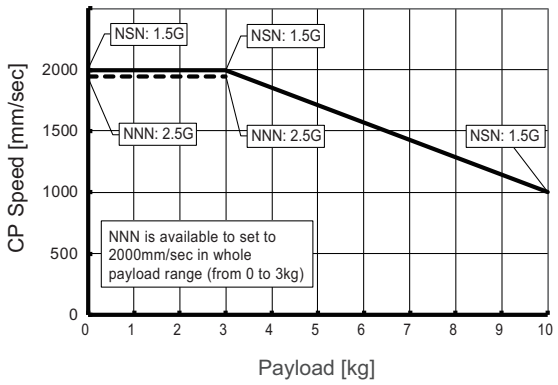
Operation Only in
Vertical Axis (Z-Axis) Operation



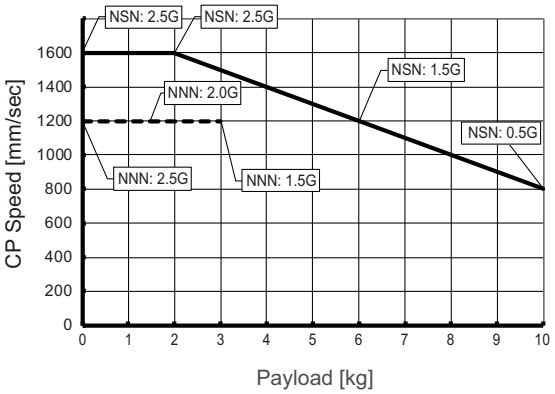
(Note) The acceleration/deceleration (G) in the range from 2kg to 8kg of the transportation payload for NSN should be the proportional values.

[IXA-□NNN45□□/□NSN45□□]

Horizontal Operation with
No Vertical Axis (Z-Axis) Operation



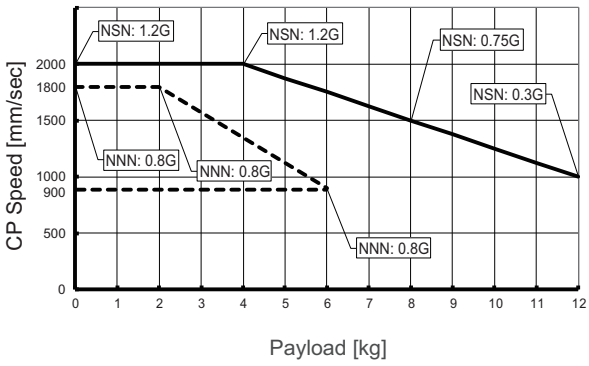
Operation Only in
Vertical Axis (Z-Axis) Operation



(Note) The acceleration/deceleration (G) in the range from 2kg to 10kg of the transportation payload for NSN and in the range from 0kg to 3kg of the transportation payload for NNN should be the proportional values.

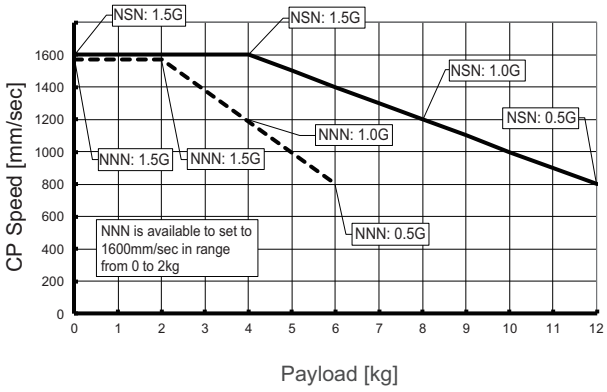
[IXA-□NNN60□□/□NSN60□□]

Horizontal Operation with
No Vertical Axis (Z-Axis) Operation



(Note) The acceleration/deceleration (G) in the range from 4kg to 12kg of the transportation payload for NSN should be the proportional values.

Operation Only in
Vertical Axis (Z-Axis) Operation

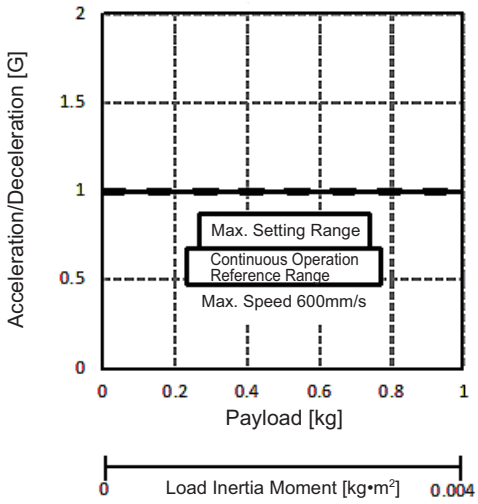


(Note) The acceleration/deceleration (G) in the range from 4kg to 12kg of the transportation payload for NSN and in the range from 2kg to 6kg of the transportation payload for NNN should be the proportional values.

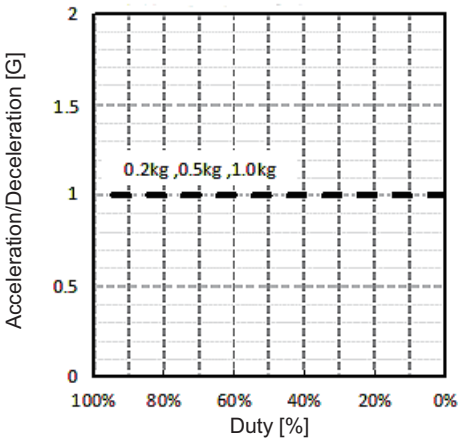
★ Reference for the Acceleration / Deceleration Setting Horizontal Operation with No Vertical Axis (Z-Axis) Operation

[IXA-□NNN1805]

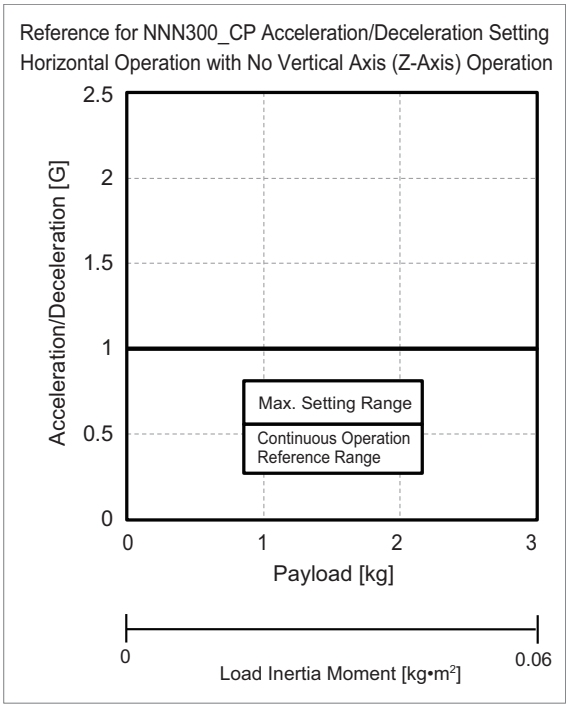
Reference for NNN180_CP Acceleration/Deceleration Setting
Horizontal Operation with No Vertical Axis (Z-Axis) Operation



Reference for NNN180_CP Operation Duty Setting
Horizontal Operation with No Vertical Axis (Z-Axis) Operation

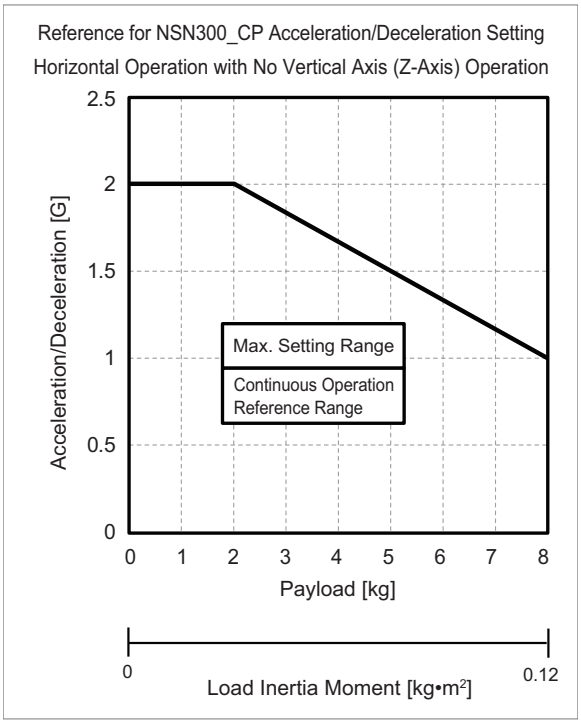


[IXA-□NNN3015]



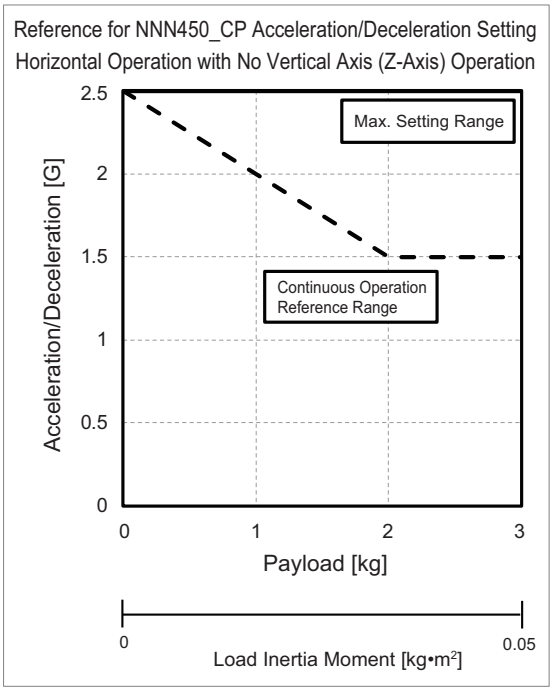
Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

[IXA-□NSN3015]



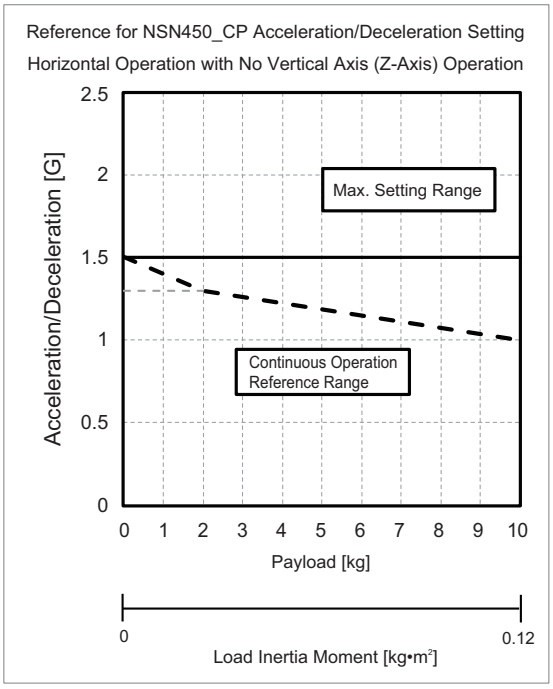
Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

[IXA-□NNN45□□]



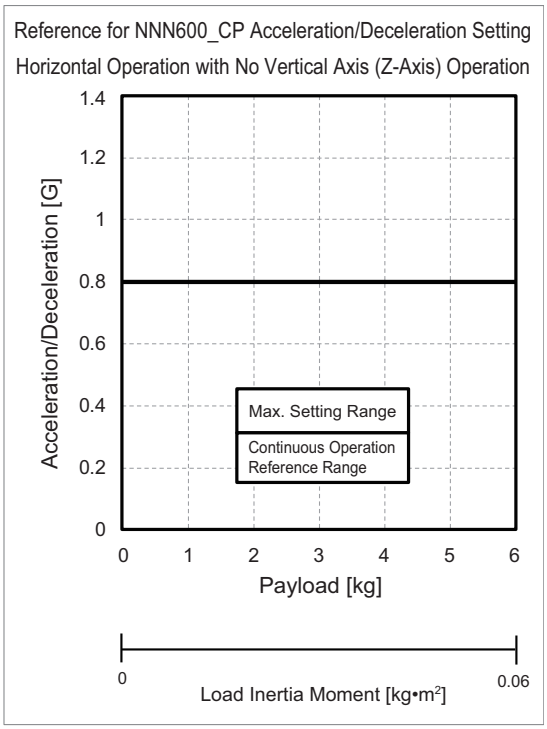
Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

[IXA-□NSN45□□]



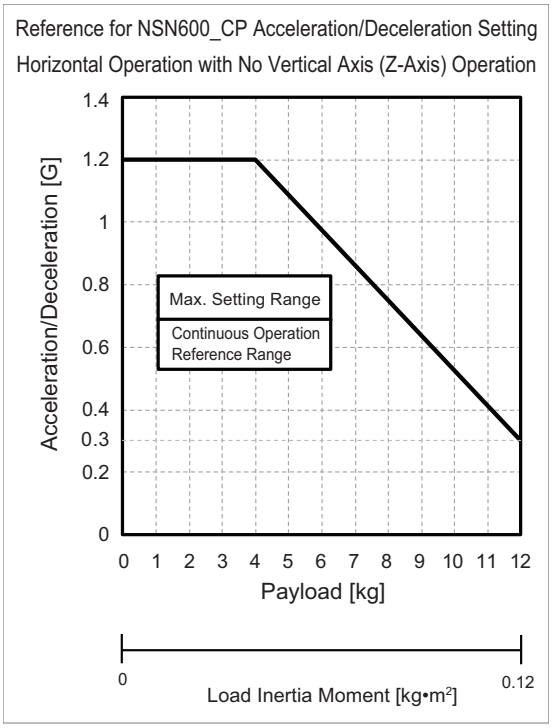
Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

[IXA-□NNN60□□]



Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

[IXA-□NSN60□□]

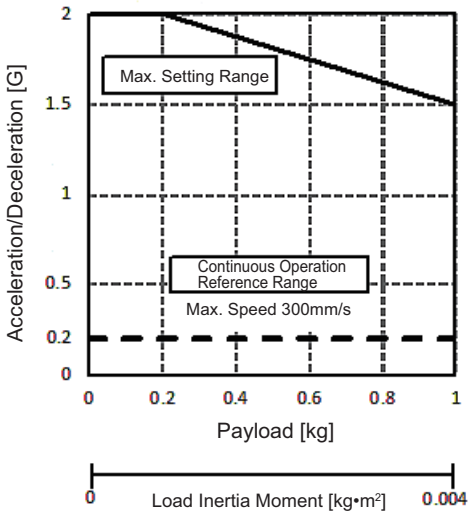


Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

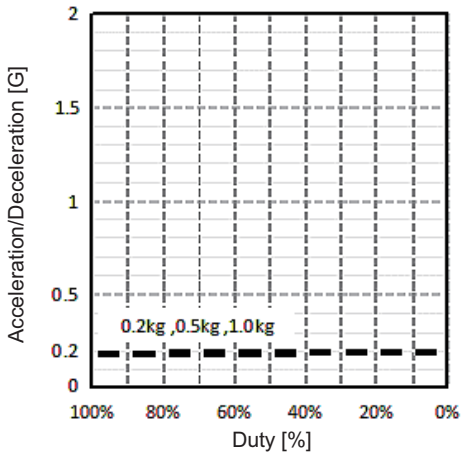
★ Reference for the Acceleration / Deceleration Setting Operation Only in Vertical Axis (Z-Axis) Operation

[IXA-□NNN1805]

Reference for NNN180_CP Acceleration/Deceleration Setting Operation Only in Vertical Axis (Z-Axis) Operation

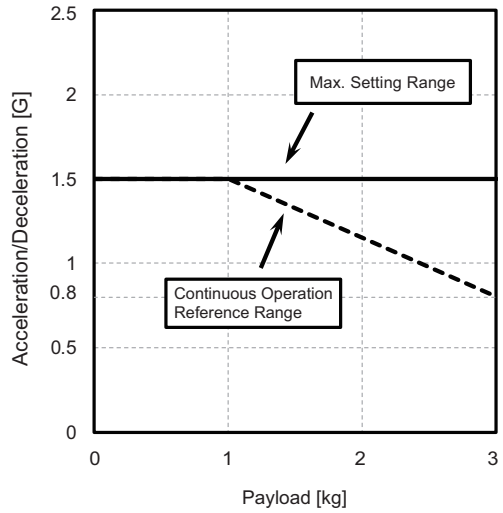


Reference for NNN180_CP Operation Duty Setting Operation Only in Vertical Axis (Z-Axis) Operation

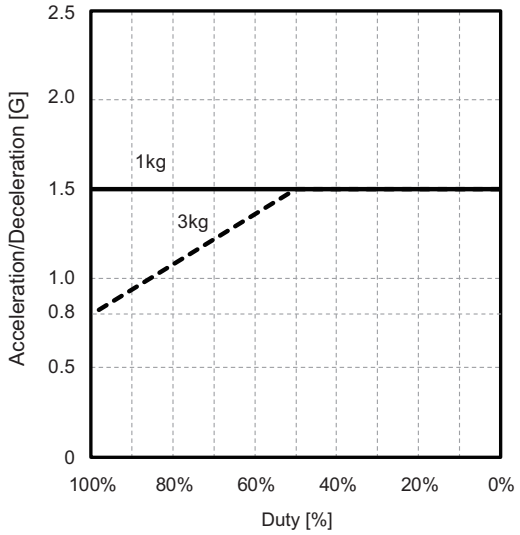


[IXA-□NNN3015]

Reference for NNN300_CP Acceleration/Deceleration Setting
Operation Only in Vertical Axis (Z-Axis) Operation



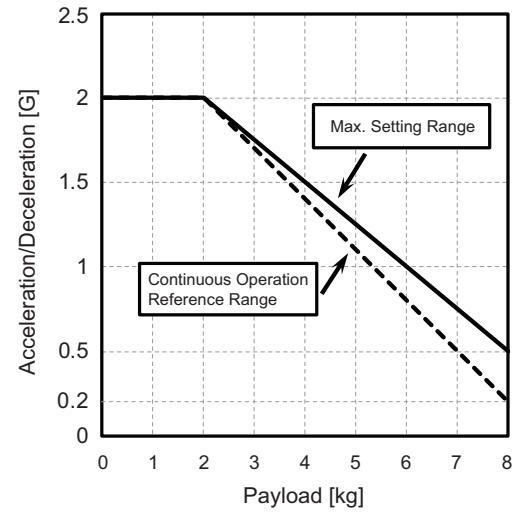
Reference for NNN300_CP Operation Duty Setting
Operation Only in Vertical Axis (Z-Axis) Operation



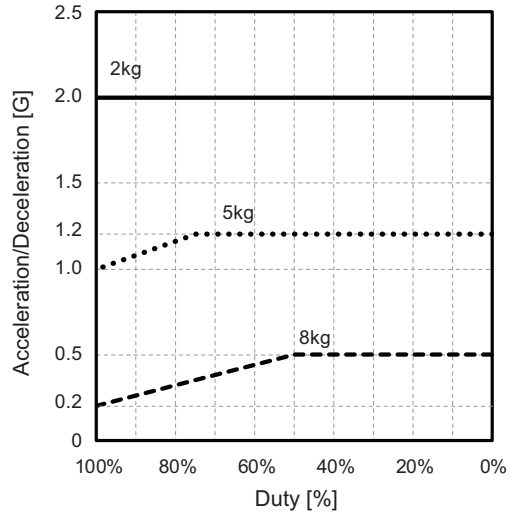
Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

[IXA-□NSN3015]

Reference for NSN300_CP Acceleration/Deceleration Setting
Operation Only in Vertical Axis (Z-Axis) Operation

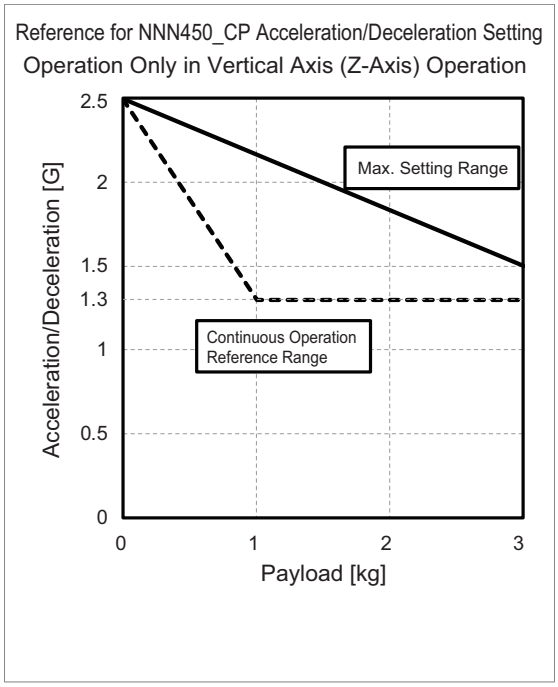


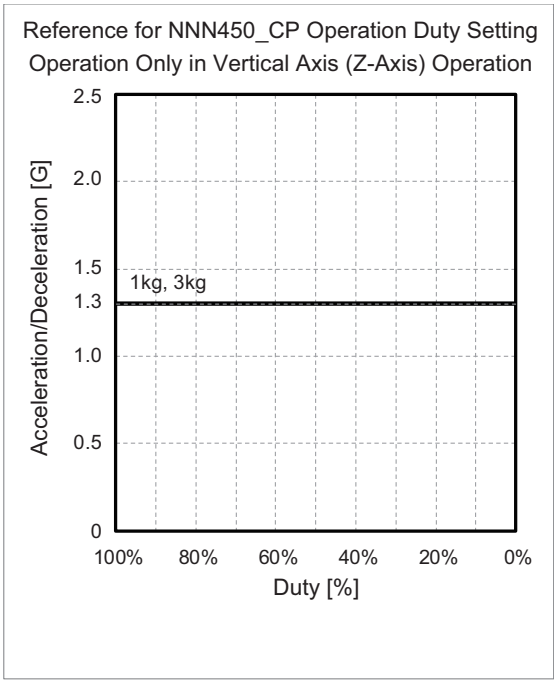
Reference for NSN300_CP Operation Duty Setting
Operation Only in Vertical Axis (Z-Axis) Operation



Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

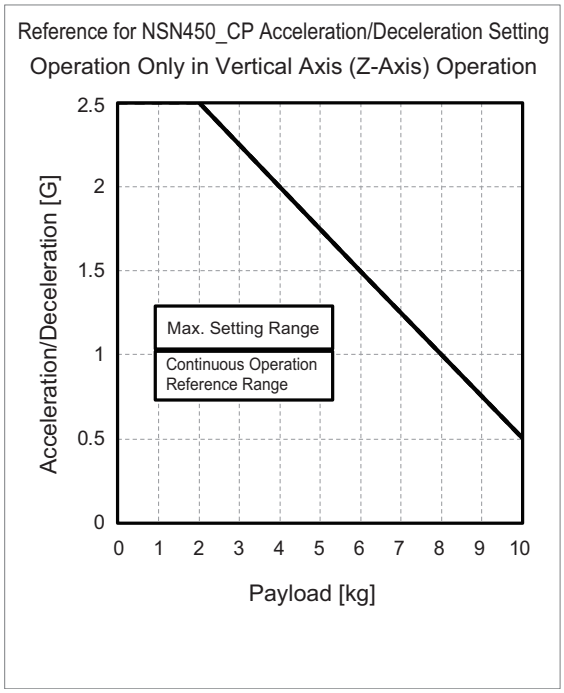
[IXA-□NNN45□□]

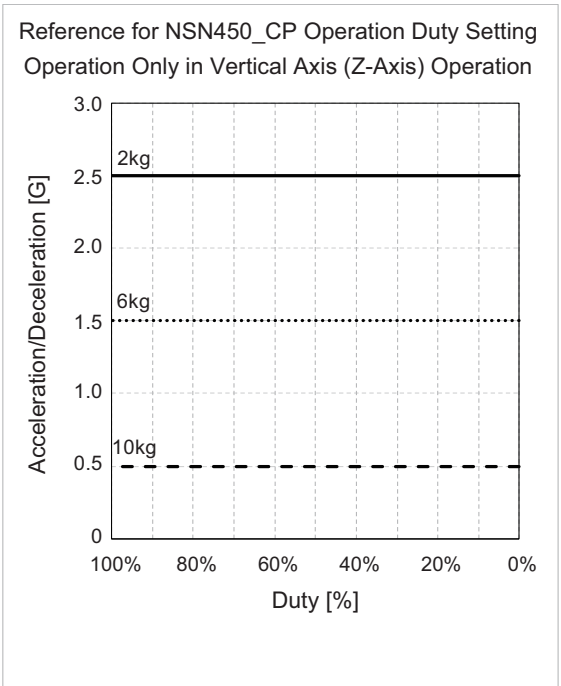




Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

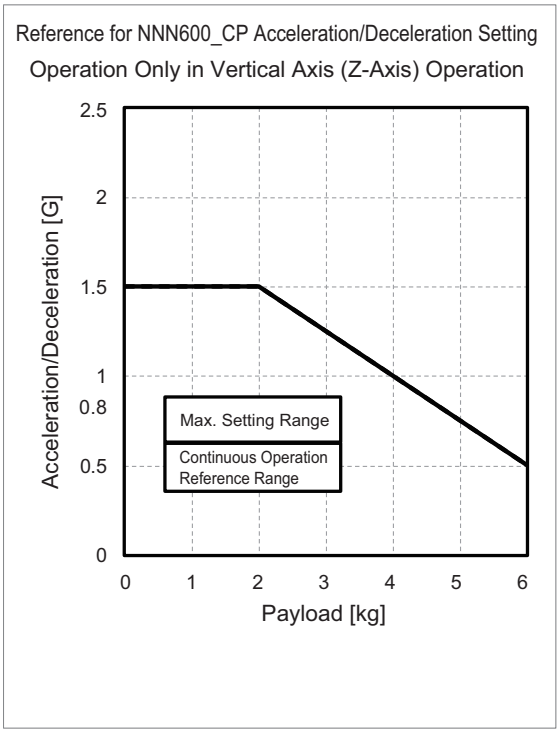
[IXA-□NSN45□□]

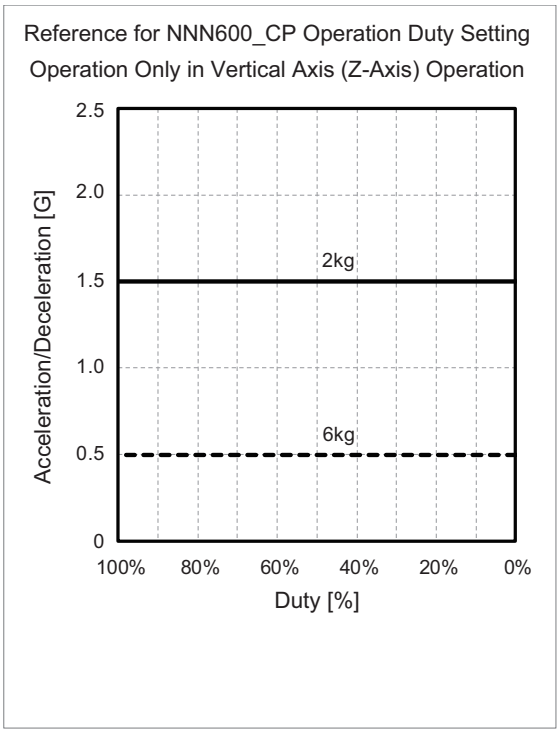




Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

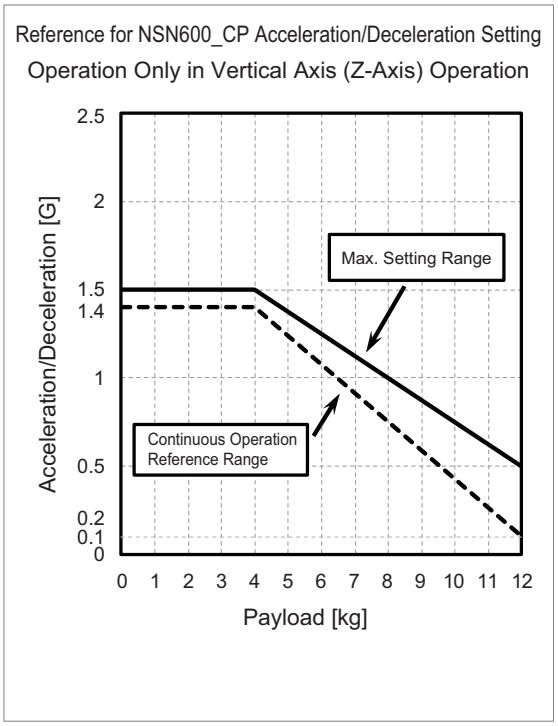
[IXA-□NNN60□□]

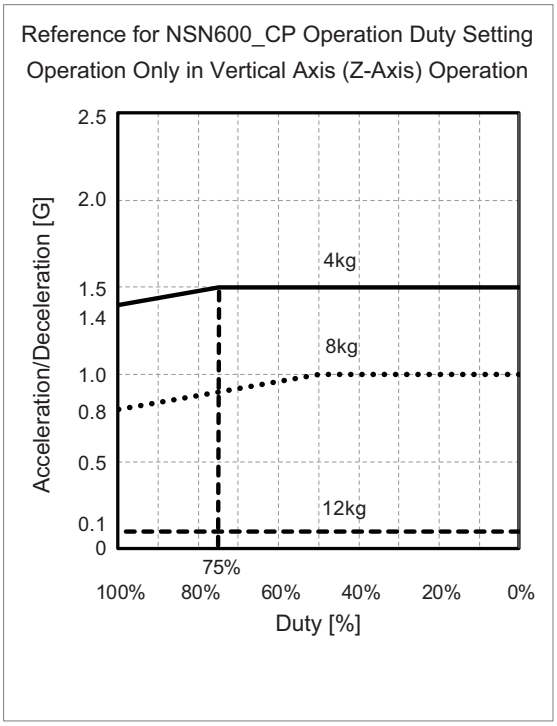




Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

[IXA-□NSN60□□]

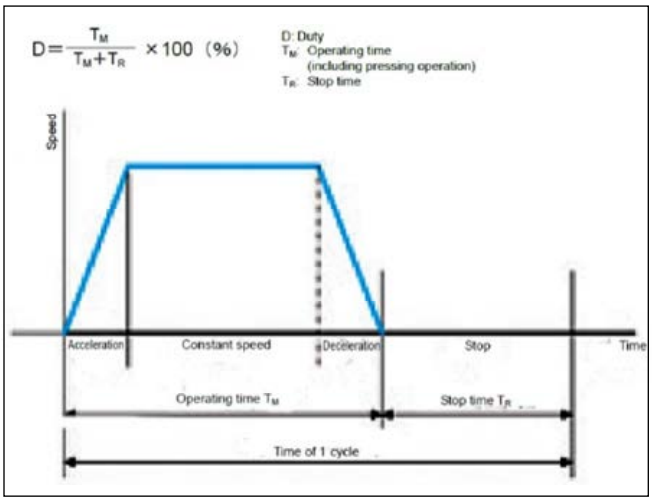




Max. Velocity in CP Operation: Depends on velocity and acceleration/deceleration limitation

Adjustment of Duty Ratio and Acceleration/Deceleration

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



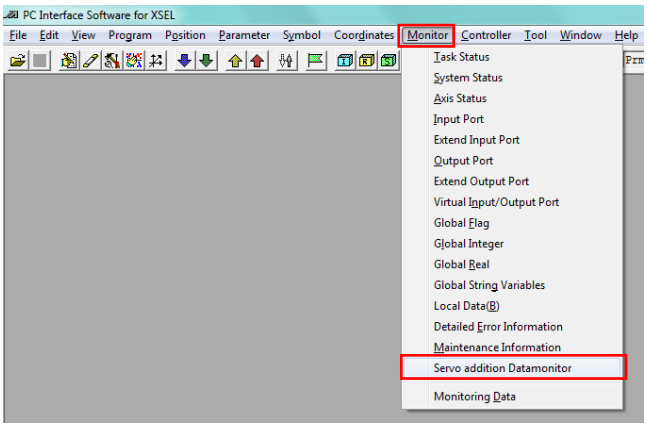
It is necessary to adjust the duty ratio or acceleration/deceleration in order to control heat generation on the motor unit and speed reducer.
While operating the unit, adjust the stop duration in order to reduce the duty ratio or reduce the acceleration/deceleration so the “Overload Monitor” on J1 Axis (Axis 1), J2 Axis (Axis 2), Z-axis (Axis 3) and R-axis (Axis 4) gets below 100%.
If the “Overload Monitor” gets above 100%, the driver overload error (Error No. D0A) will occur and SCARA Robot will stop.

Caution

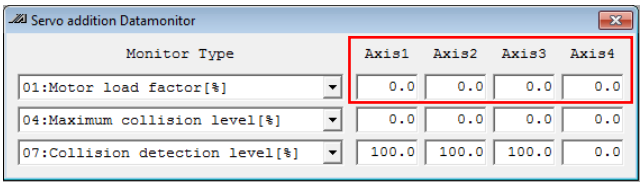
NSN high-speed type is equipped with a thermal sensor on the encoder in the motor. Temperature error may occur on the encoder sensor due to influence of the ambient temperature.

[Procedure]

1 Select “Monitor” → “Servo addition Datamonitor” in the XSEL PC software.



2 In Monitor Type “01: Motor load factor [%]”, adjust the stop duration in order to reduce the duty ratio or reduce the acceleration/deceleration so the load on each axis motor gets less than 100%. However, it takes a few hours before the motor temperature gets saturated. There should be no problem if the load ratio is less than 100% on each axis motor in a few hours after the operation starts.



1.3 Options

● Model Code Option

With Display Lamp (Model Code: LED)

Select this option, and NNN standard type gets equipped with an LED display lamp.

● Parts Option

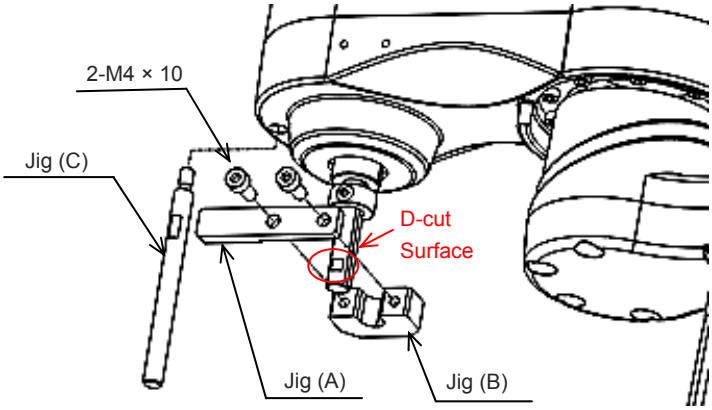
Absolute Reset Adjustment Jig

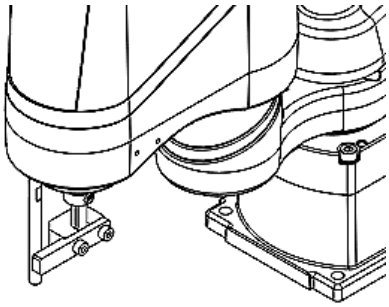
It is an adjustment jig used when it is necessary to have an absolute reset after replacing the motor or spline.
Take off the spline cover, set Jig (A) along the flat on spline shaft and affix it with Jig (B) and screws.
The position where Jig (A) and the ball screw are touched to each other becomes the datum position for the absolute reset for the R-axis.
Pay attention to the orientation of the flat surface on the spline shaft.

[IXA-□NNN1805]

Model code of single product: JG-IXA2

- Jig (A), 1 piece
- Jig (B), 1 piece
- Jig (C), 1 piece
- Hex Socket Head Cap Screw, M4 × 10, 2 pieces



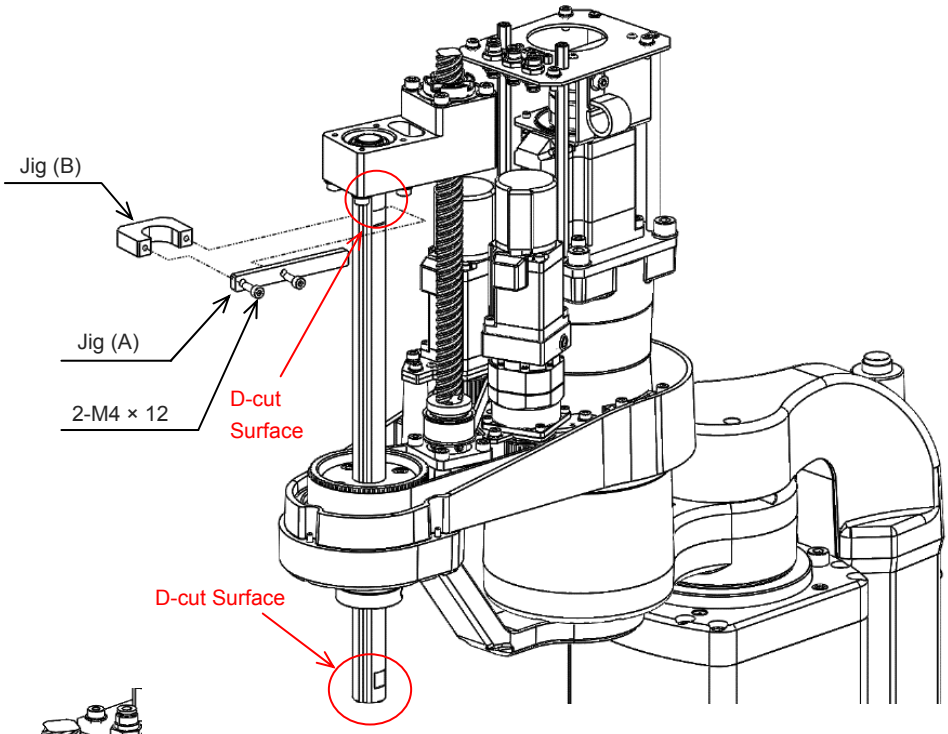


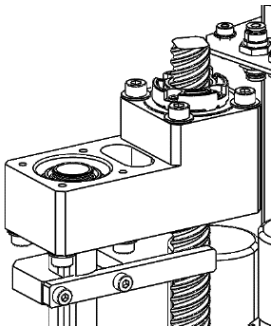
Jig Attached

[IXA-□NNN3015/□NSN3015]

Model code of single product: JG-IXA1

- Jig (A), 1 piece
- Jig (B), 1 piece
- Hex Socket Head Cap Screw, M4 × 12, 2 pieces



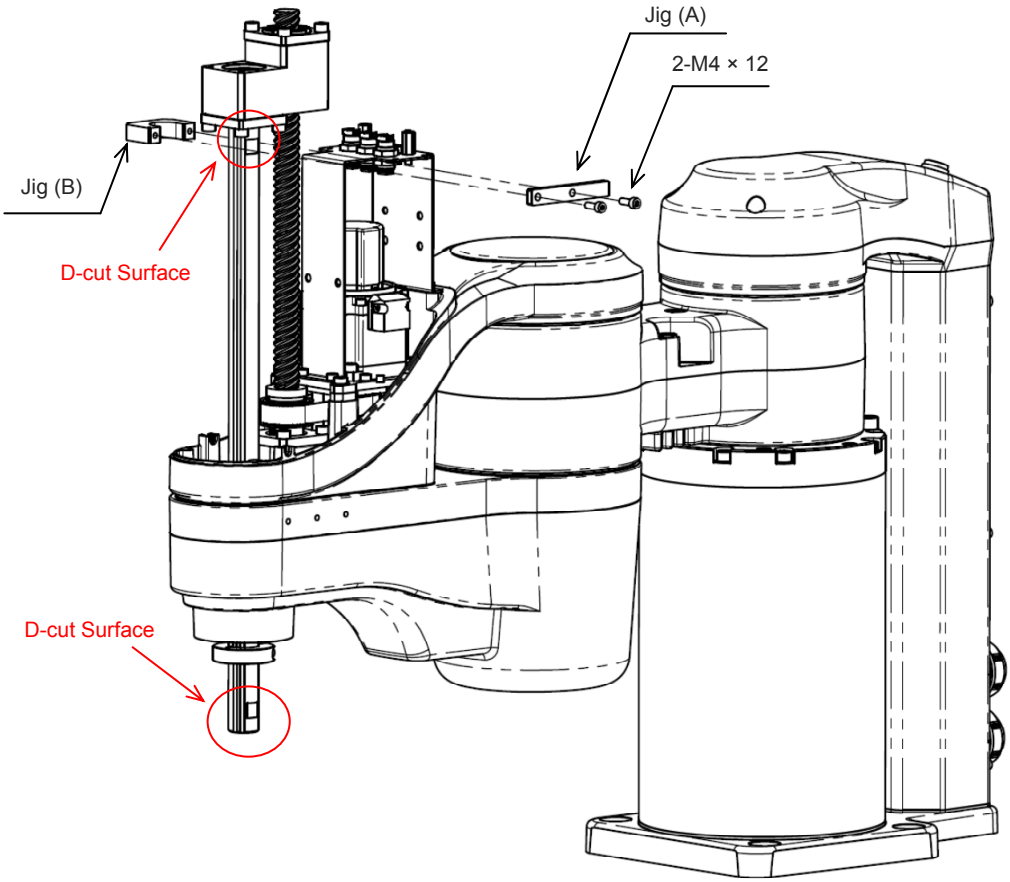


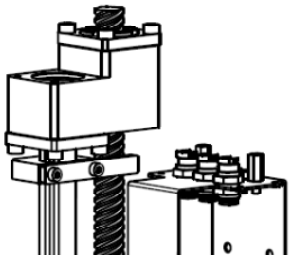
Jig Attached

[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]

Model code of single product: JG-IXA1

- Jig (A) 1 piece
- Jig (B) 1 piece
- Hex Socket Head Cap Screw, M4 × 12, 2 pieces





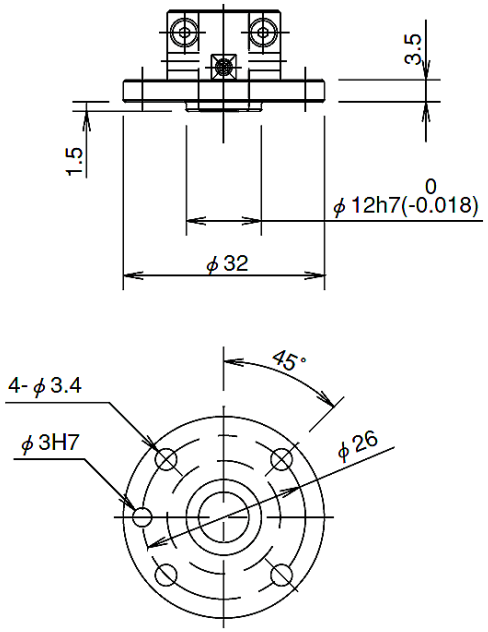
Jig Attached

Flange

Use it when attaching a tool or workpiece on the tip shaft.

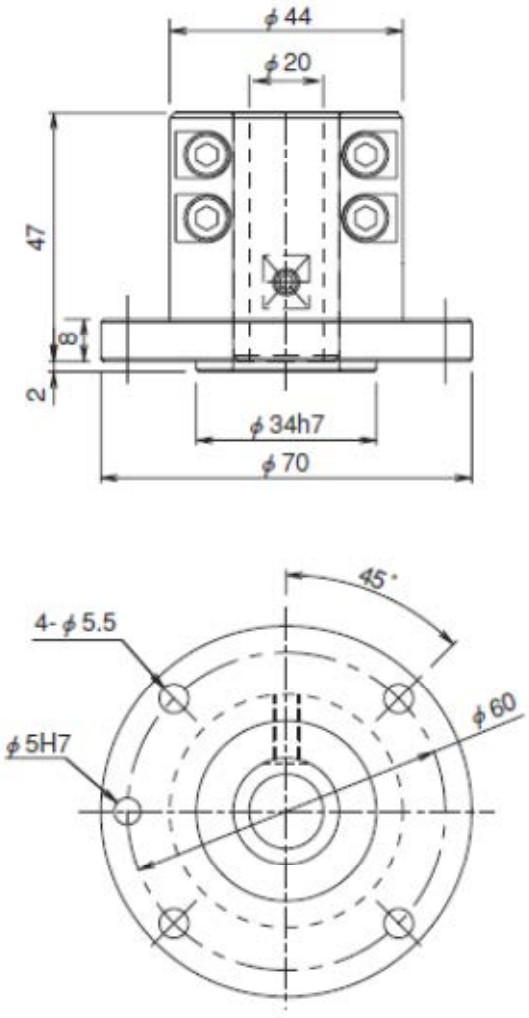
⊙ IXA-□NNN1805

Model code of single product: IX-FL-4



⊙ Models Except for IXA-□NNN1805

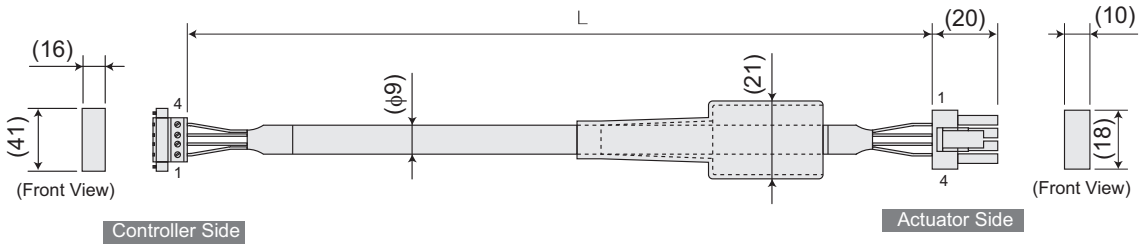
Model code of single product: IX-FL-1



1.4 Accessories

Motor Cable

Model Code: CB-X-MA□□□



Minimum bending radius r = 51mm or more (for movable use)
* Robot cable is standard for this model.

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

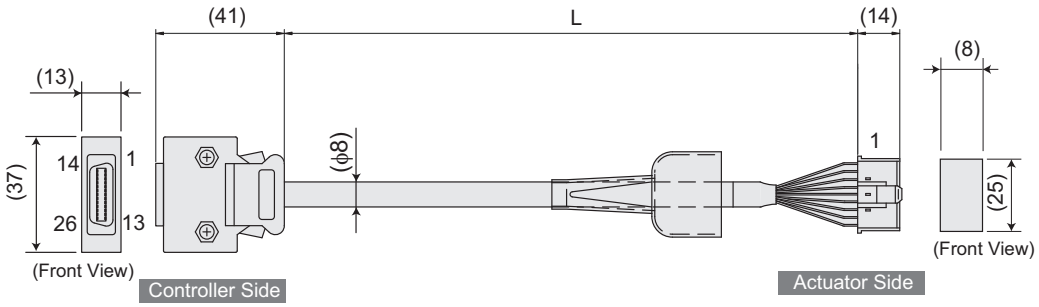
No.	Signal	Color	Wire Size
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

- The cable length is available from 1m to 15m.
  Specify the length in increments of 1m.
- The following shows a sample model number.

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

Encoder Cable

Model code: CB-X1-PA□□□



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

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

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

Ground wire or braided shield wire

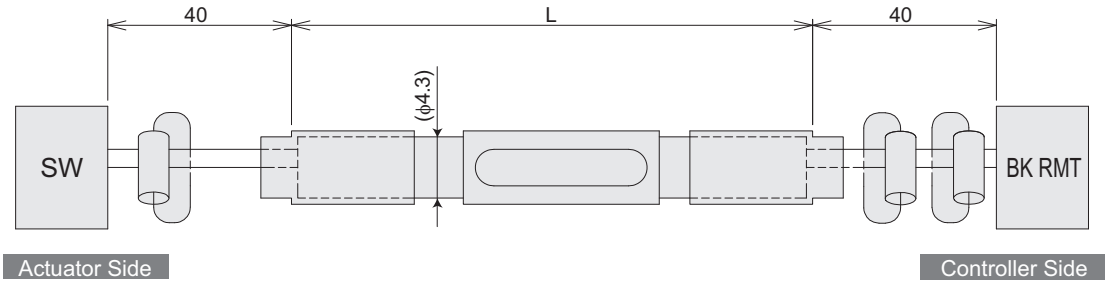
- The cable length is available from 1m to 15m.
  Specify the length in increments of 1m.
- The following shows a sample model number.

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

Brake Cable

[Standard Type: IXA-□NNN1805 / □NNN3015 / □NNN45□□]

Model code: CB-IXA-BK□□□-1



Connector	Identification	Signal	Pin No.
SW	Red	BK3	1
	White	COM	2
	-	-	3

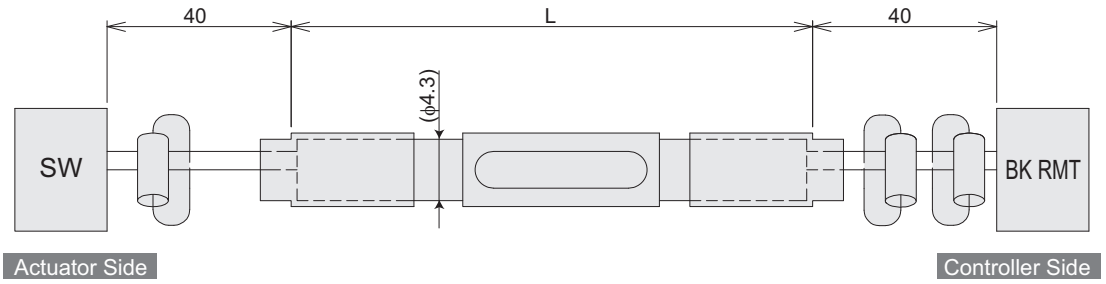
Pin No.	Signal	Identification	Connector
A2	BK3	Red	BK RMT
A3	COM	White	
Others	-	-	

Sheath

- The cable length is available from 1m to 15m.
  Specify the length in increments of 1m.
- The following shows a sample model number.
  Cable length **1**m → CB-IXA-BK**010**-1
  Cable length **3**m → CB-IXA-BK**030**-1
  Cable length **10**m → CB-IXA-BK**100**-1

[Standard Type: IXA-□NNN60□□]

Model code: CB-IXA-BK□□□-2



Connector	Identification	Signal	Pin No.
SW	Red	BK4	1
	White	COM	2
	-	-	3

Pin No.	Signal	Identification	Connector
B2	BK4	Red	BK RMT
A3	COM	White	
Others	-	-	

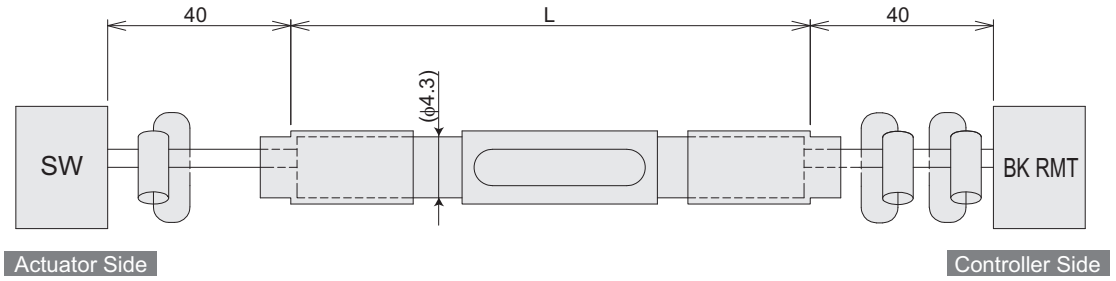
Sheath

- The cable length is available from 1m to 15m.
  Specify the length in increments of 1m.
- The following shows a sample model number.

  Cable length **1**m → CB-IXA-BK**010**-2
  Cable length **3**m → CB-IXA-BK**030**-2
  Cable length **10**m → CB-IXA-BK**100**-2

[High Speed Type: IXA-□NSN3015 / □NSN45□□ / □NSN60□□]

Model code: CB-IXA-BK□□□-3



Connector	Identification	Signal	Pin No.
SW	Red	BK5	1
	White	COM	2
	-	-	3

Pin No.	Signal	Identification	Connector
A4	BK5	Red	BK RMT
A3	COM	White	
Others	-	-	

Sheath

- The cable length is available from 1m to 15m.
  Specify the length in increments of 1m.
- The following shows a sample model number.

  Cable length **1**m → CB-IXA-BK**010**-3
  Cable length **3**m → CB-IXA-BK**030**-3
  Cable length **10**m → CB-IXA-BK**100**-3

IXA SCARA Robot

Chapter 2

Installation

2.1 Precautions for Transportation

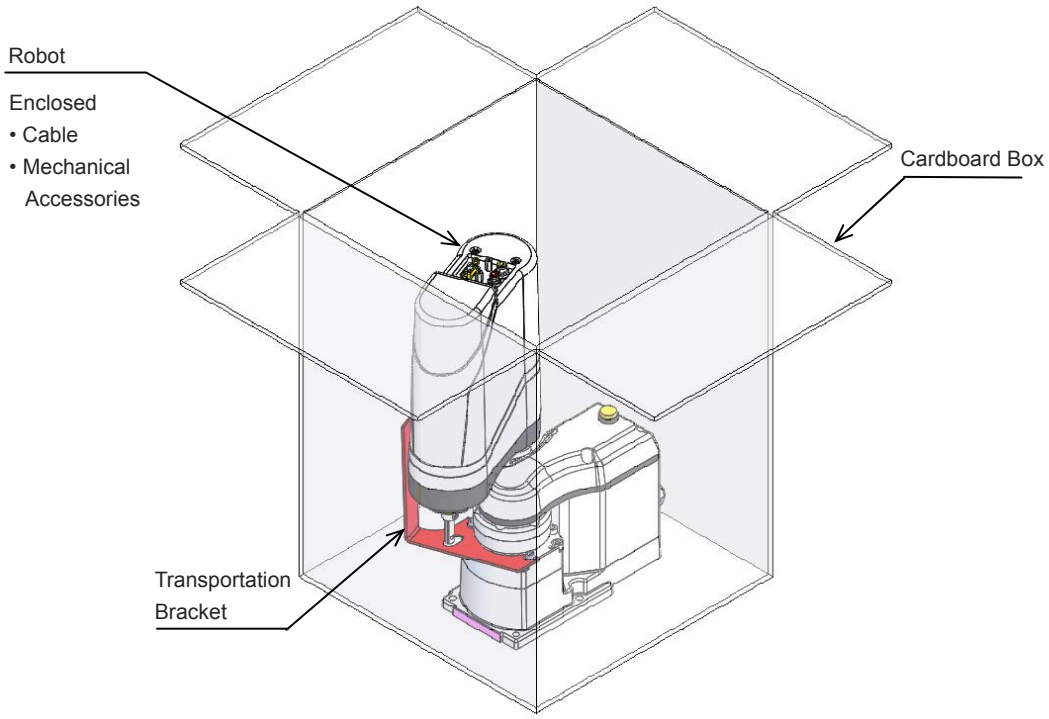
Handling of the Robot

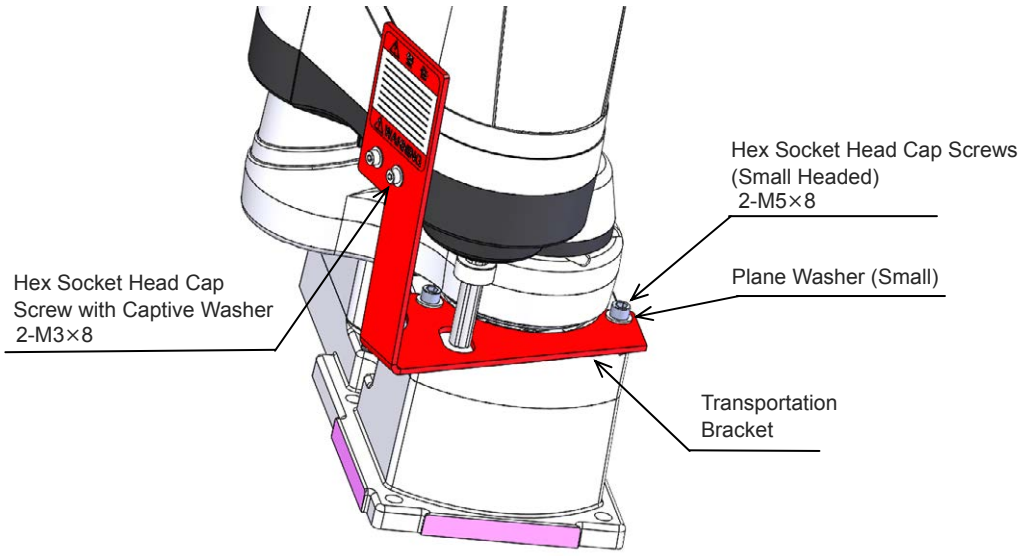
Unless otherwise specified, the robot is delivered in the package as shown in the figure below.
The transportation fixture is attached on the robot body.

Notice

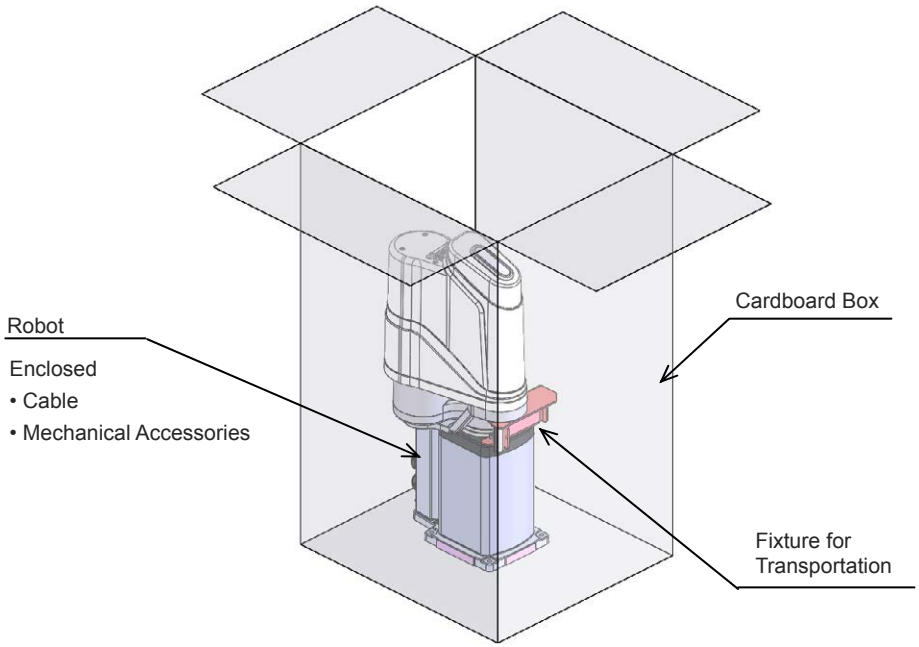
- Detach the transportation fixture before starting operation.
  After taking the unit out, put on the enclosed hex socket head cap screw
  Models Except for IXA-□NNN1805 : M8 × 10, IXA-□NNN1805 : M5 × 5 to the tapped hole for J1 rotation restriction stopper attachment.
- Keep the transportation fixture so it can be used when transporting or moving the robot.

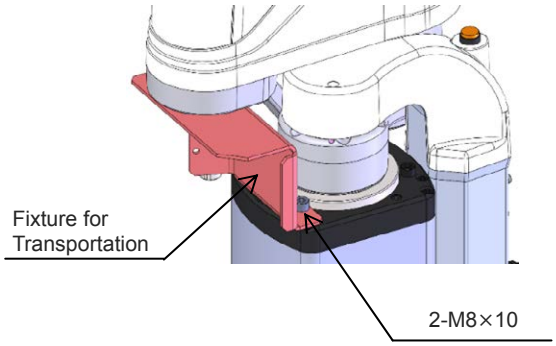
[IXA-□NNN1805]

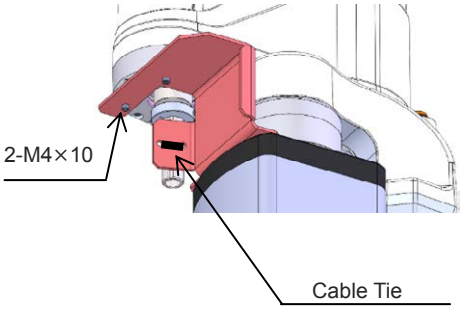

Robot
Enclosed
• Cable
• Mechanical
Accessories
Cardboard Box
Transportation
Bracket


Hex Socket Head Cap Screws
(Small Headed)
2-M5×8
Plane Washer (Small)
Hex Socket Head Cap
Screw with Captive Washer
2-M3×8
Transportation
Bracket

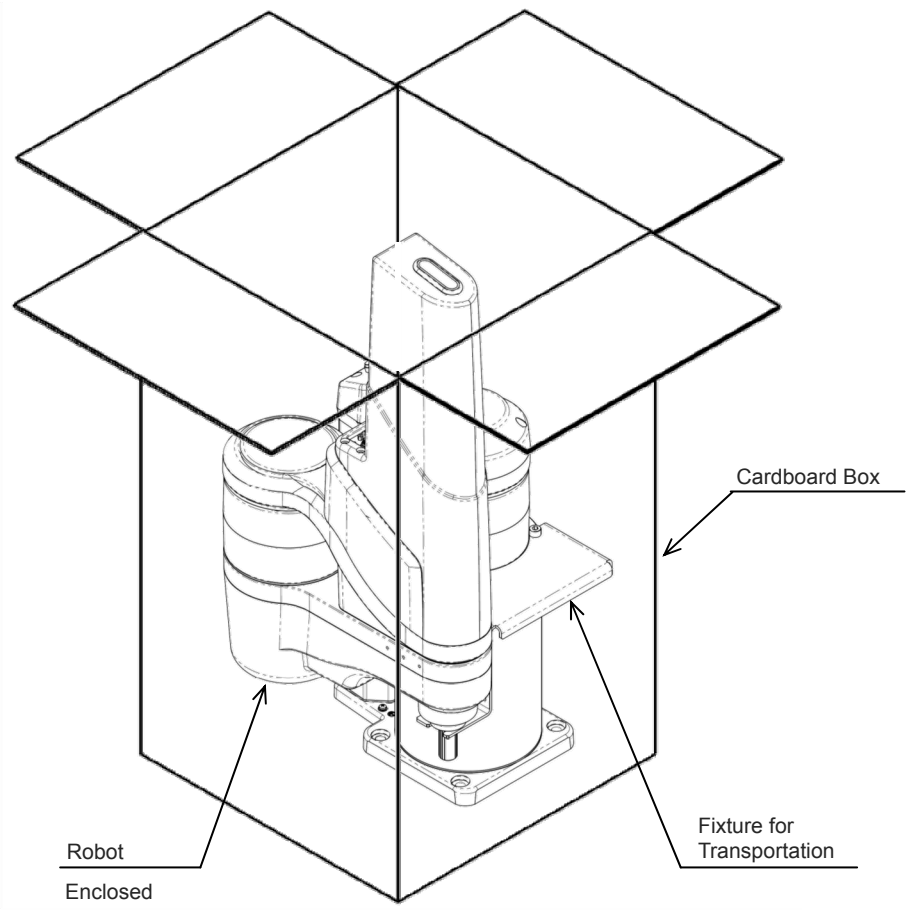
[IXA-□NNN3015/□NSN3015]



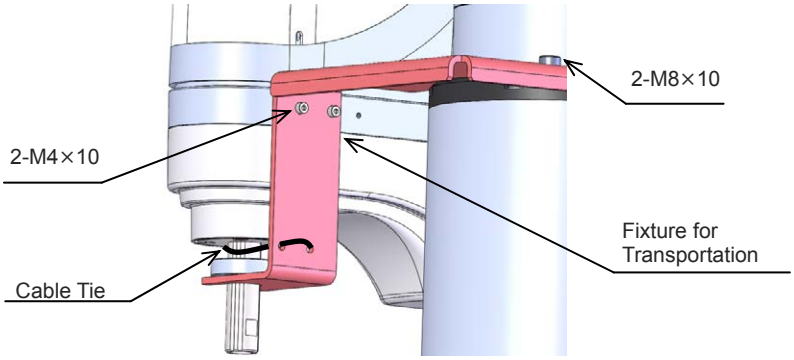




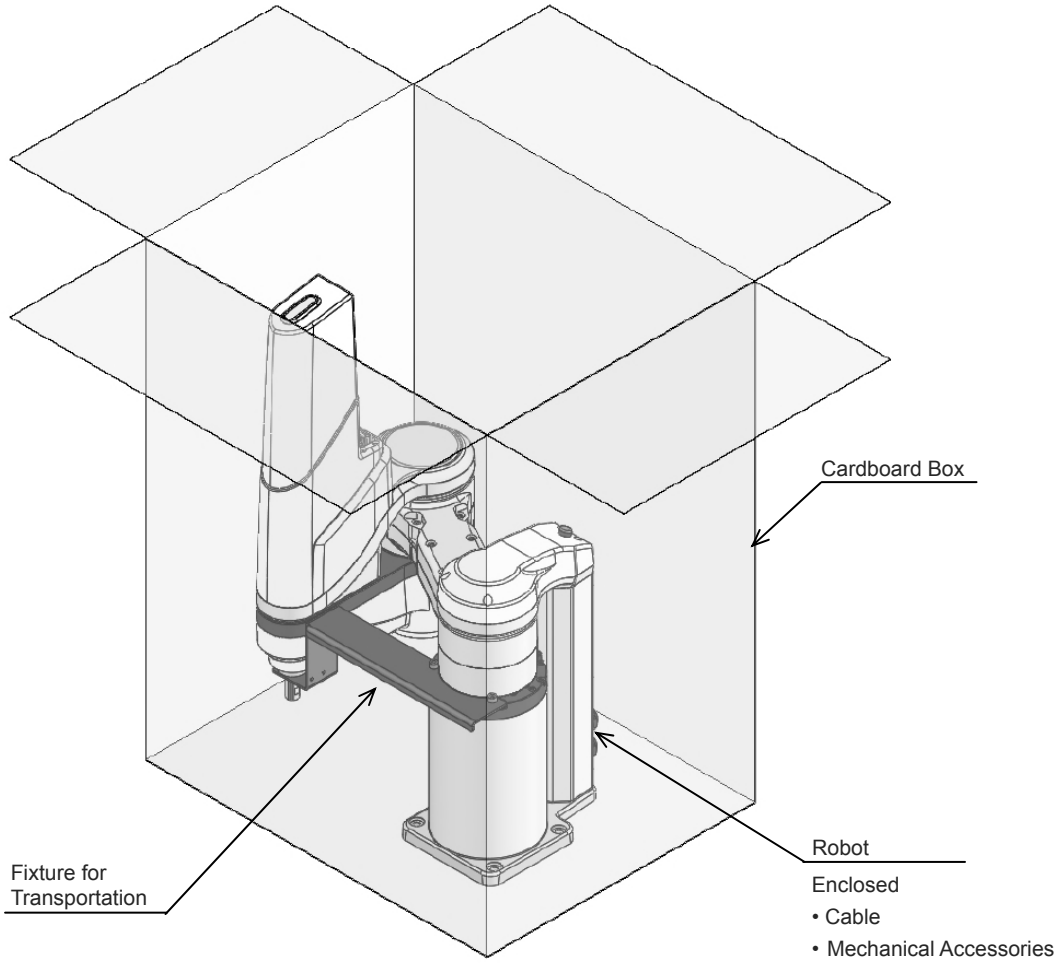
[IXA-□NNN45□□/□NSN45□□]

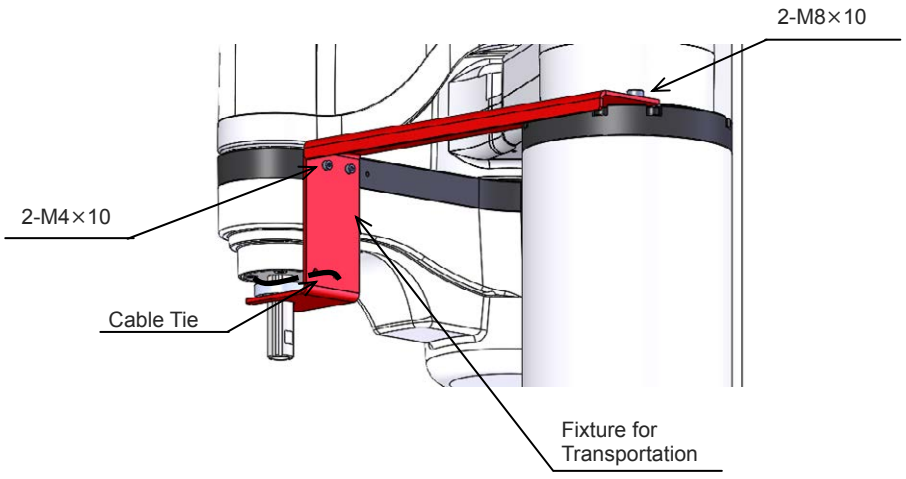


Enclosed
- Cable
- Mechanical Accessories



[IXA-□NNN60□□/□NSN60□□]





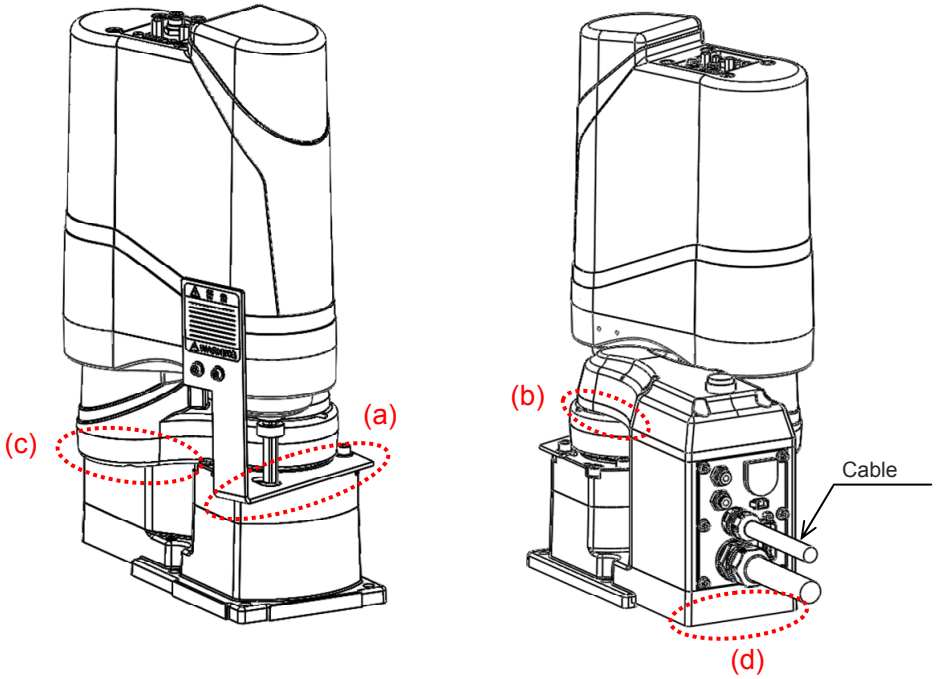
Handling of the Carton

- 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.
- An operator should never attempt to carry on their own. Also, use an appropriate way for transportation.
- When placing the package, settle it horizontally following the posture instruction of the package.
- Do not step or sit on the package.
- Do not put any load that may cause a deformation or breakage of the package.

Handling After Unpacking

⊙ IXA-□NNN1805

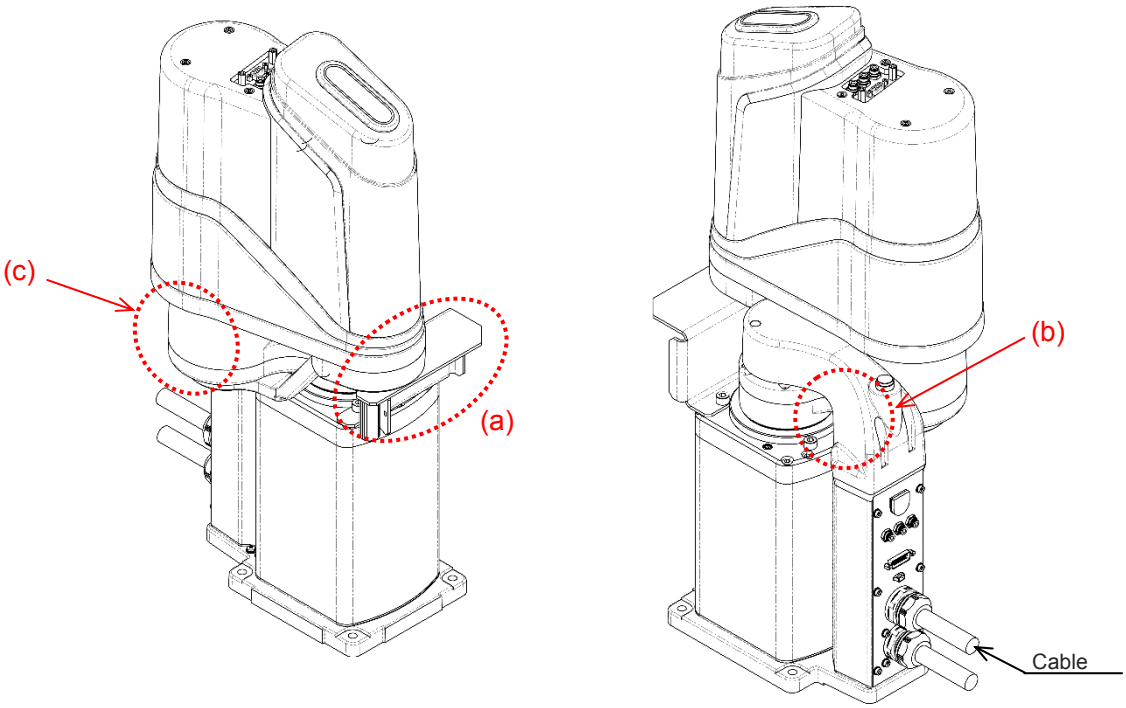
- Transportation should be conducted with the attachment fixture for transportation being attached on the robot body.
- As the figure shows, hold two places of either the transportation attachment fixture (a), J1 joint bracket (b), J2 arm (c) or base (d) while transporting.
- Do not attempt to apply excess force on each part of robot body.
- Pay attention to cables on the back panel to avoid pinching or excess force being applied on them.



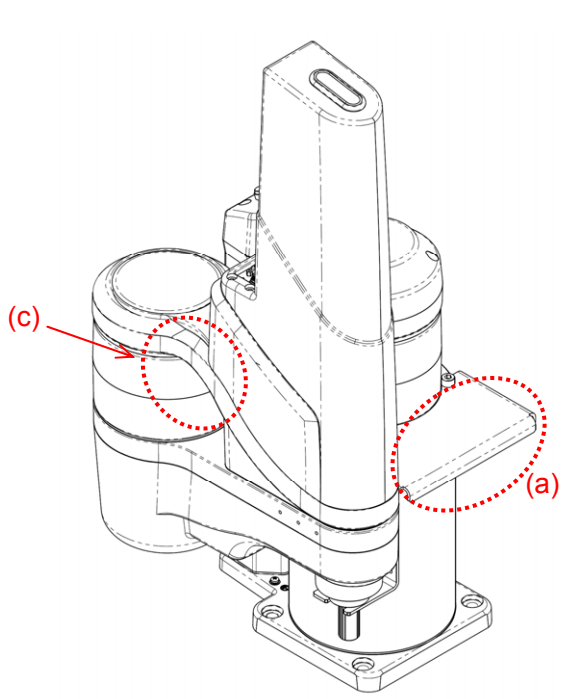
⊙ Models Except for IXA-□NNN1805

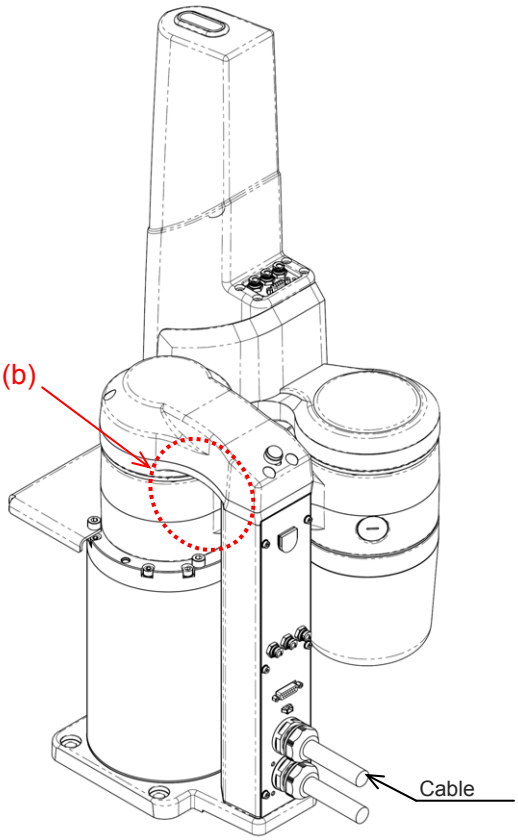
- Transportation should be conducted with two persons with the attachment fixture for transportation being attached on the robot body.
- As the figure shows, one person hold the transportation attachment fixture (a) while the other hold the J1 joint bracket (b) and J2 arm (c).
- Do not attempt to apply excess force on each part of robot body.
- Pay attention to cables on the back panel to avoid pinching or excess force being applied on them.

[IXA-□NNN3015/□NSN3015]

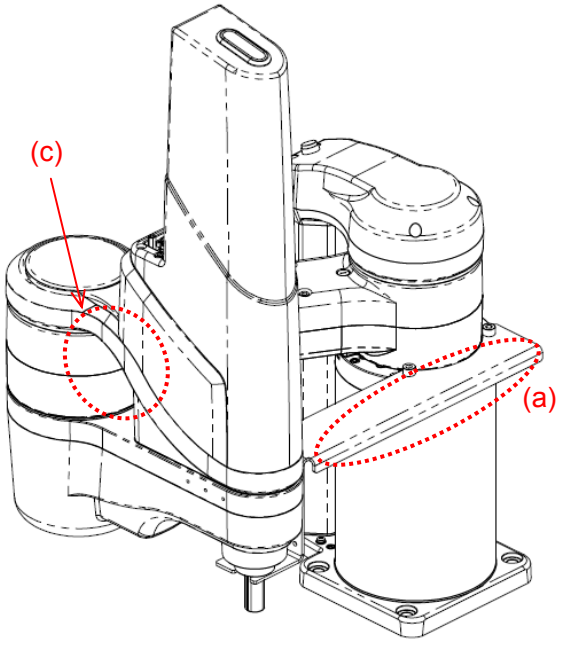


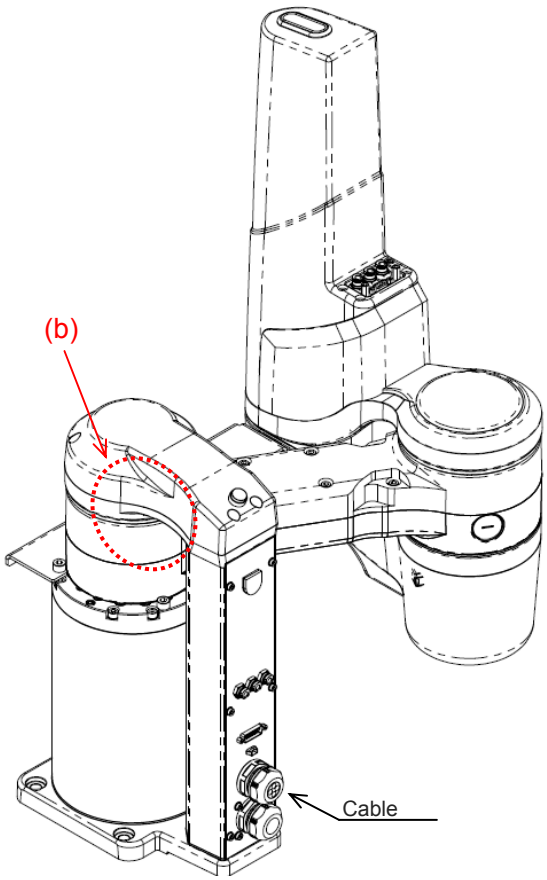
[IXA-□NNN45□□/□NSN45□□]





[IXA-□NNN60□□/□NSN60□□]





Handling of the Robot Mounted on Mechanical Equipment (System)

The following are the cautions for when transporting robot installed in the machinery equipment (system) in the whole system.

- Transport the robot with the transportation fixture attached on the body.
- When suspending the mechanical equipment with ropes, avoid applying force to robot, connector, etc. Pay attention to cables on the back panel to avoid pinching or excess force being applied on them.

Caution

If the robot is transported without the transportation fixture on it, it may cause malfunction on the main bearing or drop in the life due to the excitation force during transportation.

2.2 Installation and Storage/Preservation Environment

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

Pollution degree 2: Environment in which generally only nonconductive pollution occurs, but temporary conductive pollution may occur due to condensation (EC60664-1)

Installation Environment

Do not use this product in the following environments.
In general, the installation environment should be one in which an operator can work without protective gear.

- Location exposed to radiant heat from a huge heat source such as the heat treatment
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity smaller than 20% or larger than 85%RH
- Location exposed to direct sunlight
- Location exposed to corrosive gases or combustible gases
- Location exposed to significant amount of dust, salt or iron powder (Outside of an ordinary assembly plant)
- Location where water, oil (includes oil mist and cutting fluid) or a chemical is splashed
- Location where the product main body receives vibration or hit impact
- Where the altitude is more than 2000m

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

- Space to replenish grease
- Space to replace the motor

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

- Place subject to electrostatic noise
- Location where exposed to the influence of strong electric or magnetic field
- Location where exposed to the influence of ultraviolet or radiant rays

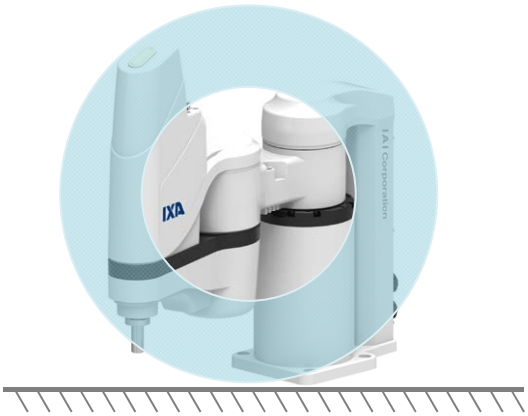
Storage/Preservation Environment

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

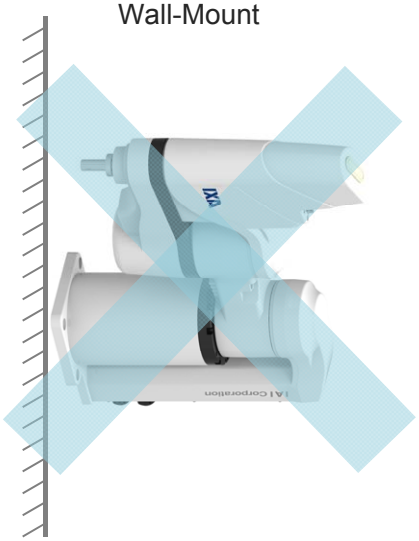
2.3 How to Install

Installation Orientation

Horizontally Oriented Mount



Wall-Mount



Ceiling-Mount

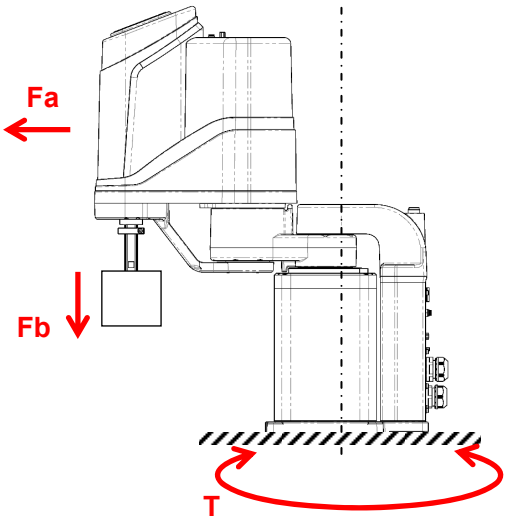
Installation of the Main Unit

Prepare a platform stiff enough to endure the reaction force caused by the robot operation for installation of the robot.

[Installation Platform]

- Regarding the platform to install the robot unit, it is necessary, not simply to endure the weight of the robot, but to be strong, stiff and stable enough to endure the reaction force caused during operation as shown in the table below.

Model Number	Fa (Max.) [N]	Fb (Max.) [N]	T (Max.) [N·m]
IXA-□NNN1805	44	42	24
IXA-□NNN3015	336	151	167
IXA-□NSN3015	879	193	301
IXA-□NNN45□□	474	144	172
IXA-□NSN45□□	660	165	395
IXA-□NNN60□□	290	176	338
IXA-□NSN60□□	536	186	638



- It is recommended for the robot installation surface that it has a steel plate with its thickness of 20mm or more.
  Build it with the surface flatness at 0.05mm/500mm or less.
- In order to secure the effective thread length for tightening, IXA-□NNN1805 requires M6 tapped holes with effective thread length 10mm or more to install the robot unit.
  Have M8 tapped holes with effective thread length 20mm or more for IXA-□NNN3015/□NSN3015.
  In order to install the robot unit, IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□ requires M10 tapped holes with effective thread length 20mm or more.

★ Installation of the Platform

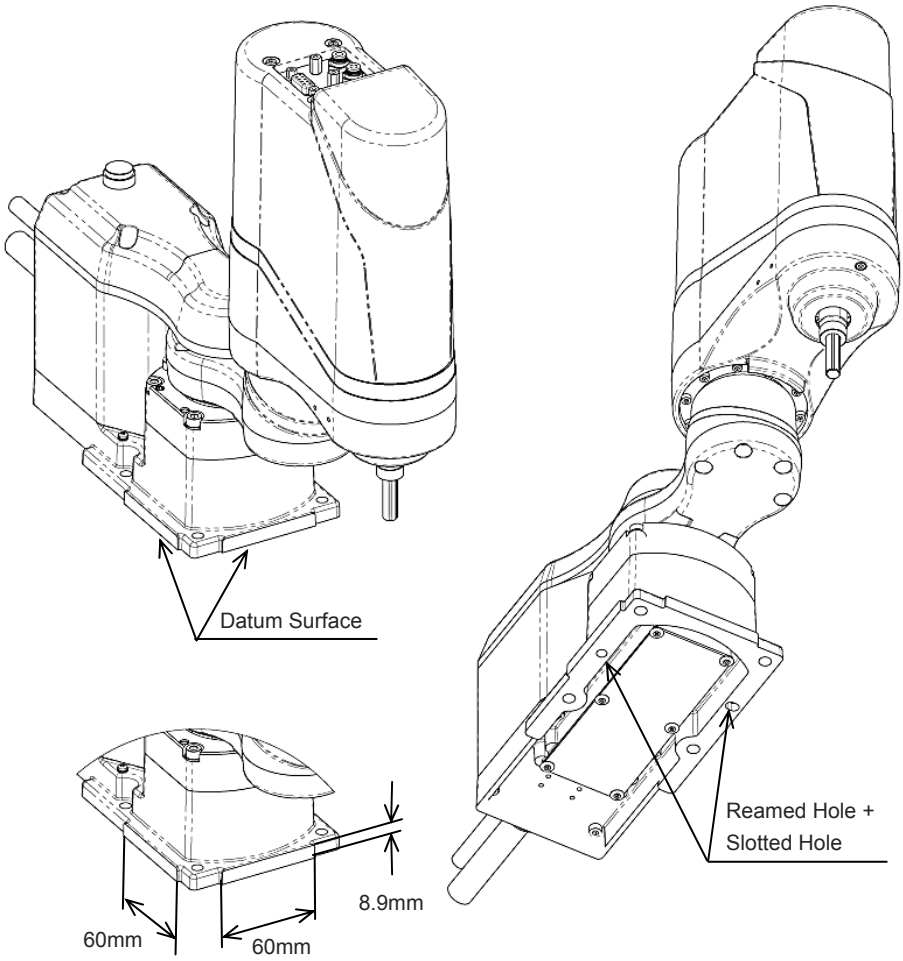
- Affix the platform on the floor to make sure it would not be moved during the robot operation.
- Install the platform to have the robot unit kept horizontal.

[Installation Robot Unit]

[IXA-□NNN1805]

- The robot body has to be securely fastened with using hex socket cap screws and steel ring plain washers 6.5 × 13 × 1.0 (4pcs each).
- Use high-strength screws with 10.9 or higher in the strength category for installation.
- For the robot installation position, either refer to the datum surface or insert parallel pins to the reamed hole and slotted hole for positioning.

Attachment Hole	Attachment Screw	Tightening Torque [N·m]
ϕ6.6 through (8.9mm from seated surface to installation surface)	M6	12.3

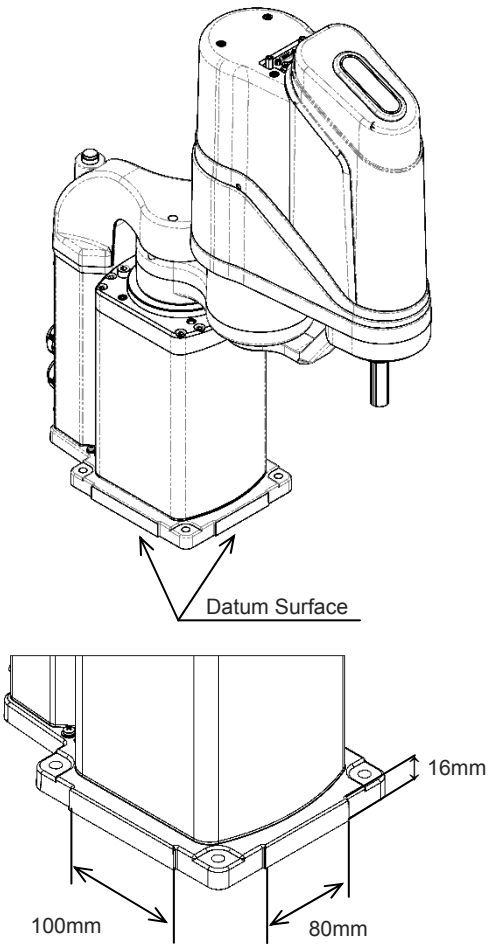


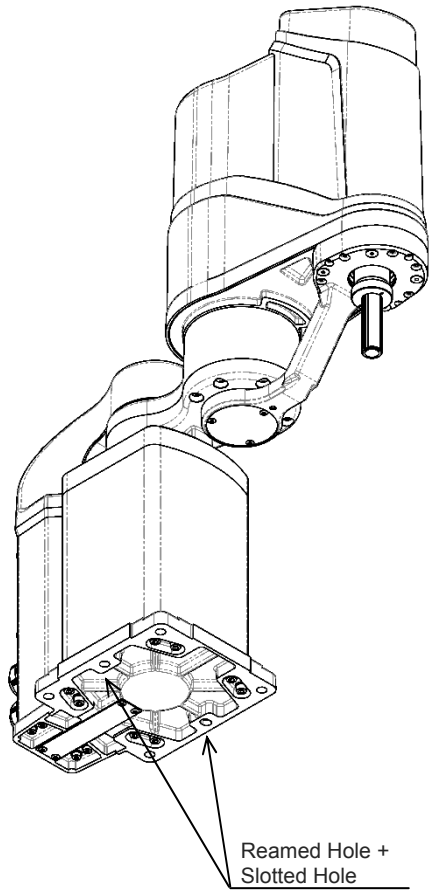
In the figure above shows the effective range of the datum surface.
The surrounding of the effective range is painted surfaces.
(Except for installation surface)

[IXA-□NNN3015/□NSN3015]

- The robot body has to be securely fastened with using hex socket cap screws and steel ring plain washers 8.5 × 18 × 1.6 (4pcs each).
- Use high-strength screws with 10.9 or higher in the strength category for installation.
- For the robot installation position, either refer to the datum surface or insert parallel pins to the reamed hole and slotted hole for positioning.

Attachment Hole	Attachment Screw	Tightening Torque [N·m]
ϕ9 through (16mm from seated surface to installation surface)	M8	30



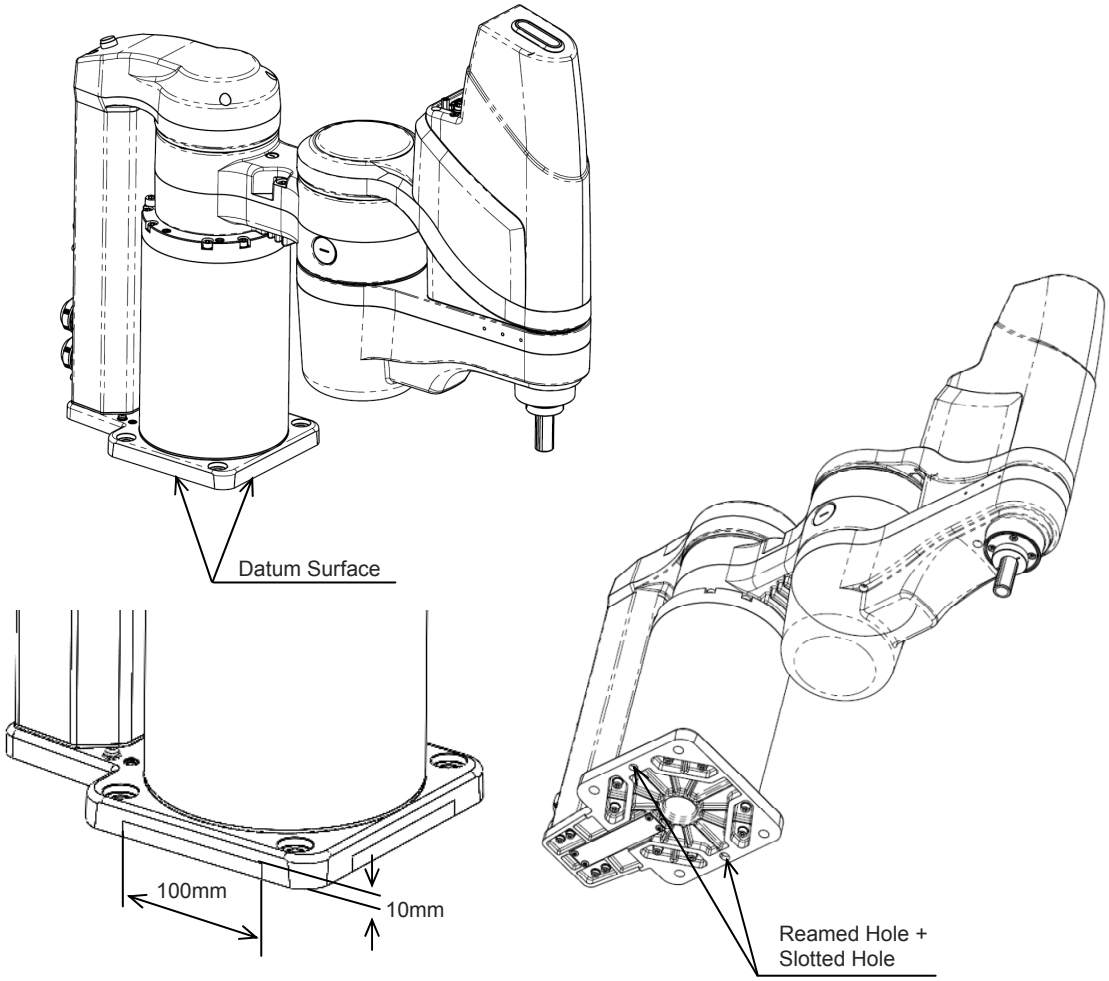


In the figure above shows the effective range of the datum surface.
The surrounding of the effective range is painted surfaces.

[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]

- The robot body has to be securely fastened with using hex socket cap screws and steel ring plain washers 10.5 × 18 × 1.6 (4pcs each).
- Use high-strength screws with 10.9 or higher in the strength category for installation.
- For the robot installation position, either refer to the datum surface or insert parallel pins to the reamed hole and slotted hole for positioning.

Attachment Hole	Attachment Screw	Tightening Torque [N·m]
ϕ11 through (15mm from seated surface to installation surface)	M10	60



In the figure above shows the effective range of the datum surface.
The surrounding of the effective range is painted surfaces.

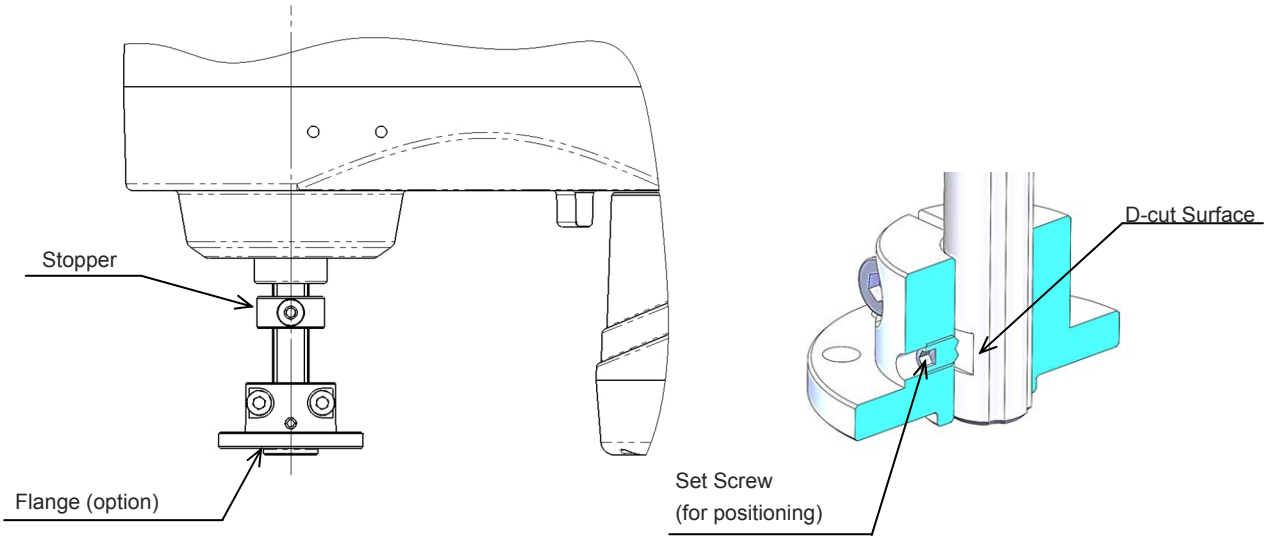
Attachment of the Load

When attaching a load, use a bracket that possesses enough strength and stiffness and also enough fastening power so the attached load would not move.
Shown in the figure below is an example of attachment when the optional flange is used. Use a tool such as a split cramp or a shrink disc.

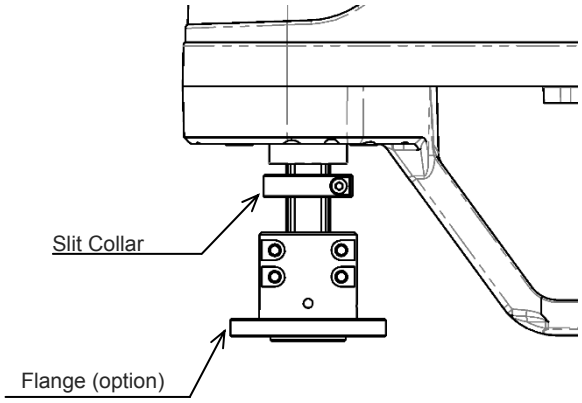
Caution

- Do not attempt to detach the stopper or slit collar on the tip shaft. Doing so may cause misalignment or damage on the ball screw.
- The flat surface on the shaft tip should be used for positioning of a tool. Do not attempt to hold a bolt or set screw against the D-cut surface to fix a load.

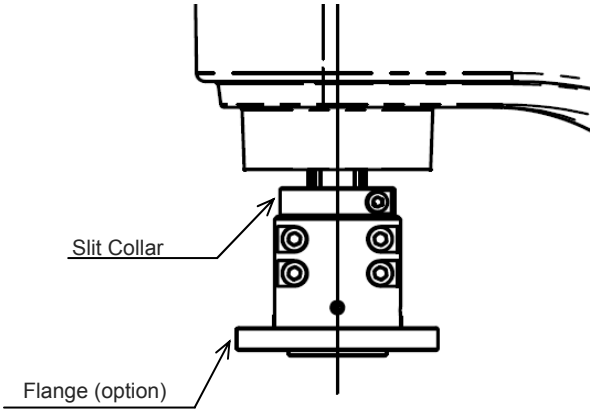
[IXA-□NNN1805]

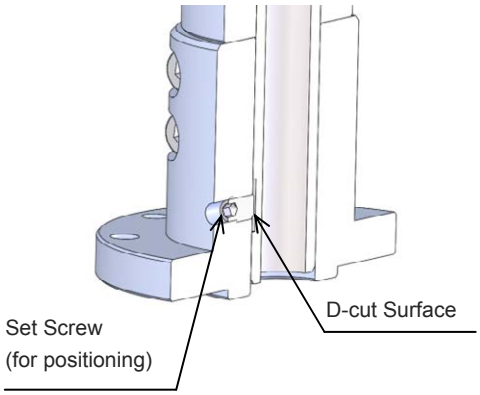


[IXA-□NNN3015/□NSN3015]



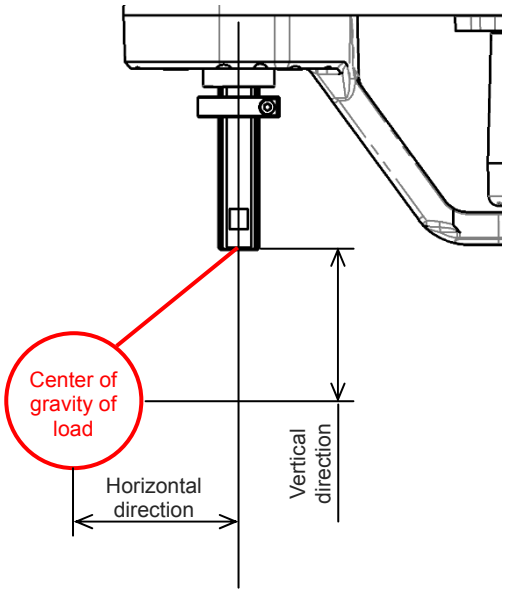
[IXA-□NNN45□□/□NSN45□□
/□NNN60□□/□NSN60□□]





[IXA-□NNN1805]
[IXA-□NNN3015/□NSN3015]
[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]

Make sure that the applied load is in the allowable offset range, below the maximum payload and in the range of allowable inertia moment.
The load offset shows the maximum value. It differs depending on the velocity and acceleration/deceleration settings (%).Refer in the graph shown in the next page.



Model Number	Load Offset [mm]		Transported Mass [kg]	Allowable Moment of Inertia on Tip Shaft [kg·m^2]
	Horizontal	Vertical	Max.	Max.
IXA-□NNN1805	30mm or less	20mm or less	1	0.004
IXA-□NNN3015	150mm or less	100mm or less	3	0.06
IXA-□NSN3015	150mm or less	100mm or less	8	0.12
IXA-□NNN45□□	120mm or less	100mm or less	3	0.05
IXA-□NSN45□□	180mm or less	100mm or less	10	0.12
IXA-□NNN60□□	120mm or less	100mm or less	6	0.06
IXA-□NSN60□□	180mm or less	100mm or less	12	0.12

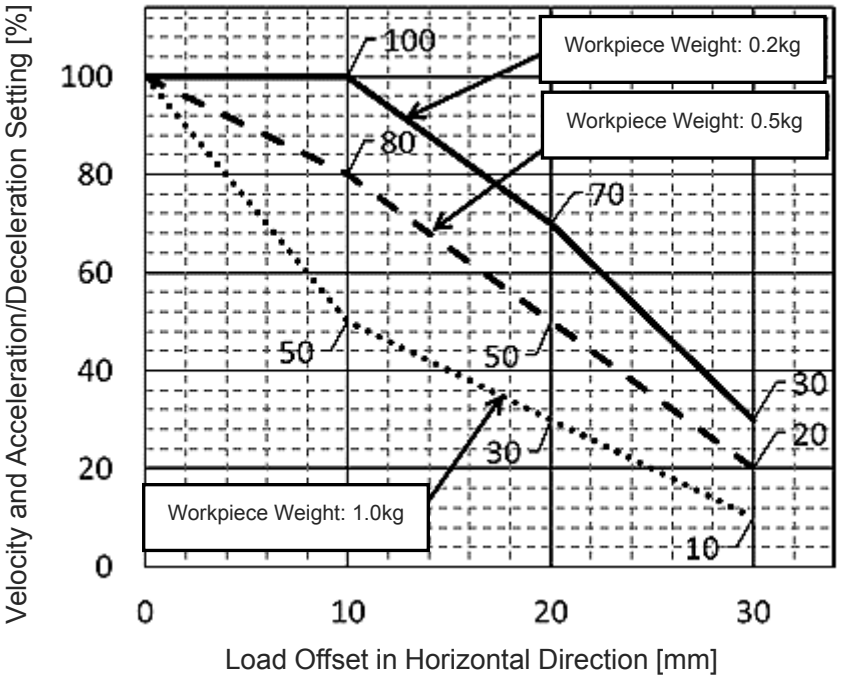
★ Limiting Load Offset by Velocity and Acceleration/Deceleration Setting (%)

Caution

- If it exceeds the load offset limit in horizontal direction, move the center of the load gravity into the load offset limit range by allocating counter weight. At this time, pay attention not to exceed the maximum payload and allowable inertia moment.
- Exceeding the maximum offset, maximum payload or allowable inertia moment may cause abnormal noise or vibration which could end up with malfunction or drop of the product life.

[IXA-□NNN1805]

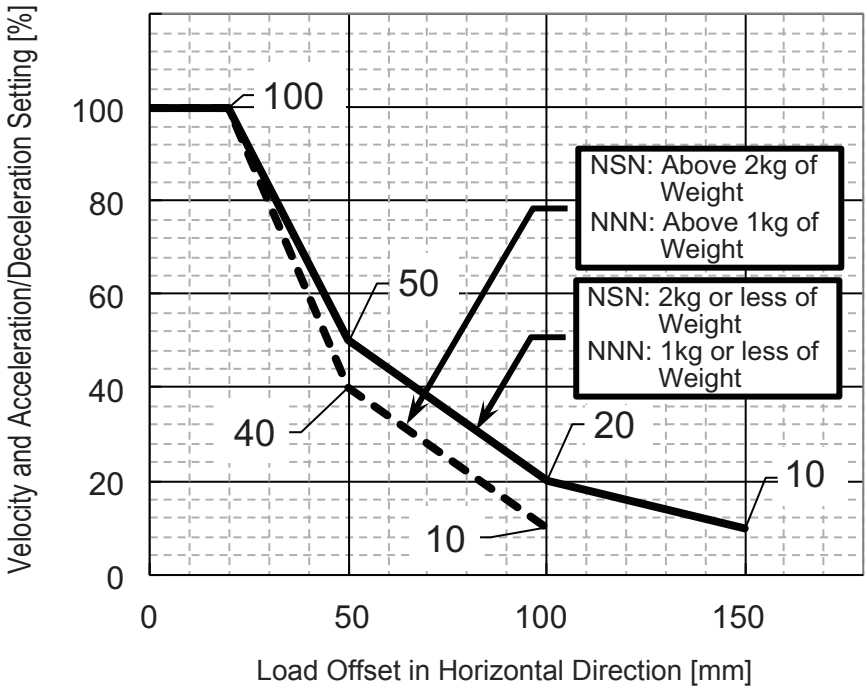
The graph below shows the load offset when the velocity and acceleration/deceleration are set at the same value such as 50% of velocity and 50% of acceleration/deceleration.
For instance, the load offset should be 20mm or less as shown in the graph when the weight is 0.5kg and the velocity is set at 50% and acceleration/deceleration is set at 50%.



(Note) when the settings for the velocity and acceleration/deceleration are in different values, it should be no problem if the load offset is read at the bigger value in the graph and the offset value is set at or below the read-out value.
However, when it is necessary to set at the offset value above the read-out value, confirm that there is no abnormality occurred such as abnormal noise or vibration. Set the value smaller when such abnormality occurs.

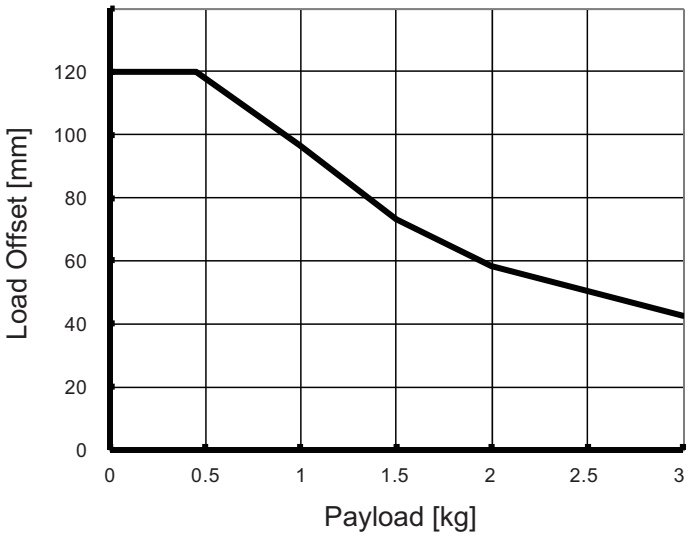
[IXA-□NNN3015/□NSN3015]

The graph below shows the load offset when the velocity and acceleration/deceleration are set at the same value such as 50% of velocity and 50% of acceleration/deceleration.
For instance, the load offset should be 50mm or less as shown in the graph when the weight of NSN is 2kg and the velocity is set at 50% and acceleration/deceleration is set at 50%.

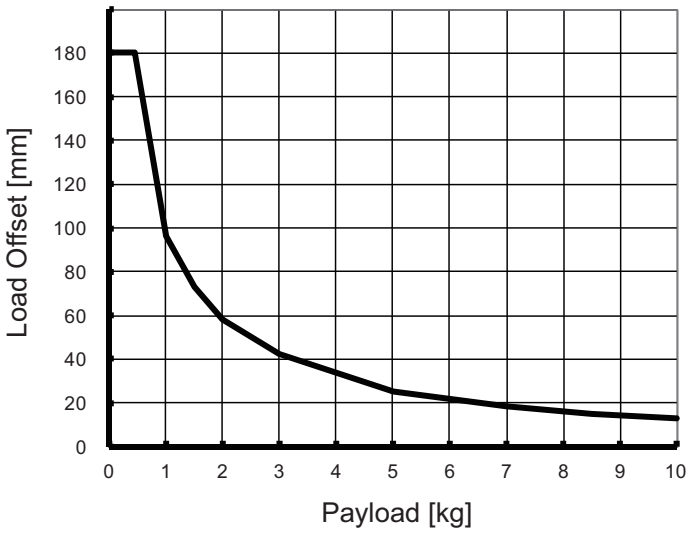


(Note) when the settings for the velocity and acceleration/deceleration are in different values, it should be no problem if the load offset is read at the bigger value in the graph and the offset value is set at or below the read-out value.
However, when it is necessary to set at the offset value above the read-out value, confirm that there is no abnormality occurred such as abnormal noise or vibration. Set the value smaller when such abnormality occurs.

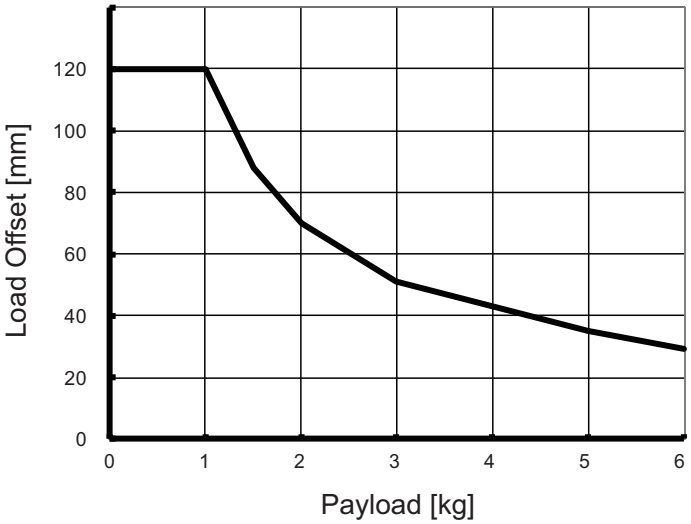
[IXA-□NNN45□□]



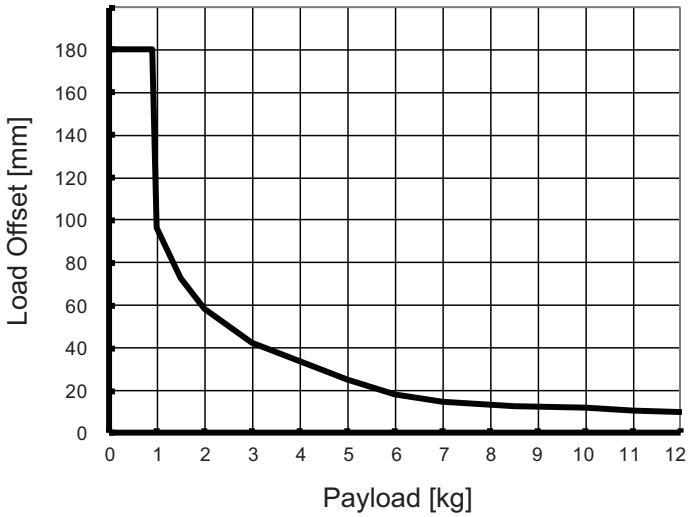
[IXA-□NSN45□□]



[IXA-□NNN60□□]



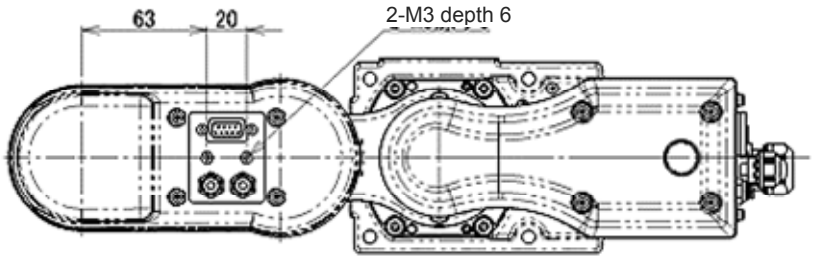
[IXA-□NSN60□□]

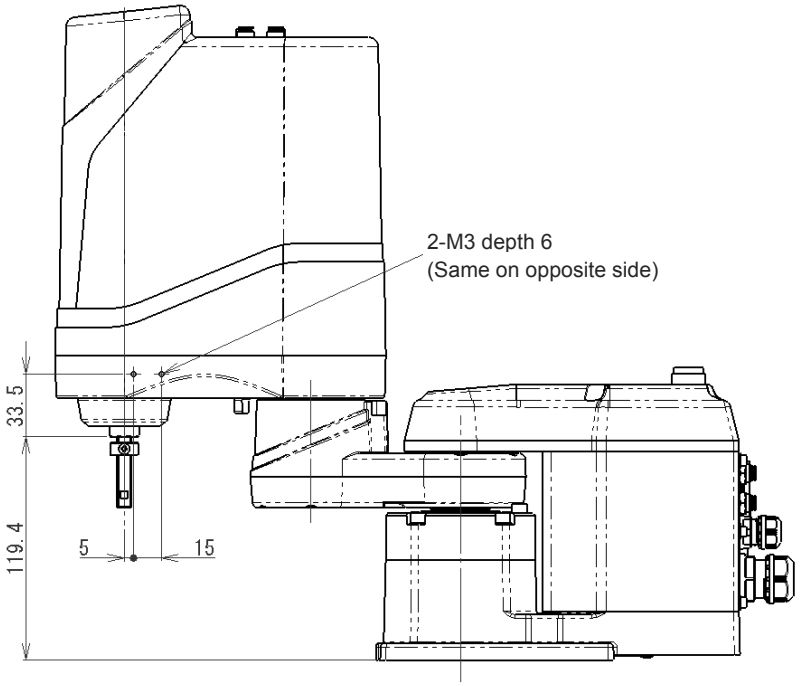


Attachment Using User Tapped Hole

[IXA-□NNN1805]

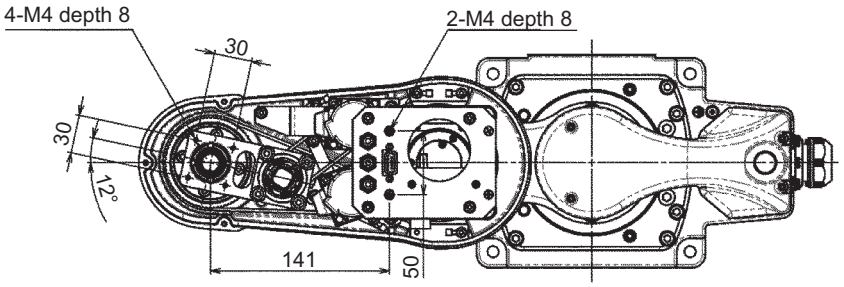
There are M3 tapped holes equipped on the J2 user panel and the side of the J2 main arm. Utilize them for wiring and tubing of tools. Do not attempt to utilize them to affix a heavy object.

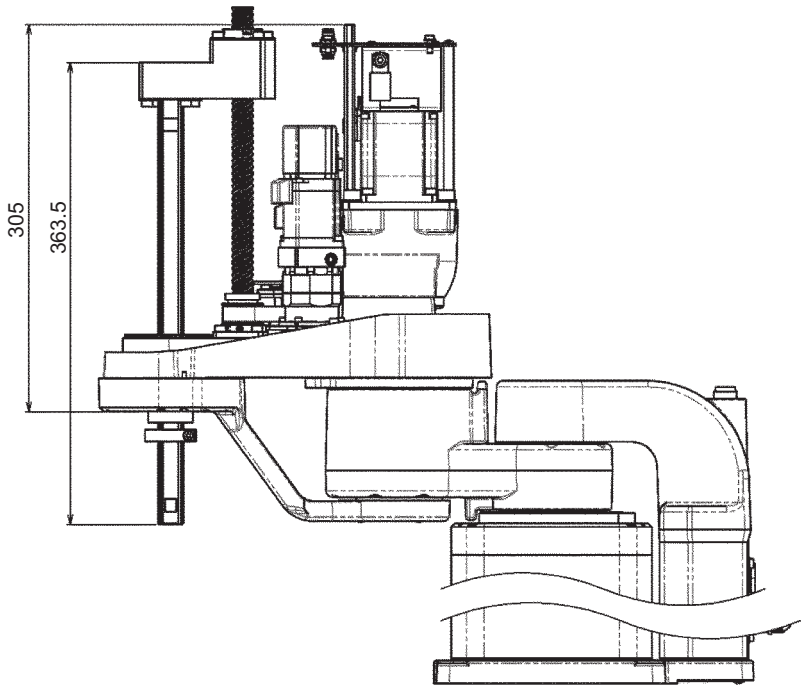


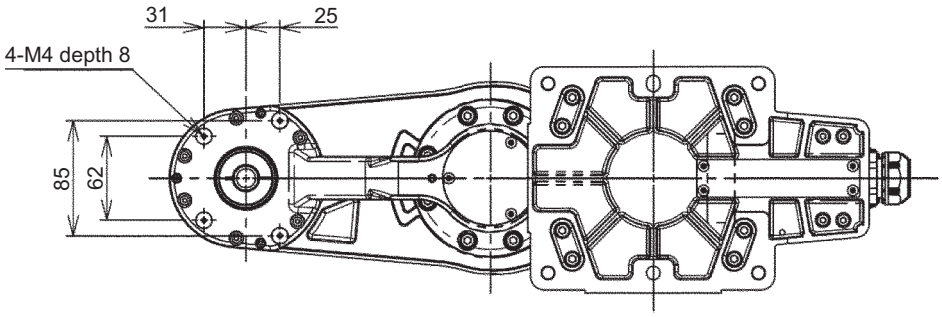


[IXA-□NNN3015/□NSN3015]

There are M4 tapped holes equipped on the J2 user panel, top of the spline shaft and the bottom of the J2 sub-arm. Utilize them for wiring and tubing of tools. Do not attempt to utilize them to affix a heavy object.

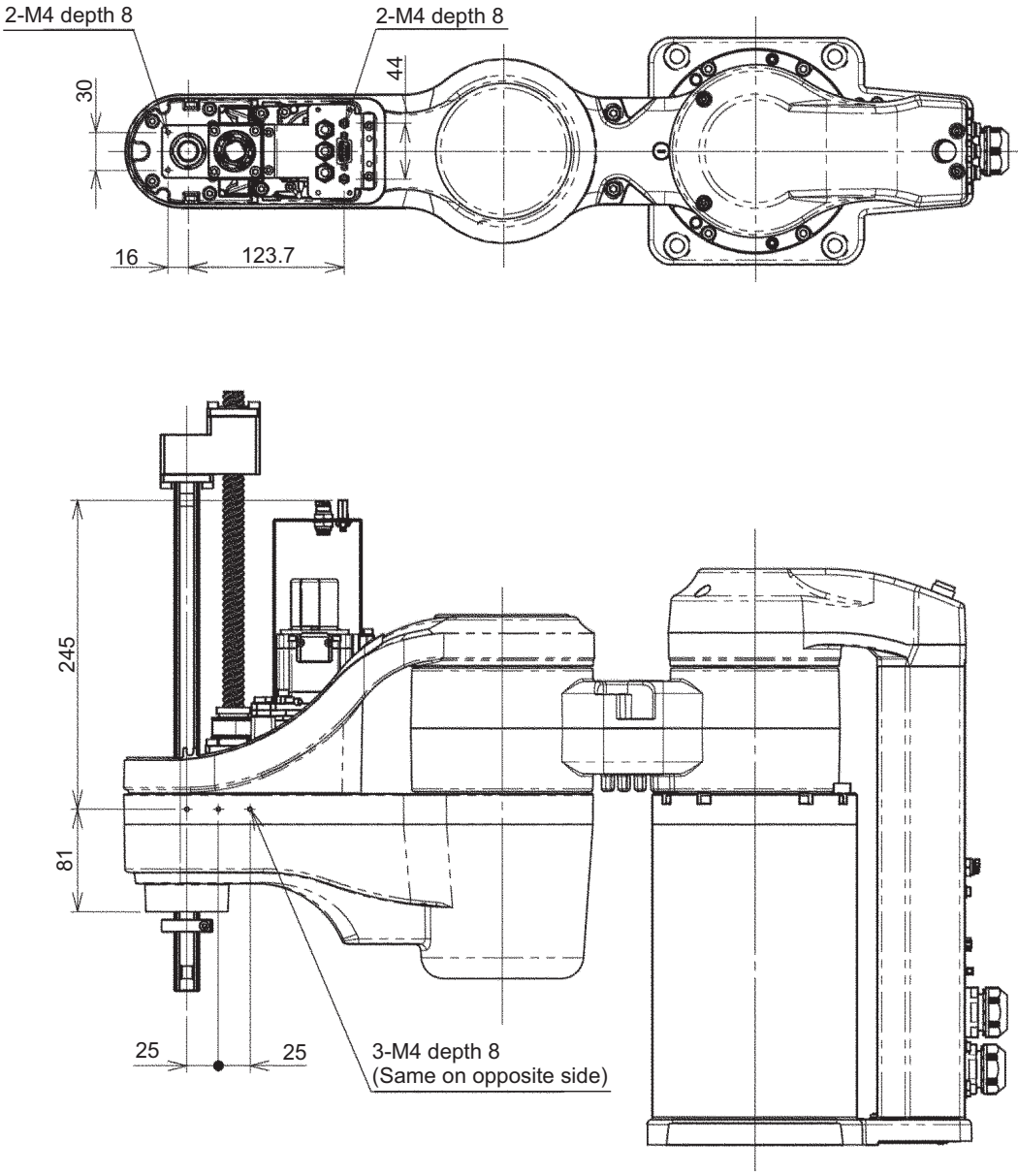






[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]

There are M4 tapped holes equipped on the J2 user panel, the side of the J2 arm and top of the spline shaft. Utilize them for wiring and tubing of tools. Do not attempt to utilize them to affix a heavy object.

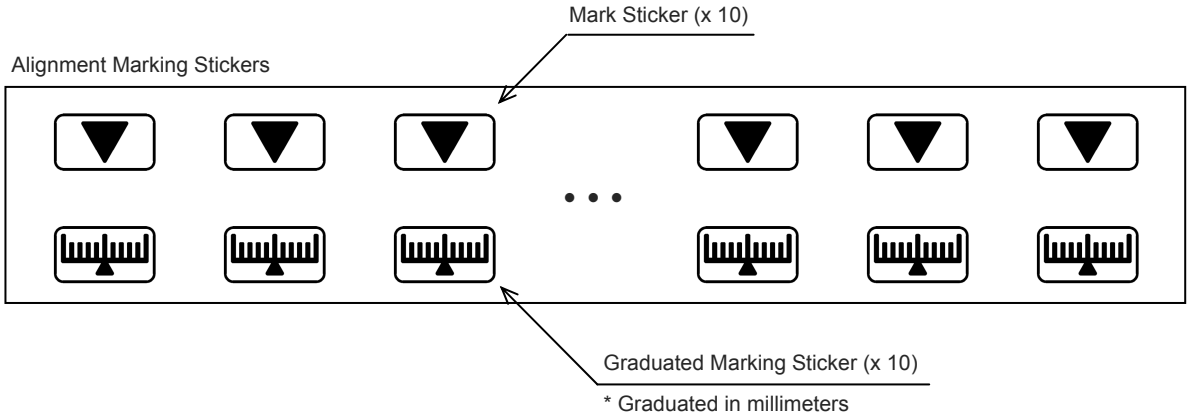


Equipping with Safety Protection Fence

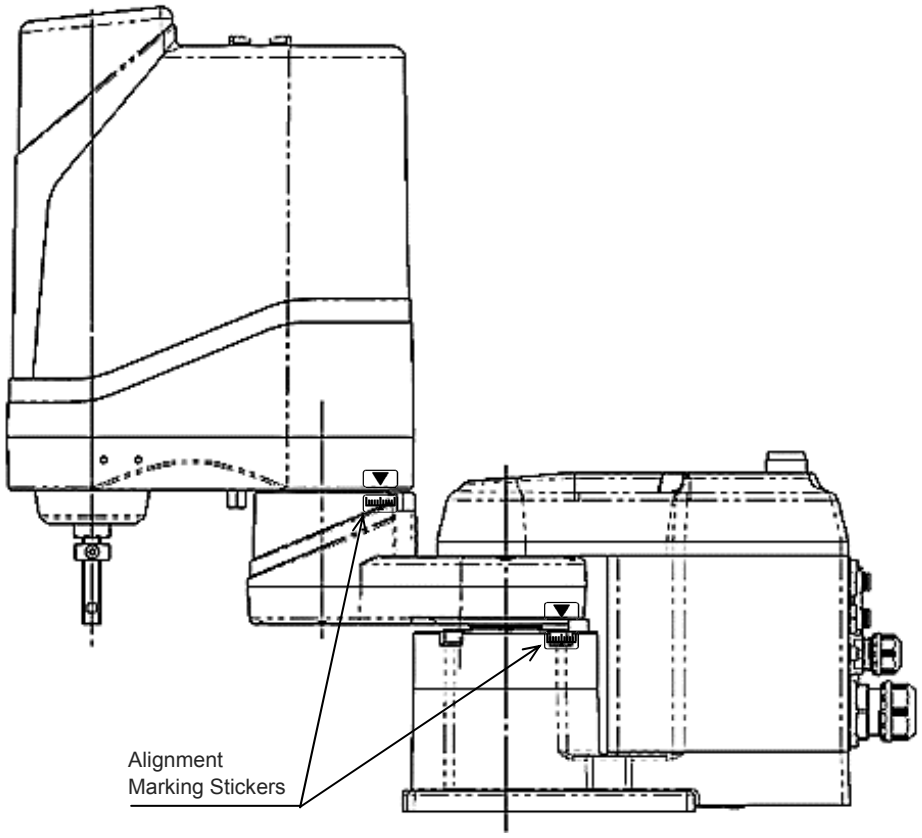
For Machinery Directive (2006/42/EC) in EU Directives, equip with safety protection fence. Use a system I/O connector at the entrance of the safety protection fence to equip with an interlock system which makes the emergency stop works when the entrance is opened, and make sure to avoid entering from nowhere else but the entrance.

Application of Alignment Marking Stickers

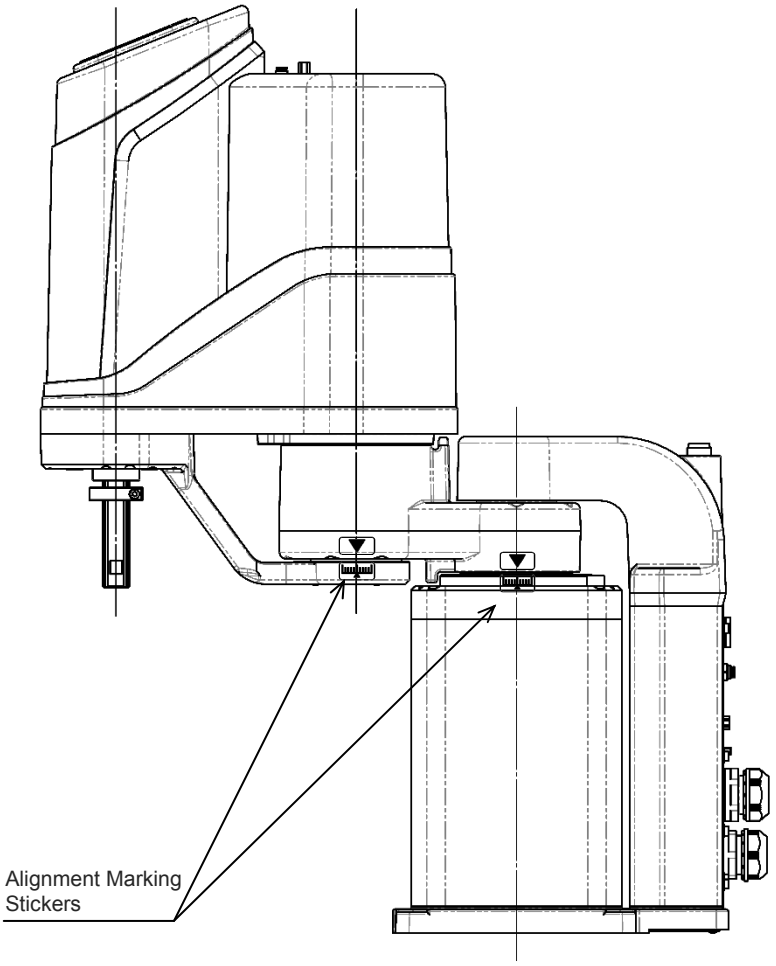
There are alignment marking stickers shown below enclosed in the package. Use them as a marking for positioning check to see the misalignment of the home position and the positioning points. Alignment marking stickers have adhesive on the back side. Wipe of any oil or dirt on the attaching surface before applying a sticker on.



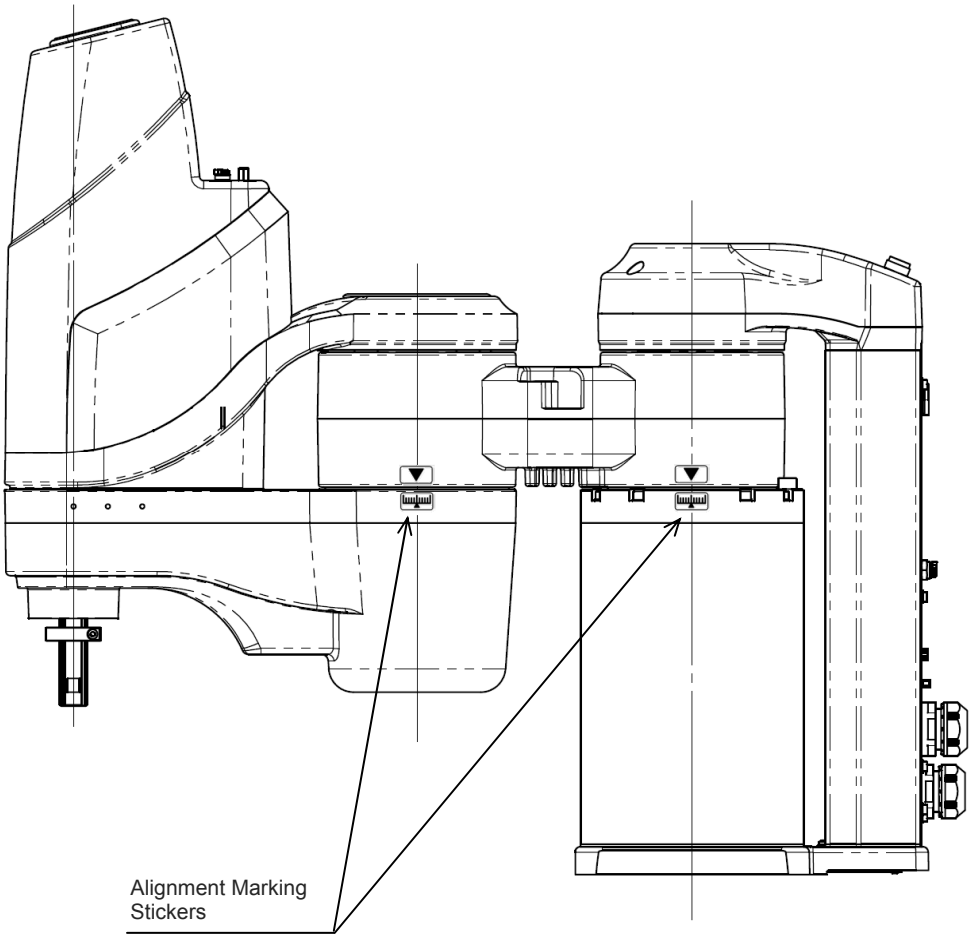
[IXA-□NNN1805]



[IXA-□NNN3015/□NSN3015]



[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]



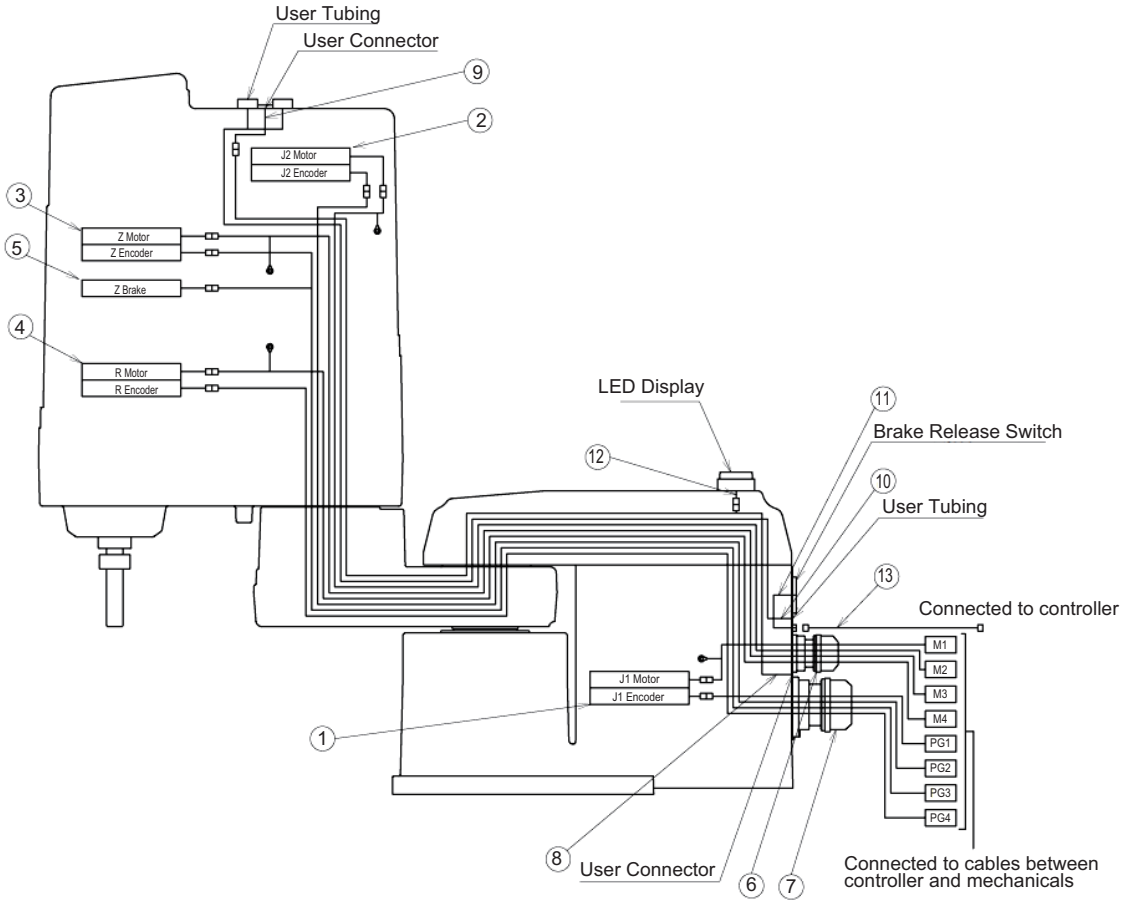
IXA SCARA Robot

Chapter 3

Wiring and Tubing

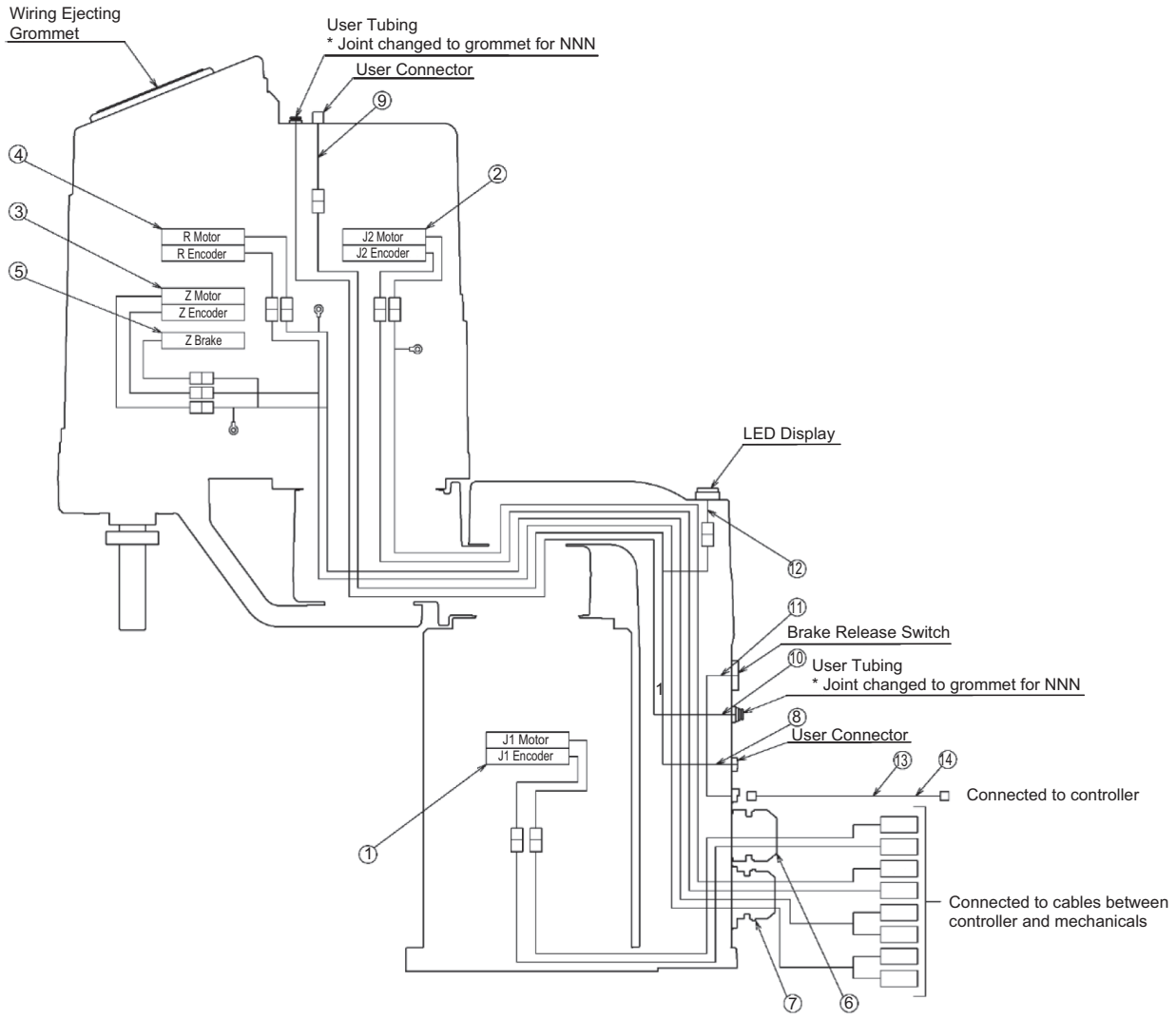
3.1 Wiring and Tubing in the Body

[IXA-□NNN1805]



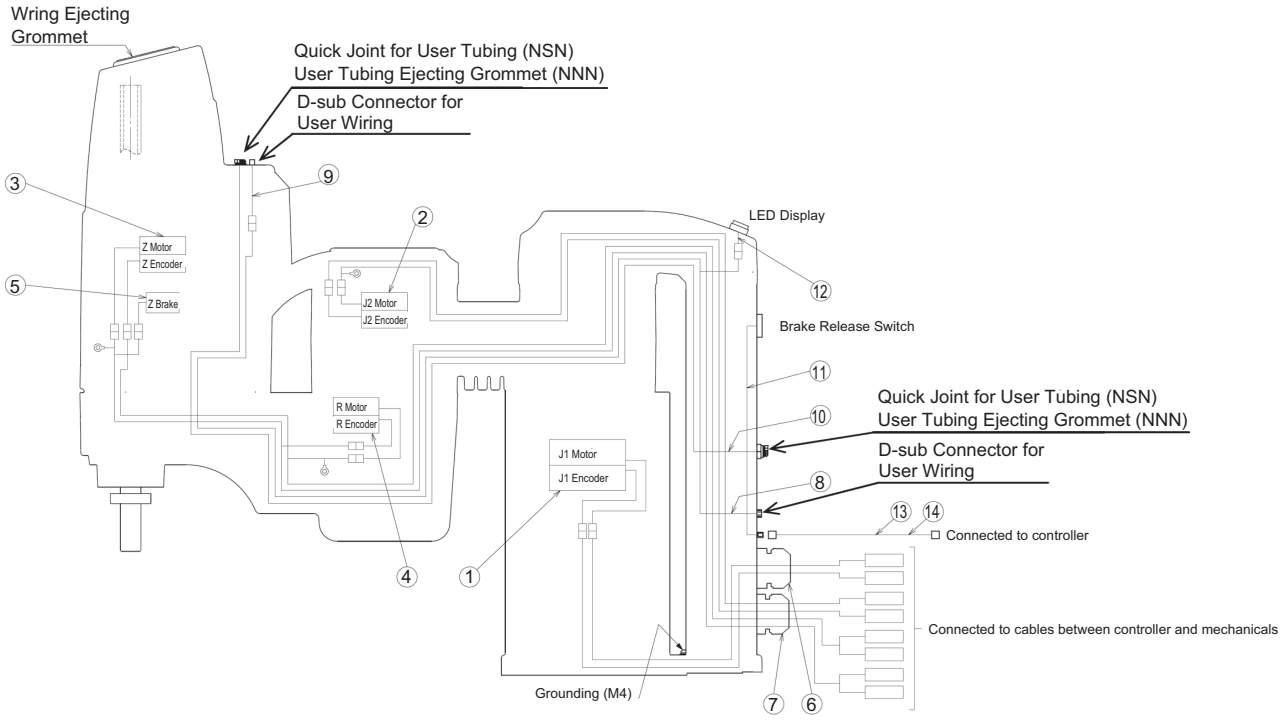
No.	Parts Name	Remarks	Quantity
1	J1 Motor		1
2	J2 Motor		1
3	Z Motor		1
4	R Motor	4-axis Type	1
5	Z Brake		1
6	Inside M Cable		1
7	Inside PG Cable		1
8	Inside U Cable		1
9	D-sub Relay Cable		1
10	Air Tube	ϕ4 × ϕ2.5, 2pieces	1
11	BK Release Switch		1
12	LED Display		1
13	BK Cable		1

[IXA-□NNN3015/□NSN3015]



No.	Parts Name	Remarks	Quantity	
			NNN	NSN
1	J1 Motor for NNN		1	-
	J1 Motor for NSN		-	1
2	J2 Motor for NNN		1	-
	J2 Motor for NSN		-	1
3	Z Motor for NNN		1	-
	Z Motor for NSN		-	1
4	R Motor for NNN	4-axis Type	1	-
	R Motor for NSN	4-axis Type	-	1
5	Z Brake		1	1
6	J1 MPG Cable		1	1
7	Inside MPG Cable		1	1
8	Inside U Cable		1	1
9	D-sub Relay Cable		1	1
10	Air Tube	ϕ4 × ϕ2.5, 3pieces	1	1
11	BK Release Switch		1	1
12	LED Display	Equipped when option selected for standard type NNN	1	1
13	BK Cable A		-	1
14	BK Cable B		1	-

[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]



No.	Parts Name	Remarks	Quantity	
			NNN	NSN
1	J1 Motor for NNN		1	-
	J1 Motor for NSN		-	1
2	J2 Motor for NNN		1	-
	J2 Motor for NSN		-	1
3	Z Motor for NNN		1	-
	Z Motor for NSN		-	1
4	R Motor for NNN	4-axis Type	1	-
	R Motor for NSN	4-axis Type	-	1
5	Z Brake		1	1
6	J1 MPG Cable		1	1
7	Inside MPG Cable		1	1
8	Inside U Cable		1	1
9	D-sub Relay Cable		1	1
10	Air Tube	ϕ6 × ϕ4, 3pieces	1	1
11	BK Release Switch		1	1
12	LED Display	Equipped when option selected for standard type NNN	1	1
13	BK Cable A		-	1
14	BK Cable B		1	-

3.2 Wiring with Controller

Use the enclosed motor cable and encoder cable to establish connection between the robot main unit and the controller.
It should be three places of the motor cable and three places of the encoder cable for the three-axis type while four places of the motor cable and four places of the encoder cable for the four-axis type.

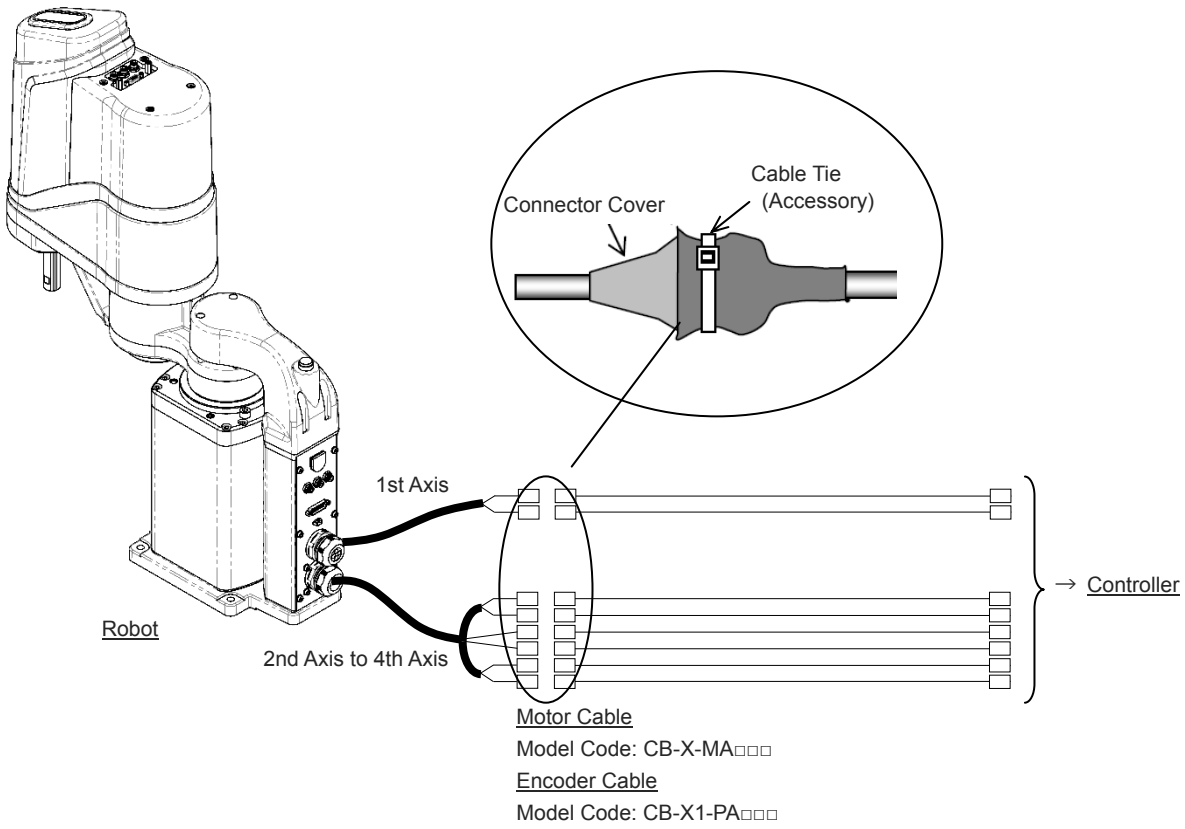


Figure shows IXA-□NNN3015/□NSN3015

Refer to the Instruction manuals for the controller and PC software for the procedures to connect the I/O cable, controller power cable, PC connection cable, etc.
After joining connectors, get the connector covers one overlapped on the other and clamp the covers with an enclosed cable tie at the overlapped area.

Caution

- Connect to the robot of the serial number specified on the robot designation label provided on the front panel of the controller. Connecting to a robot which is not specified may cause unexpected operation which may end up with a critical injury.
- Make sure to use the dedicated cables for connection. Using a cable which is not dedicated may cause not only unexpected operation but also may cause fire or injury which may end up with serious accident.
- When the cable is connected or disconnected, make to turn off the power to the controller. Working on the product with the power kept on may cause unexpected operation which may end up with a critical injury.
- Check before connecting the connectors that there is no bent or breakage on the connector pins or no damage on the cables. Also, check that the connectors are certainly locked after connection is established.

3.3 Brake Switch

For the brake on the Z-axis, the brake switch on the rear panel gets activated by connecting the controller to the robot unit with the enclosed brake cable.

Press the brake switch and the Z-axis brake gets compulsorily released.

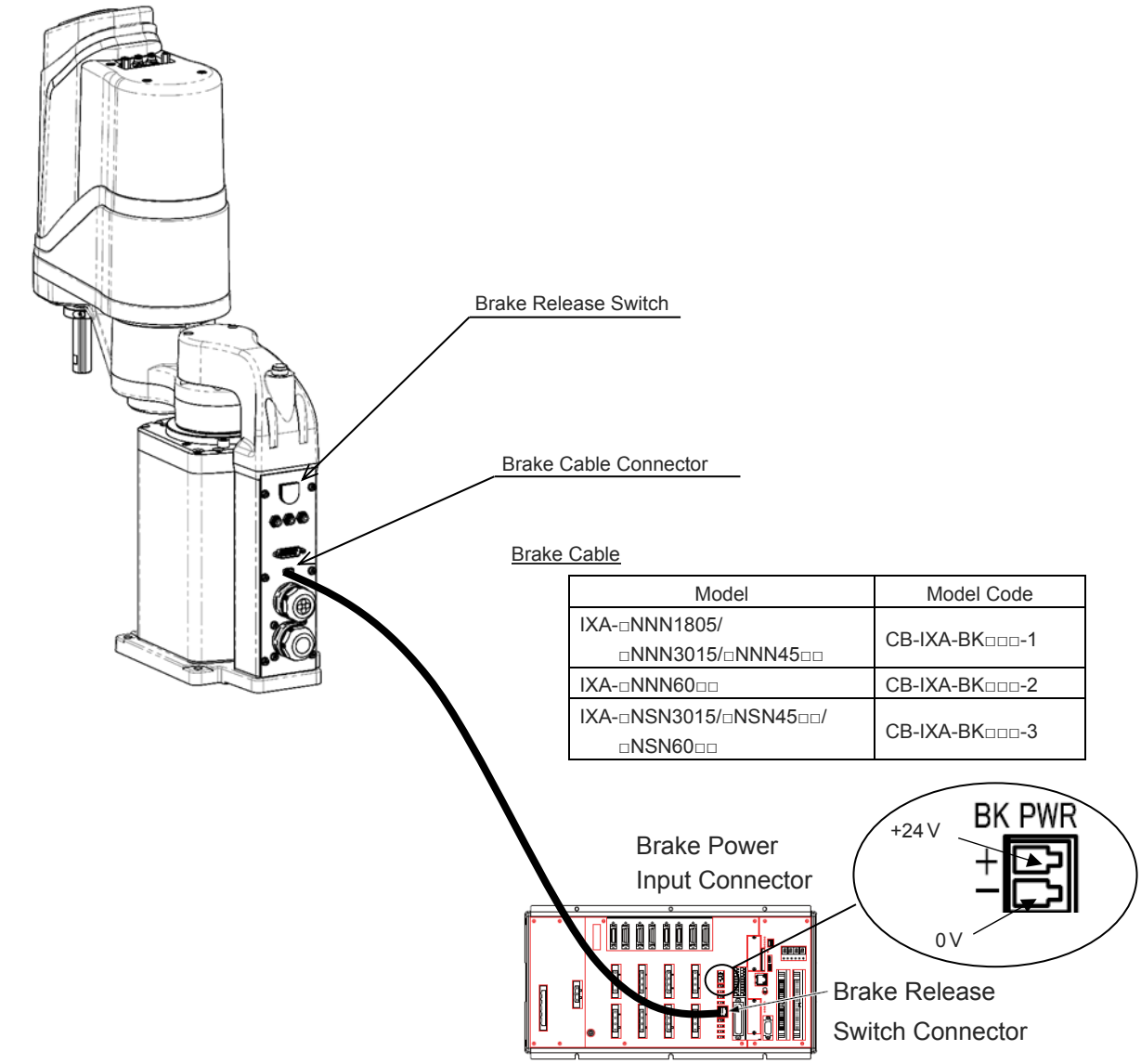
Supply +24V power (approx. 0.4A) to the brake power input connector.

[Operation on Brake Release Switch]

Open the cover and press the switch. The switch sinks and gets held, and the brake gets released.

Press the switch again and the switch pops up back to the original position. The brake starts working.

The lamp will not turn on.



Model	Model Code
IXA-□NNN1805/ □NNN3015/□NNN45□□	CB-IXA-BK□□□-1
IXA-□NNN60□□	CB-IXA-BK□□□-2
IXA-□NSN3015/□NSN45□□/ □NSN60□□	CB-IXA-BK□□□-3

Figure shows IXA-□NNN3015/□NSN3015

Caution

- When the brake is released, the tip shaft could drop and if it contacts with the bottom surface, the shaft may get bent. Also, when it drops, your hand could get pinched between the workpiece attached on the tip shaft and the bottom surface which could cause serious injury. Pay special attention when releasing the brake.
- After releasing the brake compulsorily, turn the brake switch OFF so the automatic control of the brake by the controller can work. While the brake is compulsorily released, it is very dangerous as the brake would not work when an emergency stop is held or the servo is turned OFF. The tip shaft could drop and may cause a critical accident.

3.4 User Wiring and Tubing

There are cable and tube connections equipped in the robot so the user can use freely. Make sure to use them within the specifications.

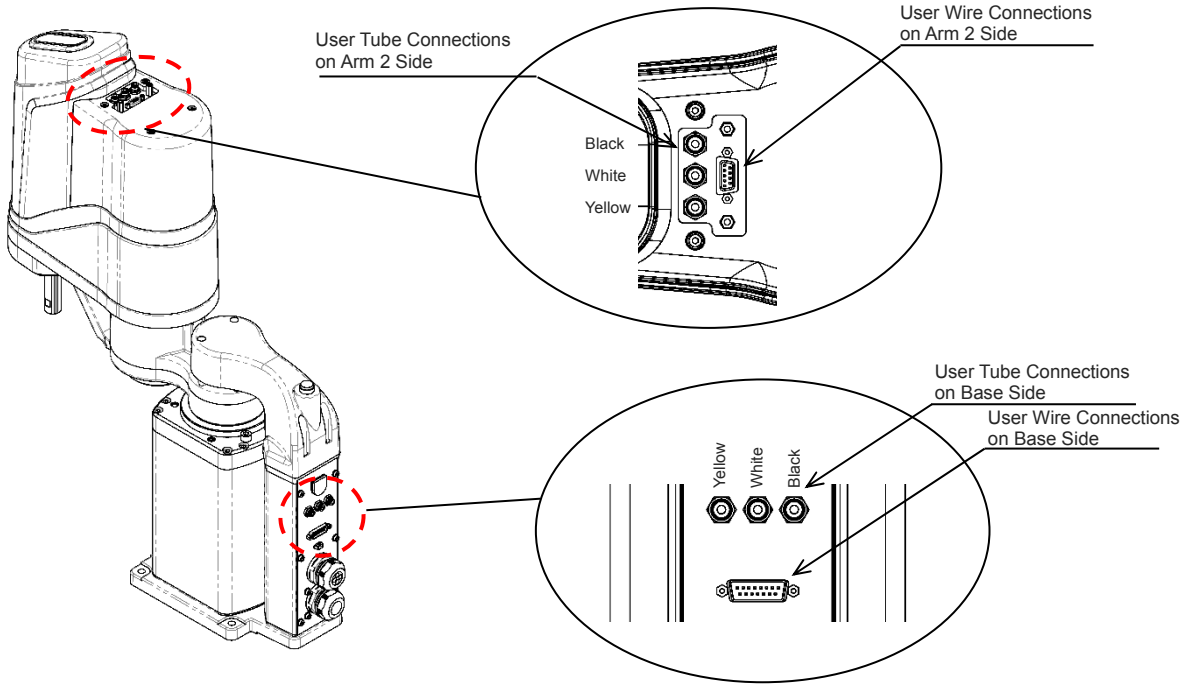


Figure shows IXA-□NNN3015/□NSN3015

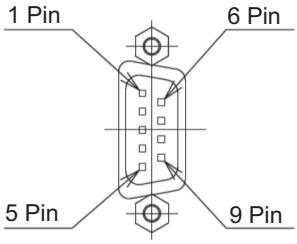
(Note) The user tubings on Arm 2 side and the base side on IXA-□NNN3015 are blinded with a blind grommet.
There is an air tube stored inside the mechanism.
Prepare a joint separately to join the air tube and eject it to use.
[Refer to User Tubing for the example of User Tube Connection on Base Side]

User Wiring

It is available for connection for signals from devices. Prepare connectors and contacts separately.

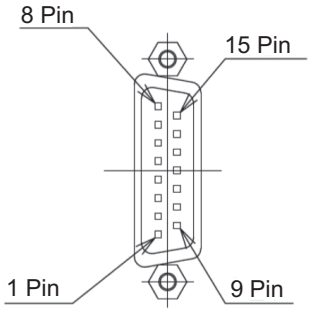
User Connector on Arm 2 Side

Connector: Dsub_XM3D-0921 (OMRON)
Fixture: M2.6 (OMRON)



User Connector on Base Side

Connector: Dsub_XM3A-1521 (OMRON)
Fixture: M2.6 (OMRON)



* The LED display lamp will turn on by conducting 24V DC to Pin 14 and 15 by the user.
* Connection between the base side and Arm 2 side should be established with pins from Pin 1 to 9.

* Polarity
14Pin (+)
15Pin (-)

Conductor Size and Number of Wires	IXA-□NNN1805	25AWG, 10-core (9-core + shield)
	Models Except for IXA-□NNN1805	24AWG, 10-core (9-core + shield)
Rated Voltage	30V	
Permissible Current	MAX1A	

Condition of D-Sub Connector for User being Joined

Notice

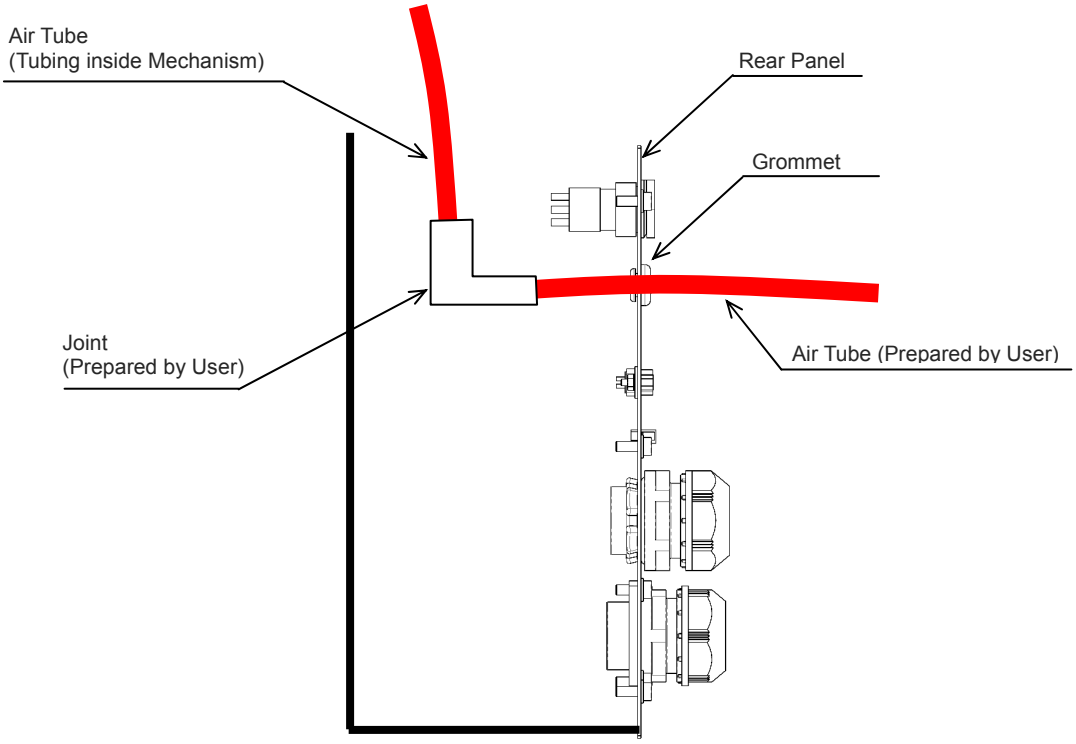
● Use those specified below for the user connector.
It would not be attached if used connector parts other than specified.

Arm 2 Side	Supplier	OMRON
	Connector	XM3A-0921/Dsub9 Pin
	Hood	XM2S-0911
Base Side	Connector	XM3D-1521/Dsub15 Pin
	Hood	XM2S-1511

User Tubing

There is a quick joint equipped on the high-speed type NSN and IXA-□NNN1805.
There is a grommet for tube ejection equipped on the standard type NNN except for IXA-□NNN1805. It is not equipped with any joint.

Dimensions (outer diameter/inner diameter) and Number of Tubes	IXA-□NNN1805	ϕ4mm × ϕ2.5mm, 2pieces
	IXA-□NNN3015/□NSN3015	ϕ4mm × ϕ2.5mm, 3pieces
	IXA-□NNN45□□/□NSN45□□ IXA-□NNN60□□/□NSN60□□	ϕ6mm × ϕ4mm, 3pieces
Normal Service Pressure	0.6MPa	
Working Medium	Air	



For Standard Type NNN

(Except for IXA-□NNN1805)

Notice

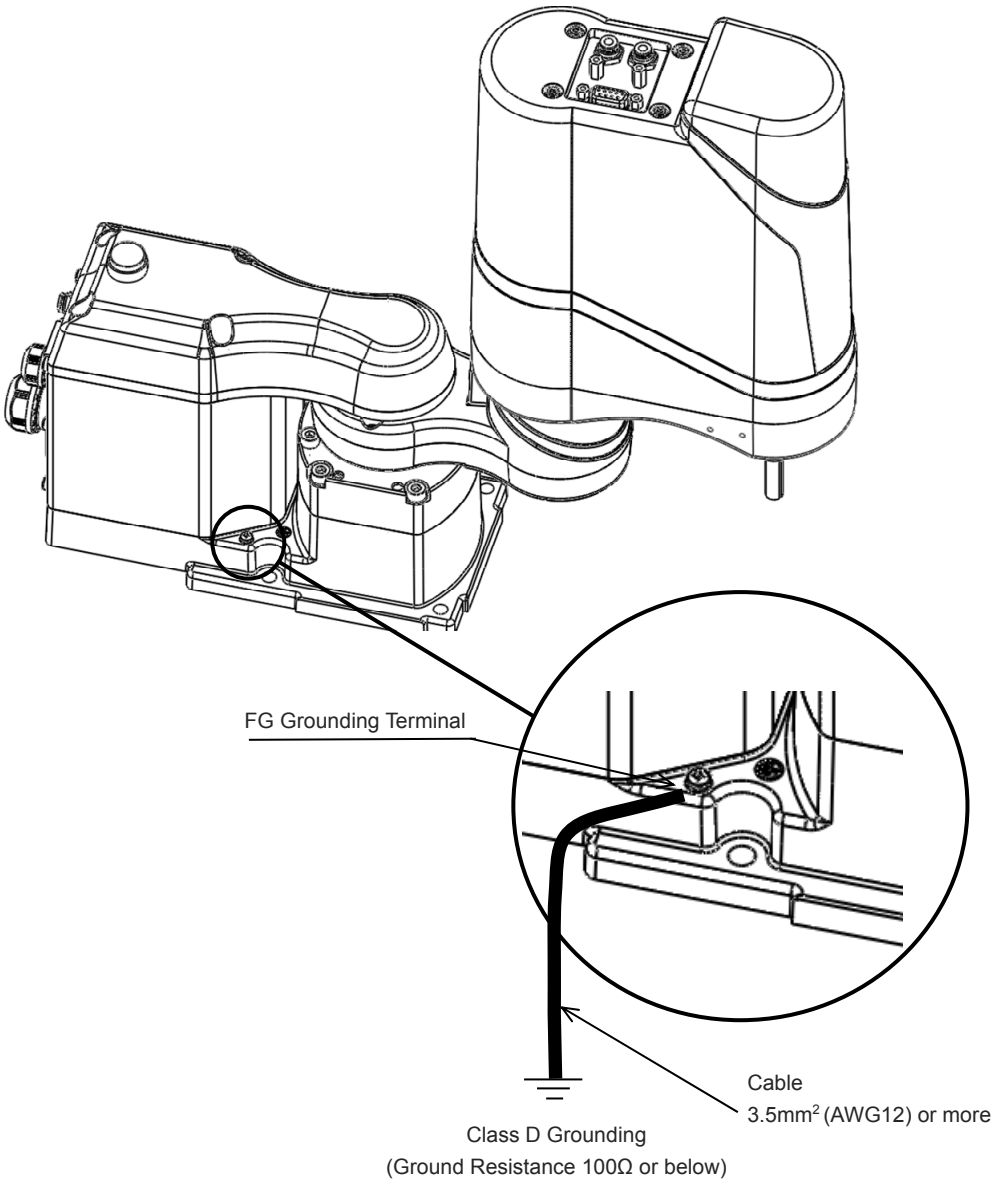
- There is no joint to connect air tubes enclosed in the standard type NNN. Prepare it separately.

Grounding

Notice

● Use the grounding terminal shown in the figure to ground the robot.

[IXA-□NNN1805]



[Models Except for IXA-□NNN1805]

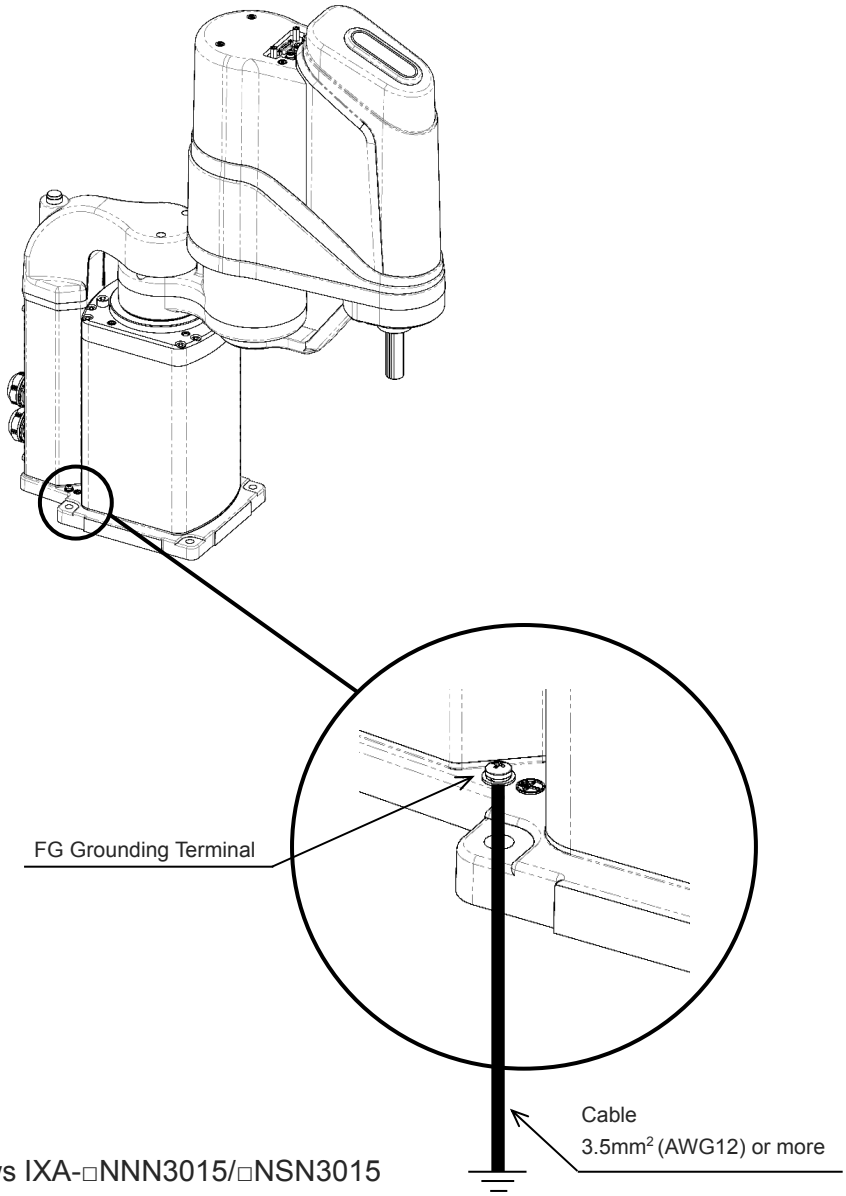


Figure shows IXA-□NNN3015/□NSN3015

Caution

Have a grounding cable and grounding wiring layout dedicated for the unit. Do not share them with other devices.

IXA SCARA Robot

Chapter 4

Maintenance and Inspection

4.1 Precautions for Maintenance and Inspection Work

Caution

Do not attempt to disassemble or cut the cable of the following items.
By doing so, recovery to normal condition cannot be done, and it may cause a critical accident such as error operation, fire or malfunction.

- Disassembly of the servo motor
- Disassembly of the ball reduction gear
- Disassembly of the ball screw and spline shaft
- Disassembly of the bearing
- Disassembly of the brake
- Cutting of the cable

Notice

There are some requests as stated below for the grease applied on the vertical axis for SCARA Robot.

- First, be sure to wipe off the old grease, and then supply new grease.
- The degradation speed of grease may differ depending on the operating environment (temperature, humidity and ambient atmosphere).
  It is recommended to shorten the grease supply period if the actuator is used under poor environmental conditions such as high temperatures or high humidity.
- Also, it is recommended to improve the environmental conditions in case the grease changes color notably due to poor operating conditions.
- As the supplied grease gets old, the base oil may get separate from the grease.
  Check visually for oil drips when supplying grease.
- A SCARA Robot stored for 6 months or more may suffer from grease degradation.
  Supply grease before the start of use.

4.2 Inspection Items and Schedule

Have daily inspections and regular inspections to use the robot in a stable condition for a long term.

Make sure to follow the caution for maintenance and inspection in Safety Guide.

(1) Daily Maintenance Inspections

Have a maintenance and inspection for those described below before starting up in everyday operation, and if any problem is found, have an appropriate treatment.

Maintenance Inspection Area	Maintenance Inspection Details
Safety Cage	Confirm that there is no deformation or misalignment of the cage. Confirm that the interlock mechanism is operating properly.
Appearance of Robot	Check the exterior for abnormality (flaws, dents, etc.). (If the robot main body has flaws or other abnormalities, please contact IAI.)
Operation of Robot	Check for abnormal operation, vibration or noise.
Cables	Confirm that there is o damage on cable or getting it pinched. Check the cable mounting parts for looseness.
Emergency-Stop Switch	Confirm that the emergency-stop switch functions properly. Check that the robot stops.

(2) 6-Month Maintenance Inspection

Conduct maintenance and inspection for the items below in every six months, and let IAI know in case there is any damage or abnormality.

Maintenance Inspection Area	Maintenance Inspection Details
Robot Main Body (Screws and covers attached on robot body)	Check for any looseness of the attachment bolts on the robot body and play on cover related components. (If there is looseness or play found on them, give them additional tightening.)
IXA-□NNN1805 Ball Screw Spline Models Except for IXA-□NNN1805 Ball Screw Ball Spline	Supply grease to ball screw and ball spline. (Applied Grease: AFG Grease by THK) [Refer to 4.3, “Grease Supply on the Vertical Axis”]
Connectors	Check the connectors for looseness.

(3) 5 Years Maintenance Inspection

Conduct maintenance and inspection for the items below after five years, and let IAI know in case there is any damage or abnormality.

After five years has passed, have a maintenance and inspection for the following items every year.

Maintenance Inspection Area	Maintenance Inspection Details
Speed Reducer (J1 Axis and J2 Axis)	Conduct the lost motion measurement, and if the lost motion amount exceeds the allowable value, it is the end of the life of the speed reducer, thus it is necessary to have maintenance work including dismantlement such as replacement. (Please contact IAI if any abnormality is found.) [Refer to 4.5, “How to Measure Lost Motion”]
Timing Belt (Vertical Axis and Rotary Axis)	Check if there is any damage or remarkable abrasion on the teeth of the timing belt. If there is any, it is the end of the life of the timing belt, which requires such as replacement that requires a work to disassemble for maintenance. (Please contact IAI if any abnormality is found.) [Refer to 4.6, “How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis”]

4.3 Grease Supply on the Vertical Axis

The ball screw and ball spline on the vertical axis require grease to be supplied.

[1] Grease used: Use an urea based grease equivalent product

Application location	**During maintenance** (recommended product)	Default (reference)
Vertical Axis	THK Co., Ltd./AFG	THK Co., Ltd./AFG

Caution

Do not attempt to apply lithium grease and fluorine grease.
Mixing with urea grease not only reduces the performance of the grease, it may even cause damage to the actuator.

[2] Greasing method

[IXA-□NNN1805]

Tools to Use

Tools to Use	
Hex wrench	2.5mm-sized

Greasing method

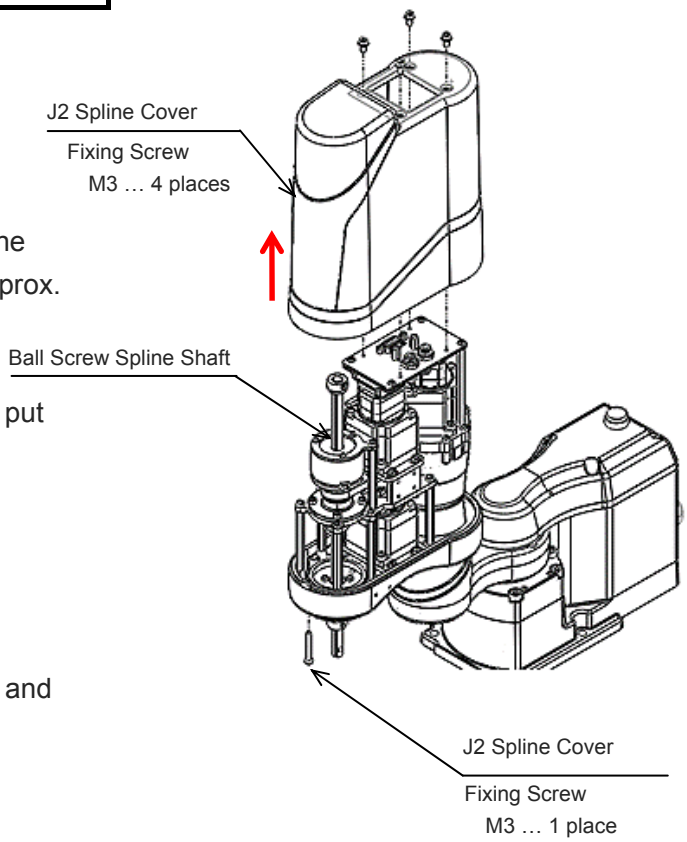
1 Detach the J2 spline cover.

2 Apply grease to the whole area of the ball screw spline shaft by hand. (approx. 0.2g)

3 Wipe off the excessive grease, and put the J2 spline cover back on.

Screw Diameter	Tightening Torque
M3	1.6N·m

4 Perform JOG operation to move up and down so the grease can be applied evenly to the balls inside the nut.

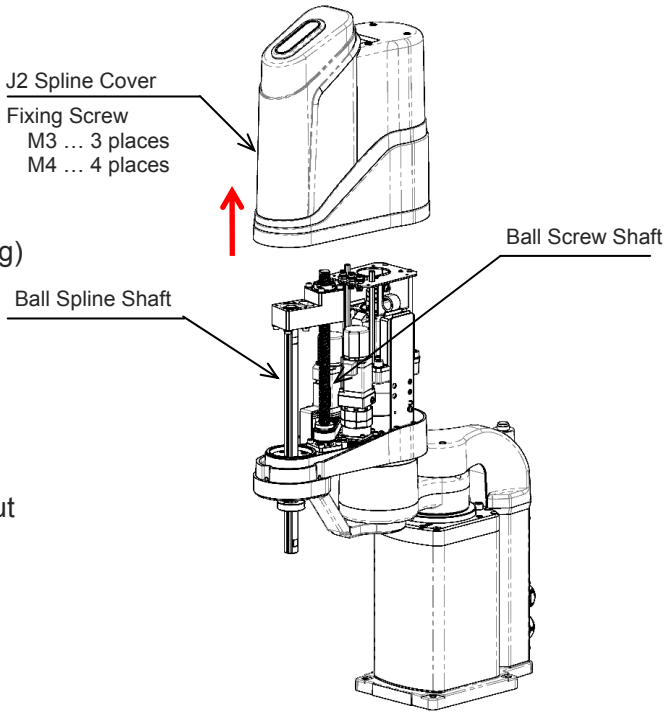


[IXA-□NNN3015/□NSN3015]

Tools to Use

Tools to Use	
Hex wrench	2.5mm-sized
	3.0mm-sized

Greasing method



1 Detach the J2 spline cover.

2 Apply grease to the whole area of the ball screw shaft by hand. (approx. 0.5g)

3 Apply grease to the whole area of the ball spline shaft in the same manner. (approx. 0.5g)

4 Wipe off the excessive grease, and put the J2 spline cover back on.

Screw Diameter	Tightening Torque
M3	1.6N·m
M4	1.8N·m

5 Perform JOG operation to move up and down so the grease can be applied evenly to the balls inside the nut.

[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]

Tools to Use

Tools to Use	
Hex wrench	3.0mm-sized

Greasing method

1 Detach the J2 spline cover.

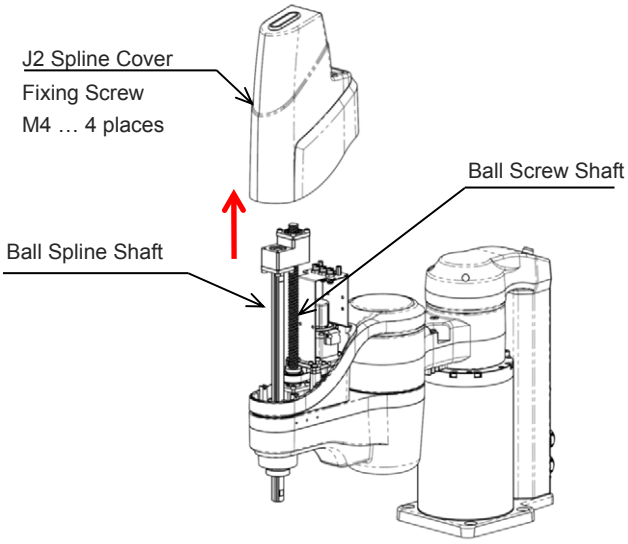
2 Apply grease to the whole area of the ball screw shaft by hand.
(Z-axis Stroke 180 = approx. 0.5g,
Z-axis Stroke 330 = approx. 1g)

3 Apply grease to the whole area of the ball spline shaft in the same manner.
(Z-axis Stroke 180 = approx. 0.5g,
Z-axis Stroke 330 = approx. 1g)

4 Wipe off the excessive grease, and put the J2 spline cover back on.

Tightening Torque
1.8N·m

5 Perform JOG operation to move up and down so the grease can be applied evenly to the balls inside the nut.



Caution

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

4.4 Grease Supply to J1 Axis and J2 Axis

It is not necessary to supply grease to the speed reducers on J1 axis and J2 axis.
However, conduct the lost motion measurement at the 5-year maintenance inspection, and if the lost motion amount exceeds the allowable value, it is the end of the life of the speed reducer, thus it is necessary to have maintenance work including dismantlement such as replacement.
Please contact IAI if any abnormality is found.
[Refer to 4.5 How to Measure Lost Motion]

4.5 How to Measure Lost Motion

Devices Necessary for Measurement

	Devices to Use
Digimatic Indicator	Measurement range 10mm or more, minimum display 0.001mm or equivalent acceptable
Magnet stand	

How to Measure

1 Create a position and a program to operate J1 Axis and J2 Axis in ±5deg with PTP Operation.

2 Allocate the measurement device as shown in the figure.

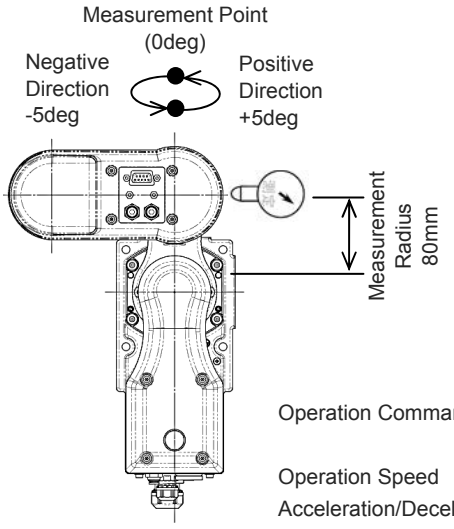
3 Move the axis from +5deg towards 0deg, the measurement point, in the positive direction, and measure the position.

4 After moving from 0deg towards -5deg in the positive direction, move it from -5deg towards 0deg, the measurement point, in the negative direction, and measure the position.

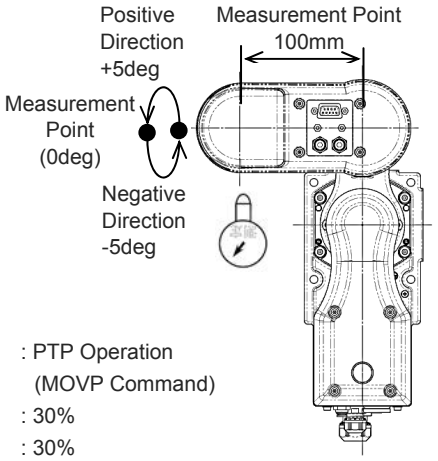
5 In addition, after moving from 0deg towards +5deg in the negative direction, move it from +5deg towards 0deg, the measurement point, in the positive direction, and measure the position.

6 Repeat the measurements of 4 and 5 for seven times in each positive and negative direction. The difference of the average of the measurement results is determined as the lost motion.

[IXA-□NNN1805]



Measurement Point on J1 Axis



Measurement Point on J2 Axis

Operation Command : PTP Operation
(MOVP Command)
Operation Speed : 30%
Acceleration/Deceleration : 30%

(Example for Lost Motion Measurement)

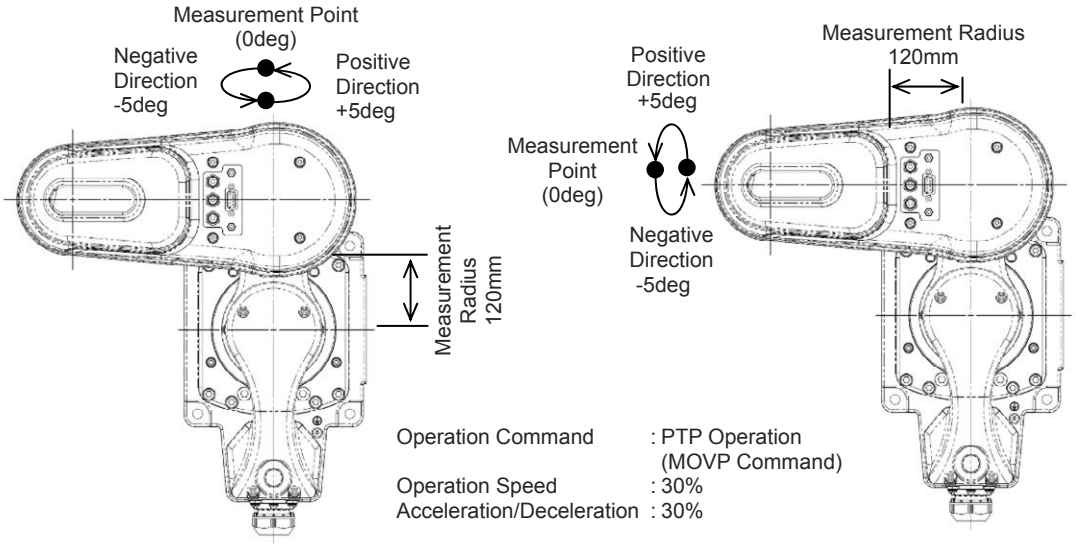
	Positive Direction	Negative Direction
1st [mm]	+0.005	-0.003
2nd [mm]	-0.003	+0.003
3rd [mm]	+0.003	+0.005
4th [mm]	-0.003	-0.007
5th [mm]	+0.005	-0.005
6th [mm]	+0.003	-0.004
7th [mm]	+0.003	-0.006
Average [mm]	+0.0019	-0.0024
Difference [mm]	|+0.0019-(-0.0024)| = 0.0043	
Measurement Radius [mm]	80	
Lost Motion [arc min]*1	[$\tan^{-1}$ (0.0043/80)] × 60 nearly equals 0.18	

*1 Calculation formula for J2 Axis
[$\tan^{-1}$ (Difference between averages in positive direction and negative direction/100)] × 60

(How to decide) It is in normal condition if the result is at or below the allowable range below.

Lost Motion Allowable Value [arc min]		Measurement Radius [mm]
J1 axis	J2 axis	
1	1	J1: 80, J2: 100

[IXA-□NNN3015/□NSN3015]



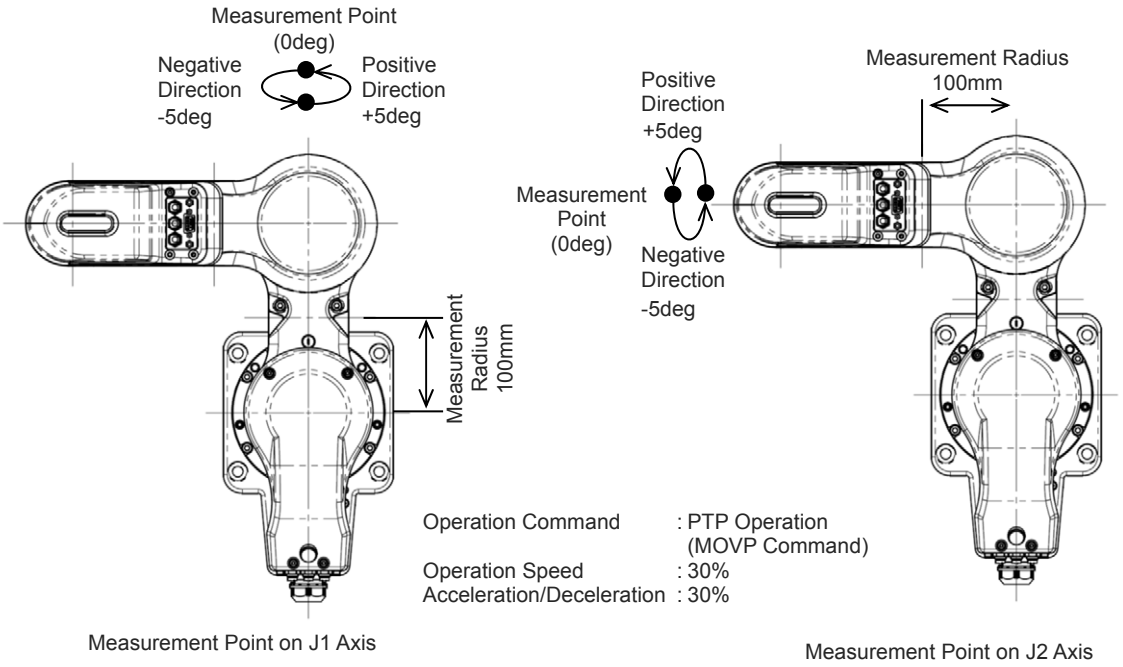
(Example for Lost Motion Measurement)

	Positive Direction	Negative Direction
1st [mm]	+0.005	-0.003
2nd [mm]	-0.003	+0.003
3rd [mm]	+0.003	+0.005
4th [mm]	-0.003	-0.007
5th [mm]	+0.005	-0.005
6th [mm]	+0.003	-0.004
7th [mm]	+0.003	-0.006
Average [mm]	+0.0019	-0.0024
Difference [mm]	|+0.0019-(-0.0024)| = 0.0043	
Measurement Radius [mm]	120	
Lost Motion [arc min]	$[\tan^{-1}(0.0043/120)] \times 60$ nearly equals 0.12	

(How to decide) It is in normal condition if the result is at or below the allowable range below.

Lost Motion Allowable Value [arc min]		Measurement Radius [mm]
J1 axis	J2 axis	
NNN = 2, NSN = 1	NNN = 2, NSN = 1	120

[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]



(Example for Lost Motion Measurement)

	Positive Direction	Negative Direction
1st [mm]	+0.003	-0.003
2nd [mm]	-0.003	+0.003
3rd [mm]	+0.003	+0.005
4th [mm]	-0.003	-0.005
5th [mm]	+0.003	-0.005
6th [mm]	+0.003	-0.004
7th [mm]	+0.003	-0.006
Average [mm]	+0.0013	-0.0021
Difference [mm]	|+0.0013-(-0.0021)| = 0.0034	
Measurement Radius [mm]	100	
Lost Motion [arc min]	$[\tan^{-1}(0.0034/100)] \times 60$ nearly equals 0.12	

(How to decide) It is in normal condition if the result is at or below the allowable range below.

Lost Motion Allowable Value [arc min]		Measurement Radius [mm]
J1 axis	J2 axis	
NNN = 2, NSN = 1	NNN = 2, NSN = 1	100

4.6 How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis

Tools to Use

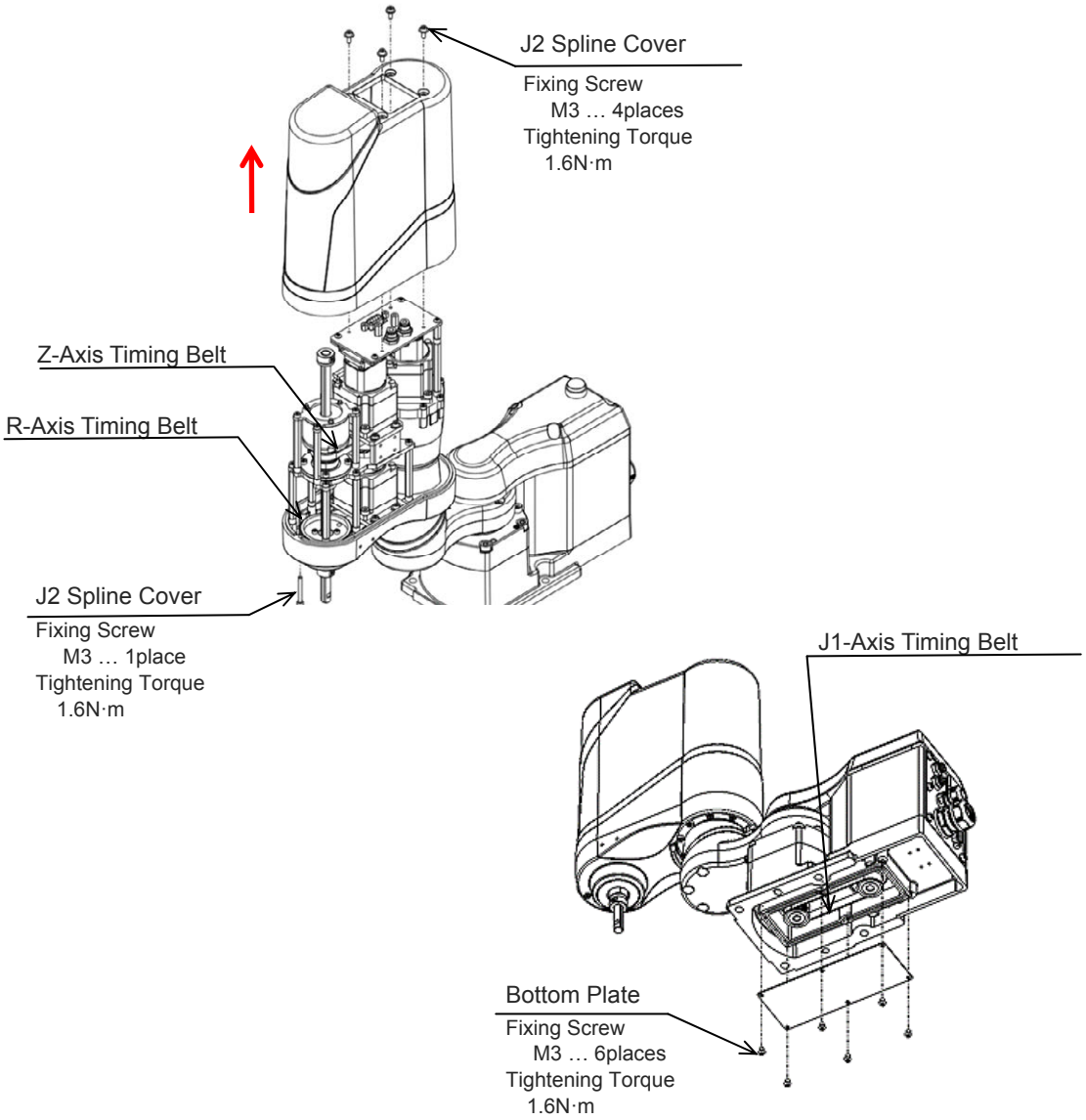
Model	Tools to Use	
IXA-□NNN1805	Hex wrench	2.0mm-sized
		2.5mm-sized
IXA-□NNN3015/□NSN3015	Hex wrench	2.5mm-sized
		3mm-sized
IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□	Hex wrench	3mm-sized

Method of Visual Inspection

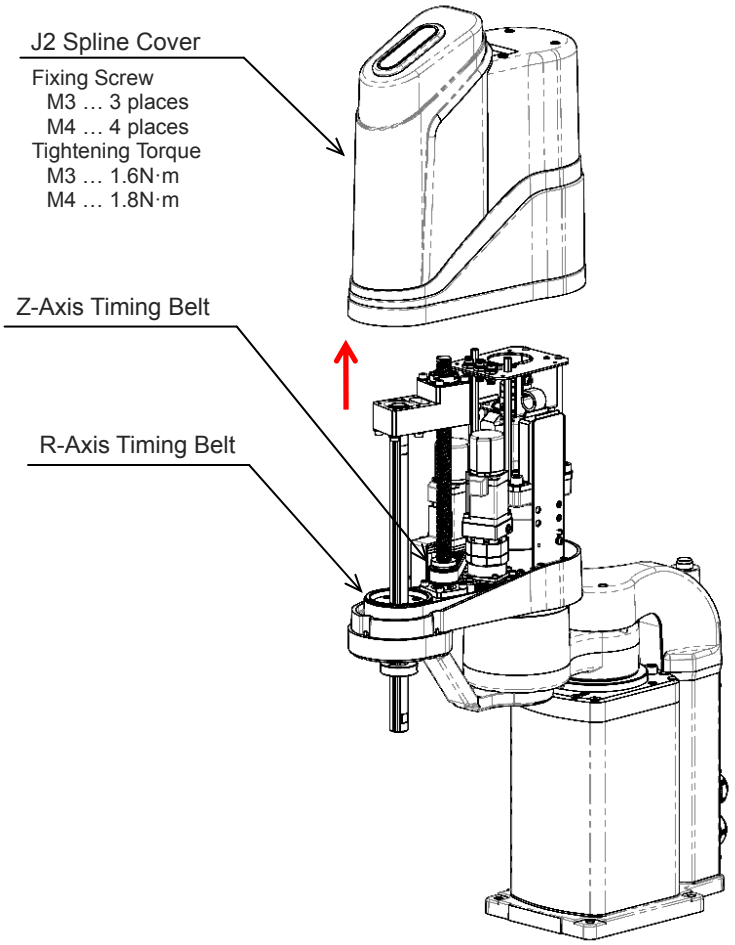
1 Detach the J2 spline cover and the J2 arm cover.

2 Check if there is any damage or remarkable abrasion on the teeth side surface.

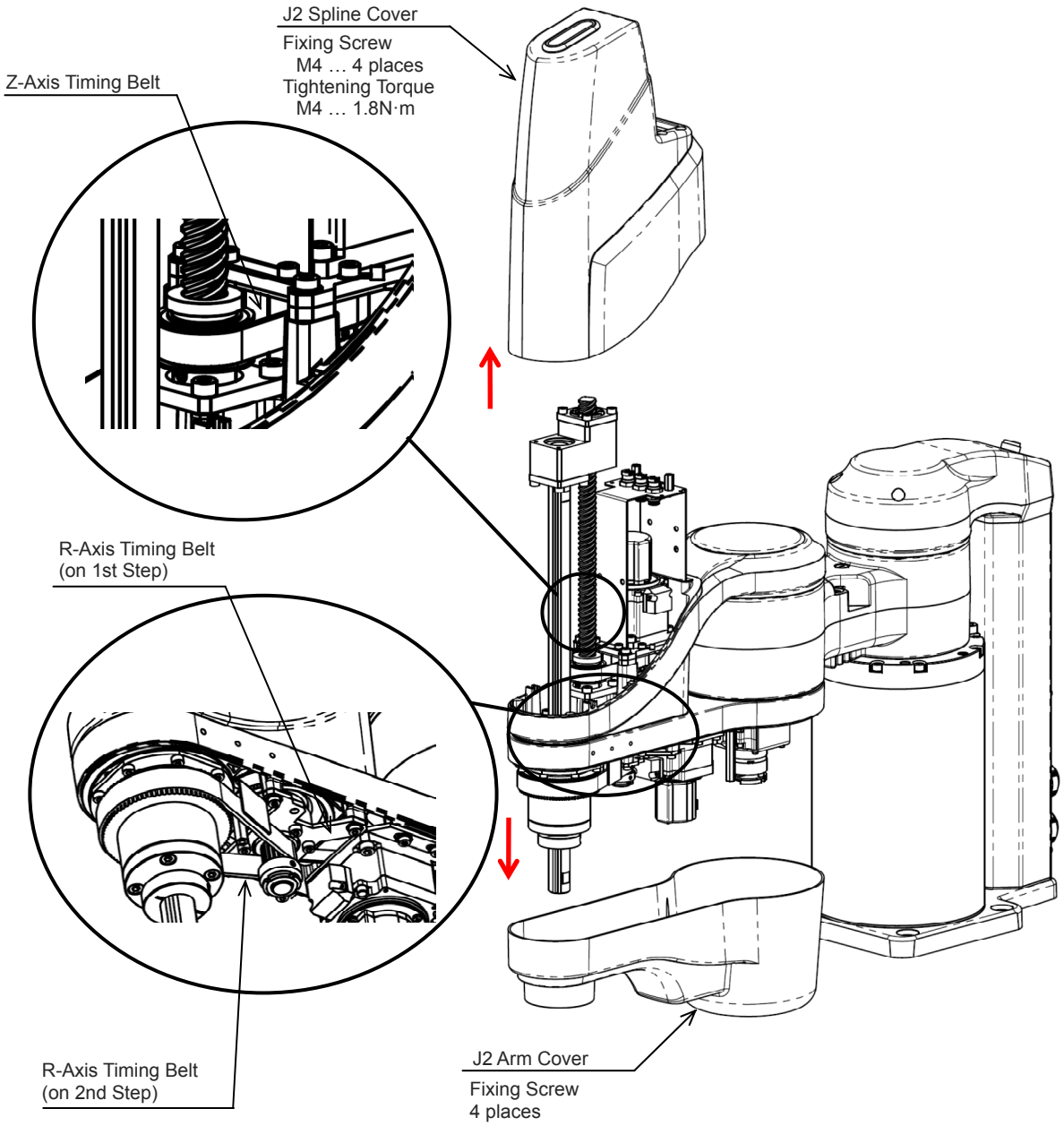
[IXA-□NNN1805]


J2 Spline Cover
Fixing Screw
M3 … 4places
Tightening Torque
1.6N·m
Z-Axis Timing Belt
R-Axis Timing Belt
J2 Spline Cover
Fixing Screw
M3 … 1place
Tightening Torque
1.6N·m
J1-Axis Timing Belt
Bottom Plate
Fixing Screw
M3 … 6places
Tightening Torque
1.6N·m

[IXA-□NNN3015/□NSN3015]



[IXA-□NNN45□□/□NSN45□□/□NNN60□□/□NSN60□□]



4.7 Replacement of Cable inside Robot

Degradation of the cables inside the robot could vary depending on the condition of use. As a reference, it is recommended to replace them before reaching five years after start activating (assuming 16 hours/day and 300 days/year of operation).
As the replacement of cables requires a disassembly work, contact IAI.

4.8 How to Replace Components

Belt Replacement

[IXA-□NNN1805]

Belt to Replace

Axis	Model Code of Single Product
J1-Axis	TB-IXA-18-1
Z-Axis	TB-IXA-18-3
R-Axis	Not Available for Replacement

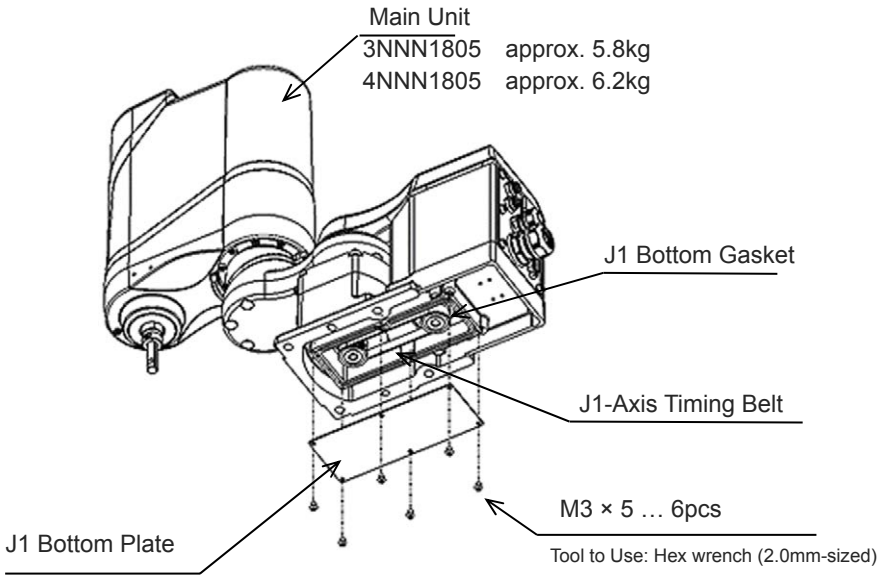
Tools to Use

Tools to Use	Specification
Hex wrench	Parallel-Face Diameter 2.0mm, 2.5mm, 3mm
Tension Gauge	Capable for tensile of 100N max.
Thin String	-

How to Replace

J1-Axis

1 Remove the hex socket button head screws (M3 × 5) holding the bottom plate.



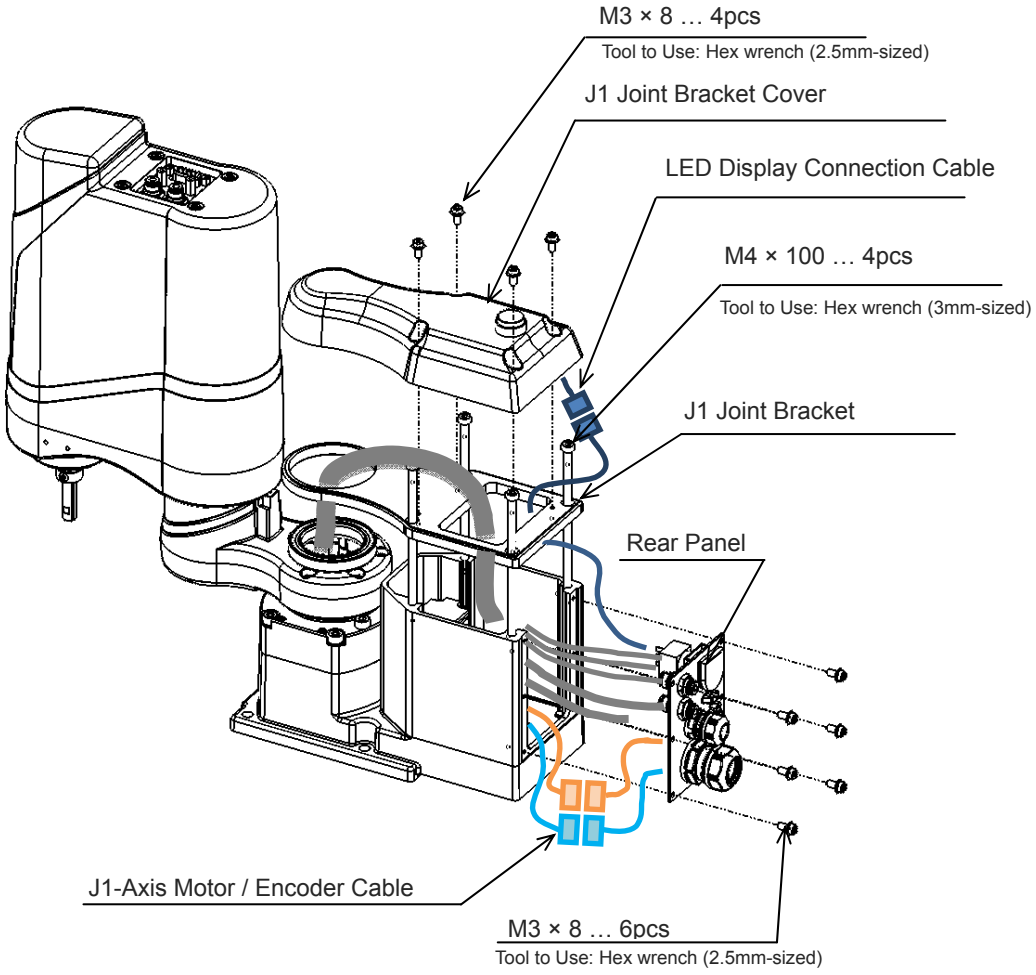
2 Remove the hex socket head cap screws with captive washer (M3 × 8) holding the joint bracket cover.

3 Take off the joint bracket cover and unplug the cable connector for LED display lamps.

4 Take off the hex socket head cap screws (M4 × 100) holding the joint bracket.

5 Remove the hex socket head cap screws with captive washer (M3 × 8) holding the rear panel.

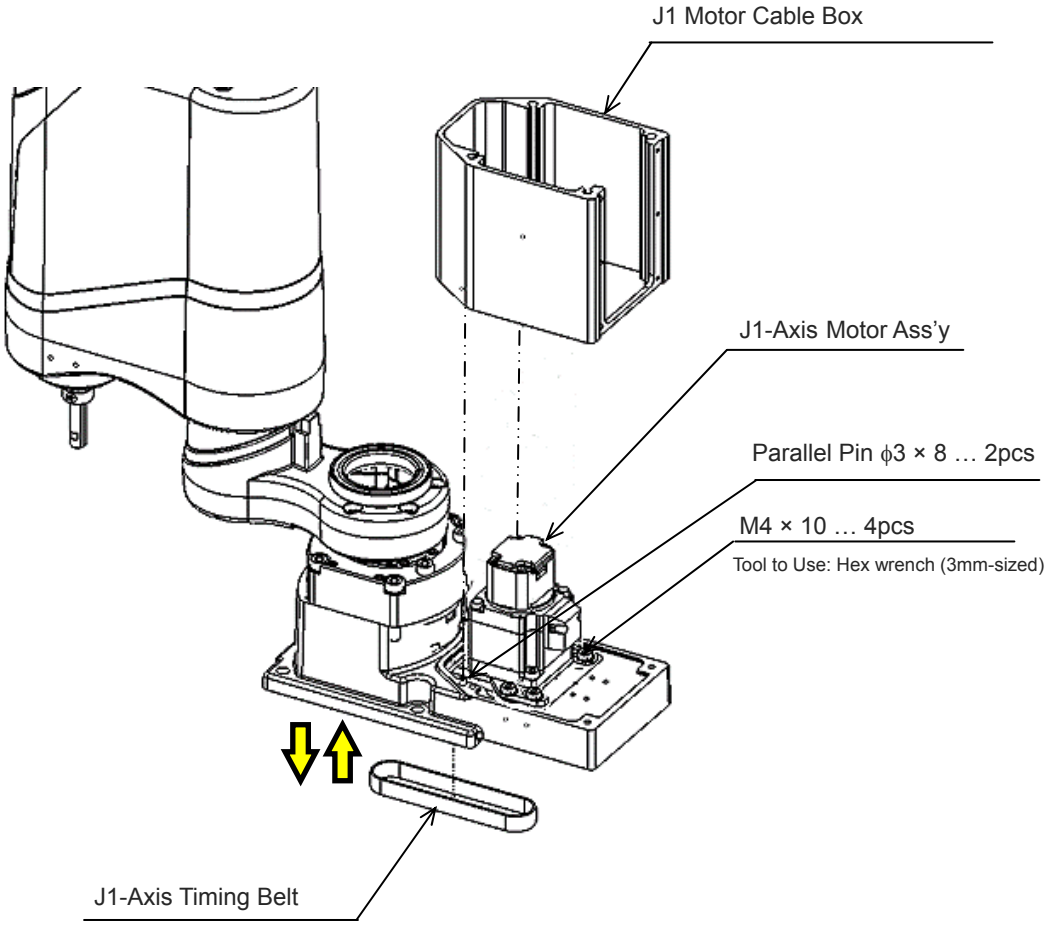
6 Take off the J1-axis motor/encoder cable connectors.



7 Detach the motor cable box. (Pay attention not to lose the parallel pin for positioning.)

8 Loosen the flange-headed hex socket head cap screws (M4 × 10).

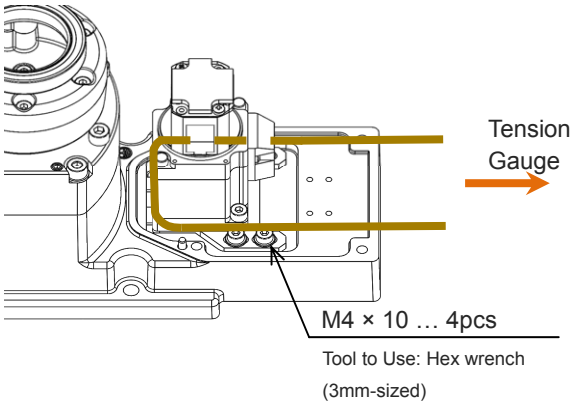
9 Move the J1-axis motor, detach the timing belt and replace with a new timing belt.



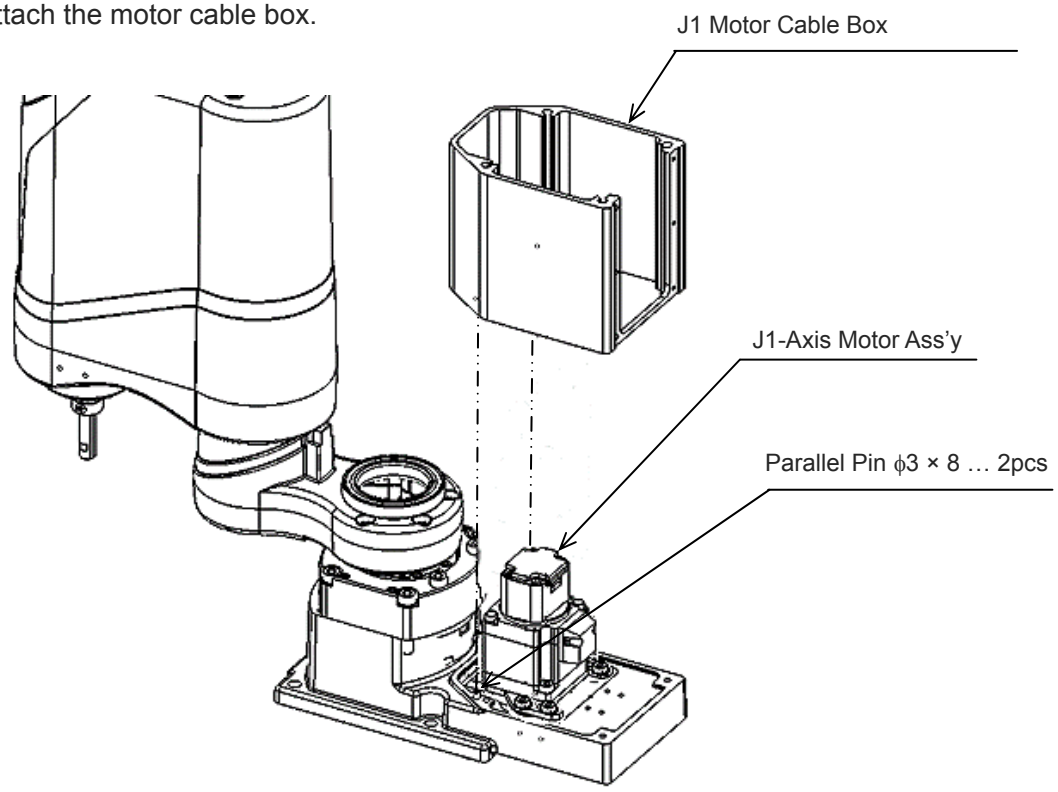
10 Hang J1-axis motor ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table.
Keep it pulled with the specified tensile strength while tightening the flange-headed hex socket head cap screws (M4 × 10) holding J1-axis motor ass'y further.

Tensile Force
80±5N

Tightening Torque
3.8N·m



11 Attach the motor cable box.



12 Join the J1-axis motor/encoder cable connectors.

13 Attach the rear panel with the hex socket head cap screws with captive washer (M3 × 8) and tighten up the hex socket head cap screws with captive washer (M3 × 8).

Tightening Torque
0.9N·m

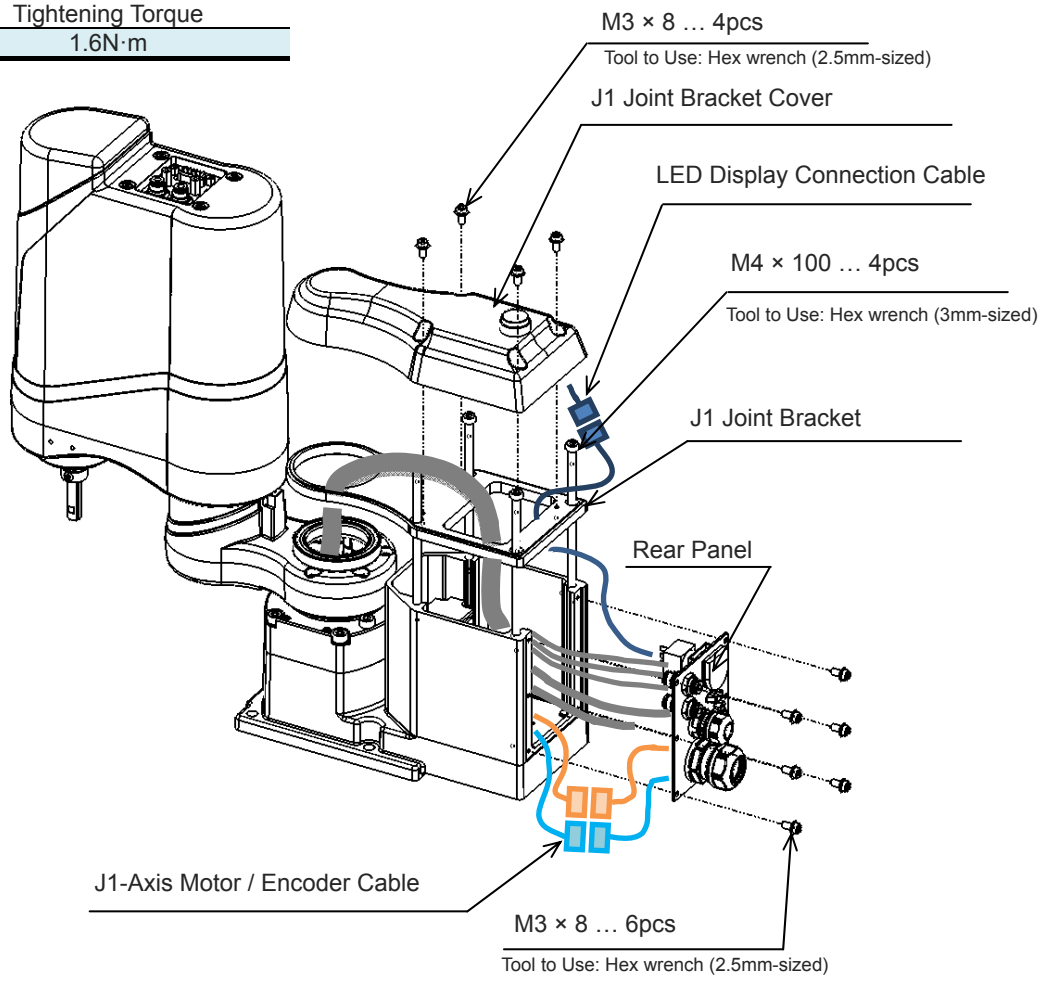
14 Attach the joint bracket with the hex socket head cap screws (M4 × 100), and tighten up the hex socket head cap screws (M4 × 100).

Tightening Torque
2.1N·m

15 Attach the joint bracket cover and join the connection cable connectors for LED display lamps.

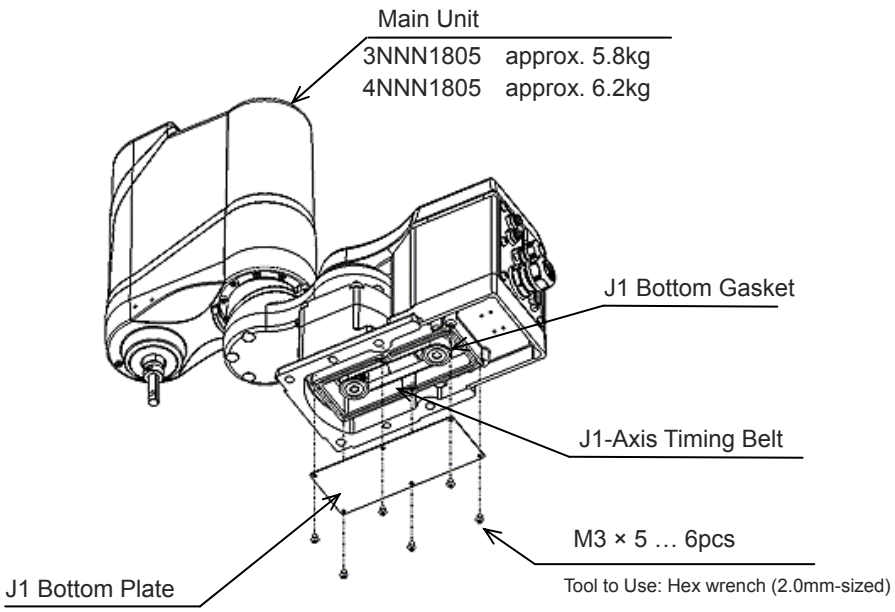
16 Attach the hex socket head cap screws with captive washer (M3 × 8) to hold the joint bracket cover, and tighten them up.

Tightening Torque
1.6N·m



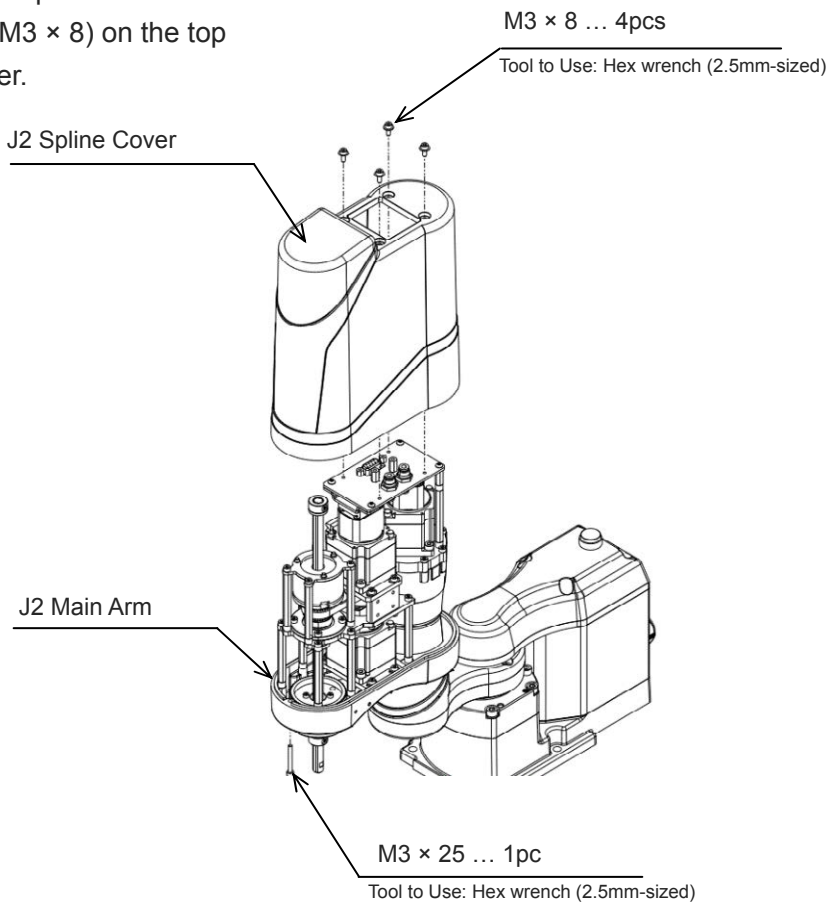
17 Attach the hex socket button head screws (M3 × 5) to hold the bottom plate, and tighten them up.

Tightening Torque
0.7N·m



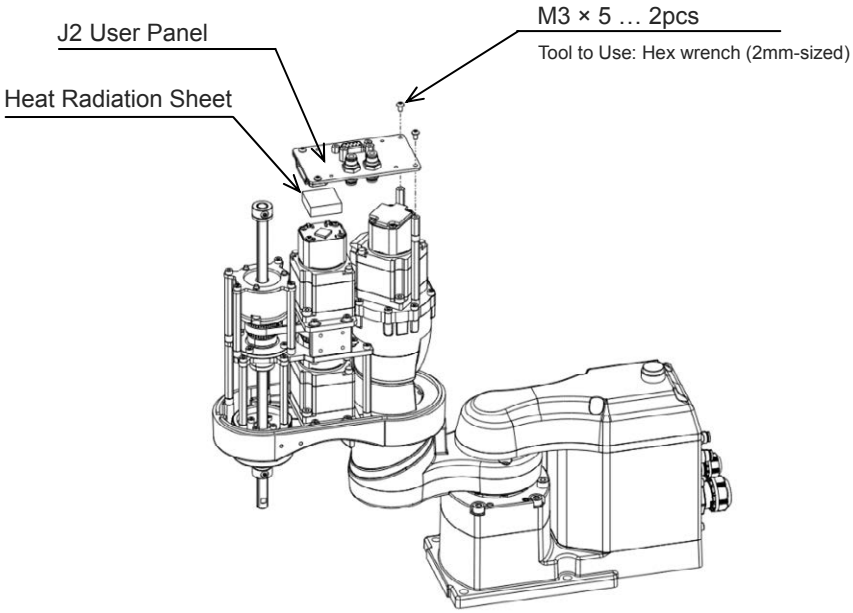
Z-Axis

1 Remove the hex socket head cap screw (M3 × 25) held at the bottom of the main arm, and remove the hex socket head cap screws with captive washer (M3 × 8) on the top of the spline cover.



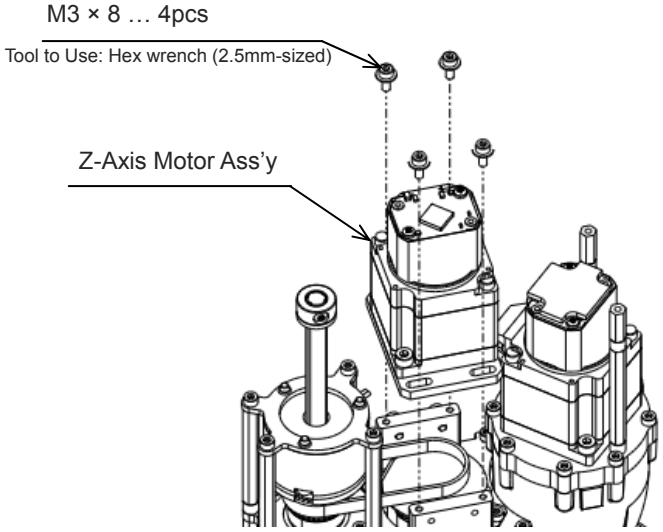
2 Take the two pieces of air tubes and the D-sub connector out of the user panel.

3 Take off the hex socket button head screws (M3 × 5) to detach the user panel.



4 Take off the Z-axis connector (motor and encoder).

5 Remove the hex socket head cap screws with captive washer (M3 × 8), and detach the Z-axis motor assembly.

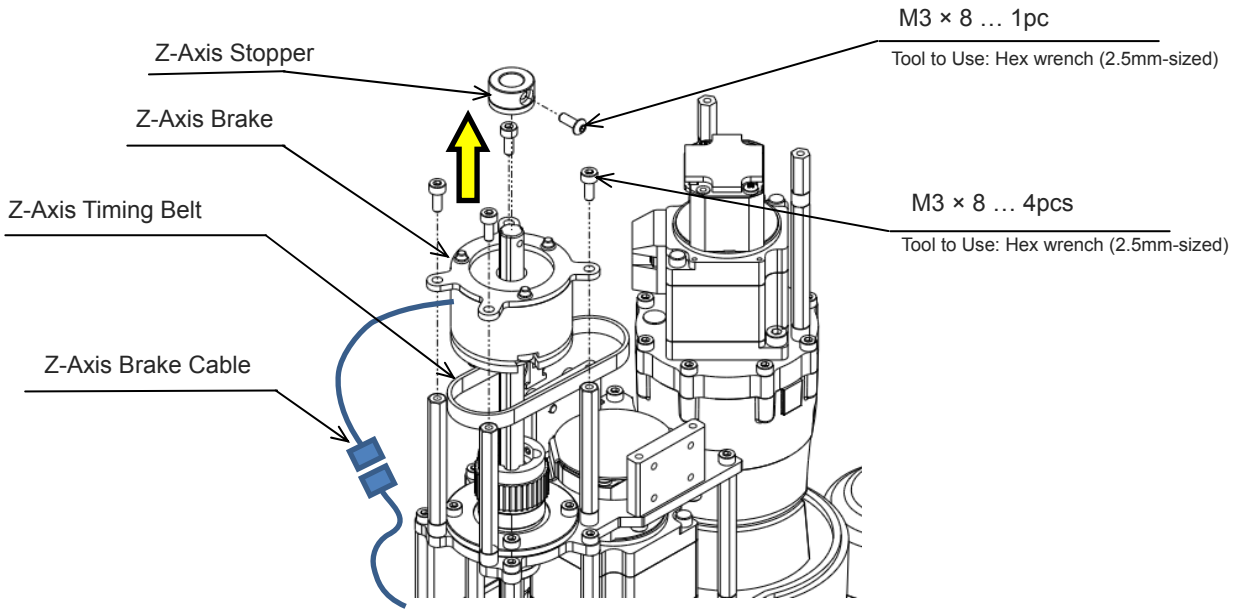


6 Disconnect the Z-axis brake cable connector.

7 Remove the hex socket button head screw (M3 × 8) on the Z-axis stopper, and take off the stopper.

8 Take off the hex socket head cap screws (M3 × 8) holding the Z-axis brake.

9 Pull off the Z-axis brake upwards. Detach the timing belt on the Z-axis and replace with a new belt.



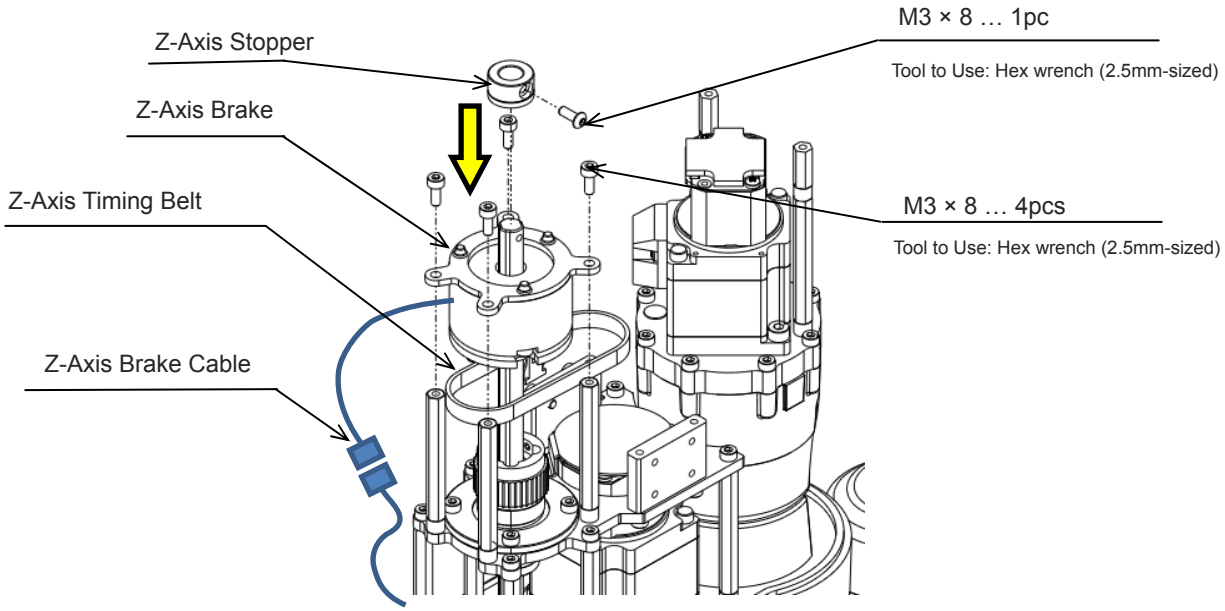
10 Attach the Z-axis brake with the hex socket head cap screws (M3 × 8), and tighten up the hex socket head cap screws (M3 × 8).

Tightening Torque
1.6N·m

11 Attach the Z-axis stopper with the hex socket button head screw (M3 × 8), and tighten up the hex socket button head screw (M3 × 8).

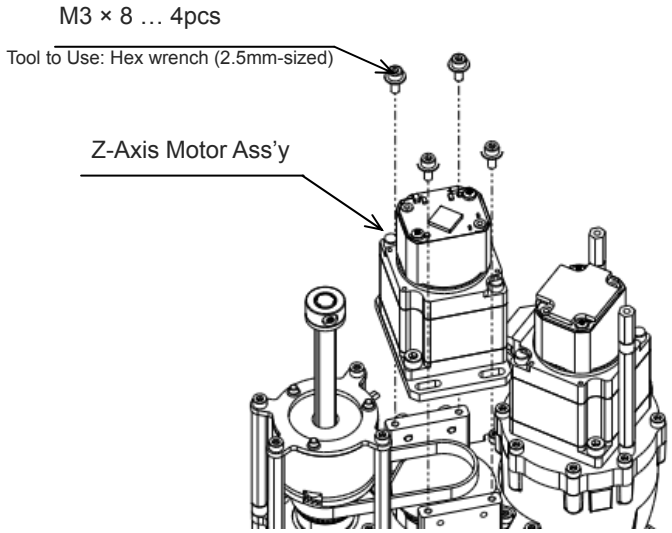
Tightening Torque
1.0N·m

12 Connect the Z-axis brake cable connectors.
[Refer to Wiring for IXA-□NNN1805 in How to Replace Motor for how to lay out the connector wiring.]



13 Attach the Z-axis motor assembly with the hex socket head cap screws with captive washer (M3×8). Keep the screws tightened loosely. Hang a belt on the Z-axis motor assembly.

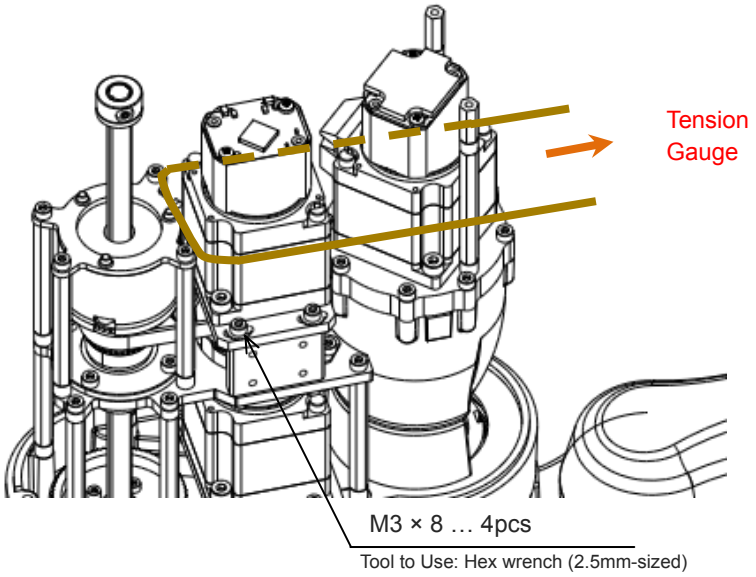
14 Join the Z-axis connectors (motor and encoder).
[Refer to Wiring for IXA-□NNN1805 in How to Replace Motor for how to lay out the connector wiring.]



15 Hang Z-axis motor ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table.
Keep it pulled with the specified tensile strength while tightening the hex socket head cap screws with captive washer (M3 × 8) holding Z-axis motor ass'y further.

Tensile Force
30±2N

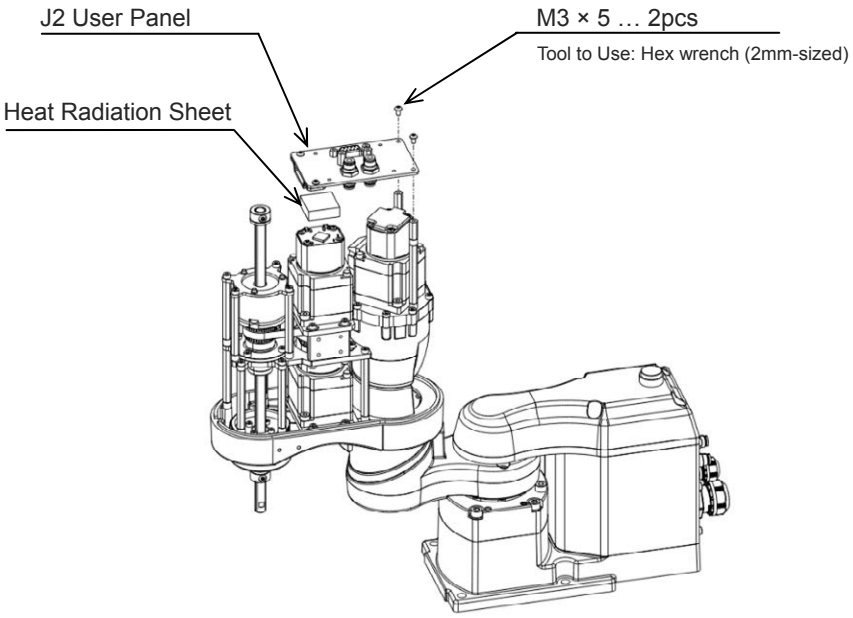
Tightening Torque
1.6N·m



16 Attach the user panel with the hex socket button head screws (M3 × 5), and tighten up the hex socket button head screws (M3×5).

Tightening Torque
1.0N·m

17 Join the two pieces of air tubes and the D-sub connector on the user panel.
[Refer to Wiring for IXA-□NNN1805 in How to Replace Motor for how to lay out the connector wiring.]

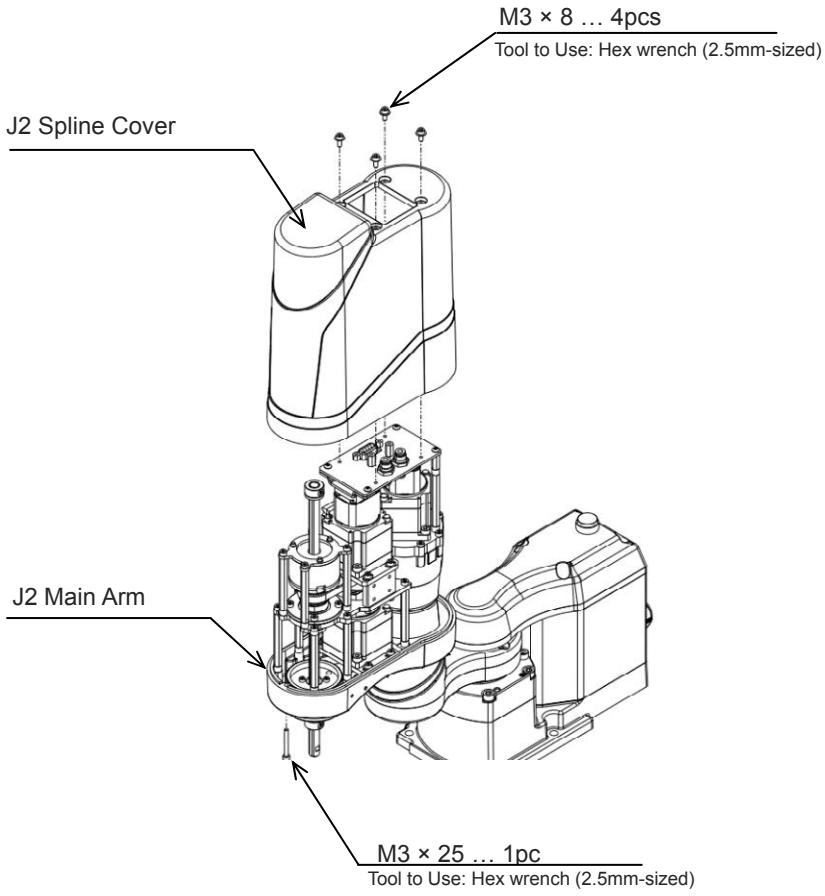


18 Attach the spline cover and tighten up the hex socket head cap screws with captive washer (M3 × 8) on the top.

Tightening Torque
1.6N·m

Tighten up the hex socket head cap screw (M3 × 25) to hold the bottom.

Tightening Torque
0.9N·m



R-Axis

It is not available that you replace the R-axis belt by your own. Contact IAI when it is necessary to have a replacement.

[IXA-□NNN3015/□NSN3015]

Belt to Replace

Axis	Model Code of Single Product
Z-Axis	TB-IXA-30-3
R-Axis	TB-IXA-30-4

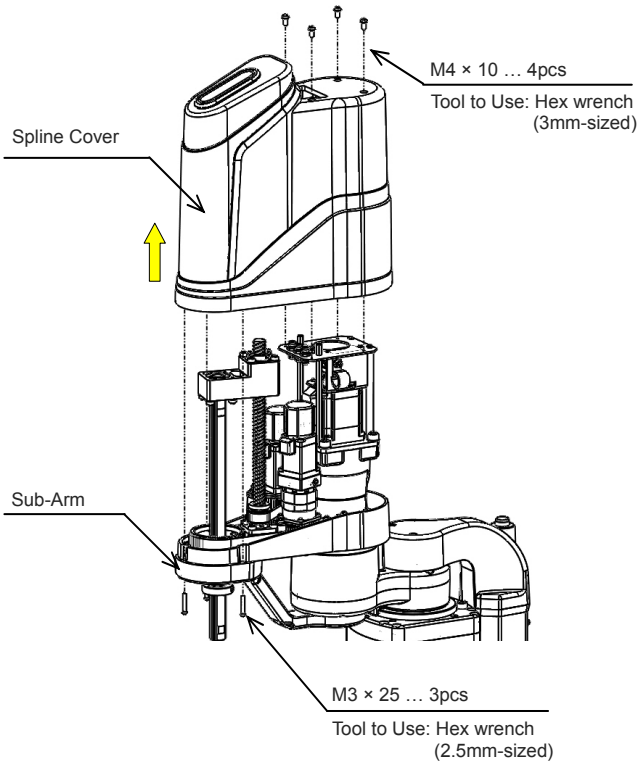
Tools to Use

Tools to Use	Specification
Hex wrench	Parallel-Face Diameter 2.5mm, 3mm, 4mm
Tension Gauge	Capable for 200N tensile
Thin String	-

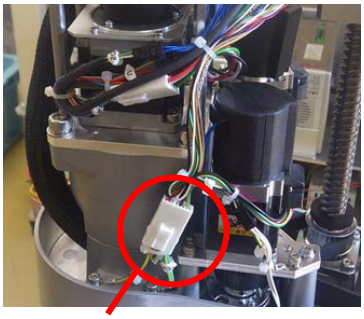
How to Replace

Z-Axis

1 Take off the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover. Detach the spline cover.

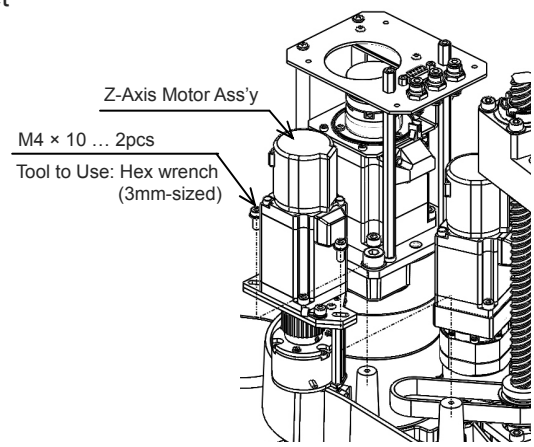


2 Take off the Z-axis connector.

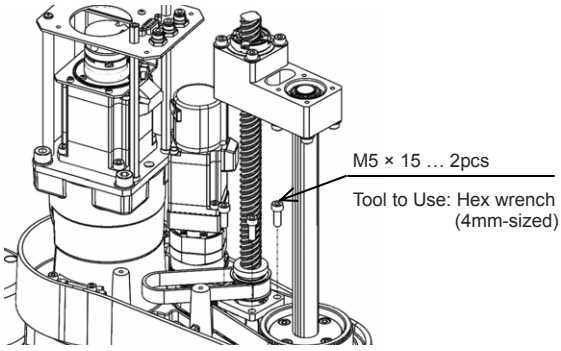


Z-Axis Connector (Motor and Encoder)

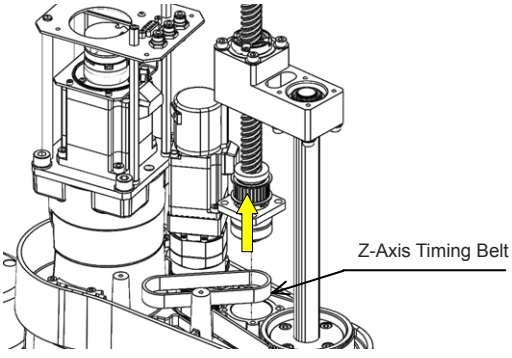
3 Take off the flange-headed hex socket head cap screws (M4 × 10) and detach Z-axis motor ass'y.



4 Take off the hex socket head cap screws (M5 × 15).

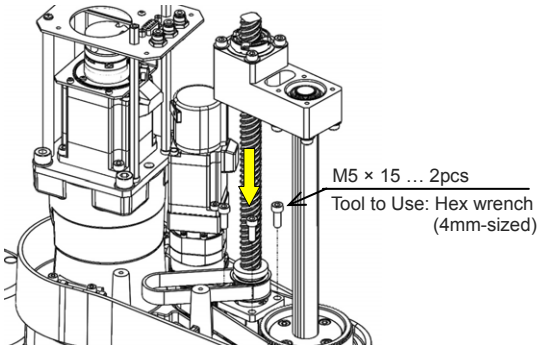


5 Pull the ball screw upwards to take out the Z-axis timing belt.
Set a new Z-axis timing belt.

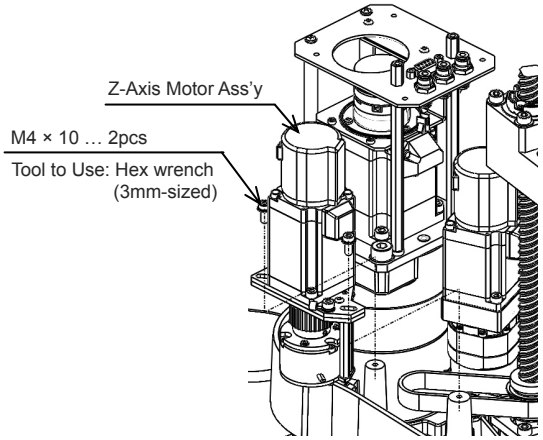


6 Set the ball screw down on and affix it with the hex socket head cap screws (M5 × 15).

Tightening Torque
7.5N·m



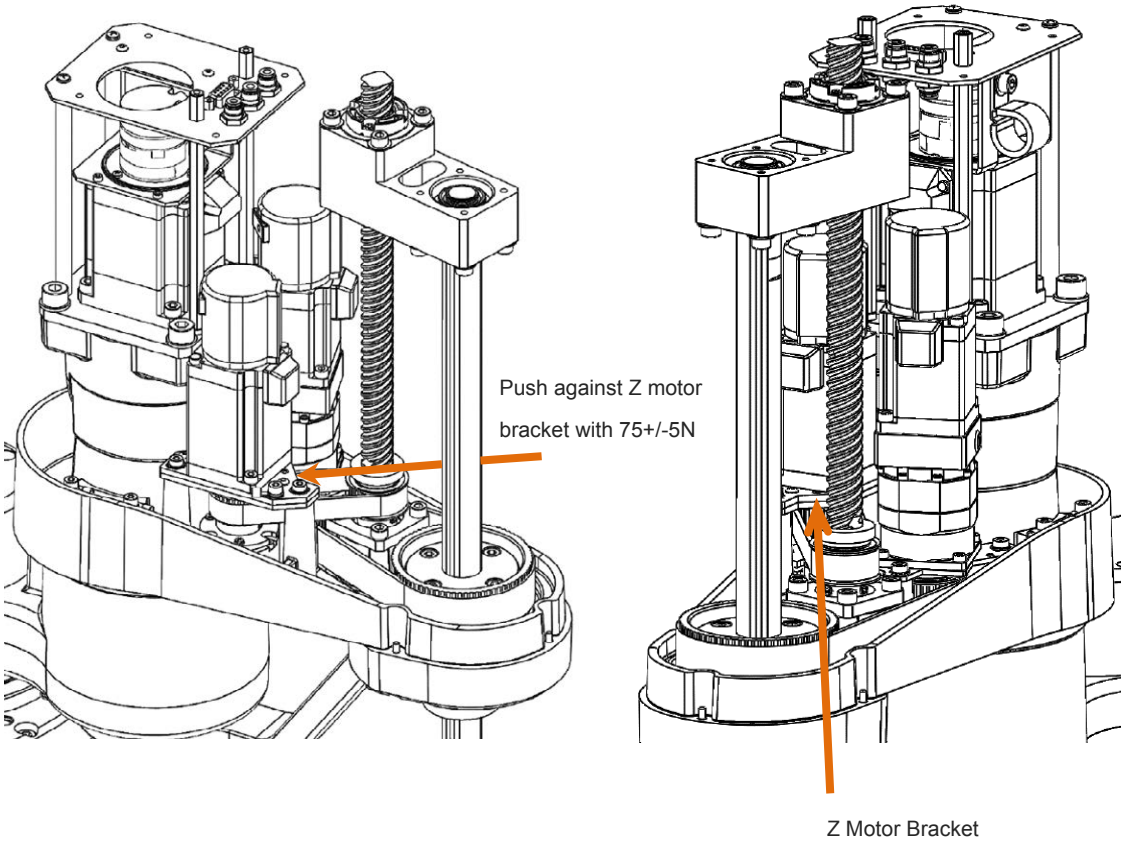
7 Tighten Z-axis motor ass'y loosely with the flange-headed hex socket head cap screws (M4 × 10).



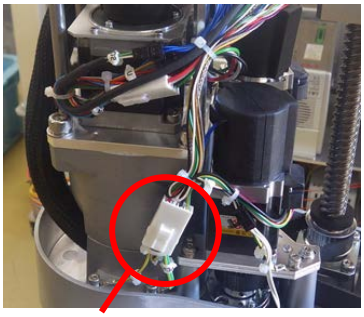
8 Push against Z-axis motor assembly with the pressing force shown in the table.
The belt tension should get into the range between 30 and 40N, which is the specification.
Keep the pressing force remained, and tighten up the flanged hex socket head cap screws (M4 × 10) holding Z-axis motor assembly.

Pressing Force
75 ± 5N

Tightening Torque
3.6N·m



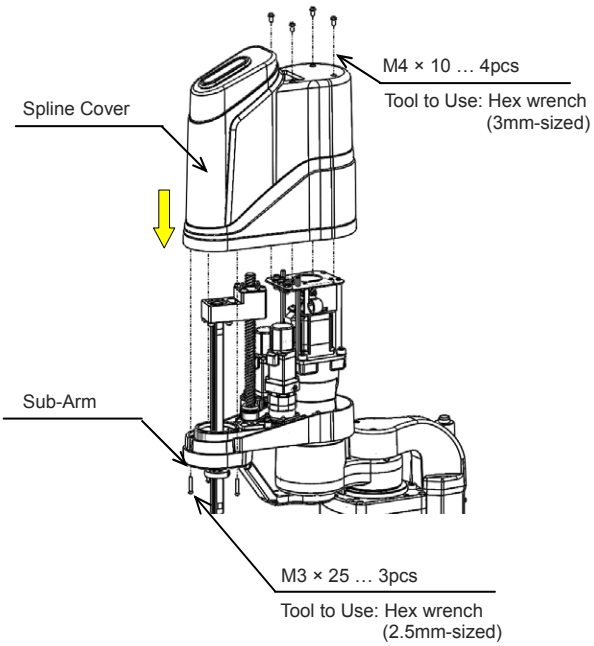
9 Join the Z-axis connector.



Z-Axis Connector (Motor and Encoder)

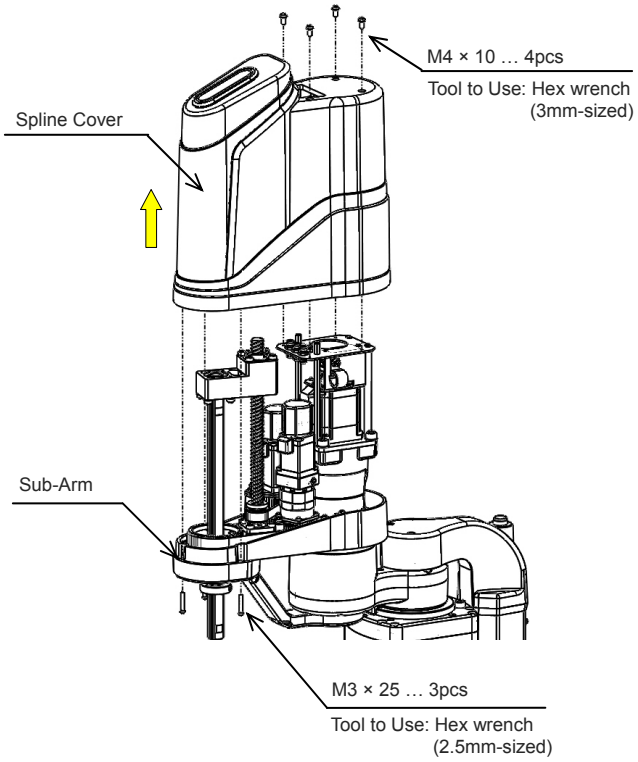
10 Put on the spline cover.
Tighten the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.

Screw Diameter	Tightening Torque
M3	1.6N·m
M4	1.8N·m

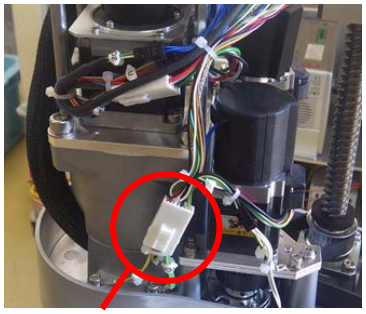


R-Axis

1 Take off the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.

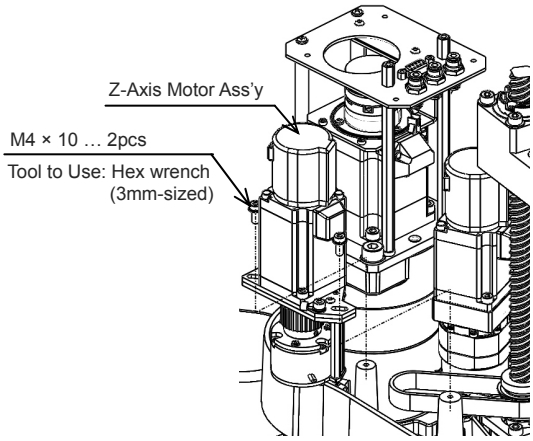


2 Take off the Z-axis connector.

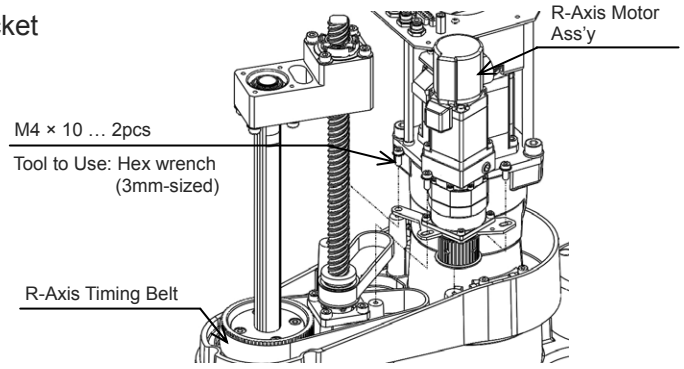


Z-Axis Connector (Motor and Encoder)

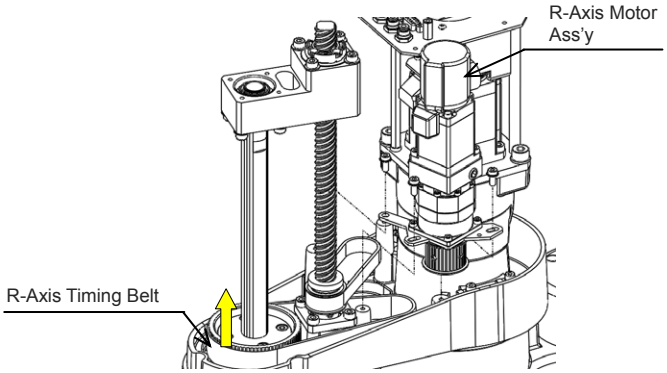
3 Take off the flange-headed hex socket head cap screws (M4 × 10) and detach Z-axis motor ass'y.



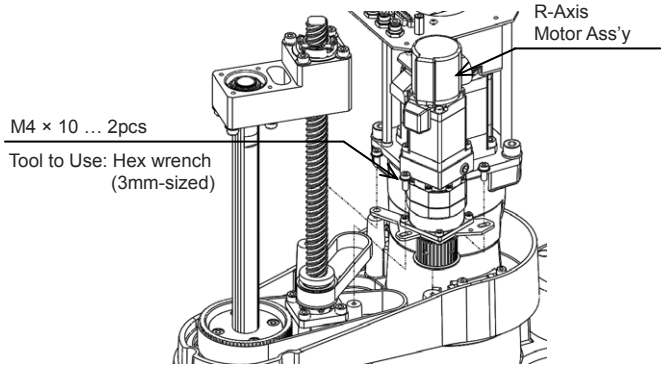
4 Take off the flange-headed hex socket head cap screws (M4 × 10) and detach R-axis motor ass'y.



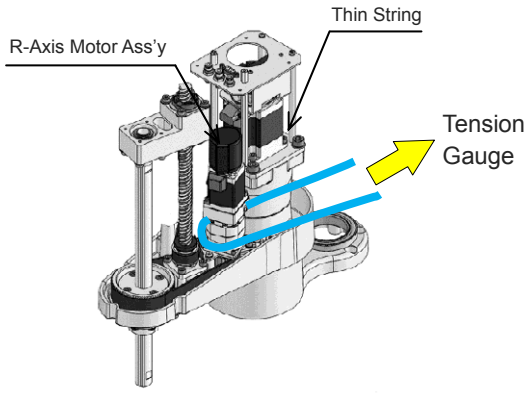
5 Take out the R-axis timing belt. Set a new R-axis timing belt.



6 Tighten R-axis motor ass'y loosely with the flange-headed hex socket head cap screws (M4 × 10).



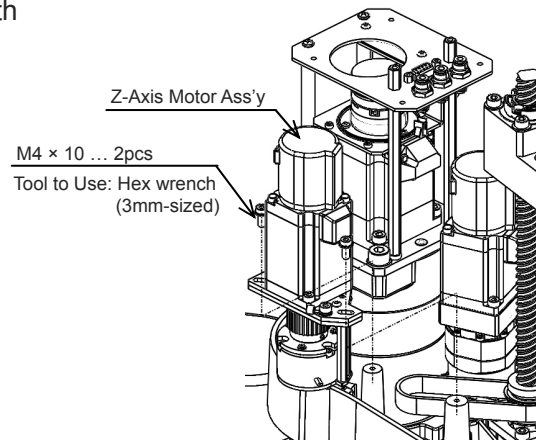
7 Hang R-axis motor ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table. The belt tension should get to 100+/-5N, which is the specification. Keep it pulled with the specified tensile strength while tightening the flange-headed hex socket head cap screws (M4 × 10) holding R-axis motor ass'y further.



Tensile Force
200 ± 10N

Tightening Torque
3.6N·m

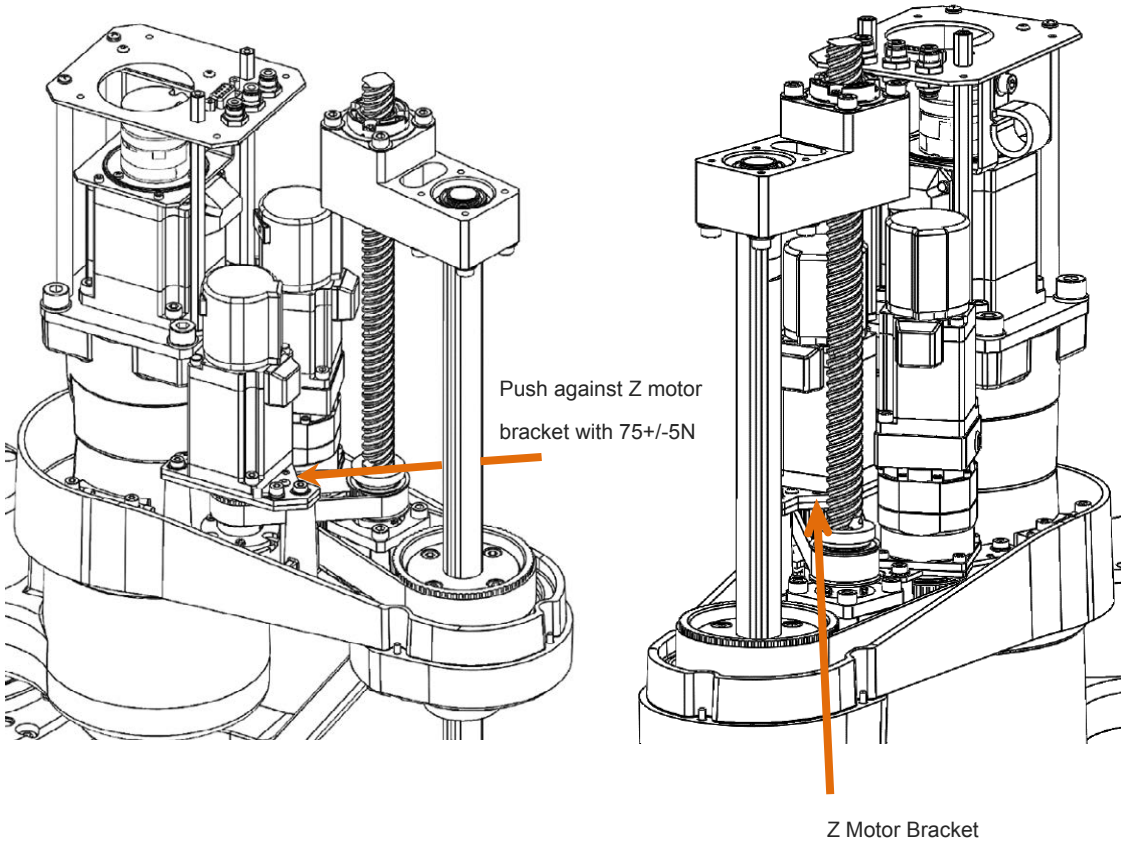
8 Tighten Z-axis motor ass'y loosely with the flange-headed hex socket head cap screws (M4 × 10).



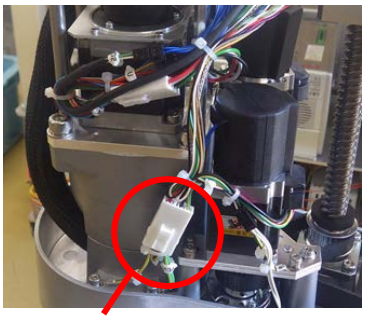
9 Push against Z-axis motor assembly with the pressing force shown in the table.
The belt tension should get into the range between 30 and 40N, which is the specification.
Keep the pressing force remained, and tighten up the flanged hex socket head cap screws (M4 × 10) holding Z-axis motor assembly.

Pressing Force
75 ± 5N

Tightening Torque
3.6N·m



10 Join the Z-axis connector.

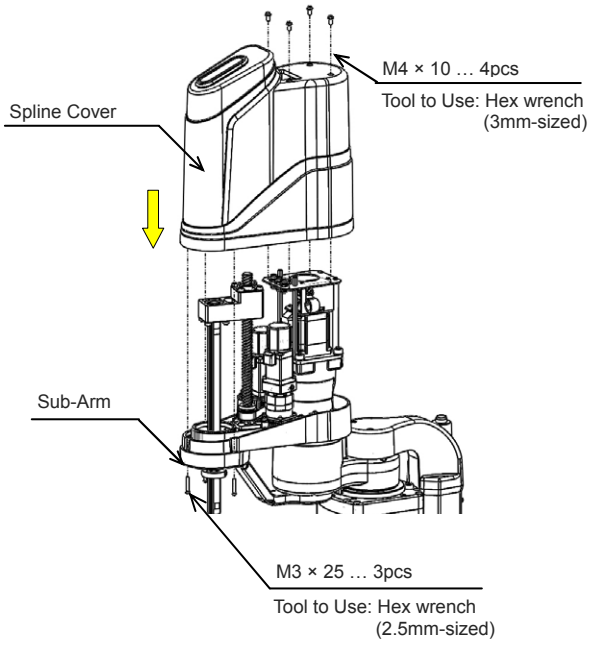


Z-Axis Connector (Motor and Encoder)

11 Put on the spline cover.

Tighten the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.

Screw Diameter	Tightening Torque
M3	1.6N·m
M4	1.8N·m



[IXA-□NNN45□□/□NNN60□□/□NSN45□□/□NSN60□□]

Belt to Replace

Axis	Model Code of Single Product
Z-axis	TB-IXA-4560-3
R-axis on 1st Step	TB-IXA-4560-4-1
R-axis on 2nd Step	TB-IXA-4560-4-2

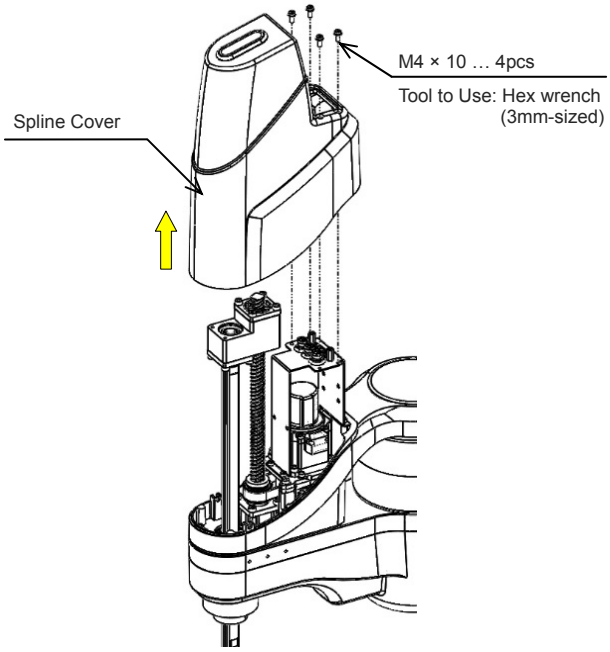
Tools to Use

Tools to use	Specification
Hex wrench	Parallel-Face Diameter 2mm, 3mm, 4mm
Tension Gauge	Capable for 200N tensile
Thin String	-

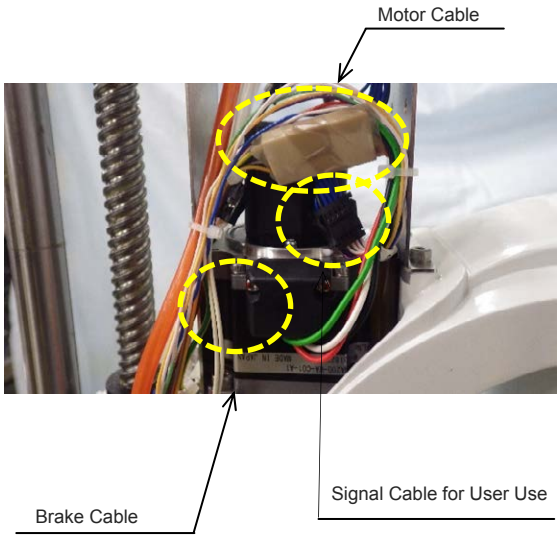
How to Replace

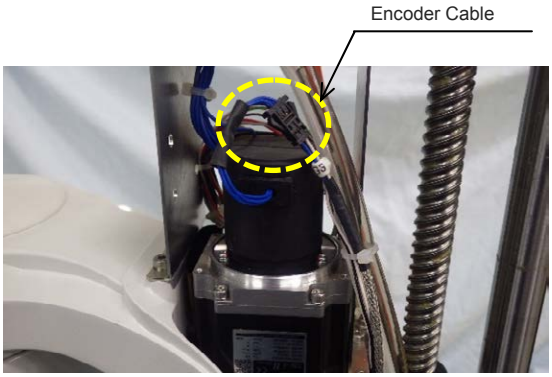
Z-Axis

1 Take off the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.

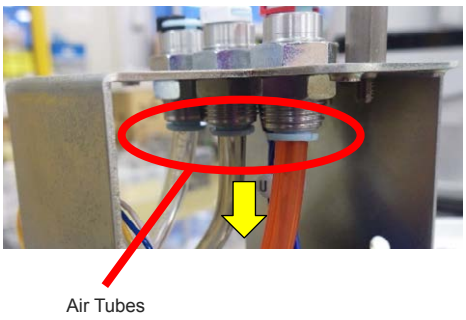


2 Take off all the connectors and ground terminals.
Take off the teflon tape applied around the motor connector.
(Note) Keep the teflon tape as it should be reused after the motor is replaced.

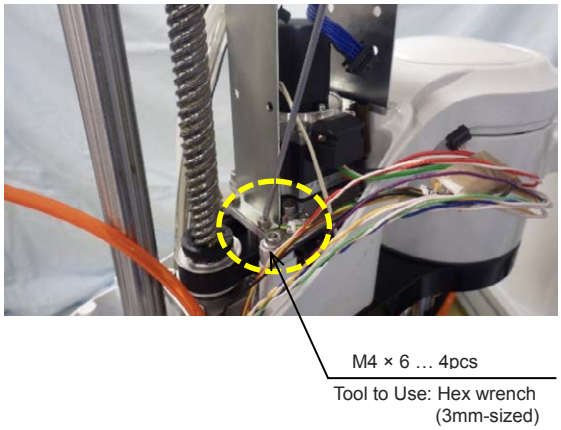


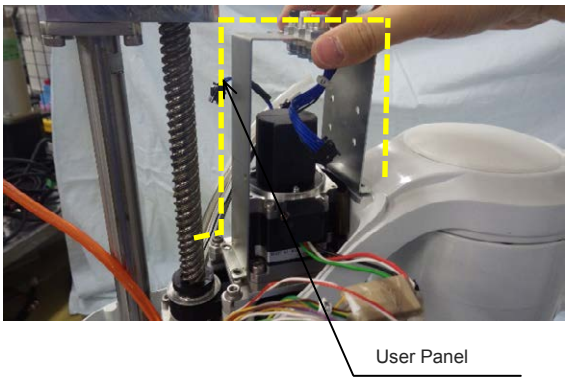


3 Take the three pieces of air tubes and the D-sub connector out of the user panel.

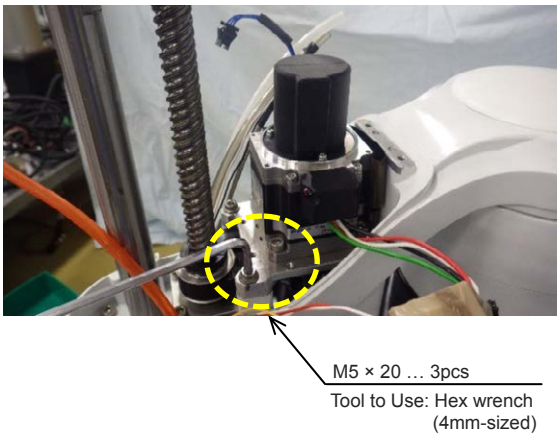


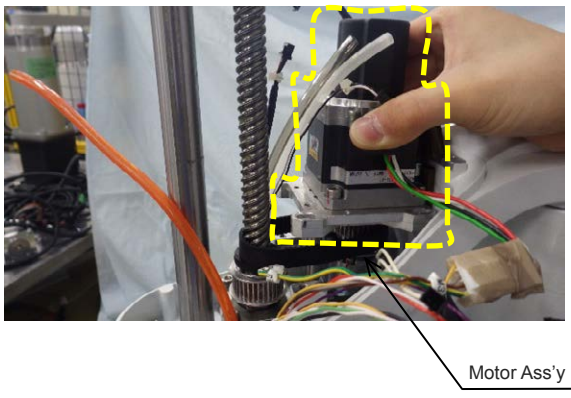
4 Take off the hex socket head cap screws (M4 × 6) to detach the user panel.



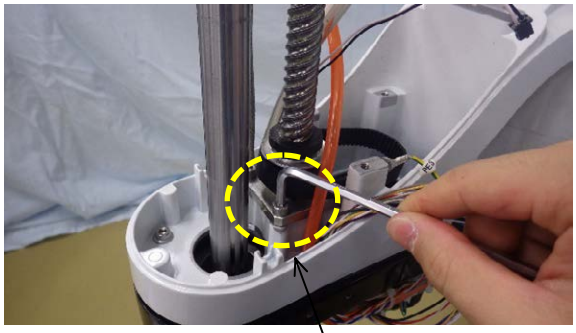


5 Take off the flange-headed hex socket head cap screws (M5 × 20) and detach Z-axis motor ass'y.

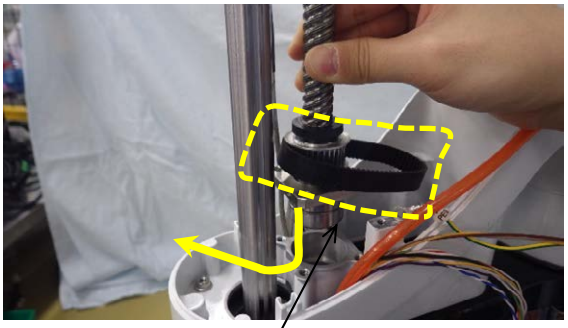




6 Take off the hex socket head cap screws (M5 × 15) holding the ball screw.

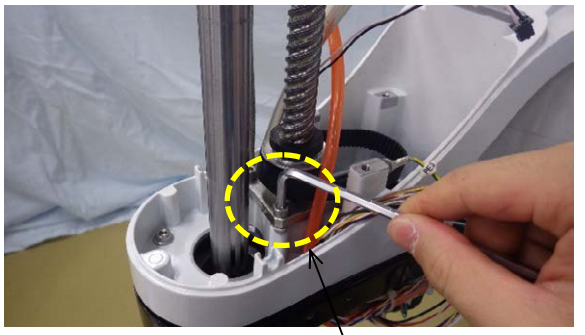


7 Pull up the ball screw, take off the timing belt, and put on a new timing belt.

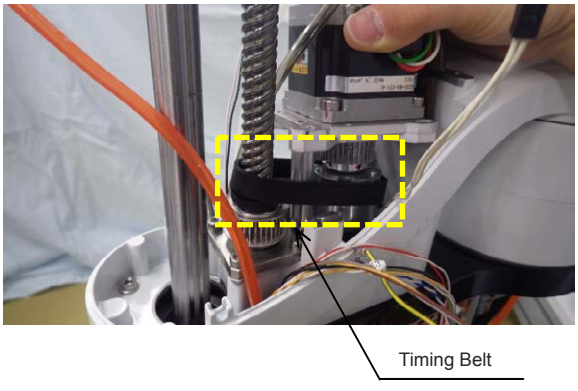


8 Hold the ball screw with the hex socket head cap screws (M5 × 15), and then tighten the screws up.

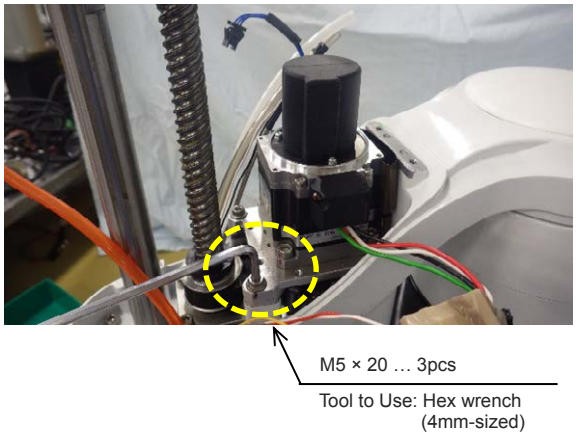
Tightening Torque
7.3N·m



9 Put the motor pulley through the timing belt, and then affix the motor assembly.



10 Tighten the Z-axis motor loosely with the hex socket head cap screws (M5 × 20).



11 Push with a pressing force shown in the table below against Z-axis motor assembly using a tension gauge.

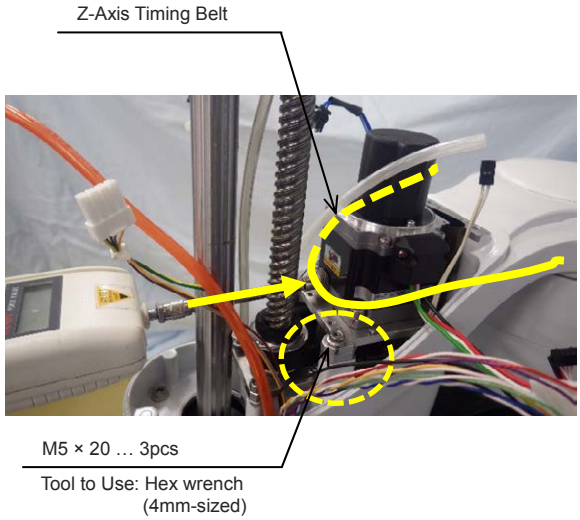
Model	Pressing Force
NSN450	120 ± 10N
NNN450	75 ± 10N
NSN600 NNN600	120 ± 10N

The belt tension should fall into the specification as shown below.

Model	Tension Specification
NSN450	60 ± 5N
NNN450	37.5 ± 5N
NSN600 NNN600	60 ±5 N

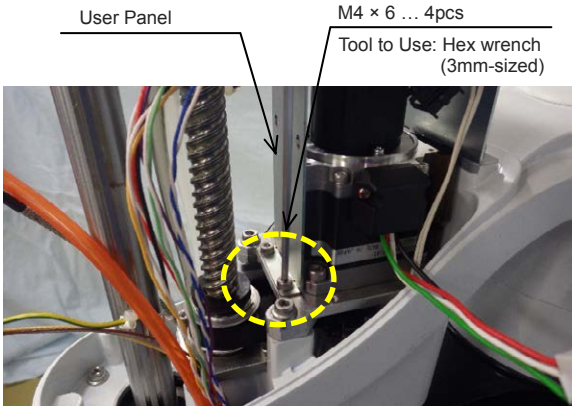
Keep the pressing force remained, and tighten up the hex socket head cap screws (M5 × 20) holding Z-axis motor assembly.

Tightening Torque
7.3N·m



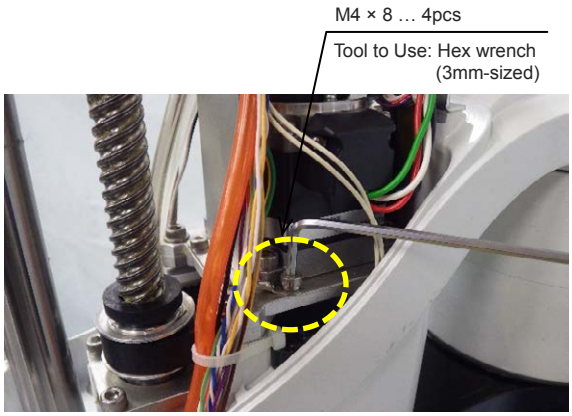
12 Put on the user panel.
Tighten the hex socket head cap screws (M4 × 6).
Put the cables back on affixed with cable ties.

Tightening Torque
3.6N·m

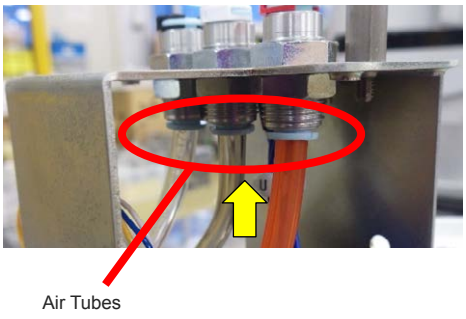


13 Affix the ground terminal with hexagon head screws with a captive washer (M4 × 8).

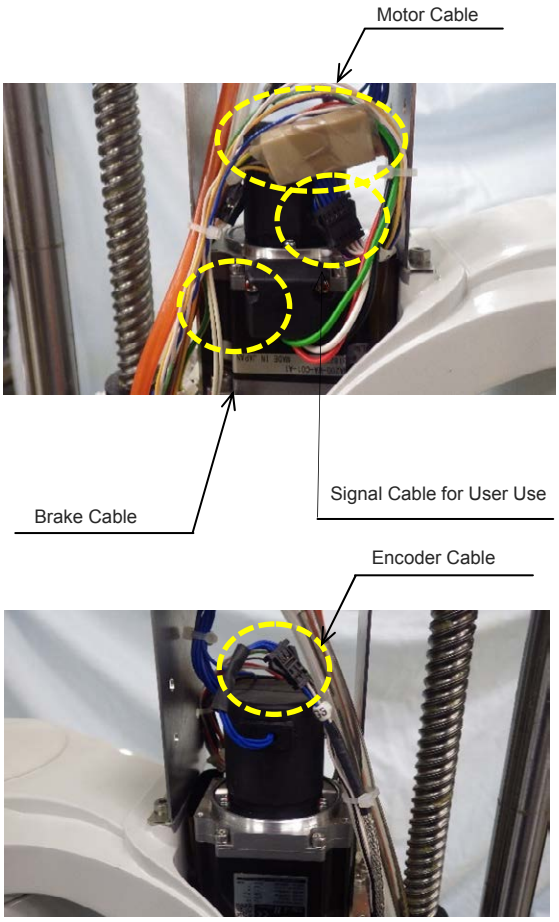
Tightening Torque
3.6N·m



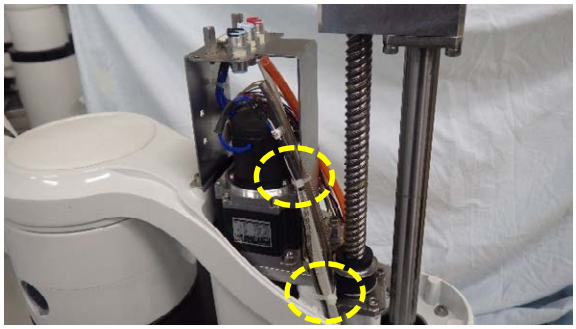
14 Join the three pieces of air tubes and the D-sub connector on the user panel.

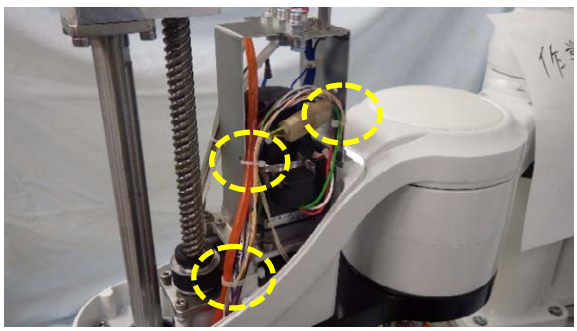


15 Plug in all the connectors.
Wrap up the motor connector with the teflon tape.

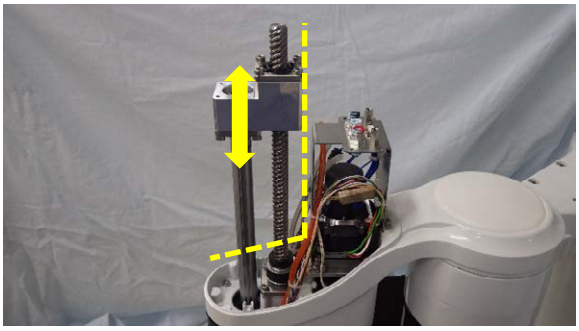


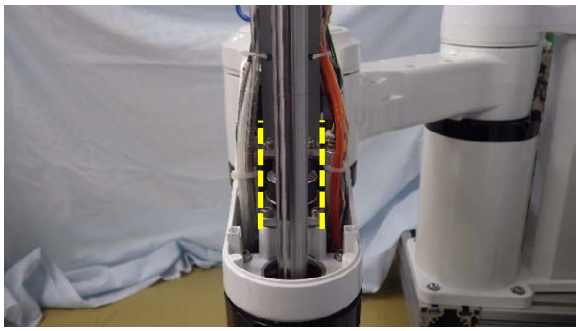
16 Affix the cables with cable ties.





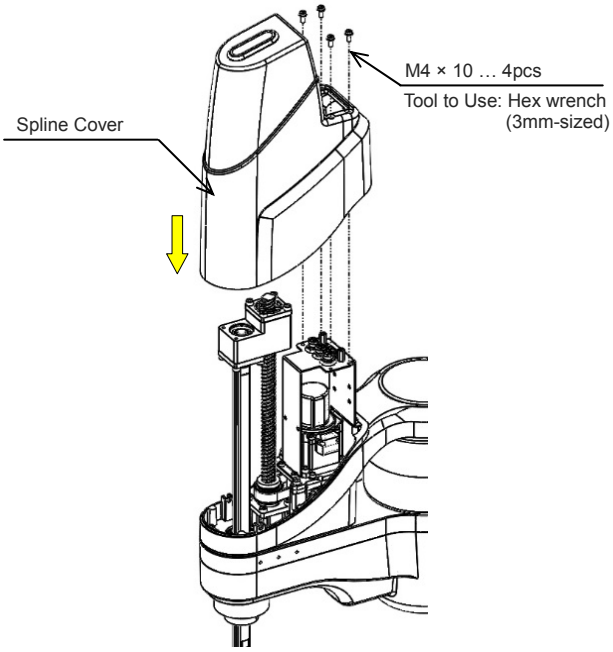
17 Move the Z-axis by either way of connecting the controller to move it with JOG or of moving manually using hand with the brake released, and check that there is no interference to cables.





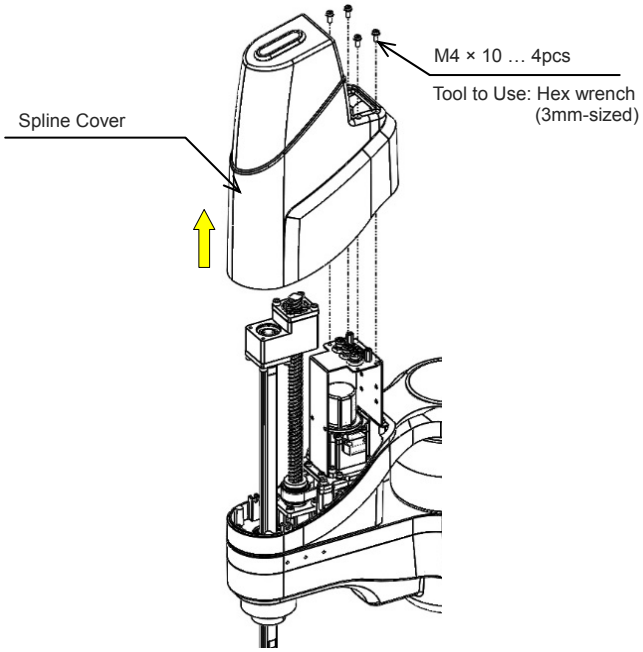
18 Put on the spline cover.
Tighten the hex socket head cap screws (M4 × 10) on the top of the spline cover.

Tightening Torque
1.8N·m

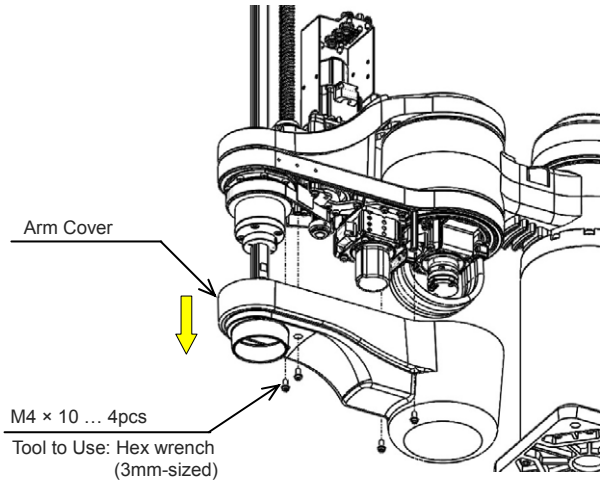


R-Axis

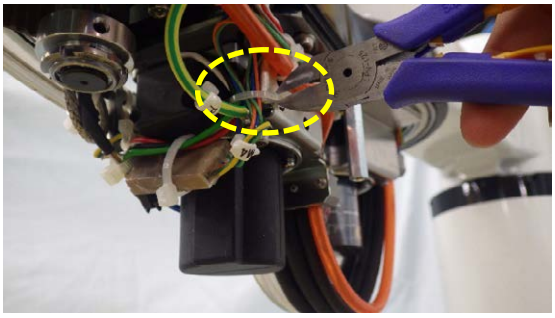
1 Take off the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.

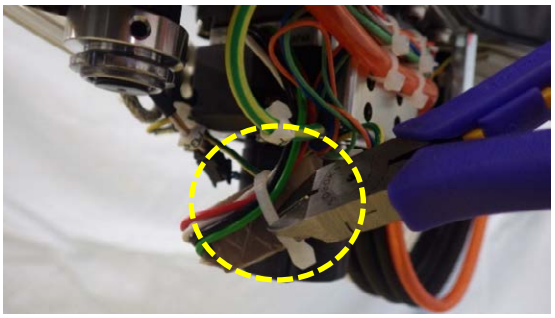


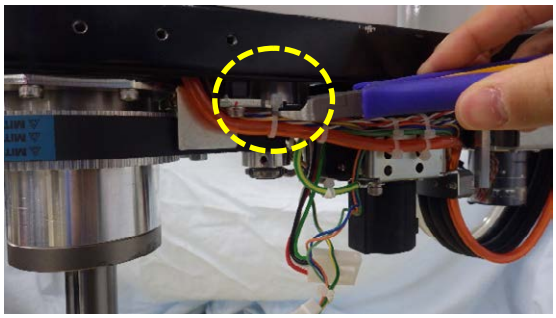
2 Take off the hex socket head cap screws (M4 × 10).
Detach the arm cover.

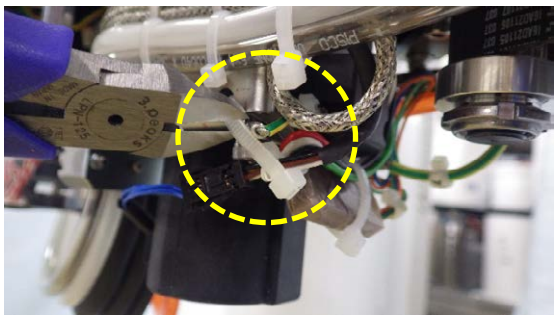


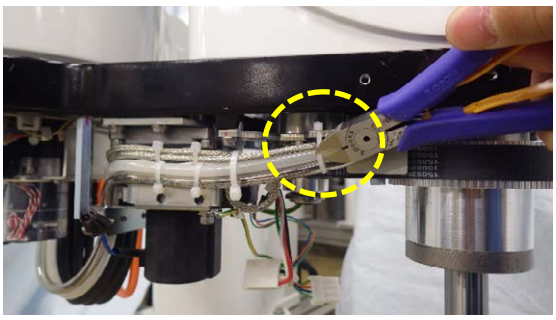
3 Cut the cable band at each point using a pair of nippers and release cables.

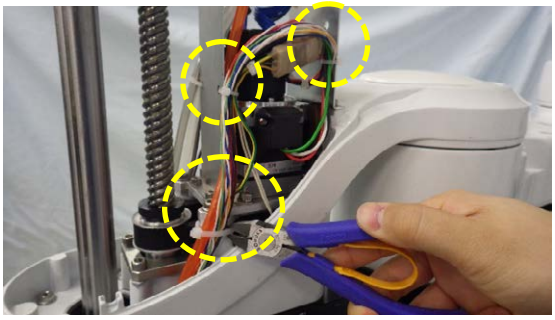


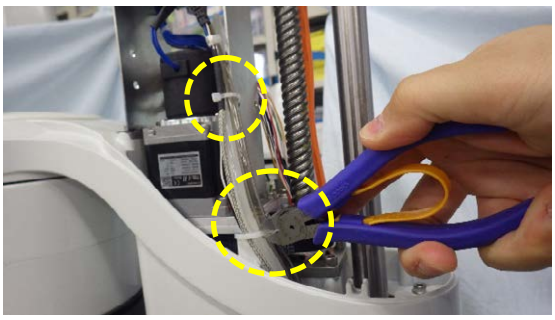




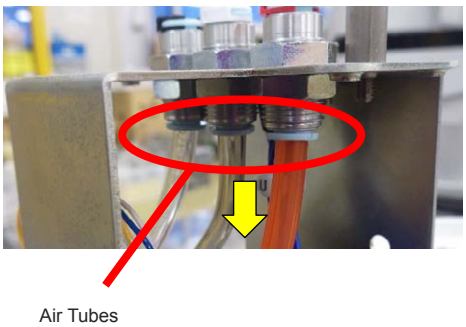




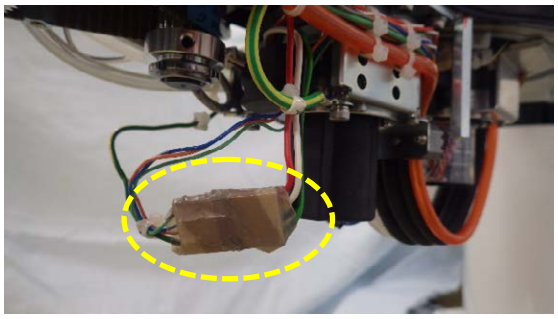


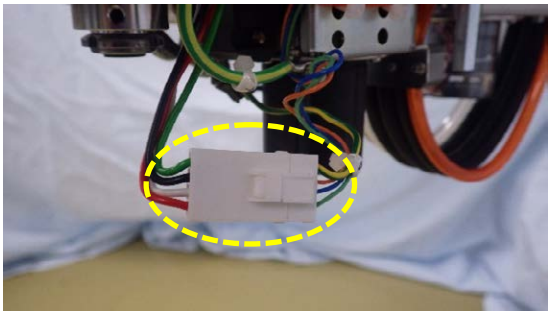


4 Take the three pieces of air tubes and the D-sub connector out of the user panel.

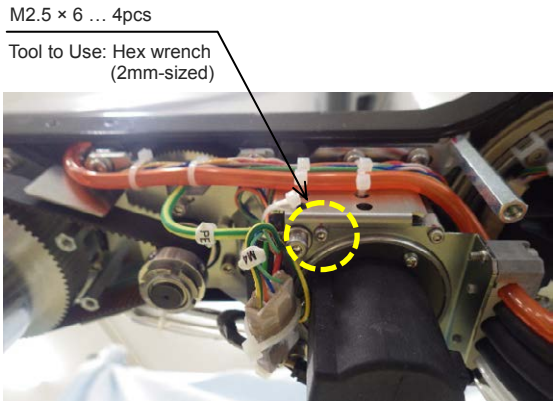


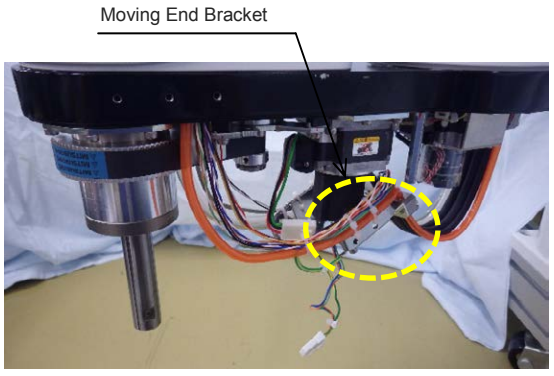
5 Take off the teflon tape applied around the motor connector.
Unplug the connectors.
(Note) Keep the teflon tape as it should be reused after the motor is replaced.



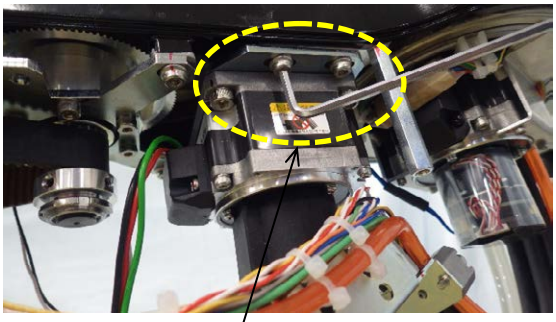


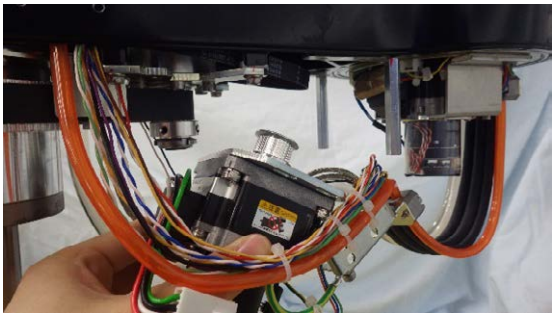
6 Remove the hex socket head cap screws (M2.5 × 6) holding the moving-end bracket to take it off.



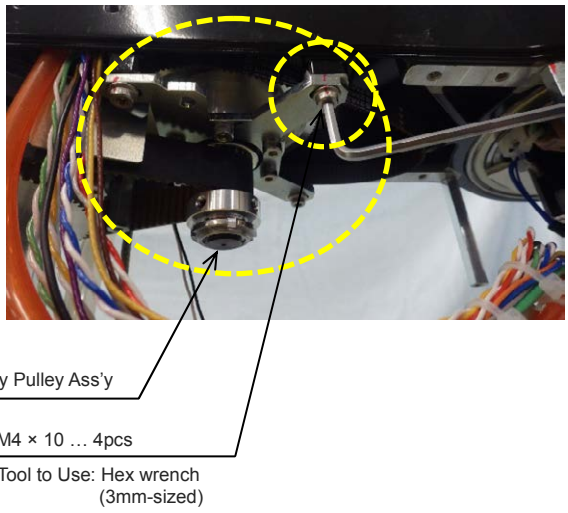


7 Remove the flanged hex socket head cap screws (M4 × 10) holding the motor and take off R-axis motor assembly.

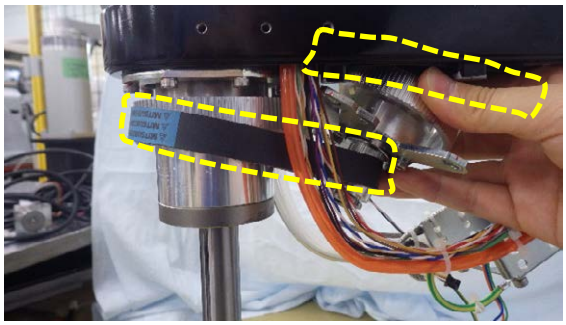




8 Remove the flanged hex socket head cap screws (M4 × 10) holding the relay pulley assembly.

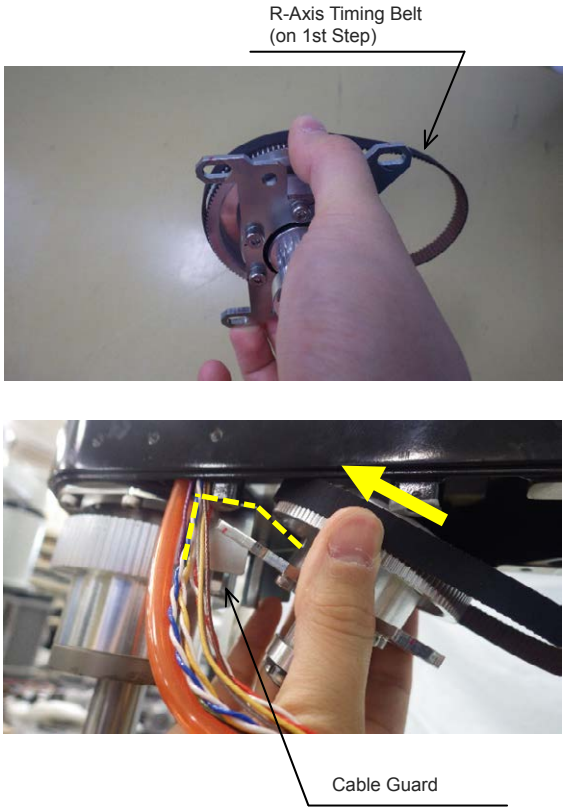


9 Take off relay pulley assembly to take out the belt.

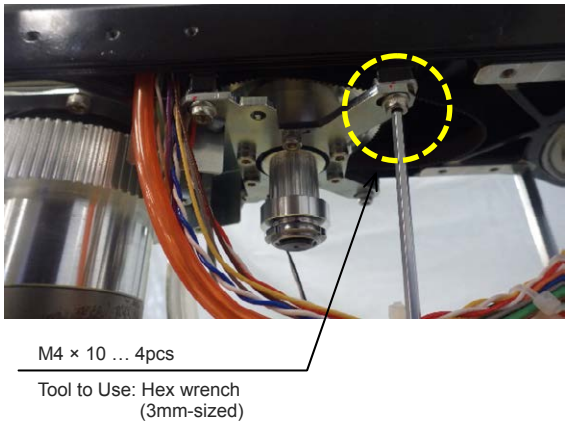


10 Hang a new belt on the first step of relay pulley assembly and set it in angle in the top of the cable guard.

* It is acceptable to take off the cable guard if it is difficult to work on it.

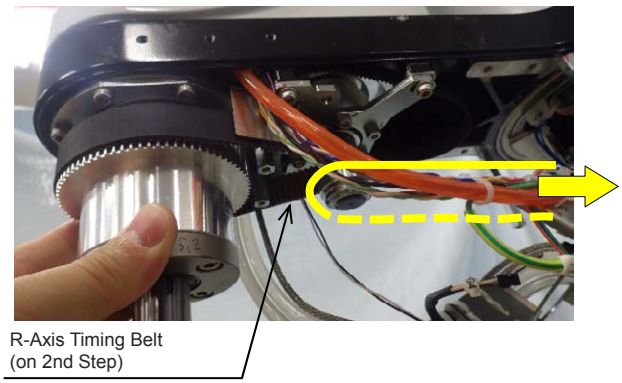


11 Loosely tighten relay pulley assembly with flanged hex socket head cap screws (M4 × 10).



12 Hang a new belt on the second step.
* It is acceptable to take off the cable guard if it is difficult to work on it.

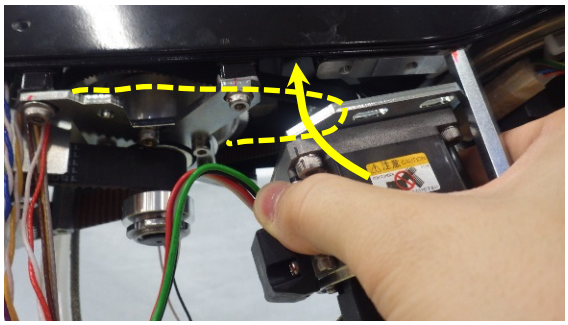
13 Hang relay pulley ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table.
The belt tension should get to 90+/-5N, which is the specification.
Keep it pulled with the specified tensile strength while tightening the flange-headed hex socket head cap screws (M4 × 10) holding relay pulley ass'y further.

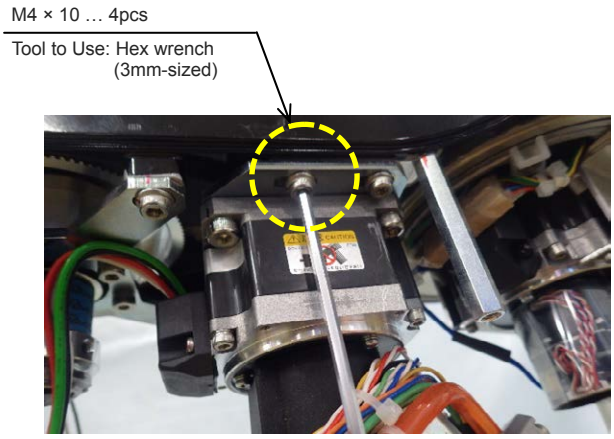


Tensile Force
180 ± 10N

Tightening Torque
3.6N·m

14 Put the pulley on R-axis motor assembly through the belt on the first step and loosely tighten it with flanged hex socket head cap screws (M4 × 10).

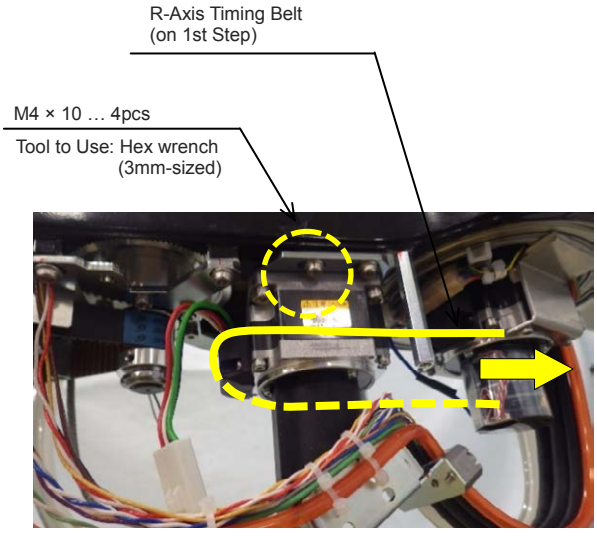




15 Hang R-axis motor ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table.
The belt tension should get to 18+/-5N, which is the specification.
Keep it pulled with the specified tensile strength while tightening the flange-headed hex socket head cap screws (M4 × 10) holding motor ass'y further.

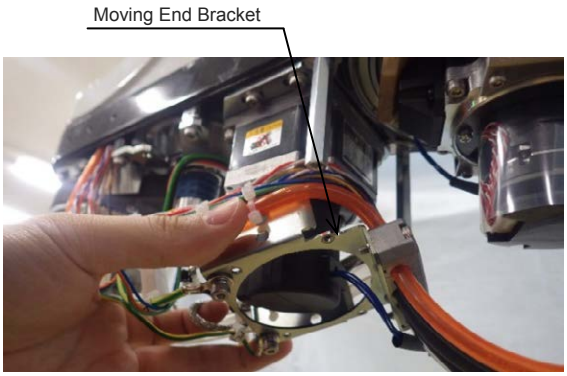
Tensile Force
36 ± 10N

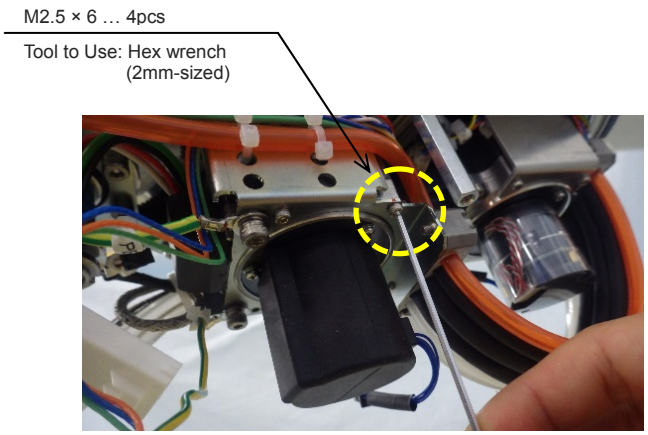
Tightening Torque
3.6N·m



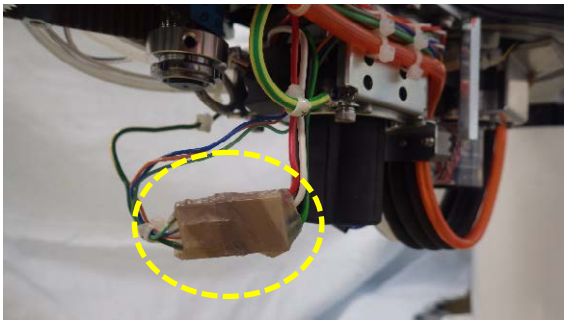
16 Attach the moving end bracket. Tighten the hex socket head cap screws (M2.5 × 6).

Screw Diameter	Tightening Torque
M2.5	0.5N·m

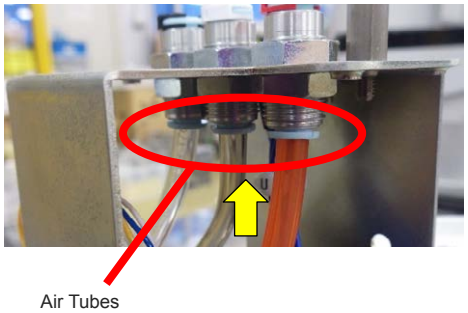




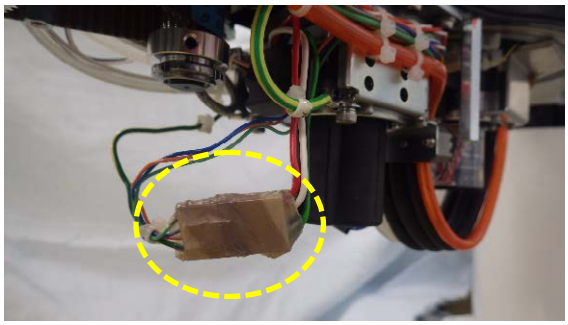
17 Plug in all the connectors.
Wrap up the motor connector with the teflon tape.

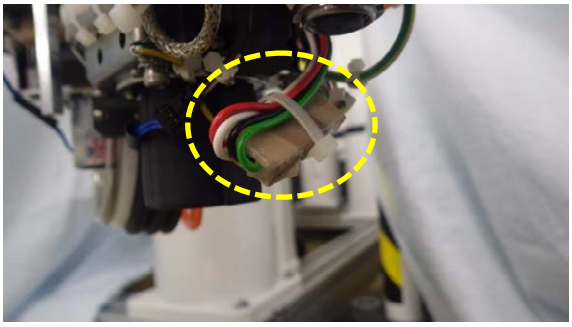


18 Join the three pieces of air tubes and the D-sub connector on the user panel.

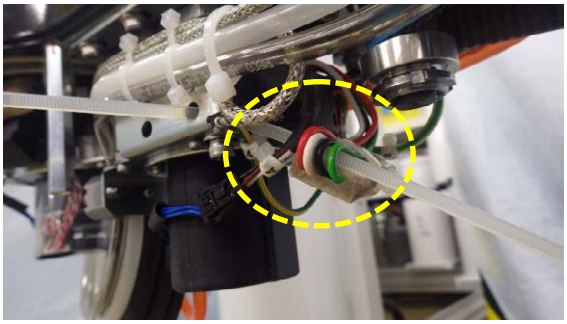


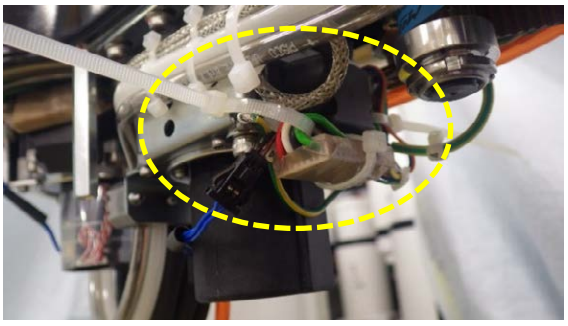
19 Affix the cables with cable ties.



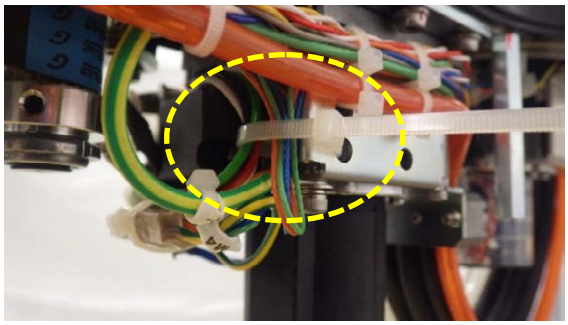


20 Affix the motor cable and encoder cable on the moving-end bracket using cable bands.

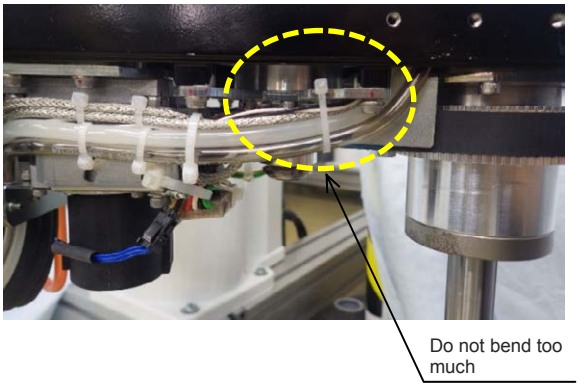


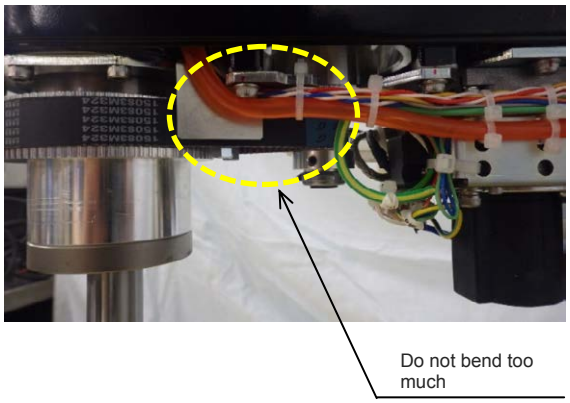


21 Affix the motor cable on the moving-end bracket using a cable band.



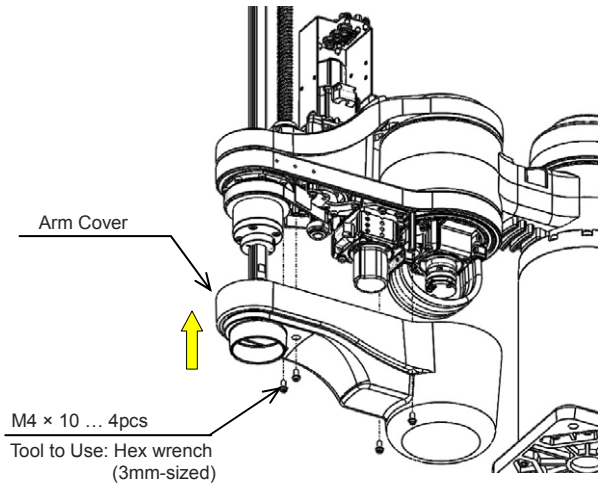
22 Affix the cables and the air tube on relay pulley assembly using cable bands.





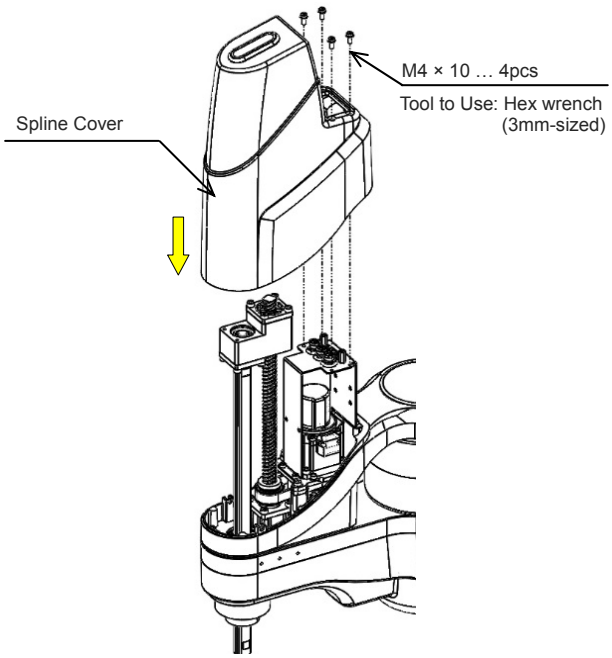
23 Put on the arm cover.
Tighten the hex socket head cap screws (M4 × 10)

Tightening Torque
1.8N·m



24 Put on the spline cover.
Tighten the hex socket head cap screws (M4 × 10) on the top of the spline cover.

Tightening Torque
1.8N·m



Motor Replacement

Notice

Here is a request when replacing the motor for SCARA Robot.

- There is no guarantee that positioning can be performed at the exactly same point even if positioning operation was held at the same point after a motor was replaced. But, it should be a very slight misalignment.
  Even though the misalignment is only little, check the positioning point to make sure there should be no problem in use.
  In case of any problem, reregister the position data.
- When the installation is in the following conditions, it is required to conduct “Acquire Stopper Pressing Point” before having the motor replaced.
  - When the absolute reset cannot be performed in the direction of the stopper interfering movement with the initial posture at the delivery from the factory due to such reasons as interference to the peripheral equipment.
  - There was a change in the stopper position due to such reasons as a removal of the stopper of the vertical axis.

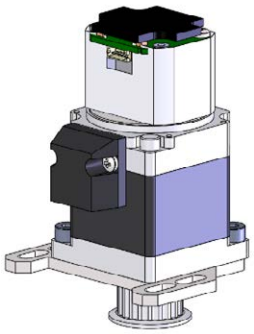
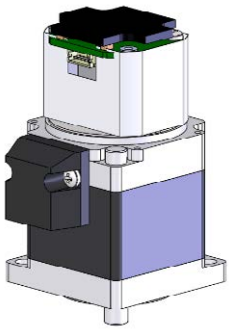
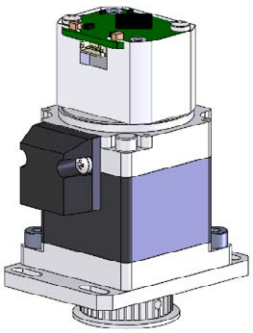
Note: In case the absolute reset cannot be conducted in the direction towards stopper pressing in the initial posture set at the delivery from our factory due to such a reason as interference to peripheral devices, change the setting to the initial posture for the left arm system (direction towards opposite side of stopper pressing) to acquire the stopper pressing point.

→ Refer to Procedure for Stopper Pressing Position Acquirement Operation in 4.9 Absolute Reset.

[IXA-□NNN1805]

Motor to Replace

Model	Axis	Model Code of Single Product
IXA-□NNN1805	J1-Axis	M-IXA-N18-1-PU
	J2-Axis	M-IXA-N18-2
	Z-Axis	M-IXA-N18-3-PU
	R-Axis	Not Available for Replacement

	J1	J2	Z
NNN		 * Flexwave, bracket, etc to be replaced	

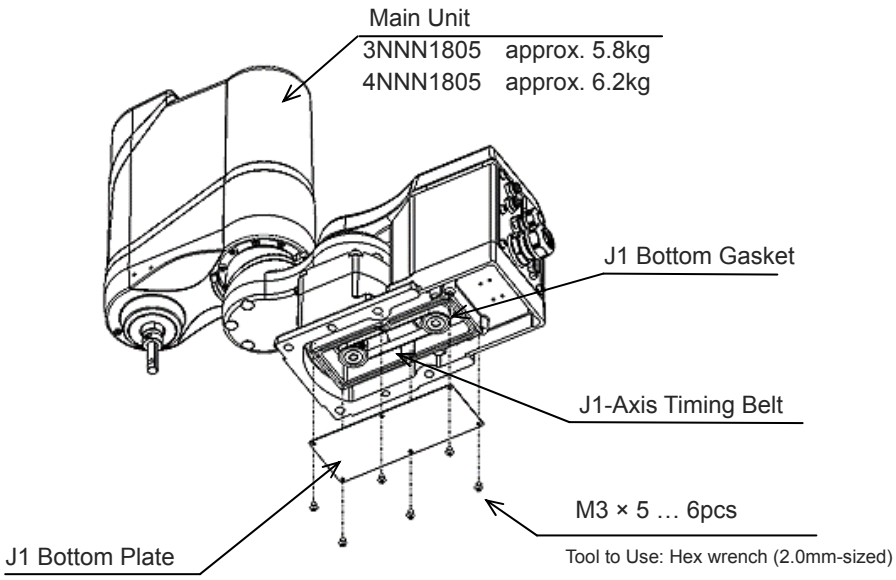
Tools to Use

Tools to Use	Specification
Hex wrench	Parallel-Face Diameter 1.5mm, 2.0 mm, 2.5mm, 3mm
Nippers	8mm
Tension Gauge	Capable for tensile of 100N max.
Thin String	-

How to Replace

J1-Axis

1 Remove the hex socket button head screws (M3 × 5) holding the bottom plate.



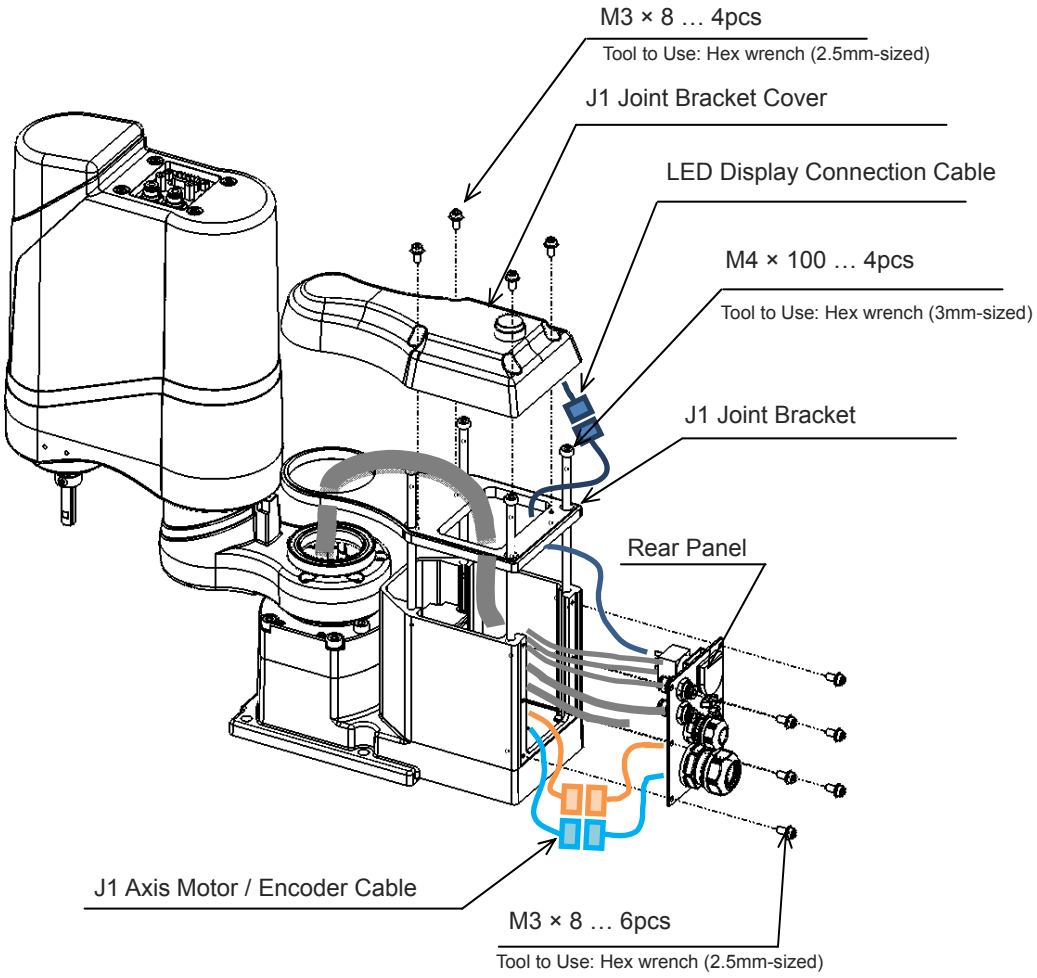
2 Remove the hex socket head cap screws with captive washer (M3 × 8) holding the joint bracket cover.

3 Take off the joint bracket cover and unplug the cable connector for LED display lamps.

4 Take off the hex socket head cap screws (M4 × 100) holding the joint bracket.

5 Remove the hex socket head cap screws with captive washer (M3 × 8) holding the rear panel.

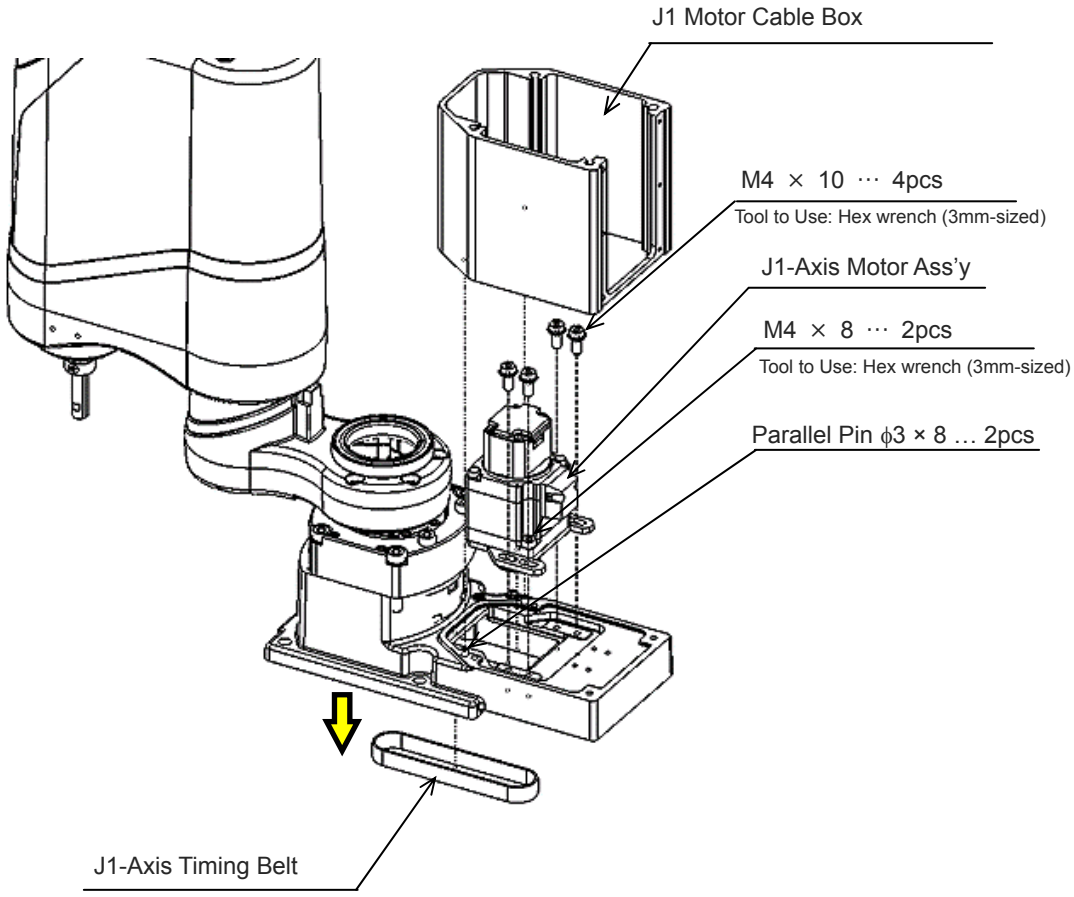
6 Take off the J1-axis motor/encoder cable connectors.



7 Detach the motor cable box. (Pay attention not to lose the parallel pin for positioning.)

8 Take off the flange-headed hex socket head cap screws (M4 × 10) to detach the J1-axis motor ass'y. Take off the timing belt.

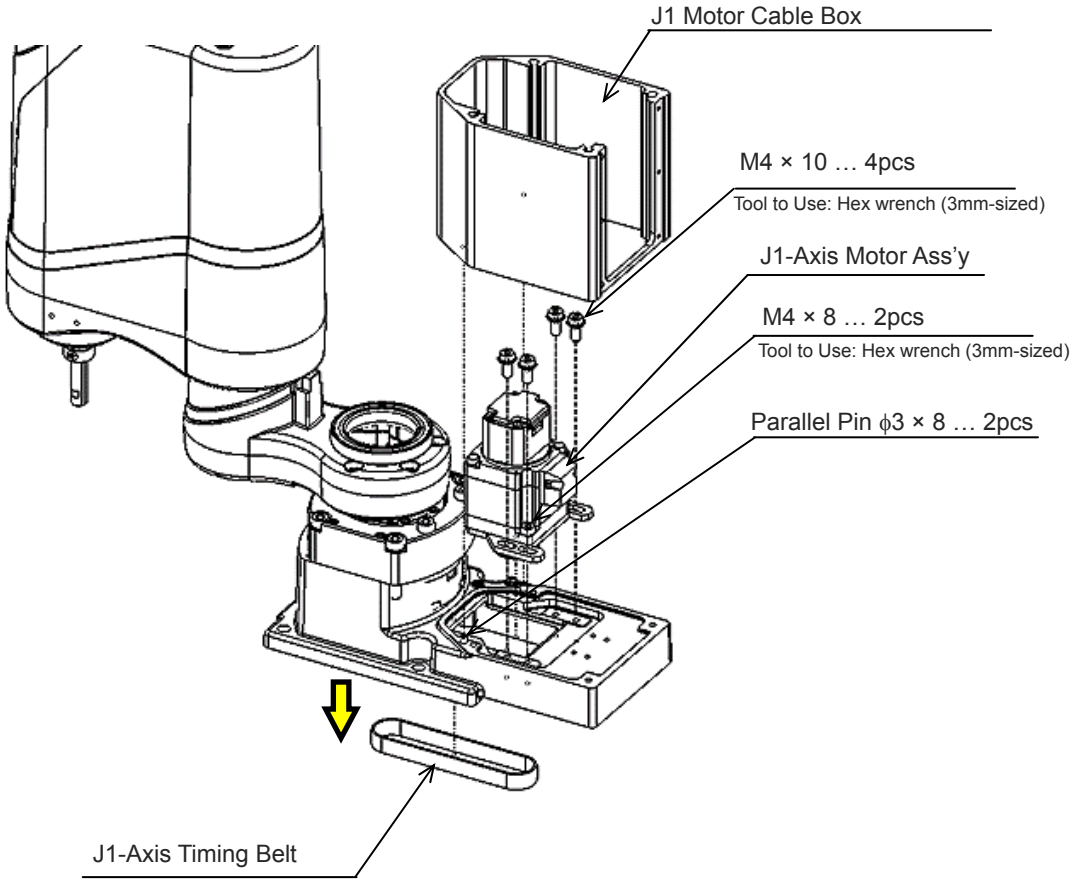
9 Take off the hex socket head cap screws (M4 × 8) to detach the J1-axis motor.



10 Attach a J1-axis motor for replacement with the hex socket head cap screws (M4 * 8).

Tightening Torque
3.6N·m

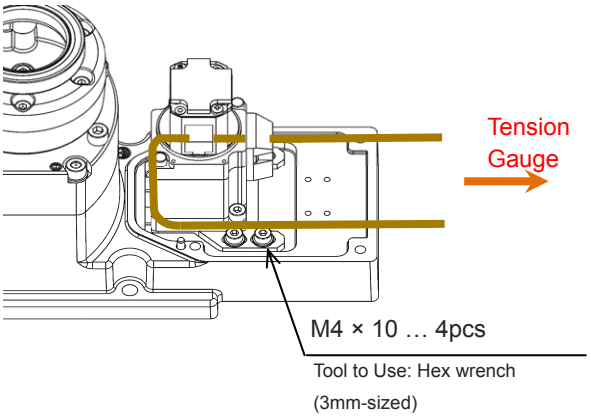
11 Take off the flange-headed hex socket head cap screws (M4 × 10) to detach the J1-axis motor ass'y. Keep the screws tightened loosely. Set a timing belt.



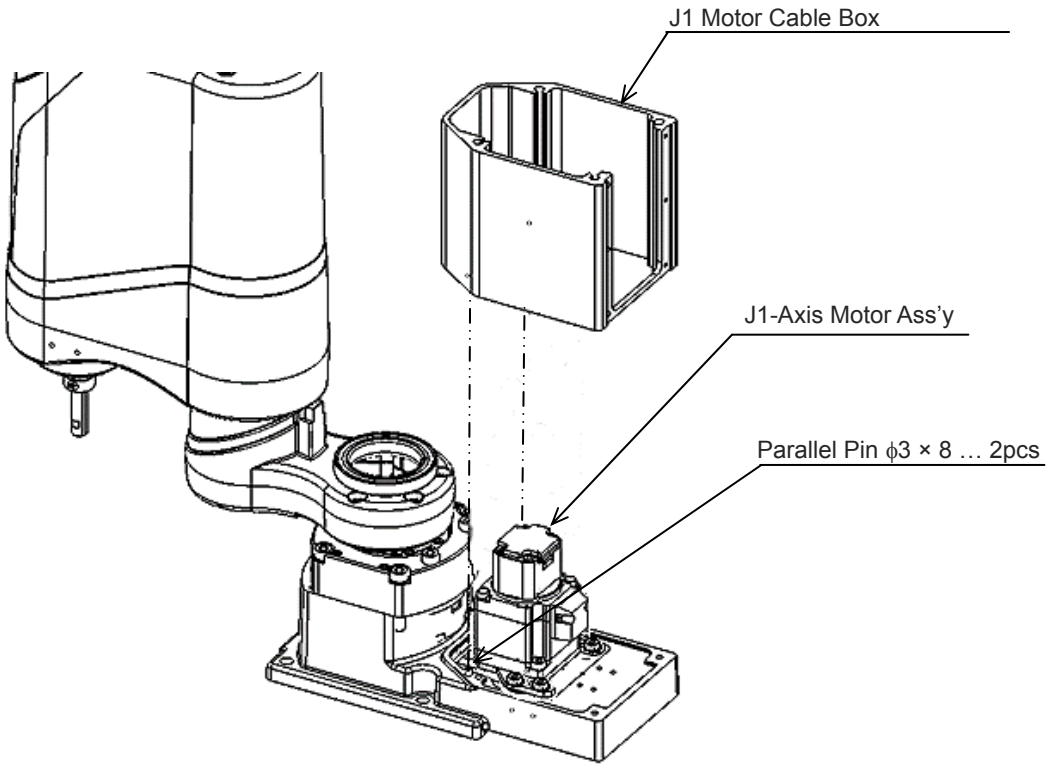
12 Hang J1-axis motor ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table.
Keep it pulled with the specified tensile strength while tightening the flange-headed hex socket head cap screws (M4 × 10) holding J1-axis motor ass'y further.

Tensile Force
80±5N

Tightening Torque
3.8N·m



13 Attach the motor cable box.



14 Join the J1-axis motor/encoder cable connectors.

15 Attach the rear panel with the hex socket head cap screws with captive washer (M3 × 8) and tighten up the hex socket head cap screws with captive washer (M3 × 8).

Tightening Torque
0.9N·m

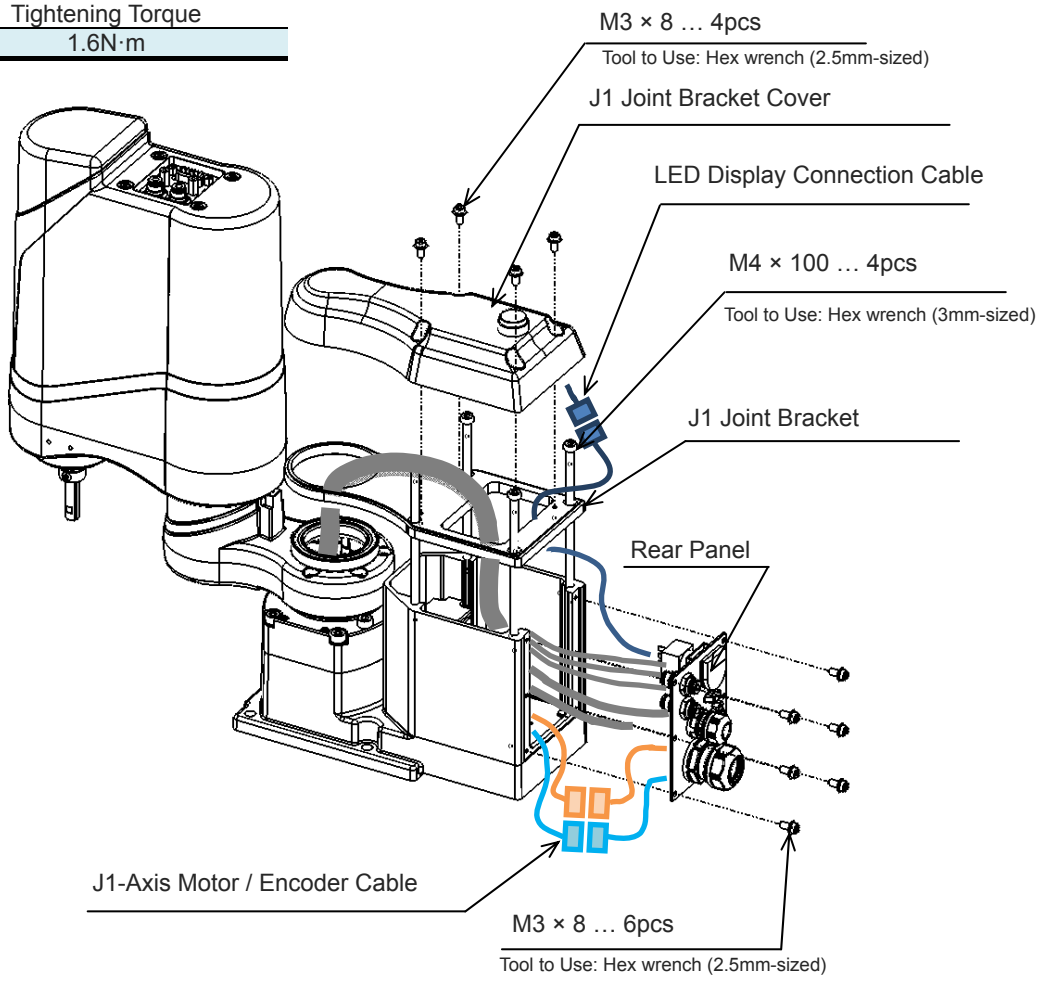
16 Attach the joint bracket with the hex socket head cap screws (M4 × 100), and tighten up the hex socket head cap screws (M4 × 100).

Tightening Torque
2.1N·m

17 Attach the joint bracket cover and join the connection cable connectors for LED display lamps.

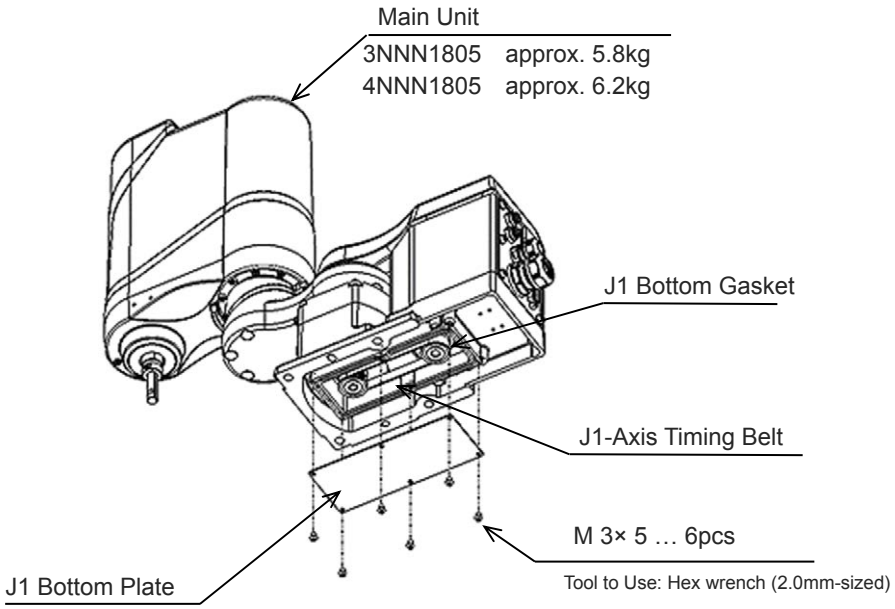
18 Attach the hex socket head cap screws with captive washer (M3 × 8) to hold the joint bracket cover, and tighten them up.

Tightening Torque
1.6N·m



19 Attach the hex socket button head screws (M3 × 5) to hold the bottom plate, and tighten them up.

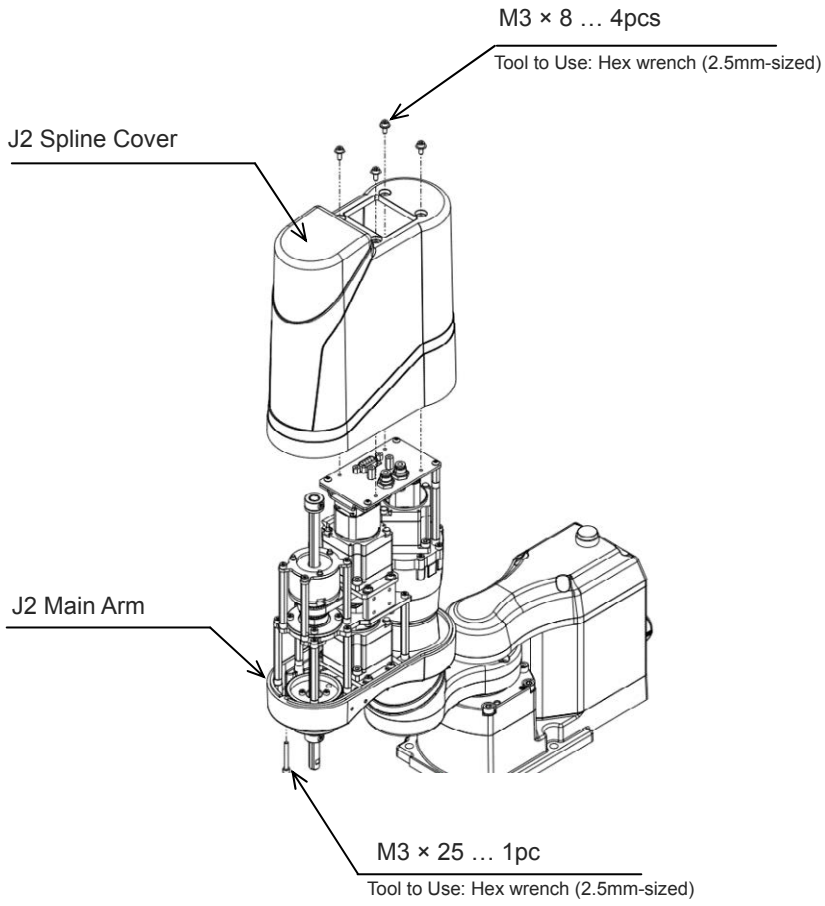
Tightening Torque
0.7N·m



20 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.24.00 or later.

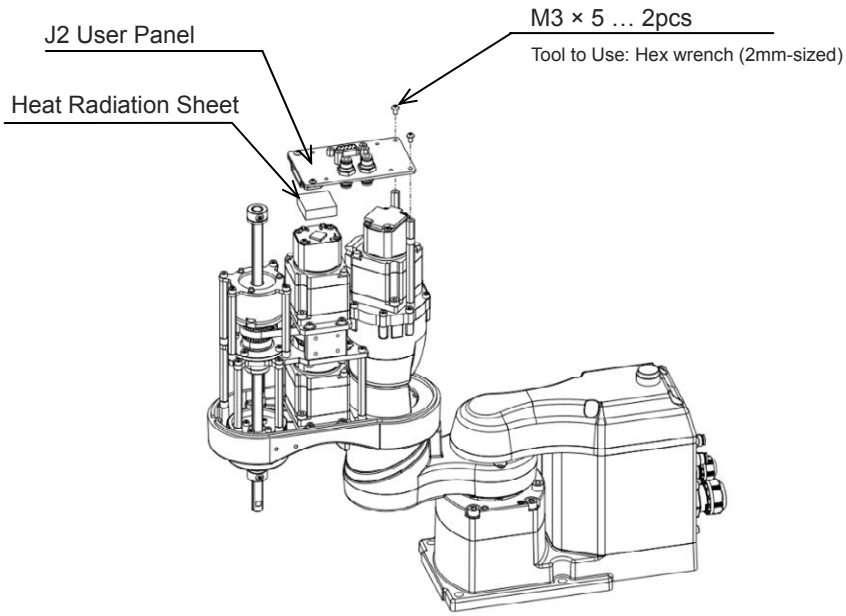
J2-Axis

1 Remove the hex socket head cap screw (M3 × 25) held at the bottom of the main arm, and remove the hex socket head cap screws with captive washer (M3 × 8) on the top of the spline cover.



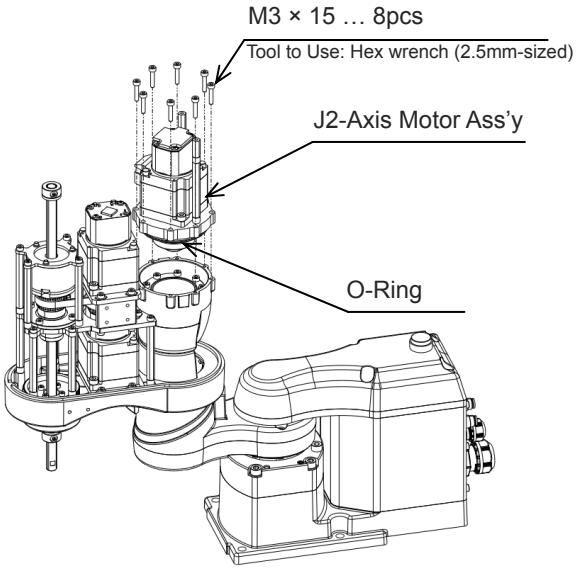
2 Take the two pieces of air tubes and the D-sub connector out of the user panel.

3 Take off the hex socket button head screws (M3 × 5) to detach the user panel.



4 Take off the J2-axis motor/encoder cable connectors.

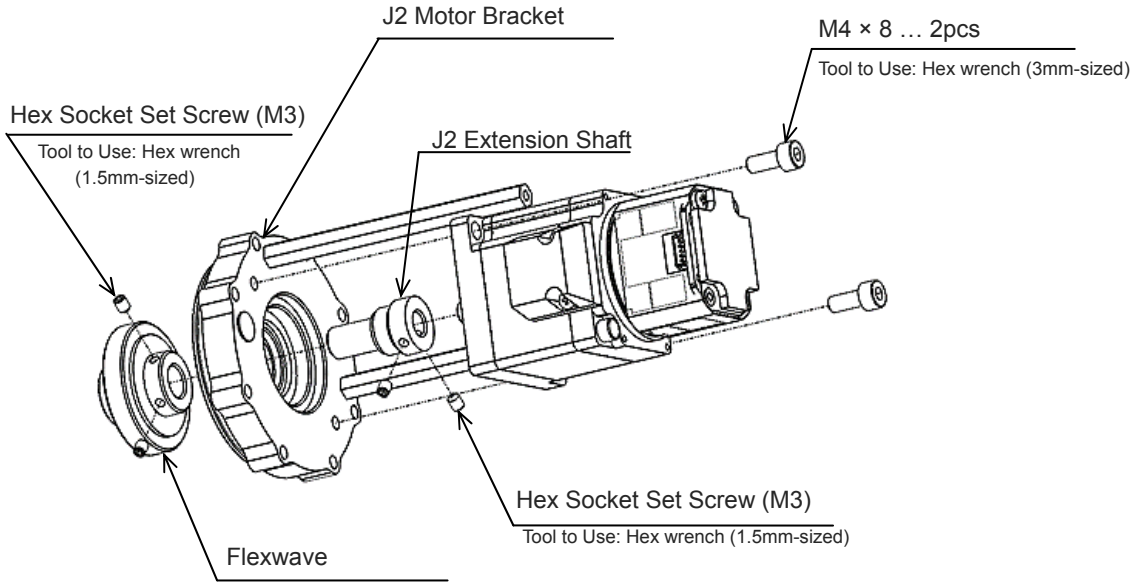
5 Take off the hex socket head cap screws (M3 × 15).
Take off the J2-axis motor ass'y.
(As there is an O-ring attached, have it tilted and take off slowly.)

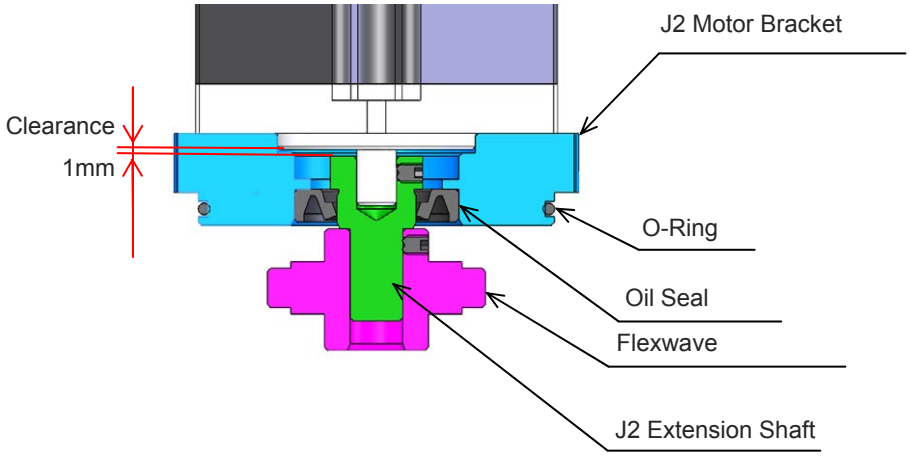


6 Loosen the hex socket set screws (M3) holding the flexwave to take off the flexwave.

7 Remove the hex socket head cap screws (M4 × 8) and take the J2 motor off the J2 motor bracket.

8 Loosen the hex socket set screws (M3) holding the extension shaft, and take off the extension shaft.





9 Attach the extension shaft on the J2 motor for replacement with the hex socket set screws (M3).

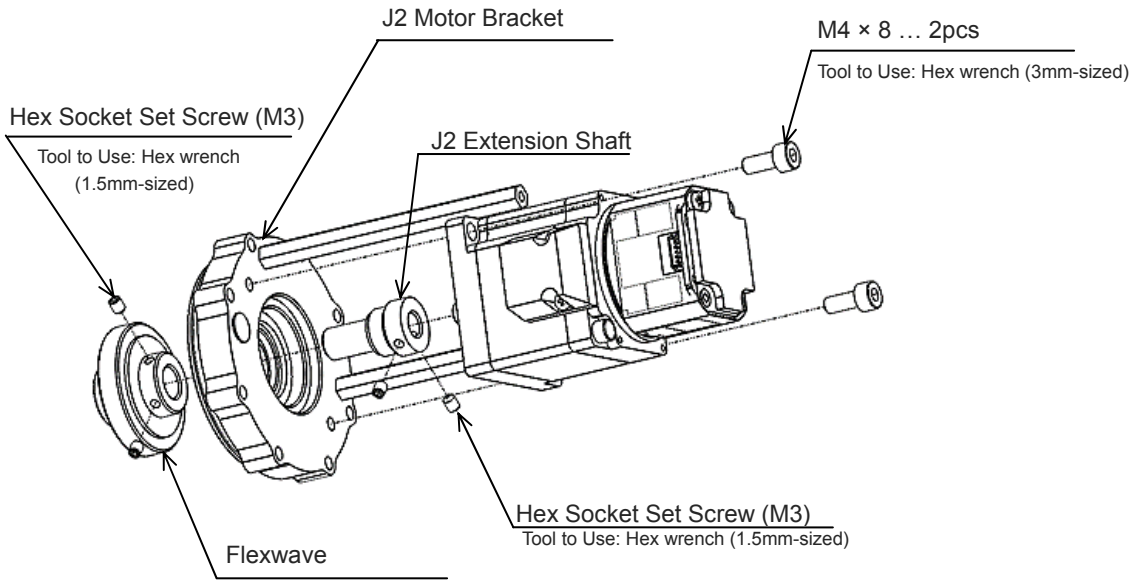
Tightening Torque
0.7N·m

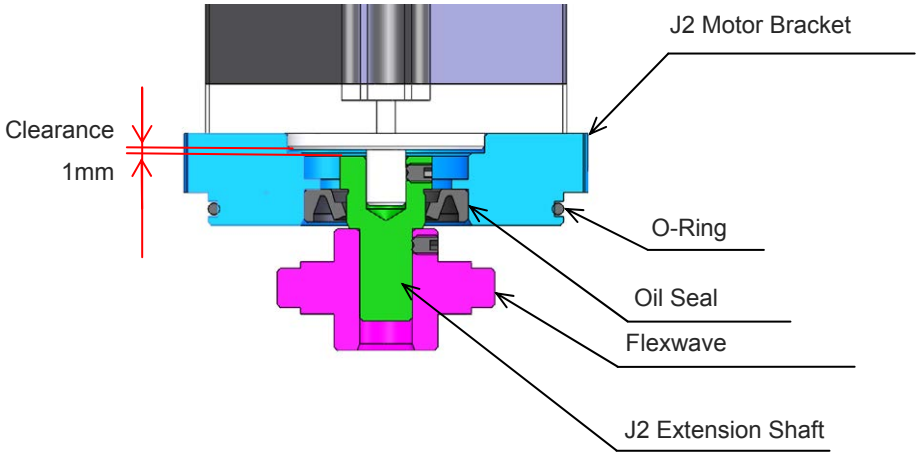
10 Set the J2 motor on the J2 motor bracket with the hex socket head cap screws (M4 × 8).

Tightening Torque
3.6N·m

11 Attach flexwave on the extension shaft with the hex socket set screws (M3).

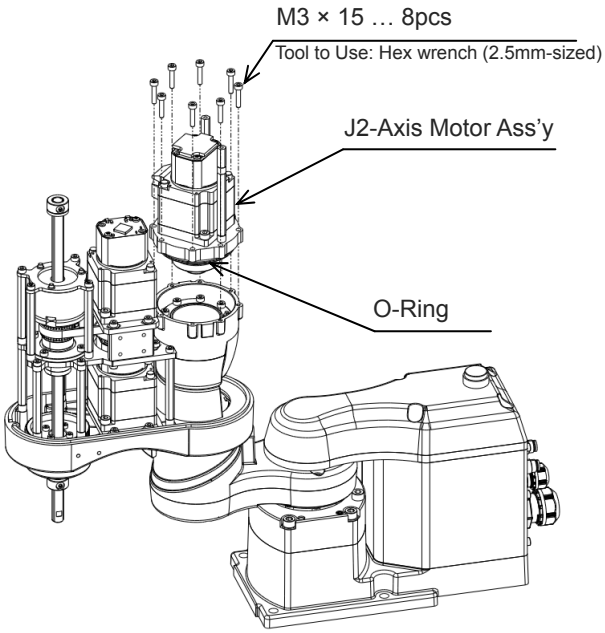
Tightening Torque
0.7N·m





12 Affix the J2 axis motor assembly with the hex socket head cap screws (M3 × 15).
(As there is an O-ring attached, have it tilted and take off slowly.)

Tightening Torque
1.6N·m

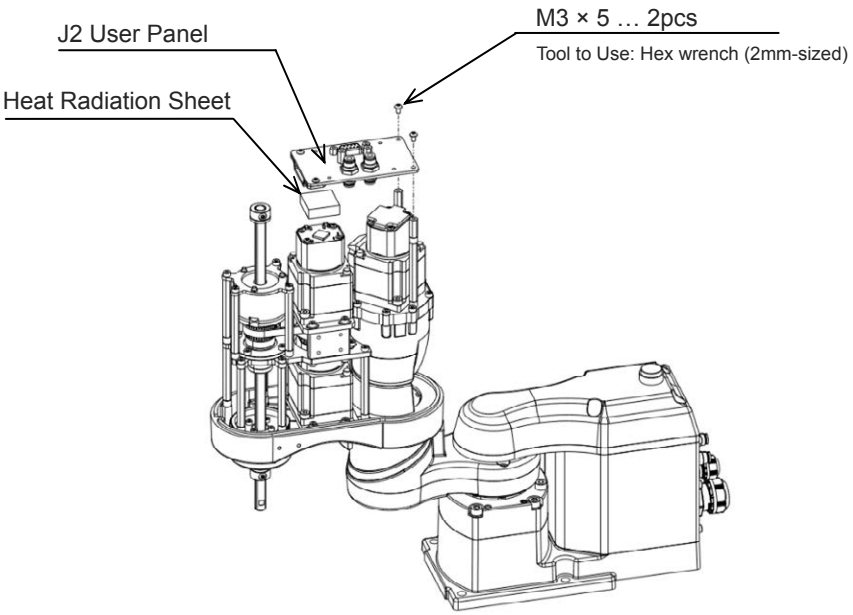


13 Join the J2-axis motor/encoder cable connectors.
[Refer to Wiring for IXA-□NNN1805 in How to Replace Motor for how to lay out the connector wiring.]

14

Affix the user panel with the hex socket button head screws (M3 × 5).

Tightening Torque
1.0N·m



15

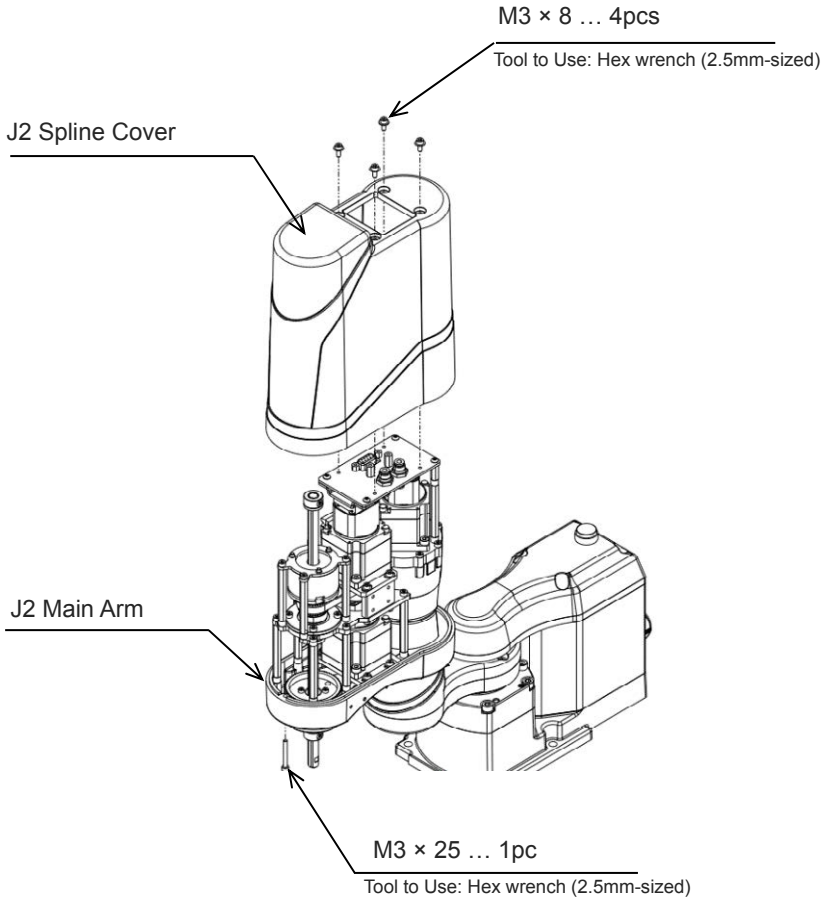
Join the two pieces of air tubes and the D-sub connector on the user panel.
[Refer to Wiring for IXA-□NNN1805 in How to Replace Motor for how to lay out the connector wiring.]

16 Put on the spline cover and tighten up the hex socket head cap screws with captive washer (M3 × 8) on the top.

Tightening Torque
1.6N·m

Tighten up the hex socket head cap screw (M3 × 25) to hold the bottom.

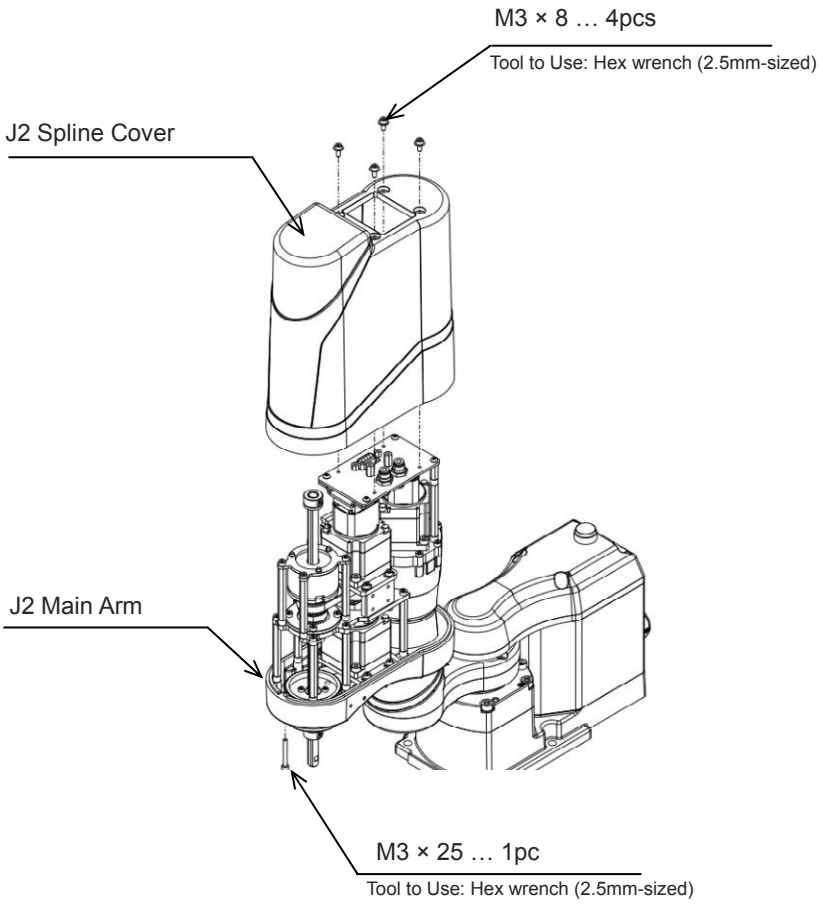
Tightening Torque
0.9N·m



17 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.24.00 or later.

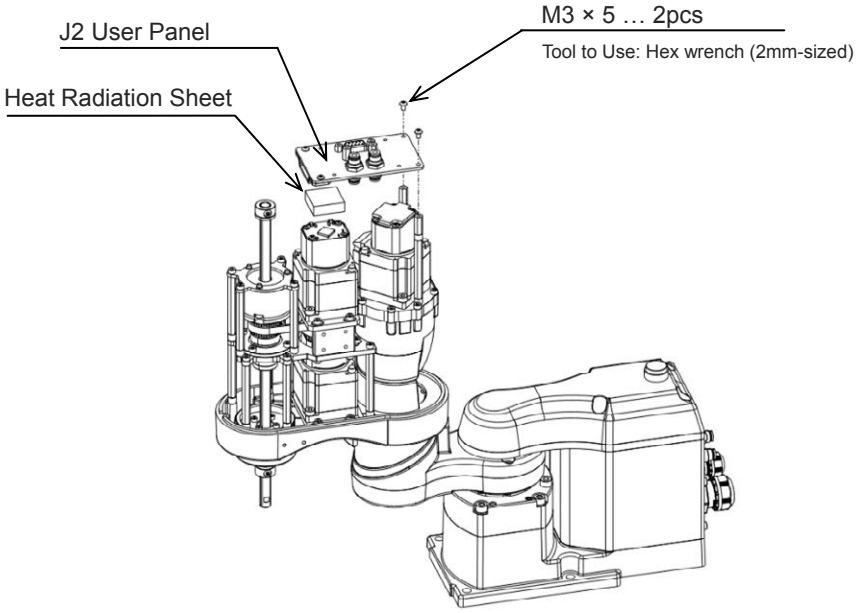
Z-Axis

1 Remove the hex socket head cap screw (M3 × 25) held at the bottom of the main arm, and remove the hex socket head cap screws with captive washer (M3 × 8) on the top of the spline cover.



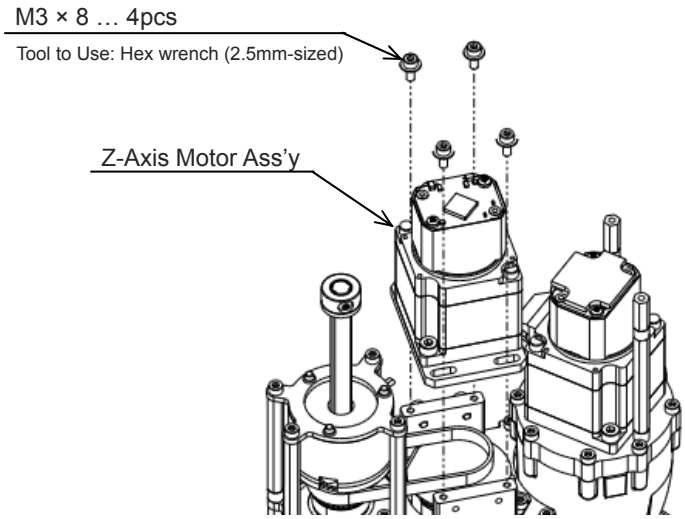
2 Take the two pieces of air tubes and the D-sub connector out of the user panel.

3 Take off the hex socket button head screws (M3 × 5) to detach the user panel.



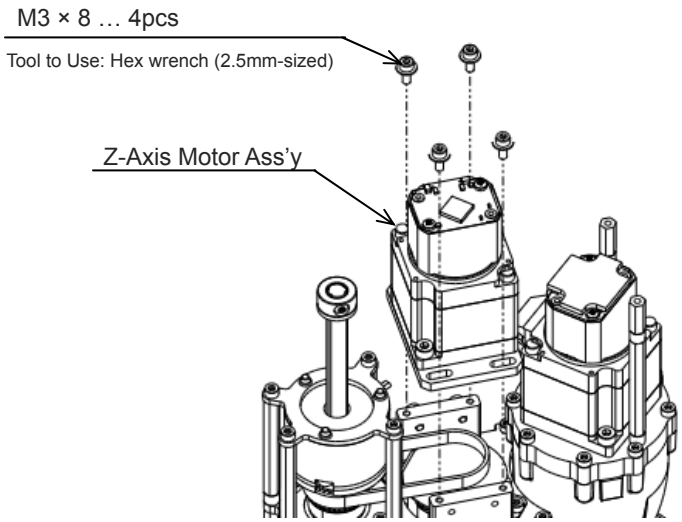
4 Take off the Z-axis connectors (motor and encoder).

5 Take off the hex socket head cap screws with captive washer (M3 × 8) to detach the Z-axis motor ass'y.



6 Attach a Z-axis motor assembly for replacement with the hex socket head cap screws with captive washer (M3 × 8).
Keep the screws tightened loosely.
Hang a belt on the Z-axis motor assembly.

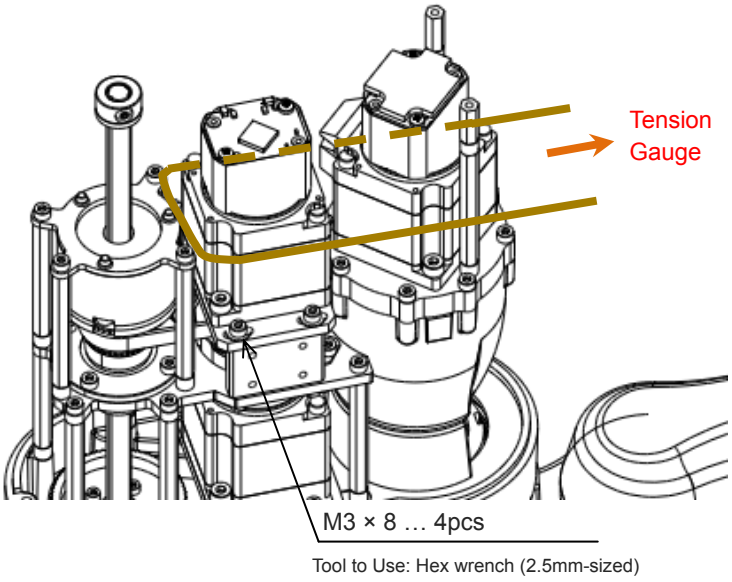
7 Join the Z-axis connectors (motor and encoder).
[Refer to Wiring for IXA-□NNN1805 in How to Replace Motor for how to lay out the connector wiring.]



8 Hang Z-axis motor ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table.
Keep it pulled with the specified tensile strength while tightening the hex socket head cap screws with captive washer (M3 × 8) holding Z-axis motor ass'y further.

Tensile Force
30±2N

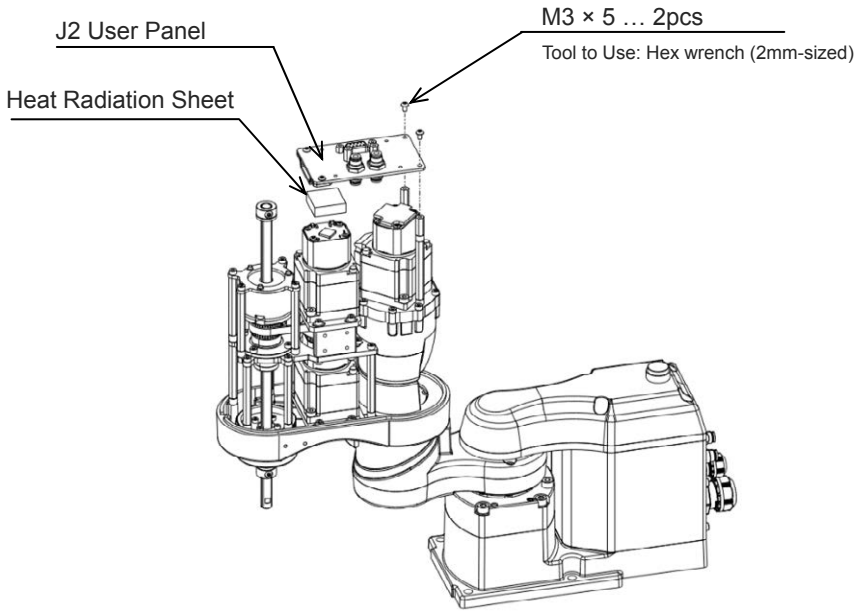
Tightening Torque
1.6N·m



9 Attach the user panel with the hex socket button head screws (M3 × 5), and tighten up the hex socket button head screws (M3 × 5).

Tightening Torque
1.0N·m

10 Join the two pieces of air tubes and the D-sub connector on the user panel.
[Refer to Wiring for IXA-□NNN1805 in How to Replace Motor for how to lay out the connector wiring.]

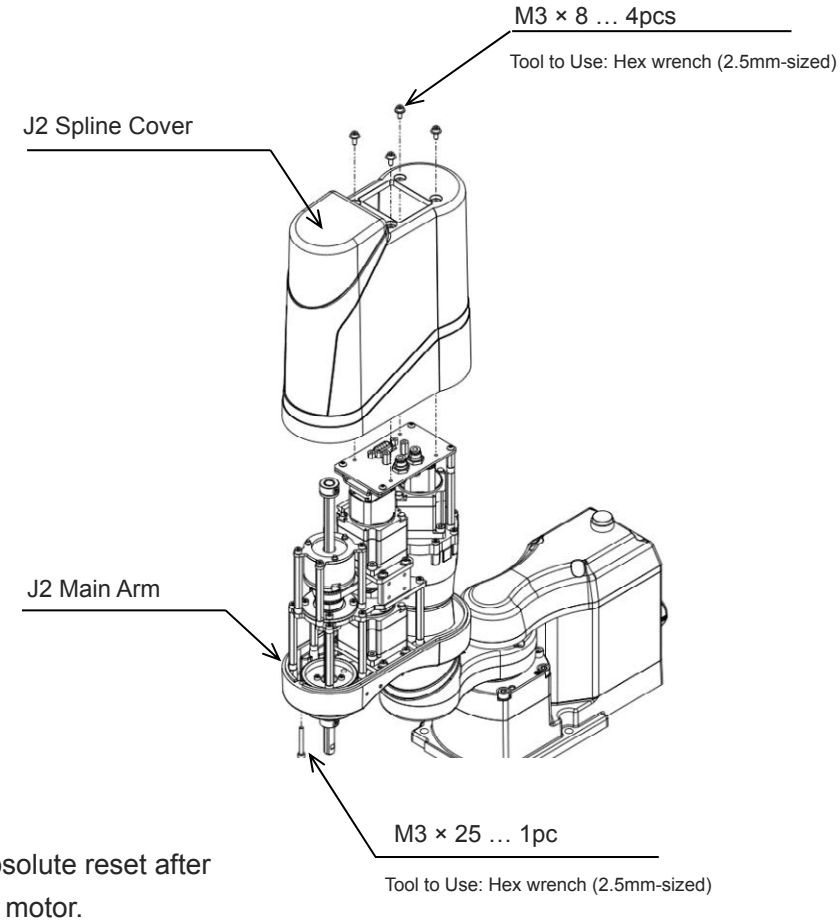


11 Attach the spline cover and tighten up the hex socket head cap screws with captive washer (M3 × 8) on the top.

Tightening Torque
1.6N·m

Tighten up the hex socket head cap screw (M3 × 25) to hold the bottom.

Tightening Torque
0.9N·m



12 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.24.00 or later.

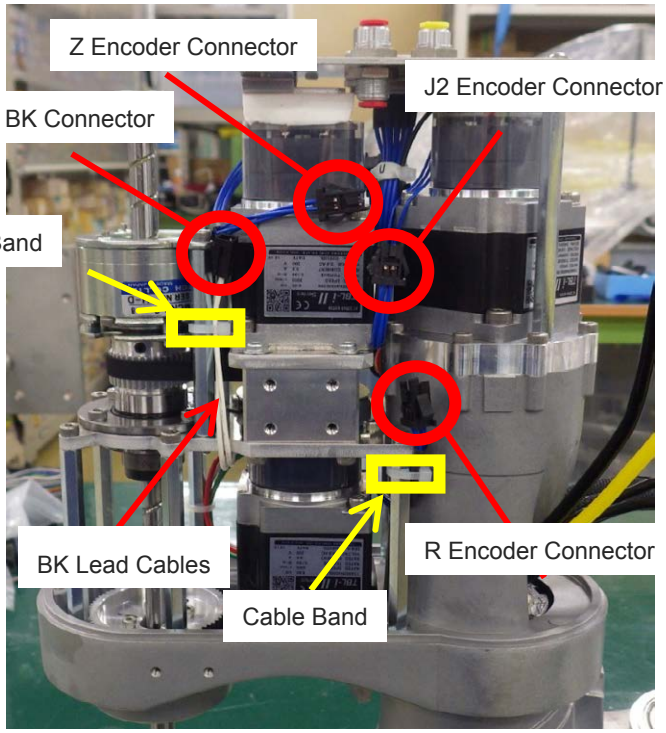
R-Axis

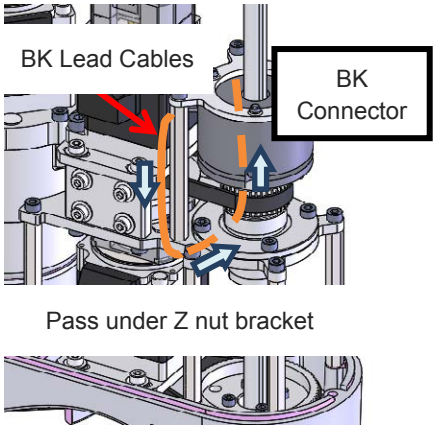
It is not available that you replace the R-axis motor by your own. Contact IAI when it is necessary to have a replacement.

Wiring

Have the wiring layout done referring to the figure blow.

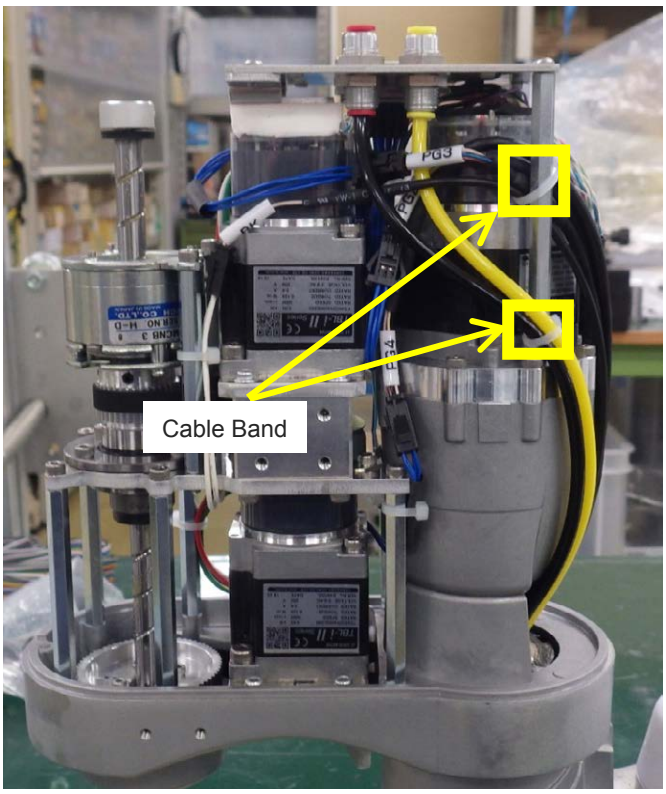
[Positions of Encoder Connectors and BK Connectors]

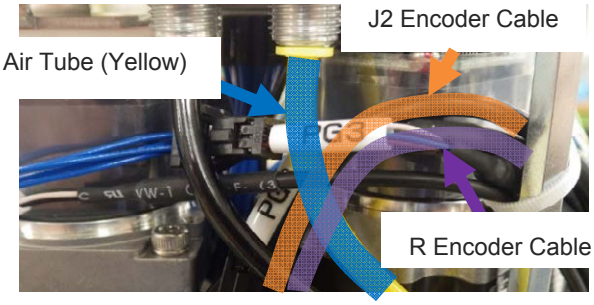




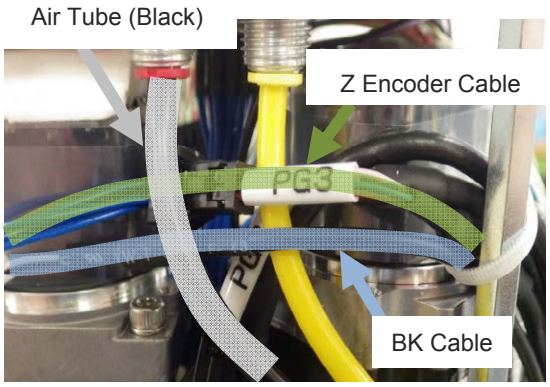
BK lead cable should go through under the Z nut bracket to make a loop. Make sure to have looseness on the BK lead cable.

[Connection for PG Cables and BK Cables]



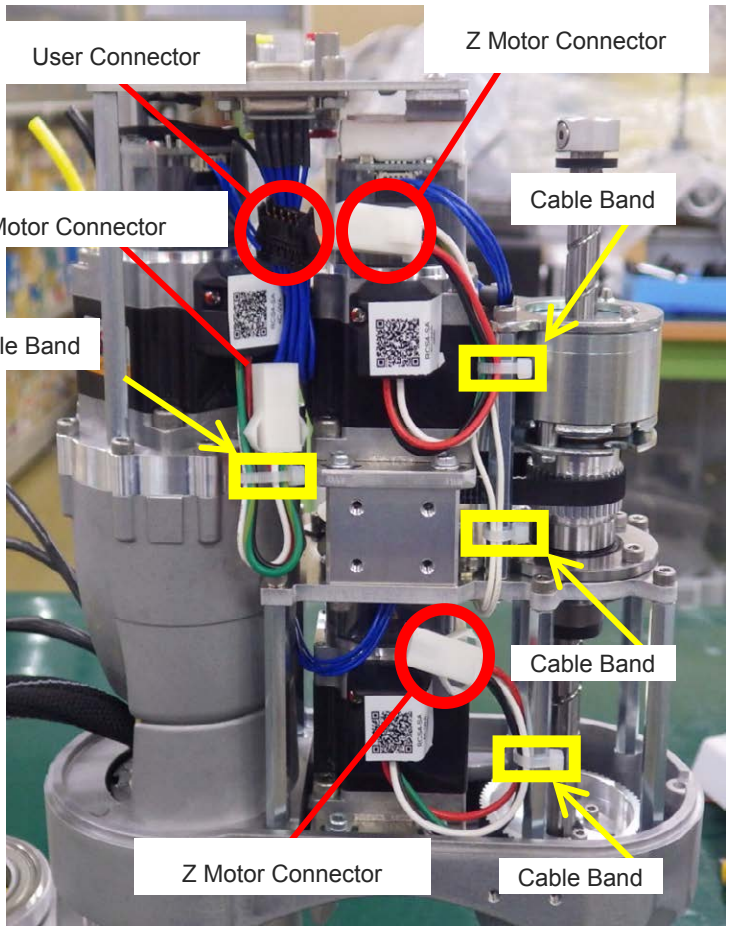


Join the air tube (yellow) as if it holds the encoder cables for J2 and R.

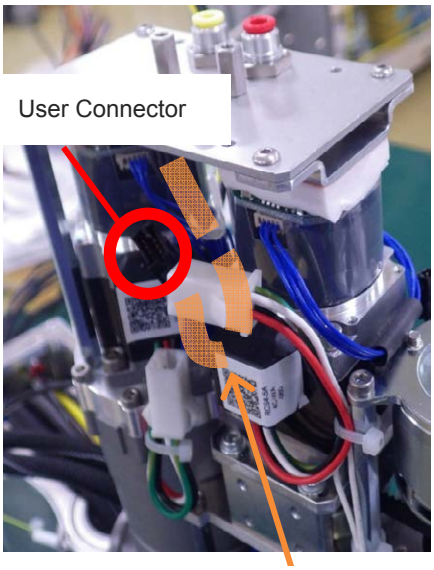


Join the air tube (black) as if it holds the BK cable and the Z encoder cable.

[Positions of Motor Connectors and User Connectors]

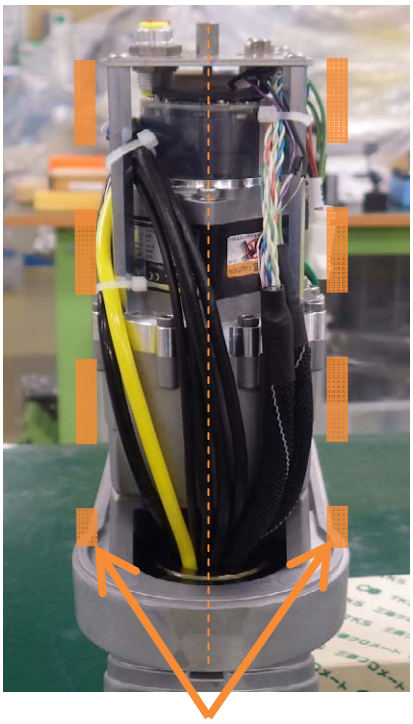


* The teflon tape around the motor connector should be taken off when dismantled and put it back on after the motor is replaced.

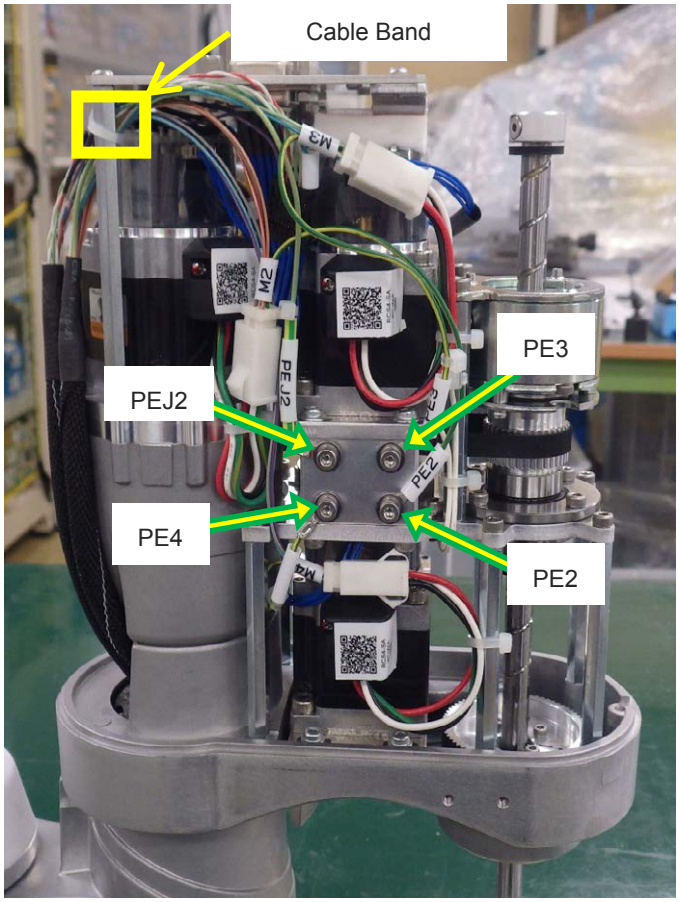


Bend the user cable

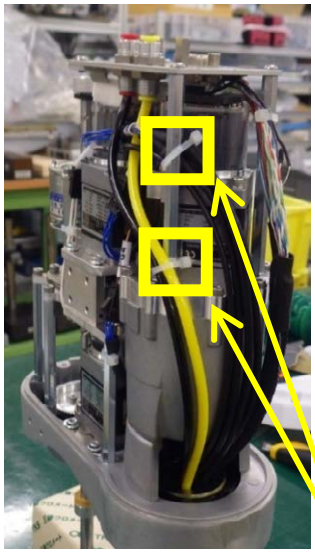
[Connection for Motor Cables and User Cables]

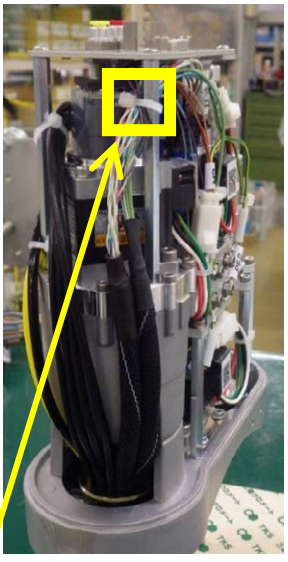


Make sure nothing hanging out to right or left.



Adjust to 20 to 30mm for the margin of the cables and hold them with a cable band.



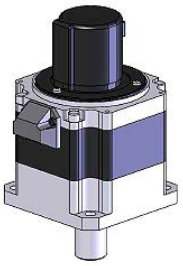
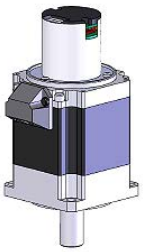
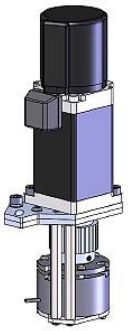
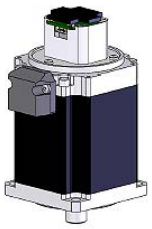
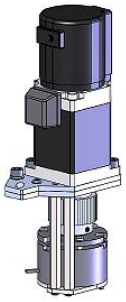


Hold up with cable band
(Pay attention not to tie up too much)

[IXA-□NNN3015/□NSN3015]

Motor to Replace

Model	Axis	Model Code of Single Product
IXA-□NNN3015	J1-Axis	M-IXA-N30N45-1
	J2-Axis	M-IXA-N30-2
	Z-Axis	M-IXA-N30-3-PU
	R-Axis	M-IXA-N30-4
IXA-□NSN3015	J1-Axis	M-IXA-S30S45-1
	J2-Axis	M-IXA-S30-2
	Z-Axis	M-IXA-S30-3-PU
	R-Axis	M-IXA-S30-4

	J1	J2	Z	R
N S N		 * Wave generator, bracket, etc to be replaced		
N N N	In common for NNN300 (J1) / NNN450 (J1) 	 * Wave generator, bracket, etc to be replaced		

Tools to use

Tools to use	Specification
Hex wrench	Parallel-Face Diameter 2mm, 2.5mm, 3mm, 4mm, 5mm
Phillips Screwdriver	No. 2
Nut Driver	7mm
Open-End Wrench	8mm
Tension Gauge	Capable for 200N tensile
Thin String	-

How to Replace

Notice

- Make sure to have two operators when you replace the motor on the J1-axis.

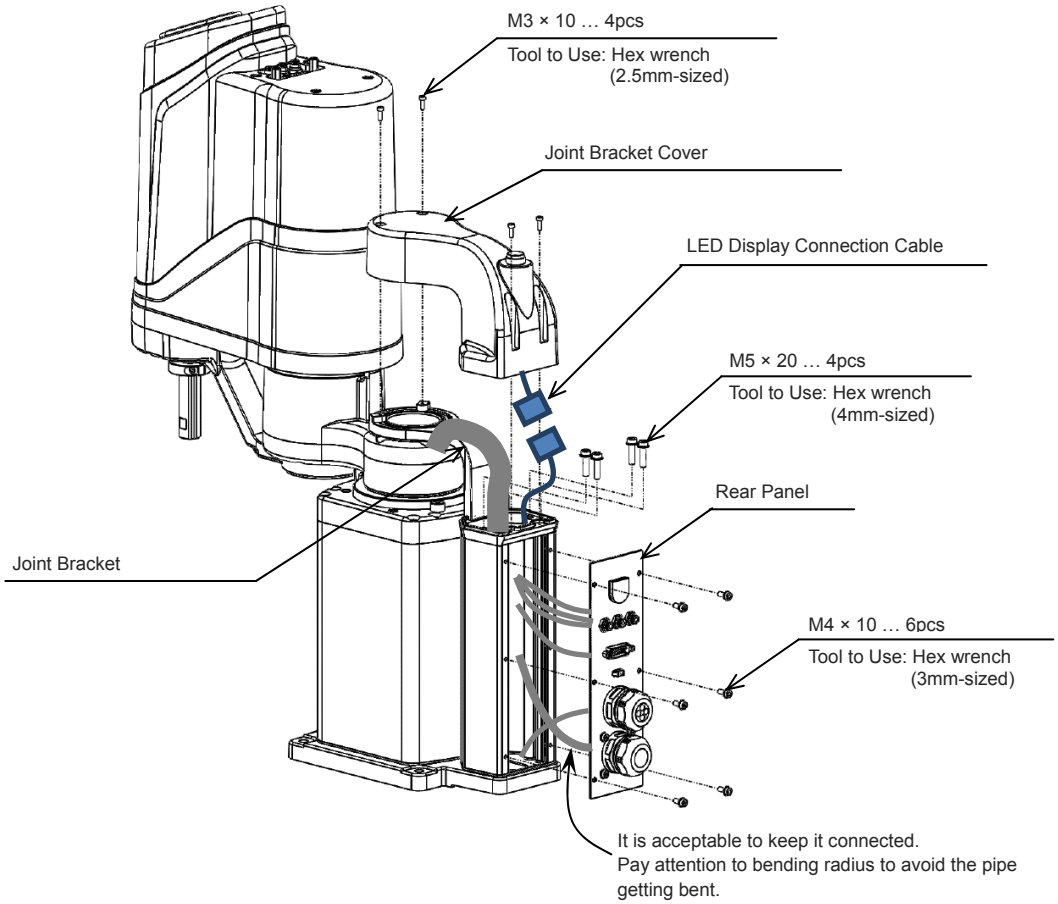
J1-Axis

1 Take off the hex socket head cap screws (M3 × 10) holding the joint bracket cover.

2 Take off the joint bracket cover and unplug the cable connector for LED display lamps (option).

3 Take off the flanged hex socket head cap screws (M5 × 20) holding the joint bracket.

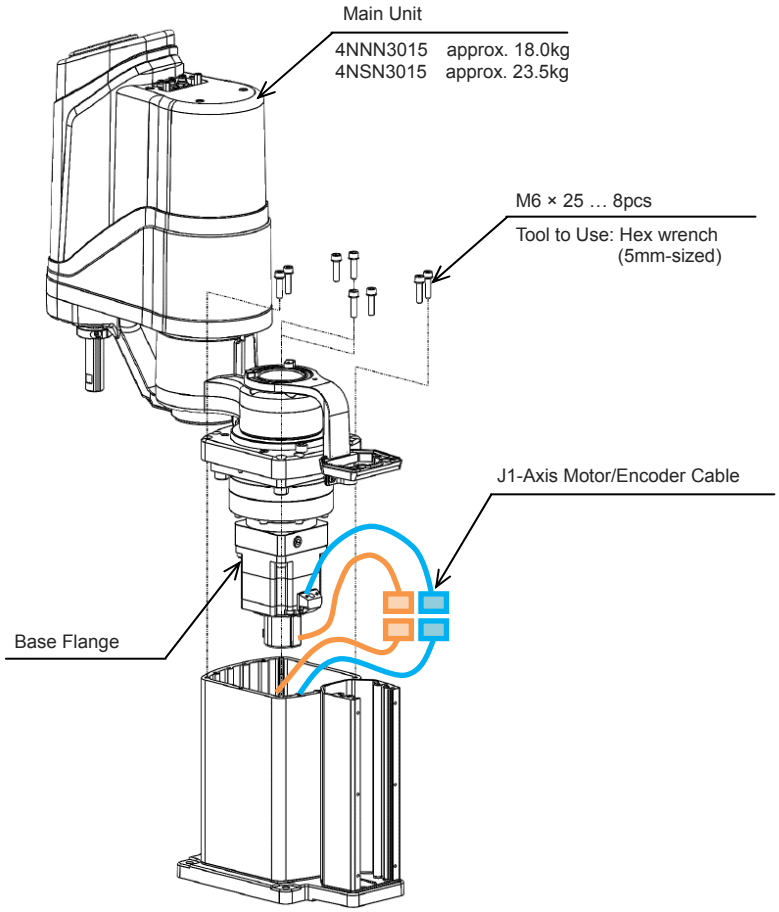
4 Take off the flanged hex socket head cap screws (M4 × 10) holding the rear panel.



5 Take off the hex socket head cap screws (M6 × 25) holding the base flange.

6 Hold the main unit up, and take off the J1-axis motor/encoder cable connectors.

7 Lay down the main unit on a soft material such as a cushion sheet.



Pay attention not to pinch cables when detaching the base plate.

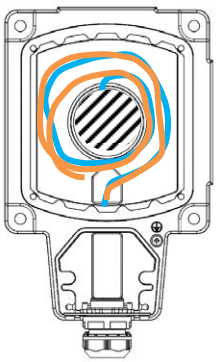
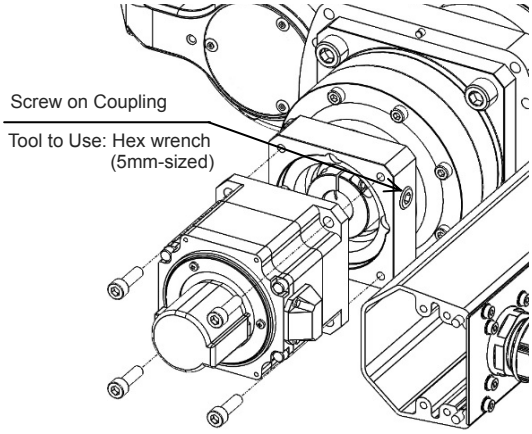
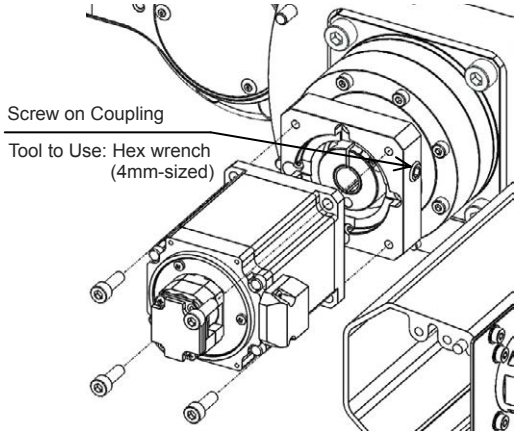


Figure of Cable Stored

8 Loosen the coupling inside the speed reducer.

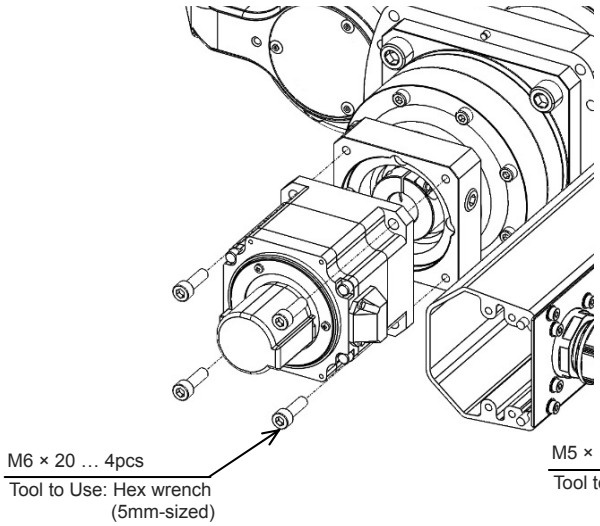


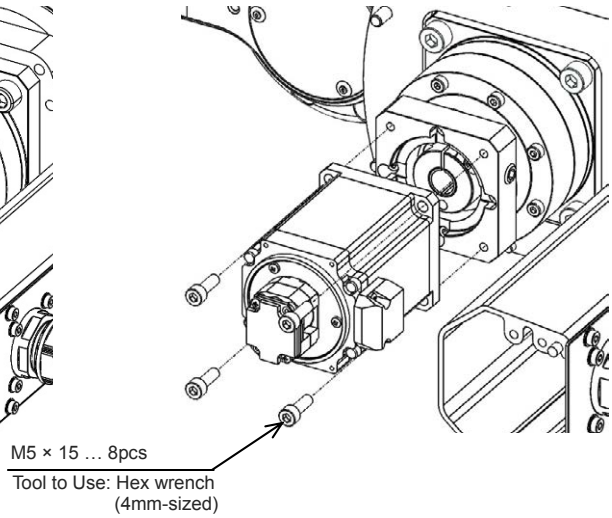
High Speed Type NSN



Standard Type NNN

9 Take off the hex socket head cap screws (NSN: M6 × 20, NNN: M5 × 15).
Take off the J1 axis motor. Put on a new motor.
Tighten the hex socket head cap screws.
Tighten the hex socket head cap screws in Step 9 and the screw on coupling in Step 10 by turns up to the specified tightening torque.





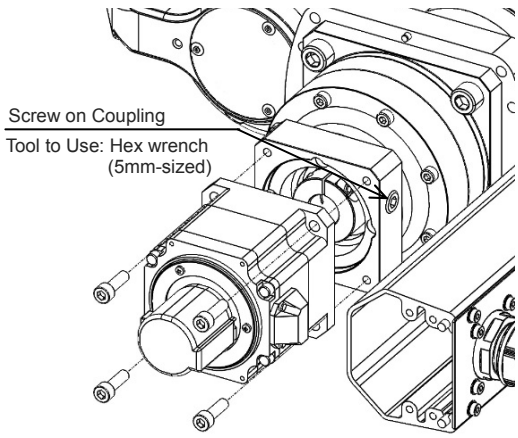
Screw Diameter	Tightening Torque
M6	12.3N·m

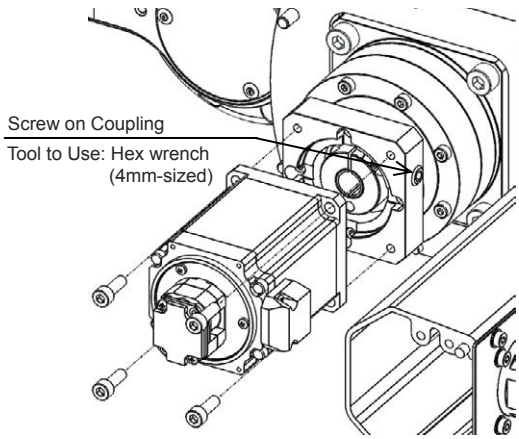
High Speed Type NSN

Screw Diameter	Tightening Torque
M5	7.3N·m

Standard Type NNN

10 Tighten the coupling inside the speed reducer.
Tighten the hex socket head cap screws in Step 9 and the screw on coupling in Step 10 by turns up to the specified tightening torque.





Tightening Torque
15.0N·m

High Speed Type NSN

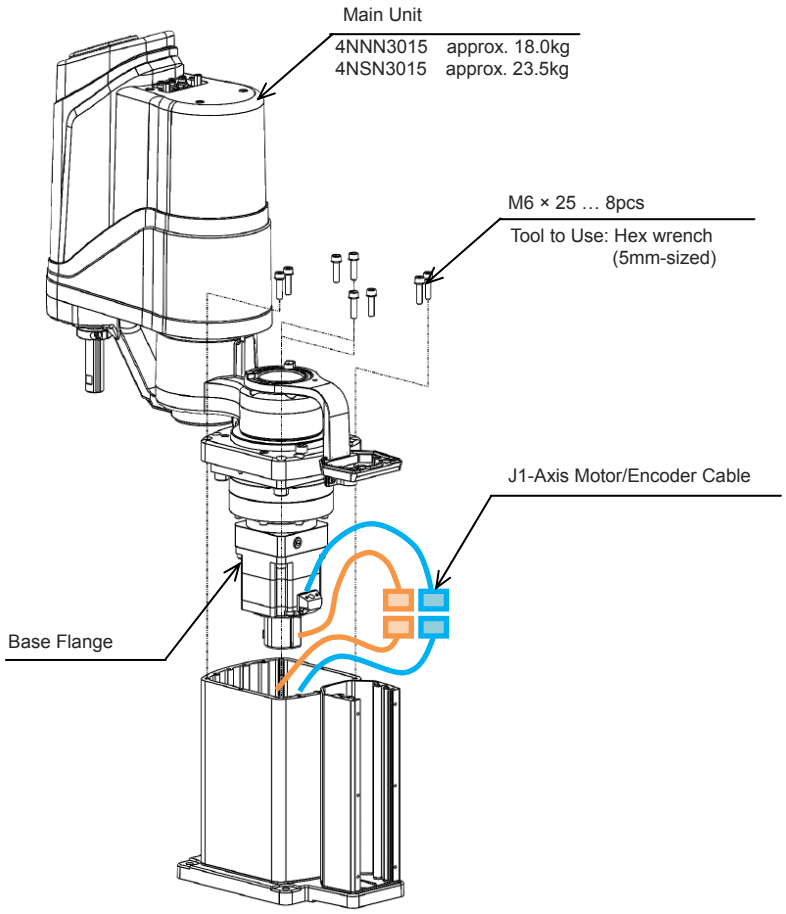
Tightening Torque
8.7N·m

Standard Type NNN

11 Keep the main unit held up, and put on the J1-axis motor/encoder cable connectors.

12 Put on the hex socket head cap screws (M6 × 25) to hold the base flange.

Tightening Torque
12.3N·m



Pay attention not to pinch cables when detaching the base plate.

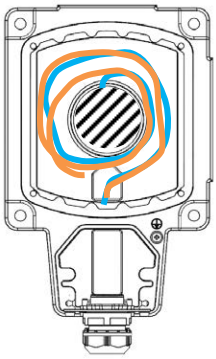


Figure of Cable Stored

13 Put on the flanged hex socket head cap screws (M4 × 10) to hold the rear panel.

Tightening Torque
3.6N·m

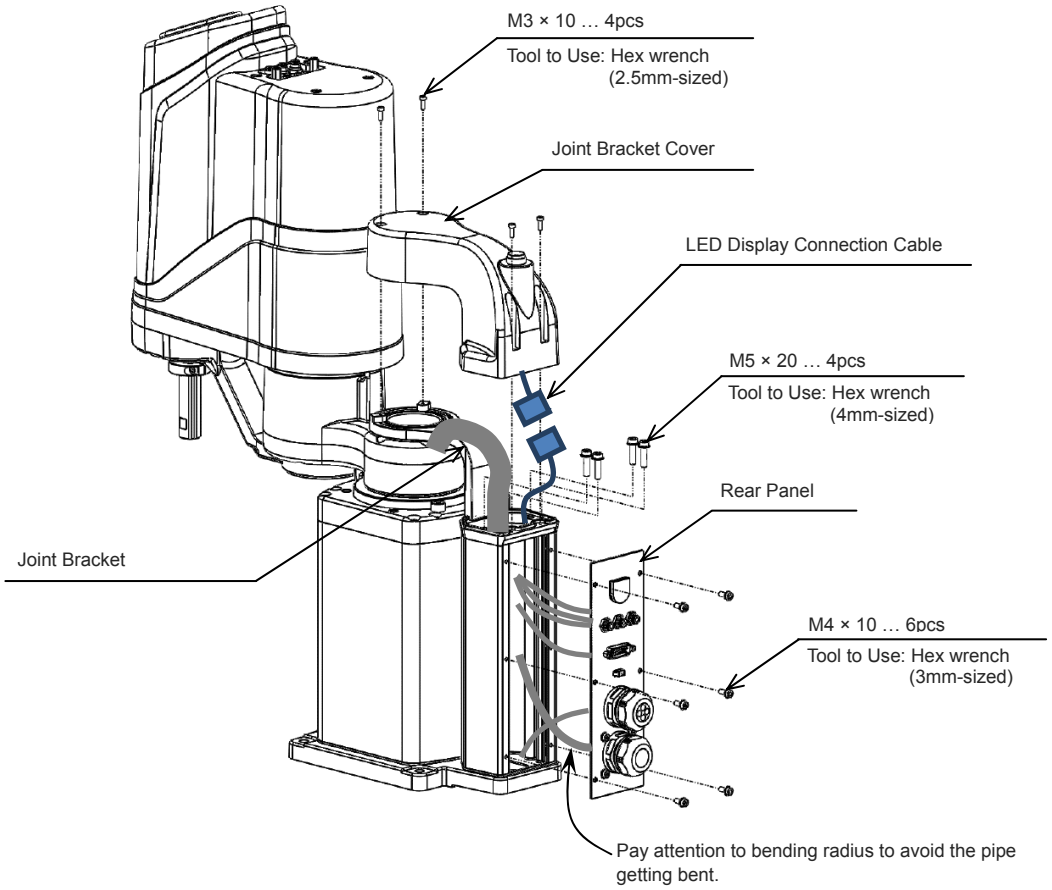
14 Put on the flanged hex socket head cap screws (M5 × 20) to hold the joint bracket.

Tightening Torque
7.3N·m

15 Take off the joint bracket cover and join the cable connector for LED display lamps (option).

16 Put on the hex socket head cap screws (M3 × 10) to hold the joint bracket cover.

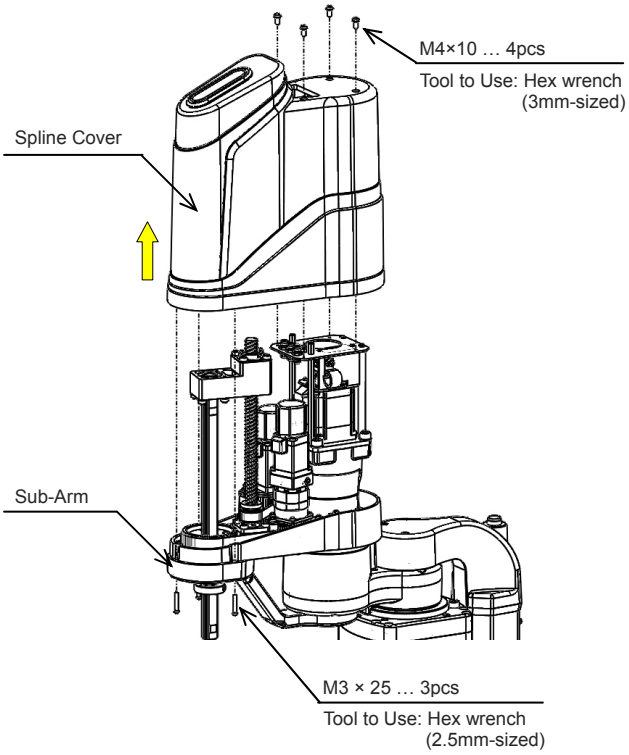
Tightening Torque
1.5N·m



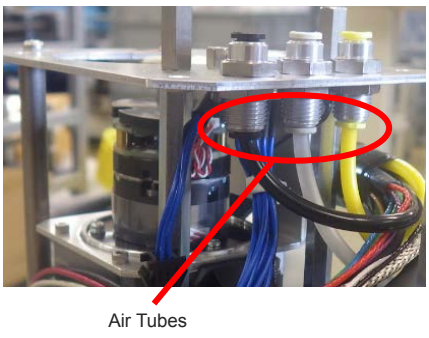
17 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

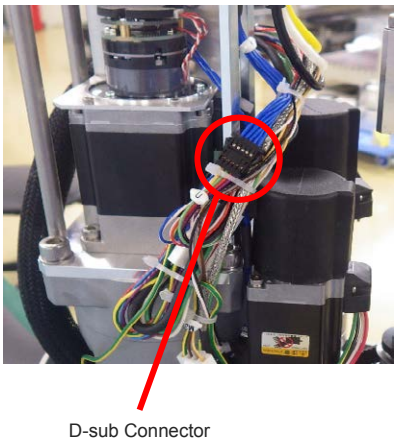
J2-Axis

1 Take off the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.

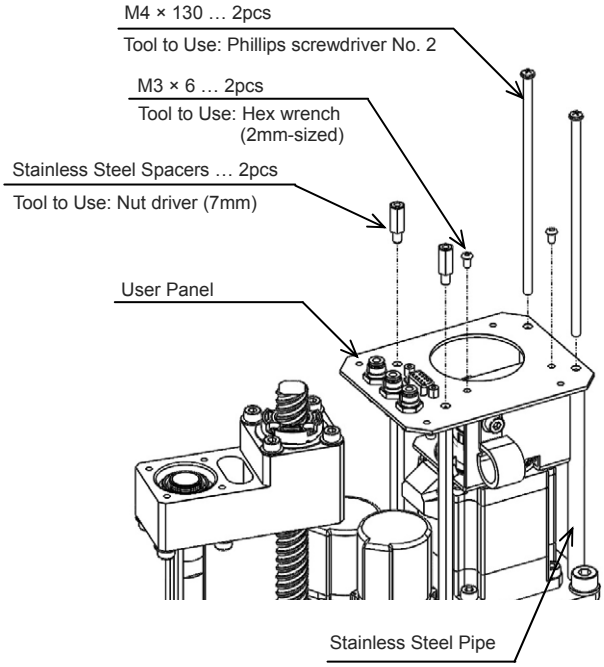


2 Take the three pieces of air tubes and the D-sub connector out of the user panel.

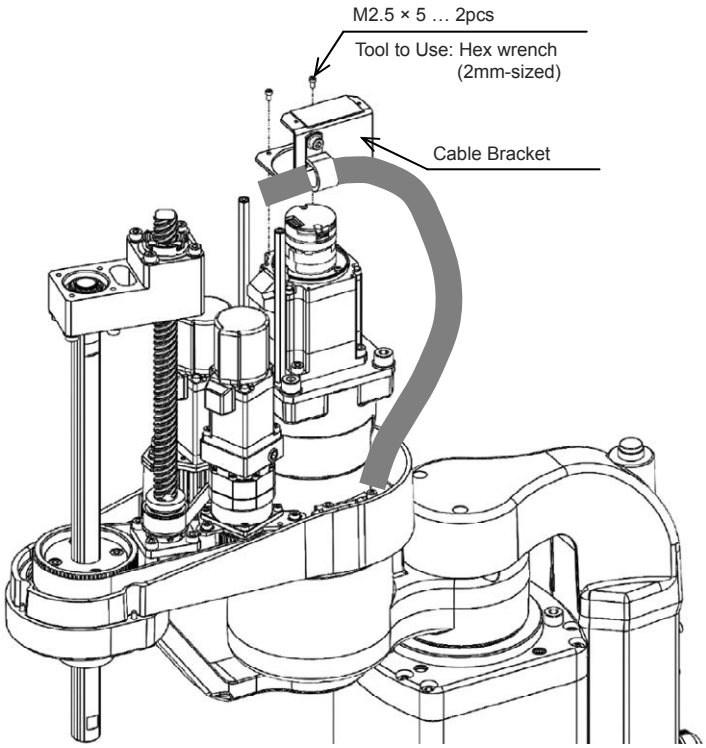




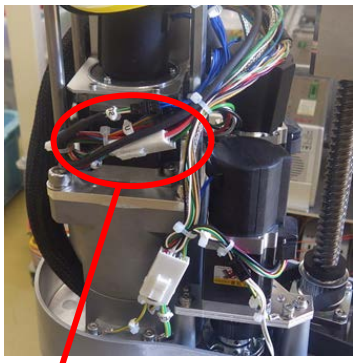
3 Take off the hex socket button head screws (M3 × 6), cross recessed set screws (M4 × 130) and stainless steel spacers and detach the user panel.



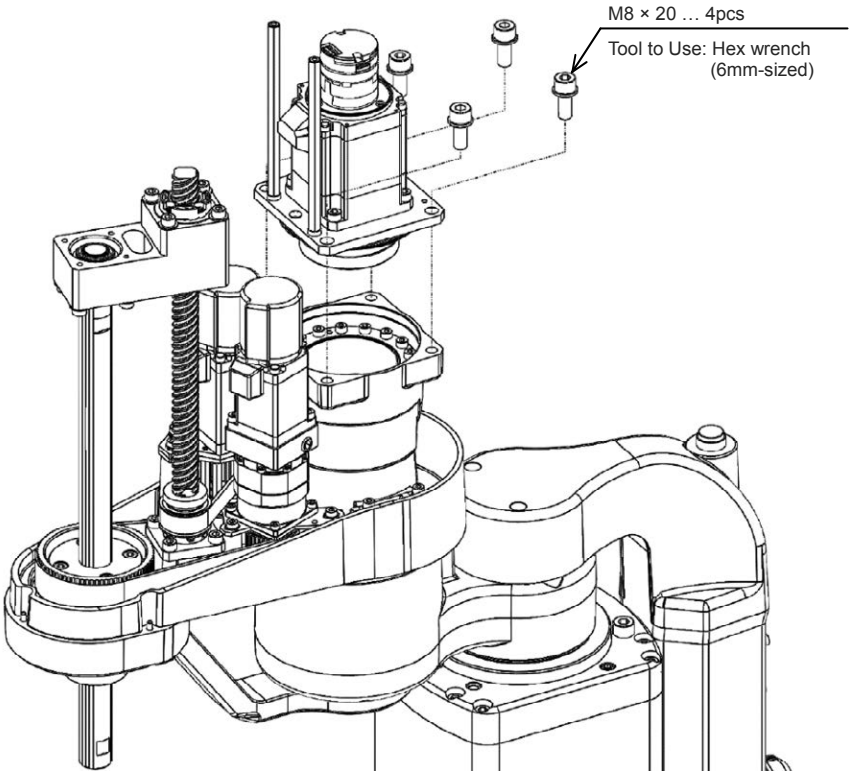
4 Take off the M2.5 × 5 screws and take the cable bracket off the motor.



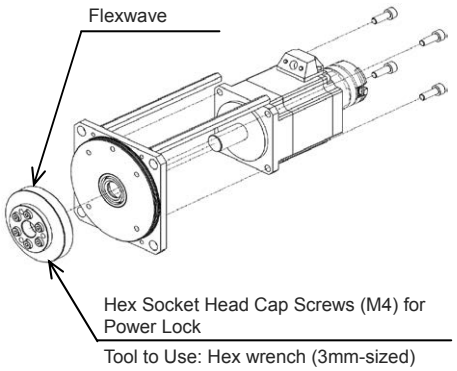
5 Take off the J2-axis connector (motor and encoder)



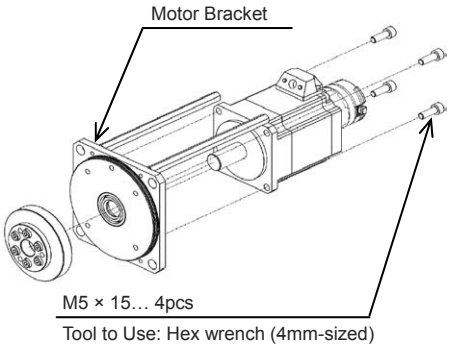
6 Take off the hex socket head cap screws (M8 × 20).
Take off the J2 axis motor.
(As there is an O-ring attached, have it tilted and take off slowly.)



7 Loosen the hex socket head cap screws (M4) for power lock holding flexwave to take off flexwave.

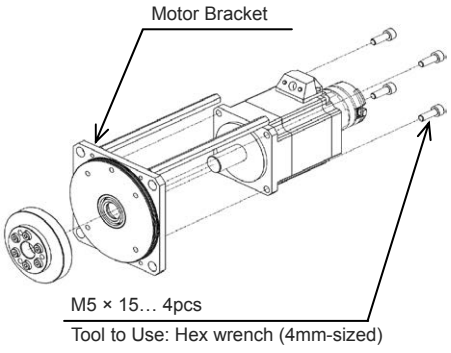


8 Take off the hex socket head cap screws (M5 × 15) to detach the J2 axis motor.
Put a new J2-axis motor on the motor bracket.



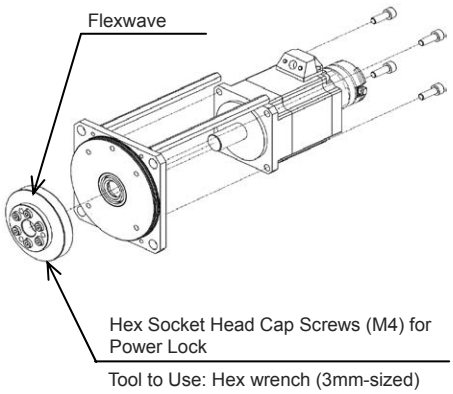
9 Tighten the hex socket head cap screws (M5 × 15).

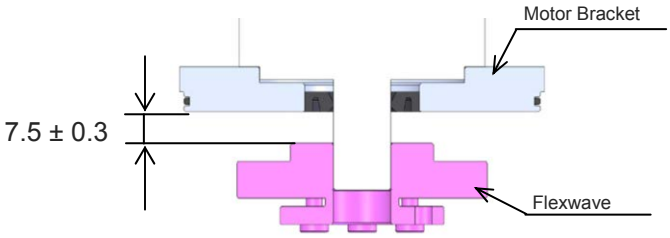
Tightening Torque
7.3N·m



10 Attach flexwave considering to keep 7.5mm away from the motor bracket as the figure shows.
Tighten the hex socket head cap screws (M4) evenly for power lock.

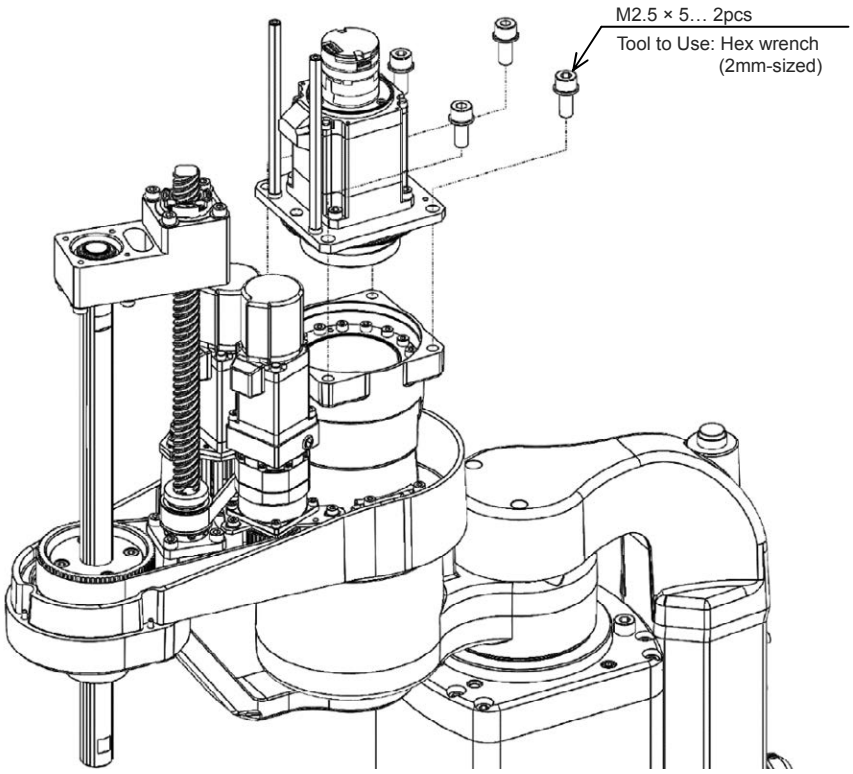
Tightening Torque
4.21N·m



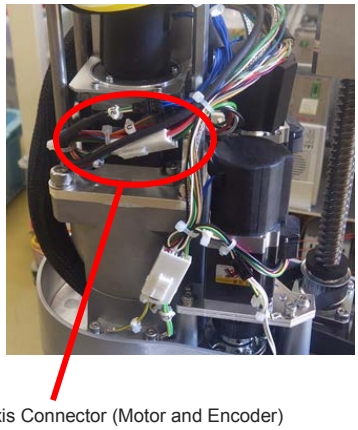


11 Put on the J2-axis motor and tighten it up with the hex socket head cap screws (M8 × 20).

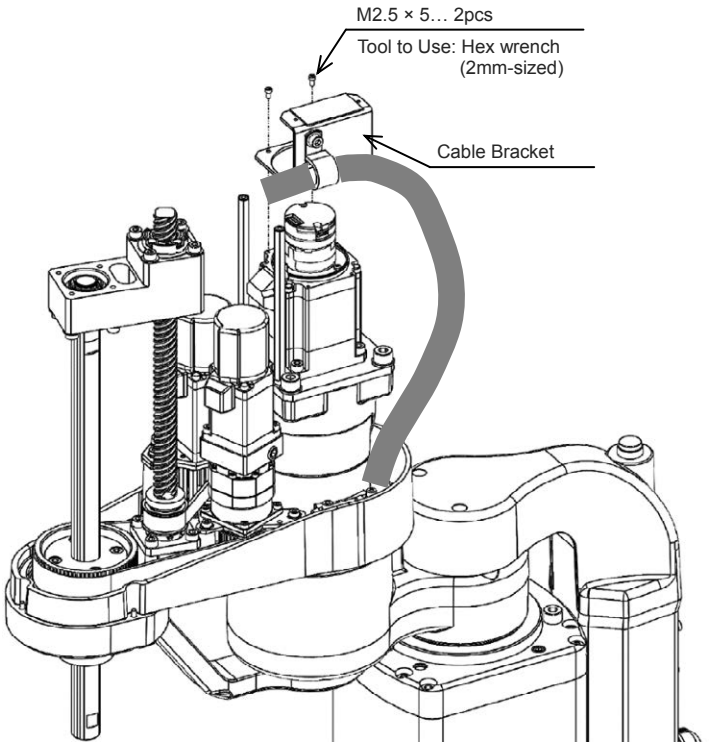
Tightening Torque
11.5N·m



12 Join the J2-axis connector (motor and encoder).

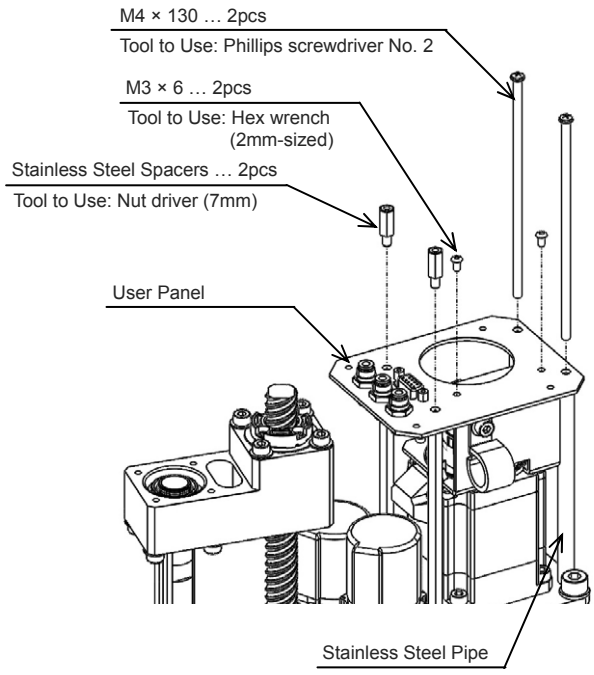


13 Attach the cable bracket to the motor and tighten it up with the M2.5 × 5 screws.

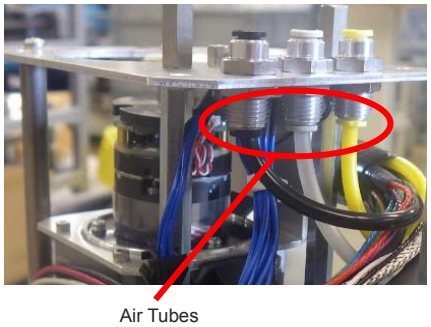


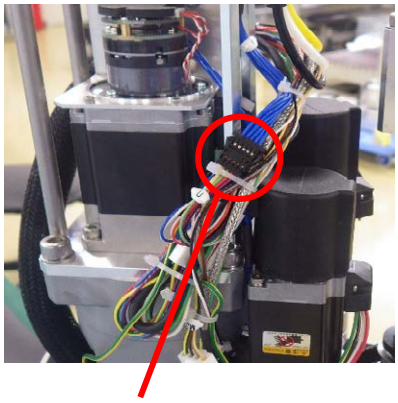
14 Put on the user panel.
Put on the hex socket button head screws (M3 × 6), cross recessed set screws (M4 × 130) and stainless steel spacers and tighten them up.

Screw Diameter	Tightening Torque
M3	0.8N·m
M4	1.2N·m
Stainless Steel Spacer	1.5N·m



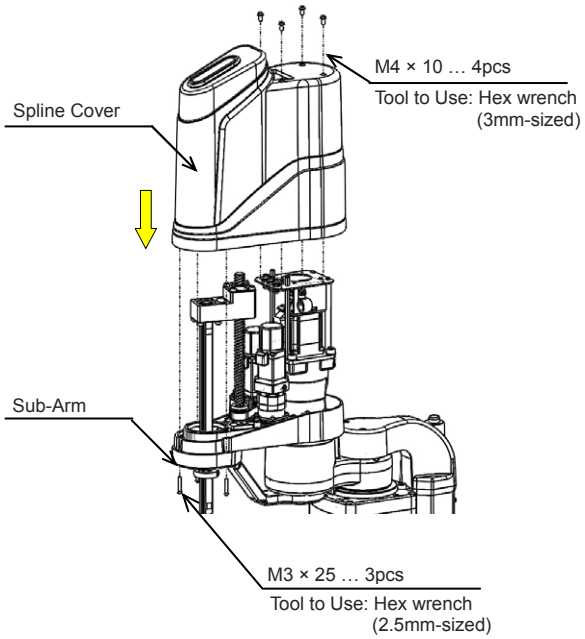
15 Join the three pieces of air tubes and the D-sub connector on the user panel.





16 Put on the spline cover.
Tighten the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.

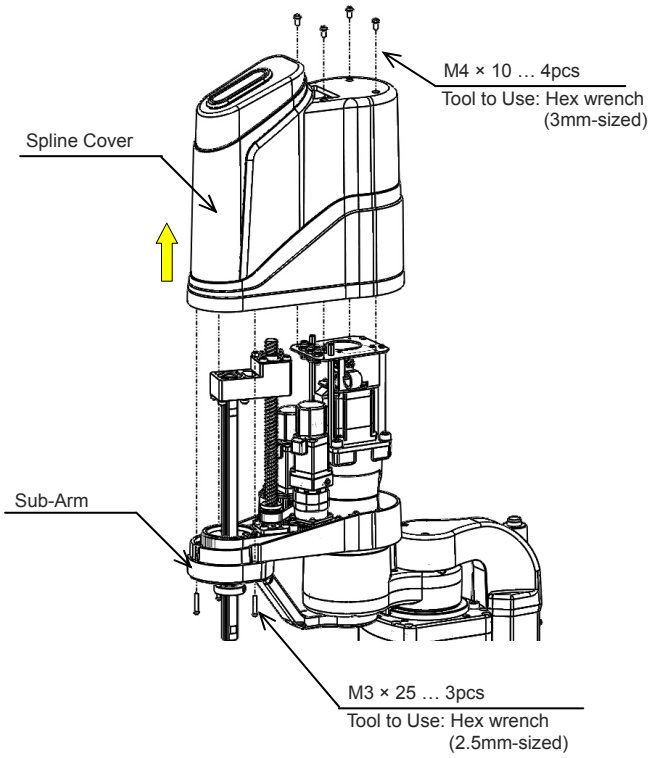
Screw Diameter	Tightening Torque
M3	1.6N·m
M4	1.8N·m



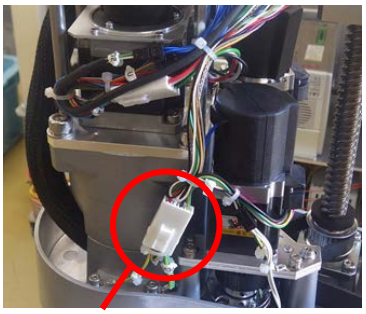
17 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

Z-Axis

1 Take off the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.

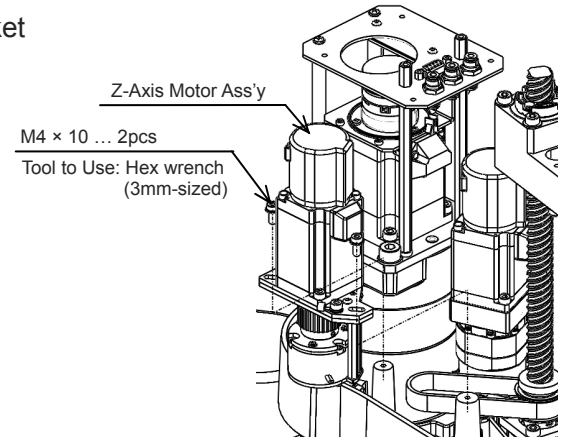


2 Take off the Z-axis connector.

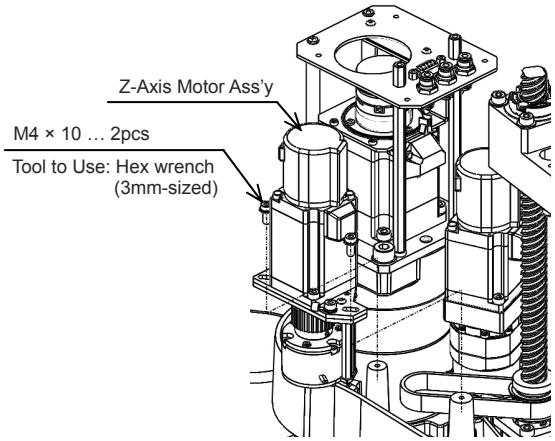


Z-Axis Connector (Motor and Encoder)

3 Take off the flange-headed hex socket head cap screws (M4 × 10) and detach Z-axis motor ass'y.



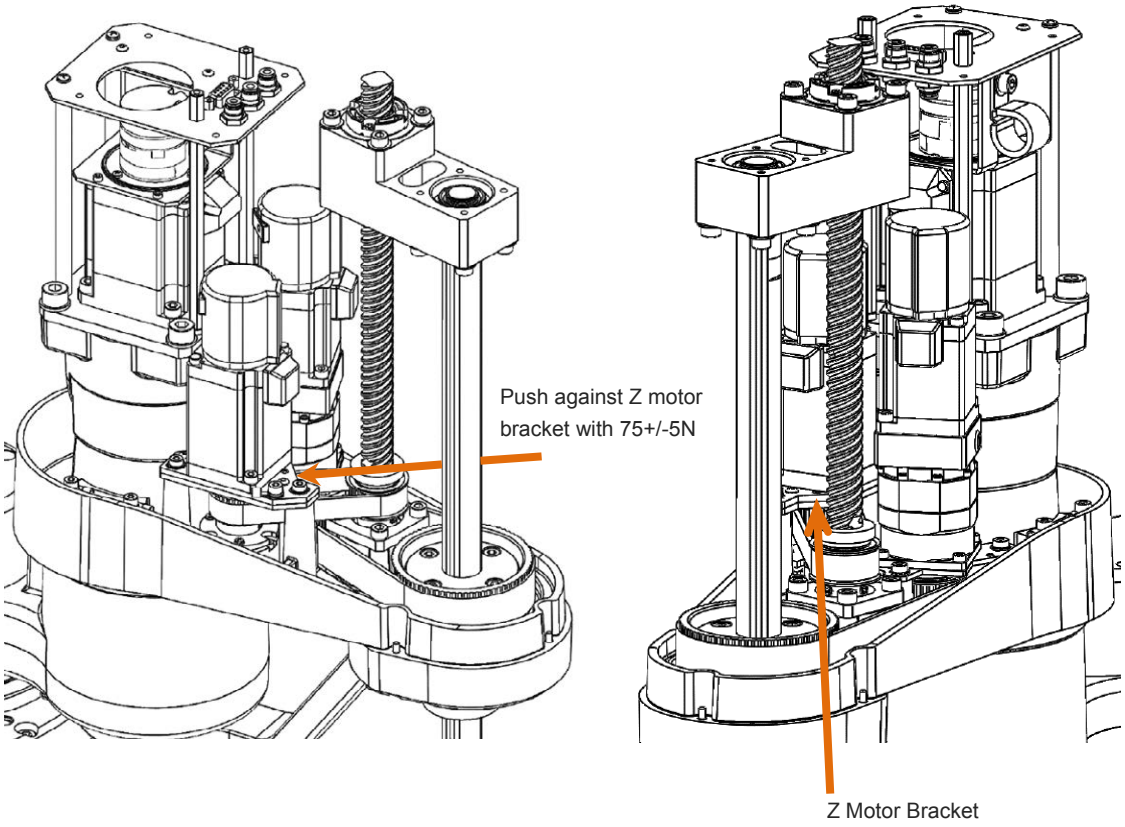
4 Tighten new Z-axis motor ass'y loosely with the flange-headed hex socket head cap screws (M4 × 10).



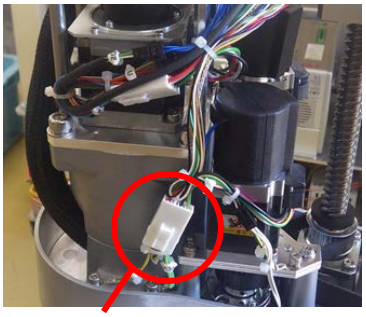
5 Push against Z-axis motor bracket with the pressing force shown in the table.
The belt tension should get into the range between 30 and 40N, which is the specification.
Keep the pressing force remained, and tighten up the flanged hex socket head cap screws (M4 × 10) holding Z-axis motor assembly.

Pressing Force
75 ± 5N

Tightening Torque
3.6N·m



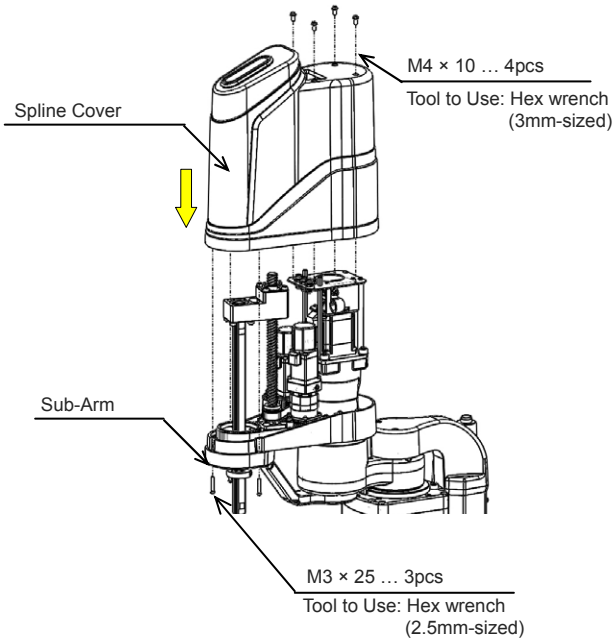
6 Join the Z-axis connector.



Z-Axis Connector (Motor and Encoder)

7 Put on the spline cover.
Tighten the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.

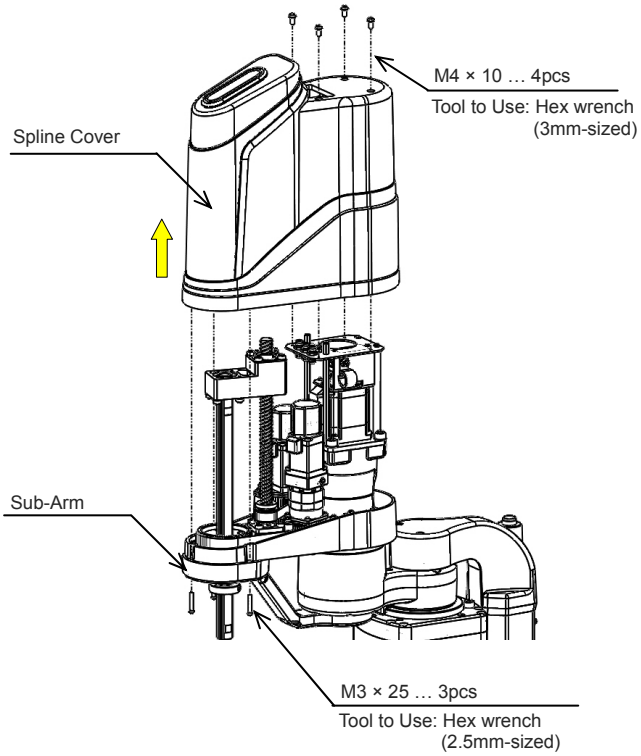
Screw Diameter	Tightening Torque
M3	1.6N·m
M4	1.8N·m



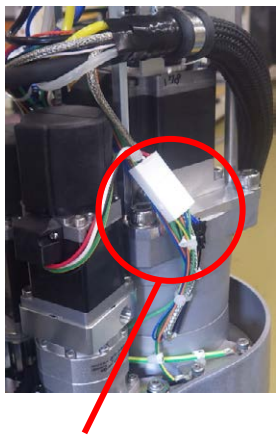
8 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

R-Axis

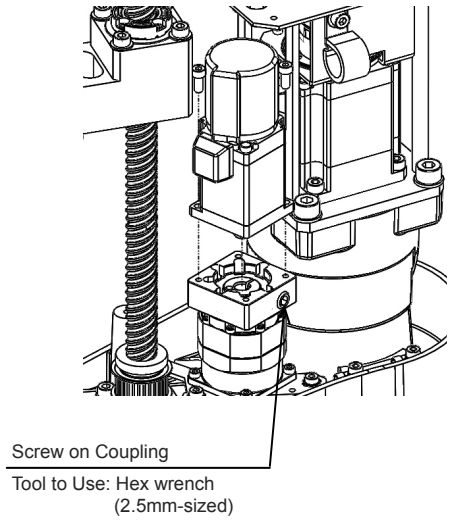
1 Take off the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.



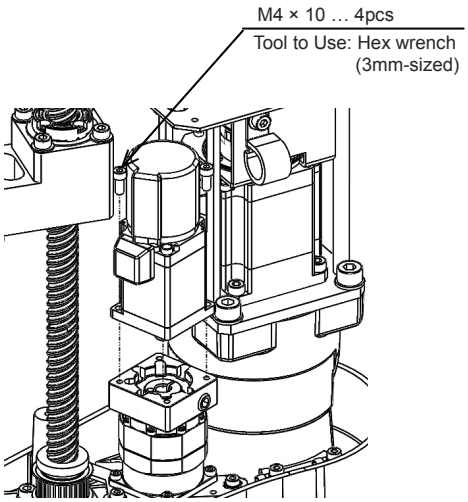
2 Take off the R-axis connector.



3 Loosen the screw on coupling inside the speed reducer.

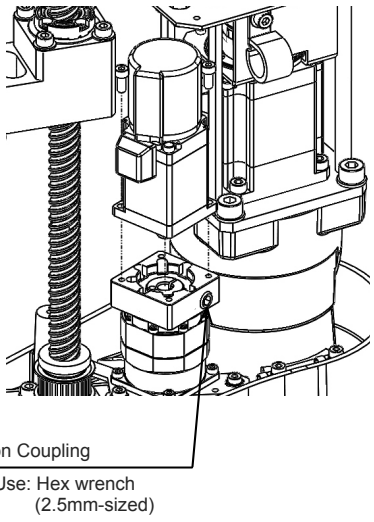


4 Take off the hex socket head cap screws (M4 × 10) and detach R-axis motor.
Put on a new R-axis motor.



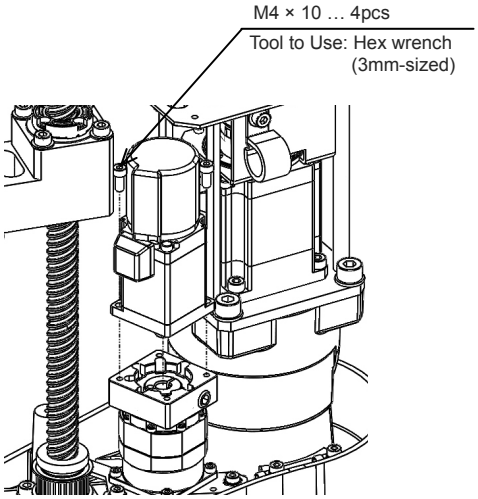
5 Tighten the screw on coupling inside the speed reducer.
Tighten the screw on coupling in Step 5 and the hex socket head cap screws in Step 6 by turns up to the specified tightening torque.

Tightening Torque
1.9N·m

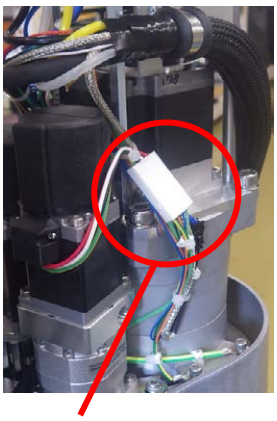


6 Tighten the hex socket head cap screws (M4 × 10) to affix the R-axis motor.
Tighten the screw on coupling in Step 5 and the hex socket head cap screws in Step 6 by turns up to the specified tightening torque.

Tightening Torque
3.6N·m

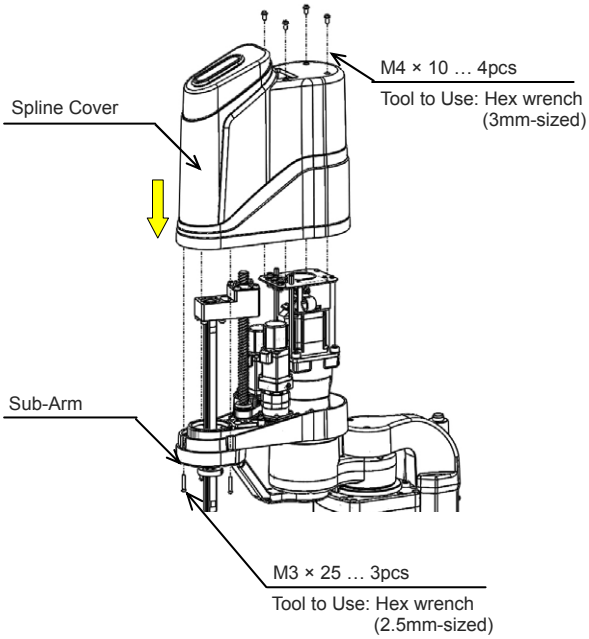


7 Join the R-axis connector.



8 Put on the spline cover.
Tighten the hex socket head cap screws (M3 × 25) holding on the bottom of the sub-arm and the hex socket head cap screws (M4 × 10) on the top of the spline cover.

Screw Diameter	Tightening Torque
M3	1.6N·m
M4	1.8N·m



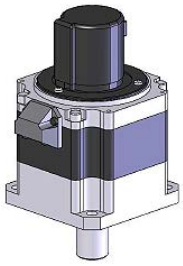
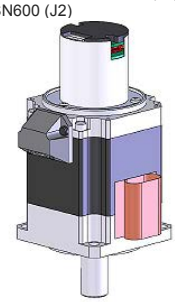
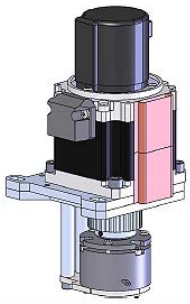
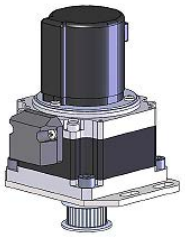
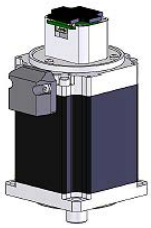
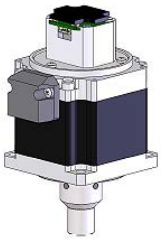
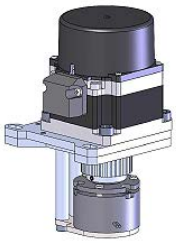
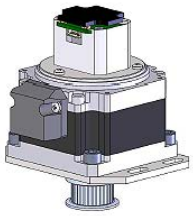
9 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

[IXA-□NNN45□□/□NNN60□□/□NSN45□□/□NSN60□□]

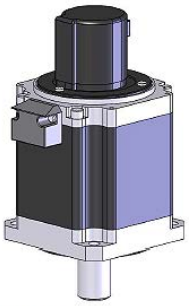
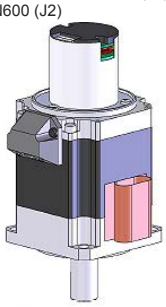
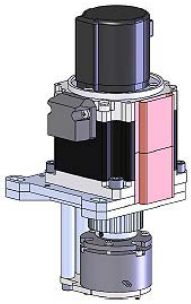
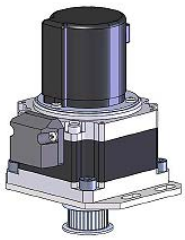
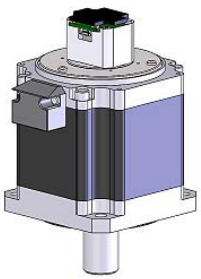
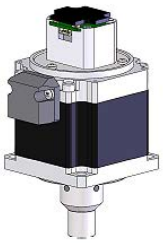
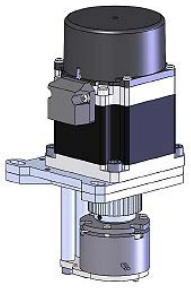
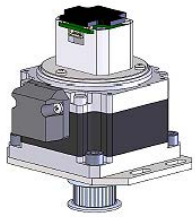
Motor to Replace

Model	Axis	Model Code of Single Product
IXA-□NNN45□□	J1-Axis	M-IXA-N30N45-1
	J2-Axis	N-IXA-N45N60-2
	Z-Axis	M-IXA-N45-3-PU
	R-Axis	M-IXA-N45N60-4-PU
IXA-□NSN45□□	J1-Axis	M-IXA-S30S45-1
	J2-Axis	M-IXA-S45S60-2
	Z-Axis	M-IXA-S45S60-3-PU
	R-Axis	M-IXA-S45S60-4-PU
IXA-□NNN60□□	J1-Axis	M-IXA-N60-1
	J2-Axis	N-IXA-N45N60-2
	Z-Axis	M-IXA-N60-3-PU
	R-Axis	M-IXA-N45N60-4-PU
IXA-□NSN60□□	J1-Axis	M-IXA-S60-1
	J2-Axis	M-IXA-S45S60-2
	Z-Axis	M-IXA-S45S60-3-PU
	R-Axis	M-IXA-S45S60-4-PU

[IXA-□NNN45□□/□NSN45□□]

	J1	J2	Z	R
N S N	In common for NSN300 (J1) / NSN450 (J1)  * Heat sink to be replaced	In common for NSN450 (J2) / NSN600 (J2)  * Heat sink to be replaced	In common for NSN450 (Z) / NSN600 (Z) 	In common for NSN450 (R) / NSN600 (R) 
N N N	In common for NNN300 (J1) / NNN450 (J1) 	In common for NNN450 (J2) / NNN600 (J2) 		In common for NNN450 (R) / NNN600 (R) 

[IXA-□NNN60□□/□NSN60□□]

	J1	J2	Z	R
N S N	 * Heat sink to be replaced	In common for NSN450 (J2) / NSN600 (J2)  * Heat sink to be replaced	In common for NSN450 (Z) / NSN600 (Z) 	In common for NSN450 (R) / NSN600 (R) 
N N N		In common for NNN450 (J2) / NNN600 (J2) 		In common for NNN450 (R) / NNN600 (R) 

Tools to use

Tools to use	Specification
Hex wrench	Parallel-Face Diameter 2mm, 2.5mm, 3mm, 4mm, 5mm, 6mm
Nippers	
Cable tie	
Tension Gauge	Capable for 200N tensile
Thin String	-

How to Replace

Notice

- Make sure to have two operators when you replace the motor on the J1-axis.

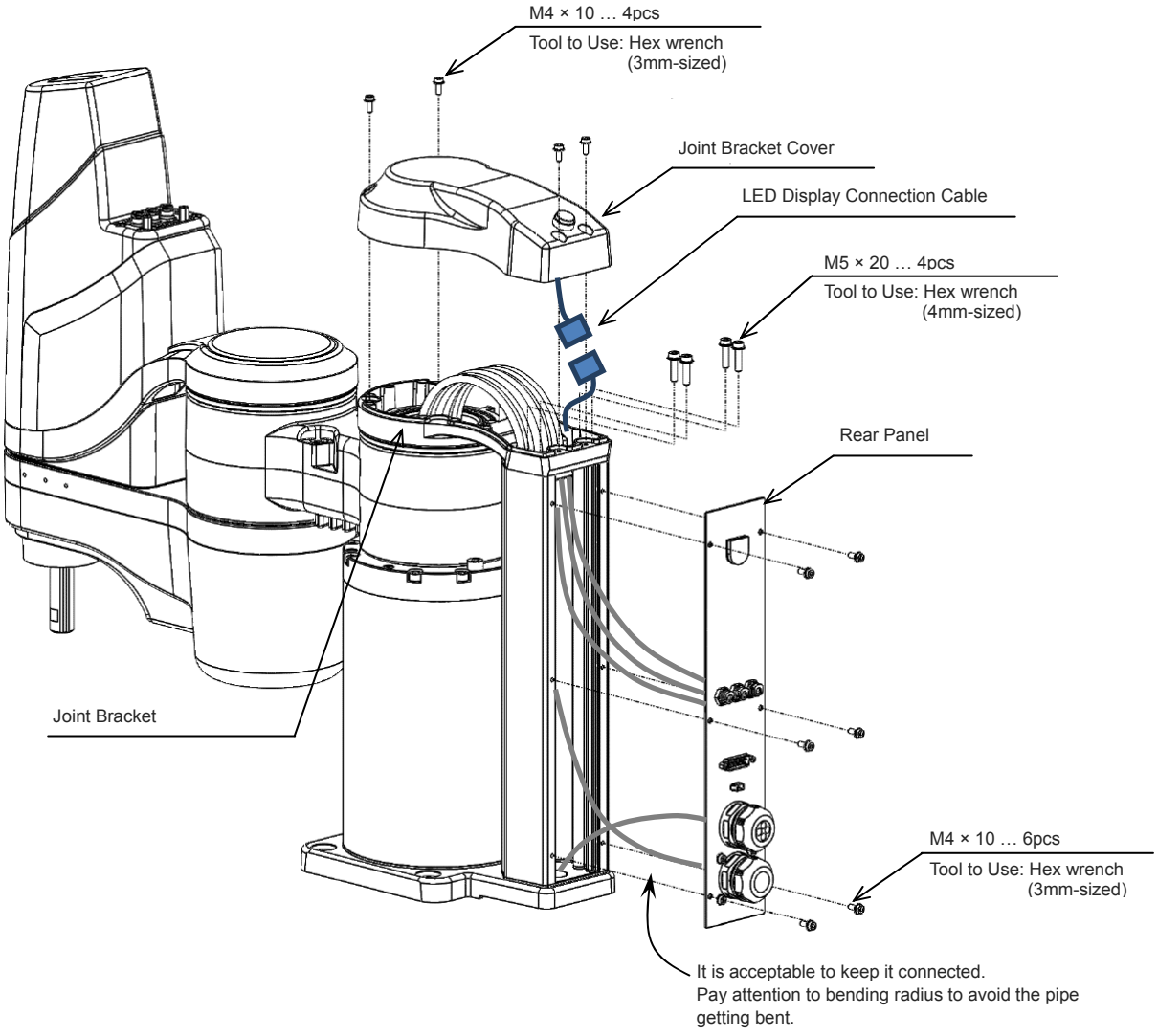
J1 Axis

1 Take off the hex socket head cap screws (M4 × 10) holding the joint bracket cover.

2 Take off the joint bracket cover and unplug the cable connector for LED display lamps (option).

3 Take off the flanged hex socket head cap screws (M5 × 20) holding the joint bracket.

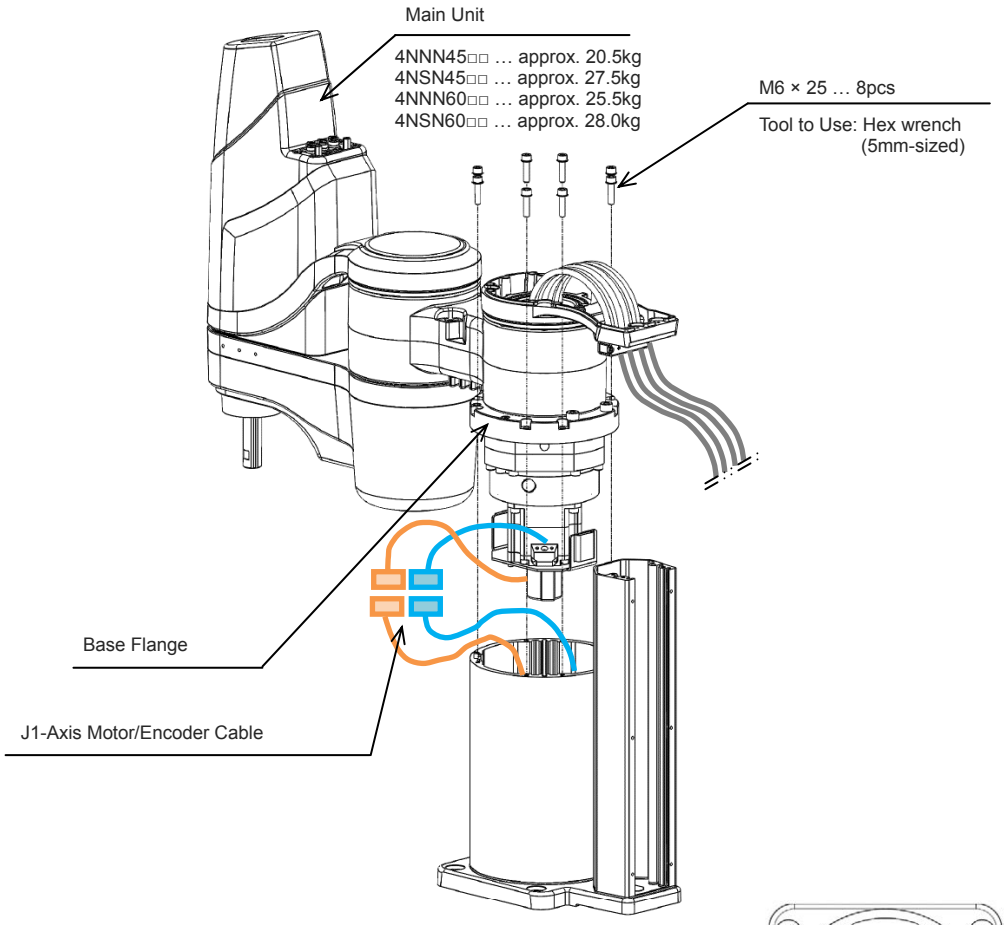
4 Take off the flanged hex socket head cap screws (M4 × 10) holding the rear panel.



5 Take off the hex socket head cap screws (M6 × 25) holding the base flange.

6 Hold the main unit up, and take off the J1-axis motor/encoder cable connectors.

7 Lay down the main unit on a soft material such as a cushion sheet.



Pay attention not to pinch cables when detaching the base plate.

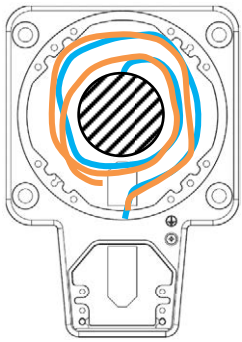
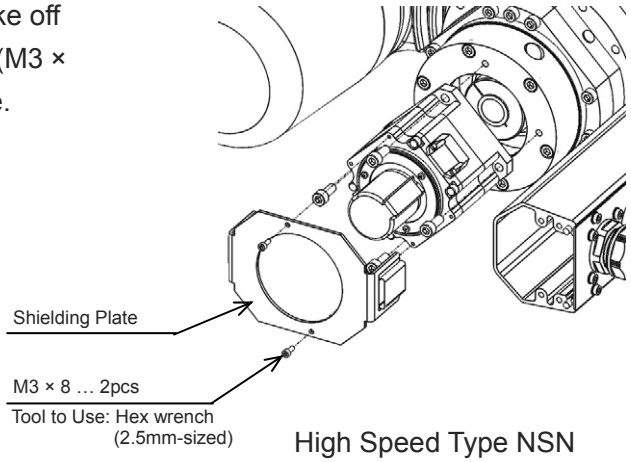


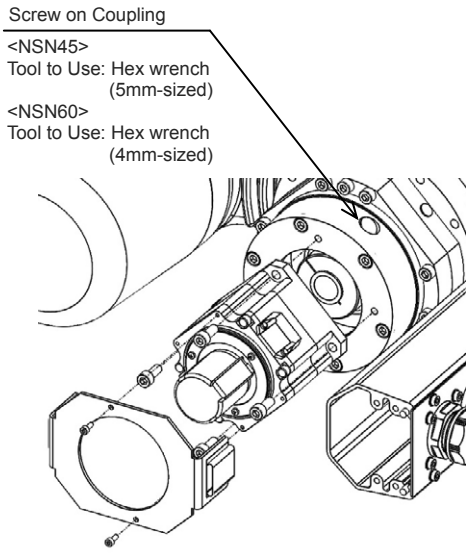
Figure of Cable Stored

8 For the high-speed type NSN, take off the hex socket head cap screws (M3 × 8) and take off the shielding plate.

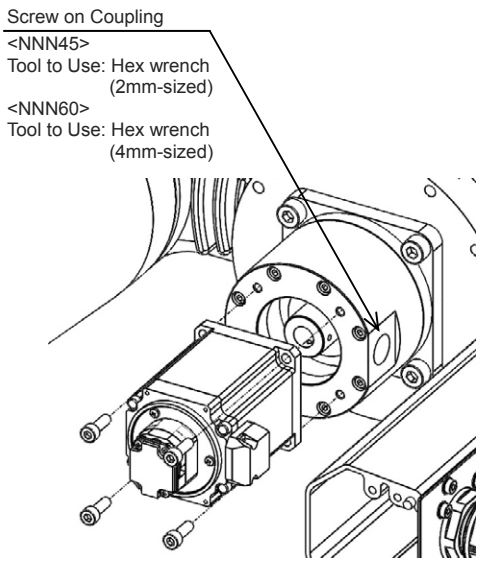


High Speed Type NSN

9 Loosen the coupling inside the speed reducer.

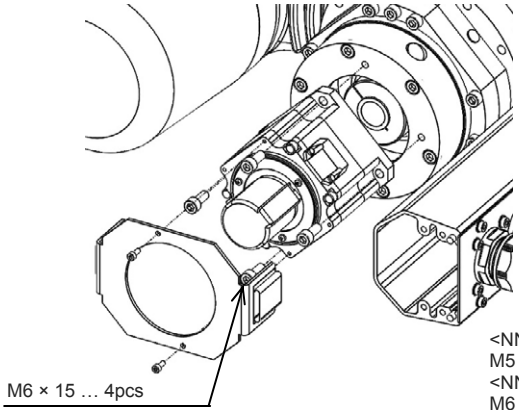


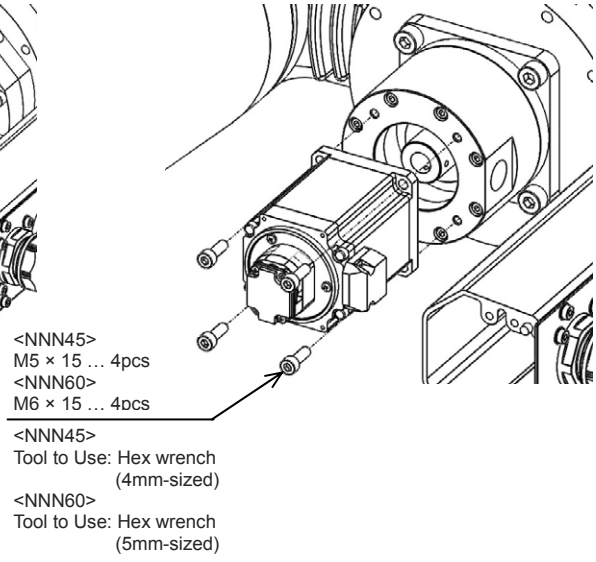
High Speed Type NSN



Standard Type NNN

10 Take off the hex socket head cap screws.
Take off the J1-axis motor.
Put on a new J1-axis motor.
Tighten the hex socket head cap screws.
Tighten the hex socket head cap screws in Step 10 and the screw on coupling in Step 11 by turns up to the specified tightening torque.





Screw Diameter	Tightening Torque
M6	12.3N·m

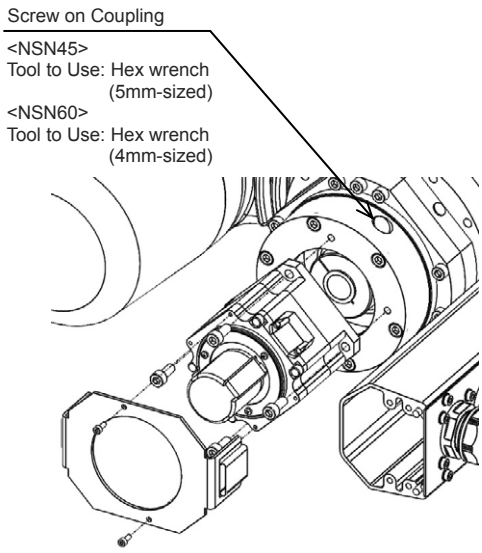
High Speed Type NSN

Model	Screw Diameter	Tightening Torque
NNN45	M5	7.3N·m
NNN60	N6	12.3N·m

Standard Type NNN

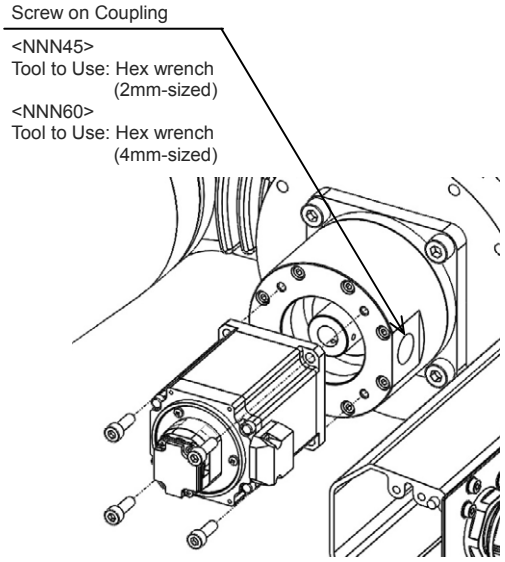
11

Tighten the coupling inside the speed reducer.
Tighten the hex socket head cap screws in Step 10 and the screw on coupling in Step 11 by turns up to the specified tightening torque.



Model	Tightening Torque
NSN45	9.6N·m
NSN60	8.7N·m

High Speed Type NSN



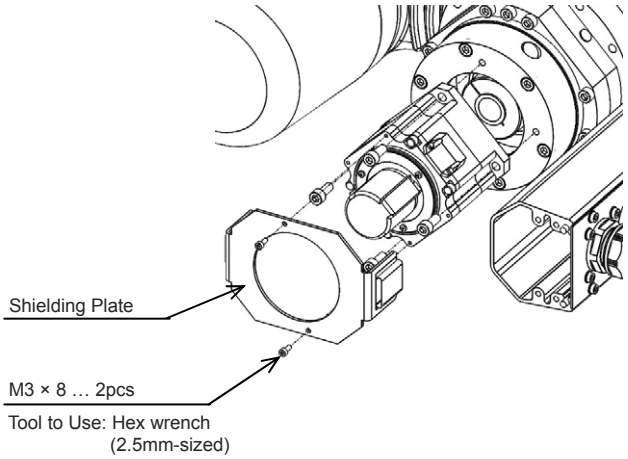
Model	Tightening Torque
NNN45	2.5N·m
NNN60	8.7N·m

Standard Type NNN

12

For the high-speed type NSN, take off the hex socket head cap screws (M3 × 8) and take off the shielding plate.

Tightening Torque
0.9N·m

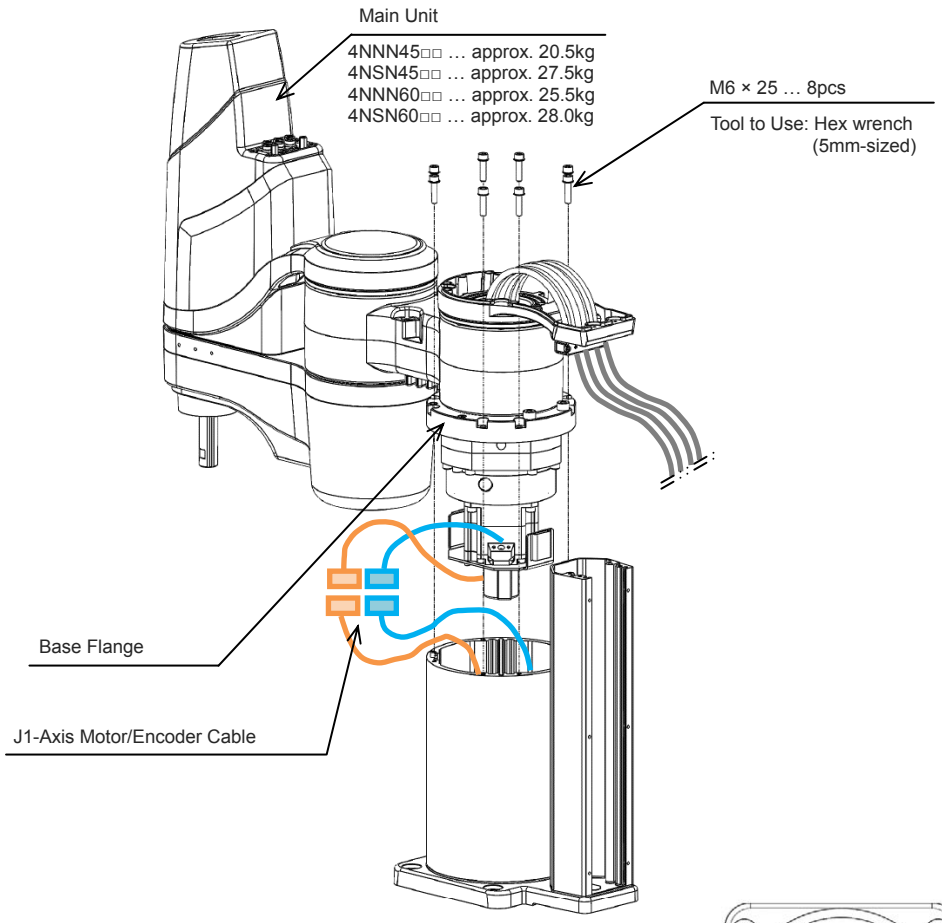


High Speed Type NSN

13 Keep the main unit held up, and put on the J1-axis motor/encoder cable connectors.

14 Put on the hex socket head cap screws (M6 × 25) to hold the base flange.

Tightening Torque
12.3N·m



Pay attention not to pinch cables when detaching the base plate.

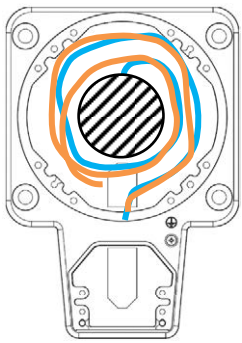


Figure of Cable Stored

15 Put on the flanged hex socket head cap screws (M4 × 10) to hold the rear panel.

Tightening Torque
3.6N·m

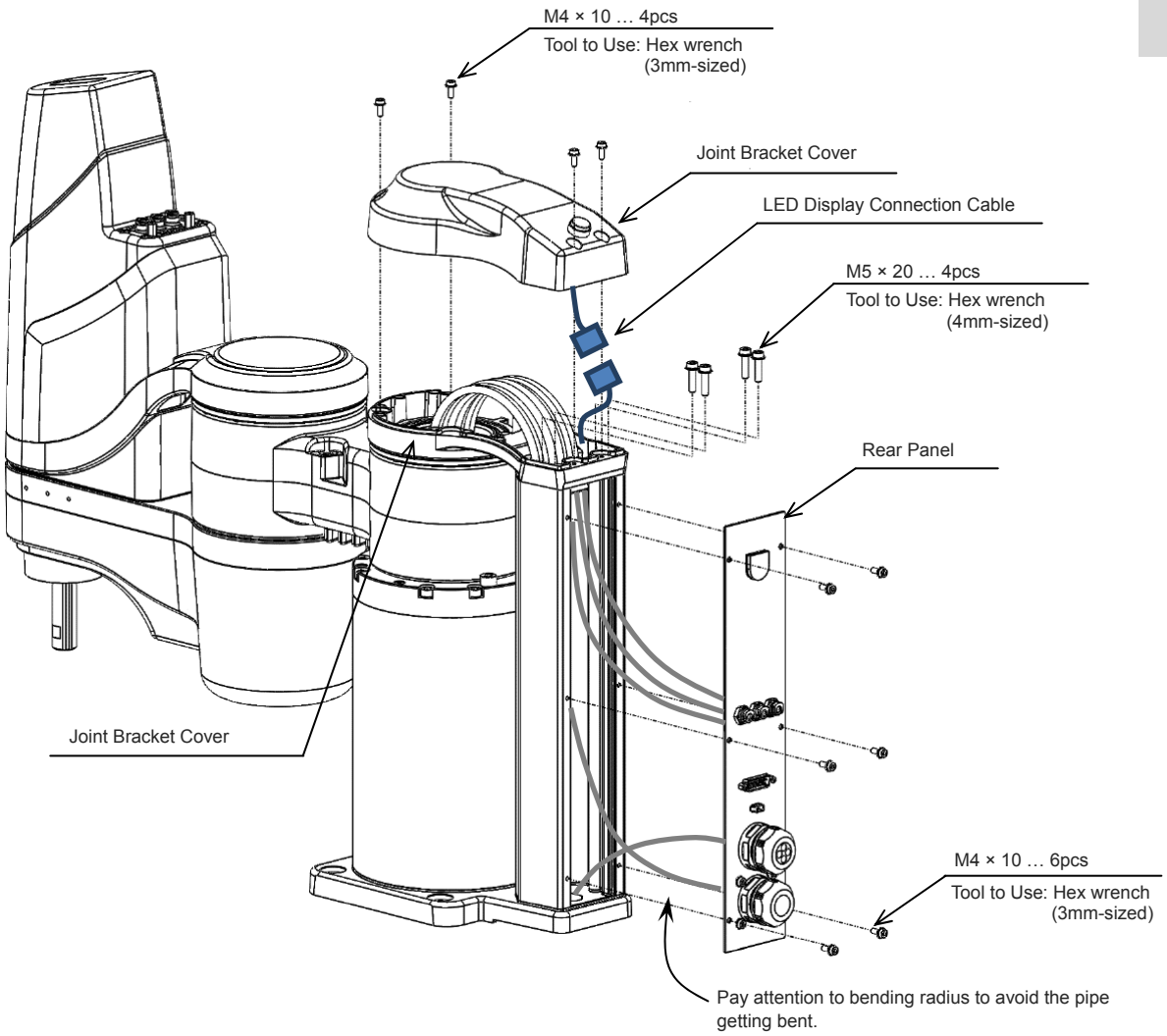
16 Put on the flanged hex socket head cap screws (M5 × 20) to hold the joint bracket.

Tightening Torque
7.3N·m

17 Take off the joint bracket cover and join the cable connector for LED display lamps (option).

18 Put on the hex socket head cap screws (M4 × 10) to hold the joint bracket cover.

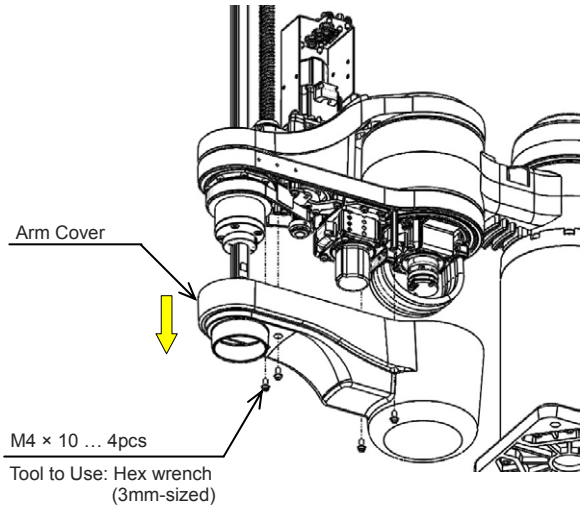
Tightening Torque
1.8N·m



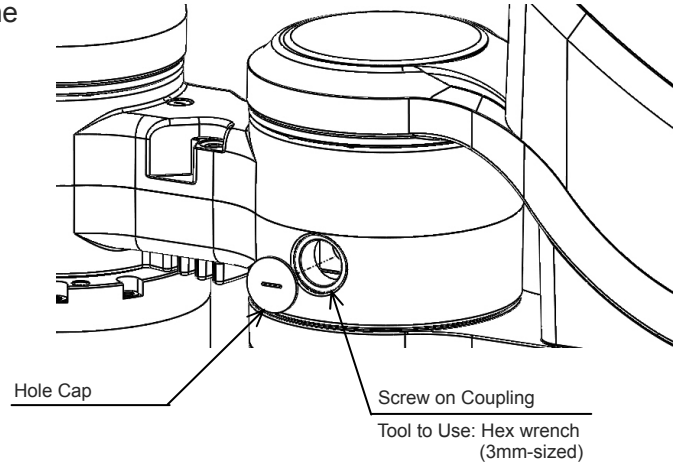
19 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

J2 Axis

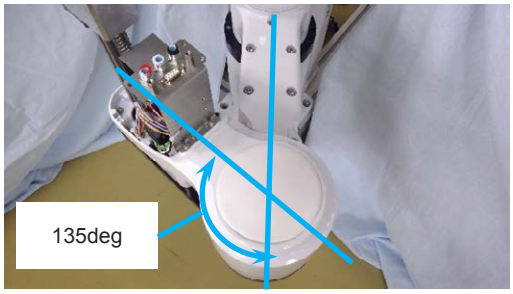
1 Take off the hex socket head cap screws (M4 × 10).
Detach the arm cover.



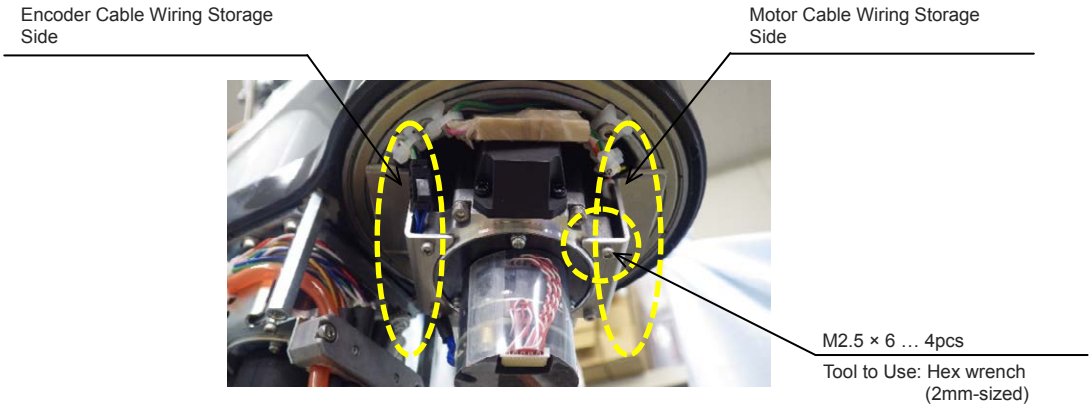
2 Take off the hole cap and loosen the coupling slightly inside the speed reducer.



3 Bend the J2 arm for approximately 135deg.

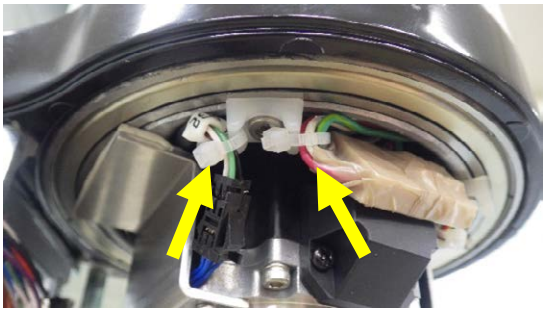


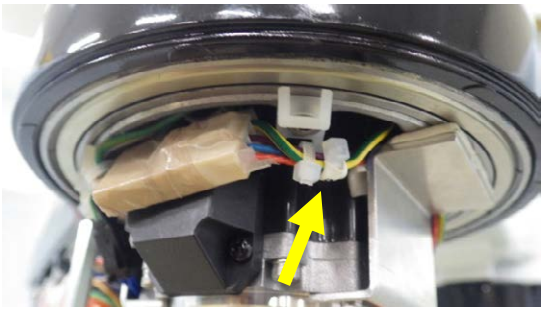
4 For the high-speed type NSN, take off the hex socket head cap screws (M2.5 × 6) and take off the heat radiation plate.



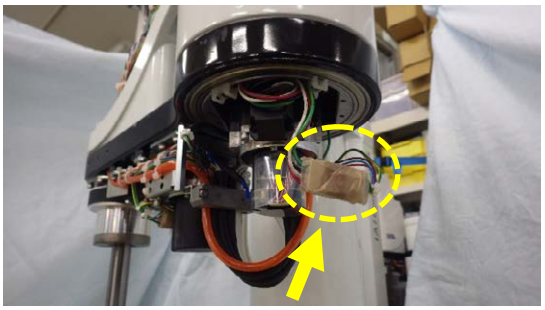
High Speed Type NSN

5 Cut the cable bands at three points using a pair of nippers to release cables.

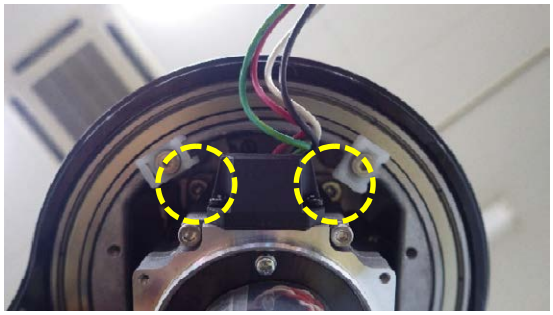


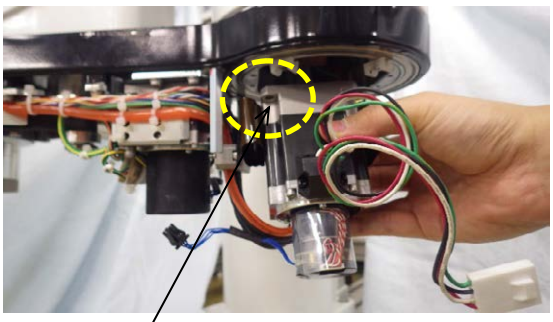


6 Take off the teflon tape applied around the motor connector to take off the motor connector.
Take off the encoder connector.
(Note) Keep the teflon tape as it should be reused after the motor is replaced.



7 Take off the screws (M5 × 12) holding the motor.
Take off the J2-axis motor.

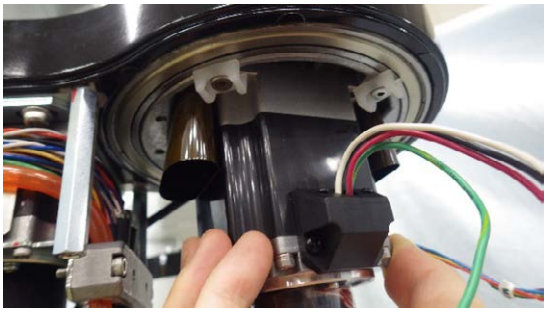




M5 × 12 … 4pcs
Tool to Use: Hex wrench (4mm-sized)

8 Attach a new J2-axis motor.
Tighten up the M5 screws.

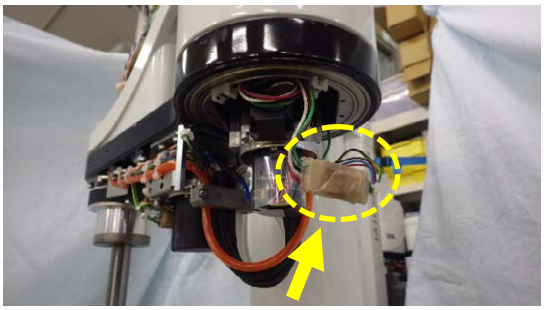
Tightening Torque
7.3N·m



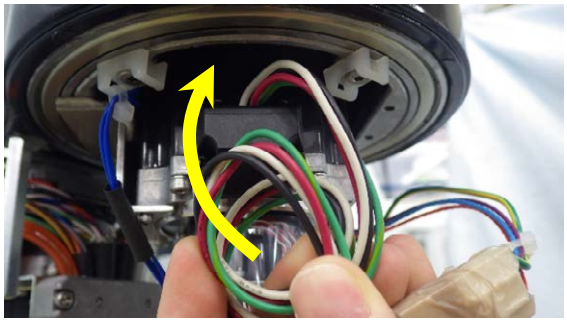
M5 × 12 … 4pcs

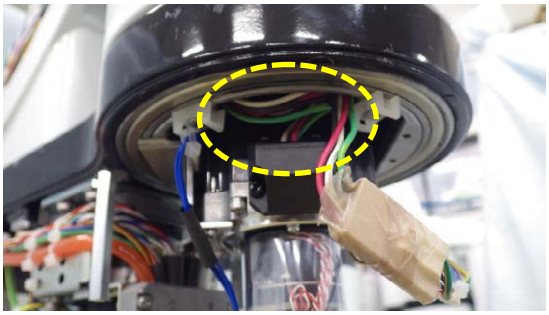
Tool to Use: Hex wrench
(4mm-sized)

9 Connect the motor connector and encoder connector.
Wrap up the motor connector with the teflon tape.

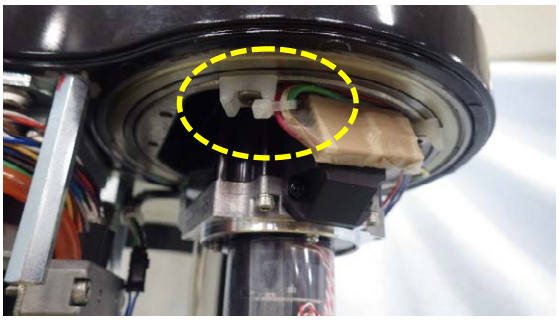


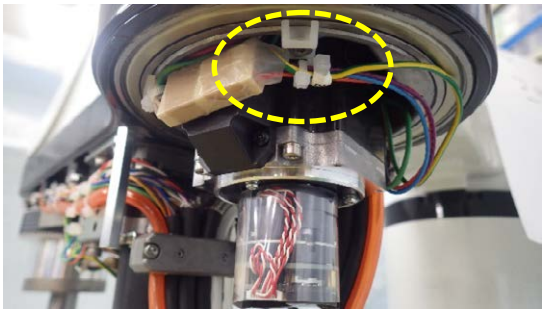
10 Make the motor cables have two turns and store in a space above the table.





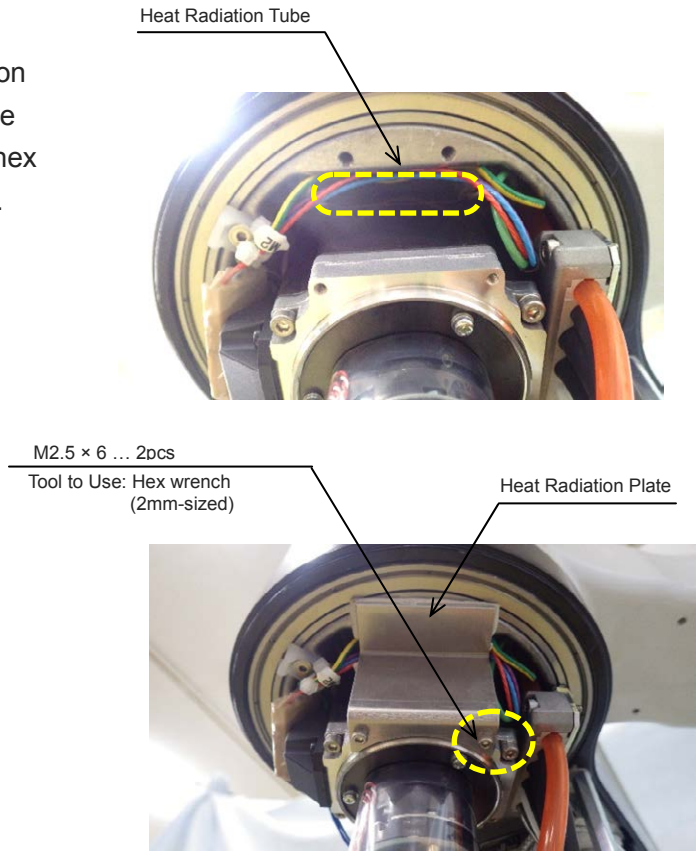
11 Affix the motor cables with cable ties.





12 For high-velocity type NSN, put the motor cables inside the heat radiation tube on the side, and then attach the heat sink and tighten it up with the hex socket head cap screws (M2.5 × 6).

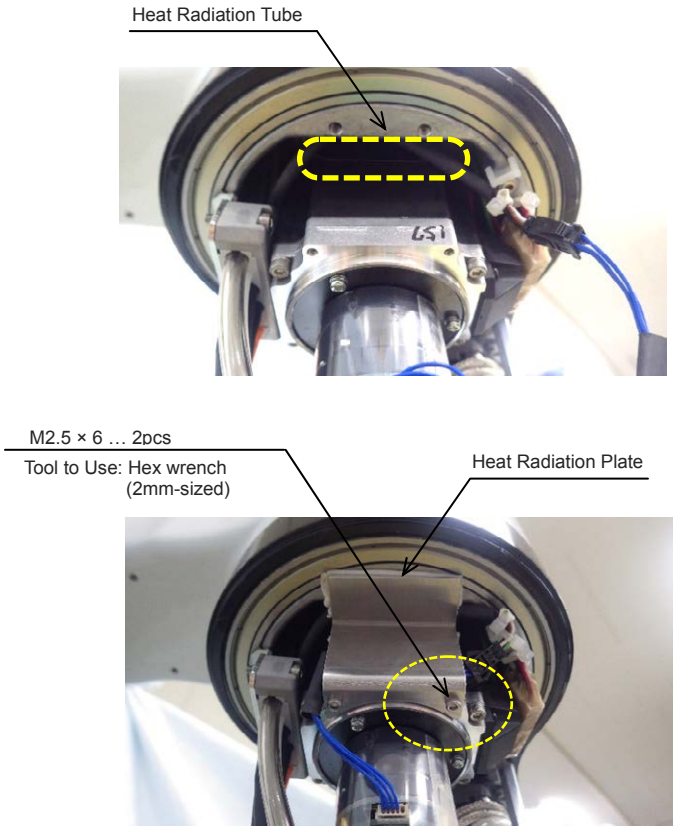
Tightening Torque
0.5N·m



High Speed Type NSN

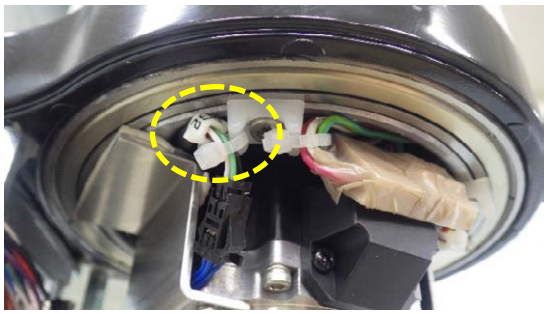
13 For high-velocity type NSN, put the encoder cables inside the heat radiation tube on the side, and then attach the heat sink and tighten it up with the hex socket head cap screws (M2.5 × 6).

Tightening Torque
0.5N·m



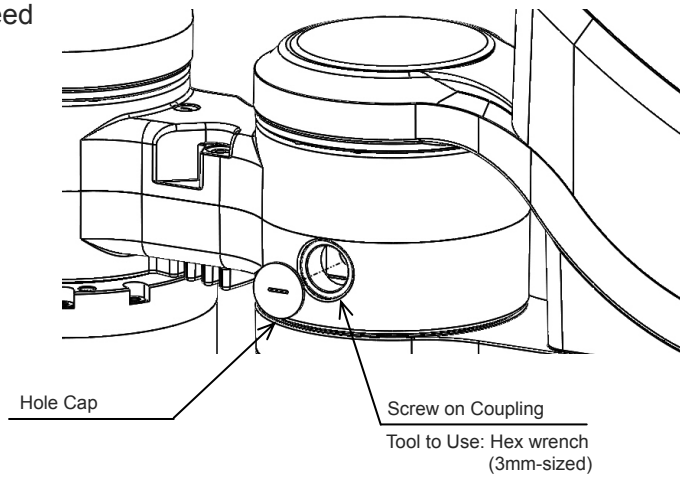
High Speed Type NSN

14 Affix the encoder cables with cable ties.



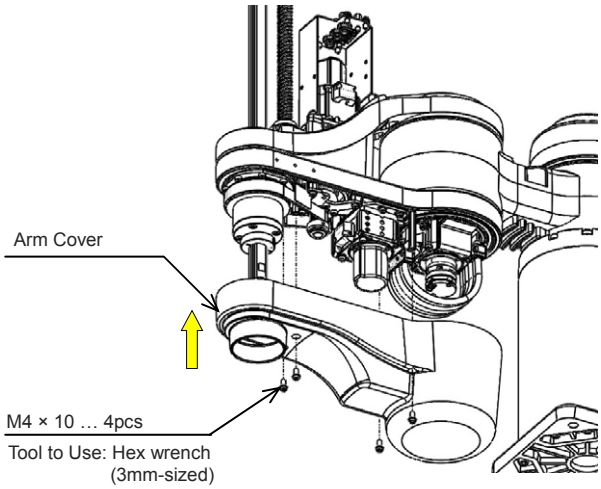
15 Tighten the coupling inside the speed reducer.
Put the hole cap back on.

Tightening Torque
4.5N·m



16 Put on the arm cover.
Tighten the hex socket head cap screws (M4 × 10).

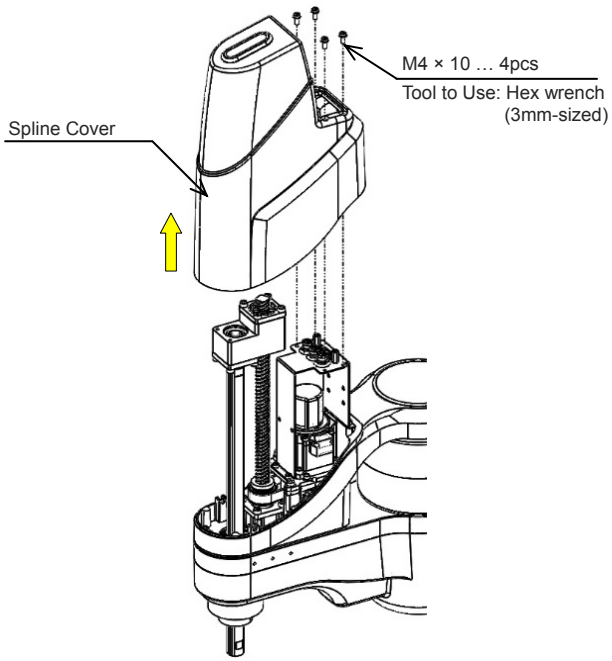
Tightening Torque
1.8N·m



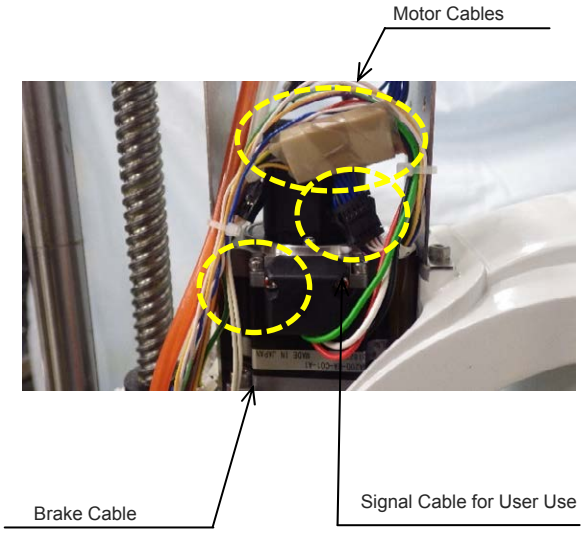
17 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

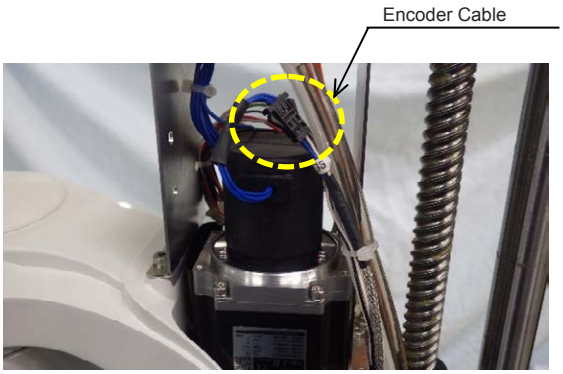
Z-Axis

1 Take off the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.

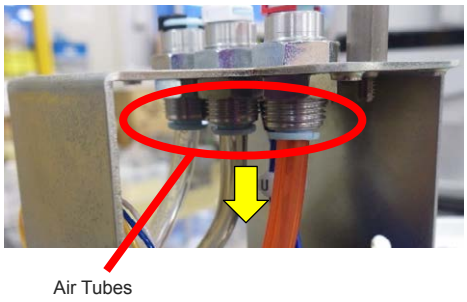


2 Take off all the connectors and ground terminals.
Take off the teflon tape applied around the motor connector.
(Note) Keep the teflon tape as it should be reused after the motor is replaced.

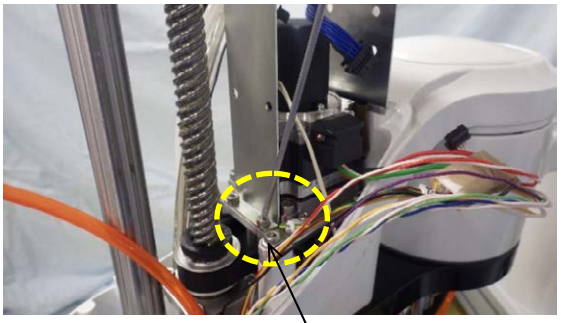


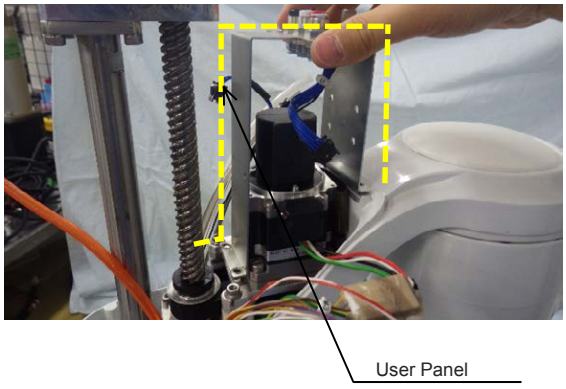


3 Take the three pieces of air tubes and the D-sub connector out of the user panel.

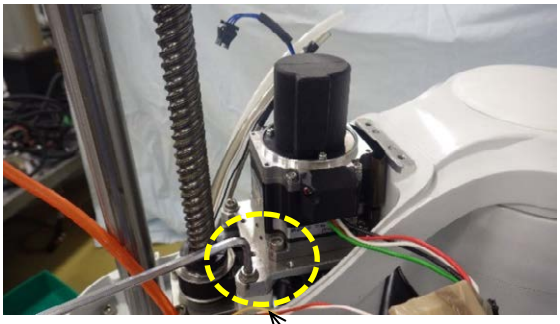


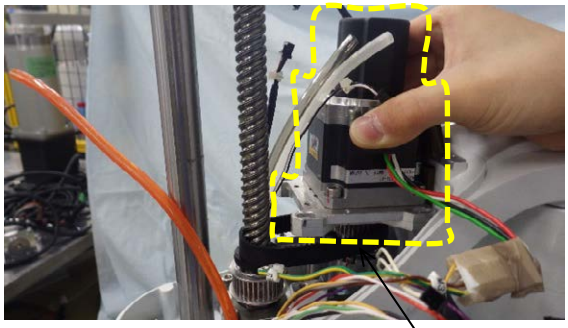
4 Take off the hex socket head cap screws (M4 × 6) to detach the user panel.



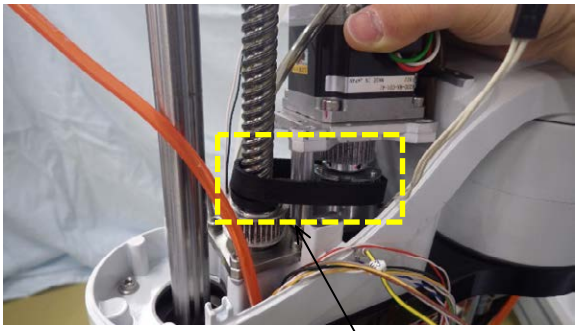


5 Take off the flange-headed hex socket head cap screws (M5 × 20) and detach Z-axis motor ass'y.

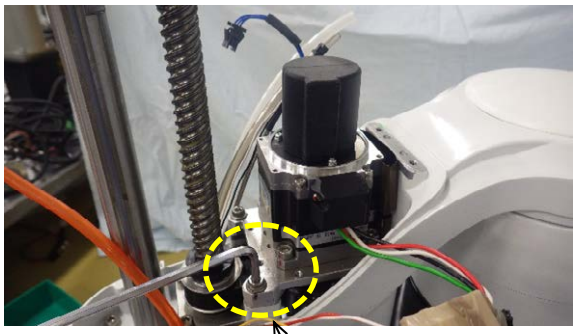




6 Put the new Z-axis motor pulley through the timing belt, and then affix the motor assembly.



7 Tighten the Z-axis motor loosely with the hex socket head cap screws (M5 × 20).



8 Push with a pressing force shown in the table below against Z-axis motor assembly using a tension gauge.

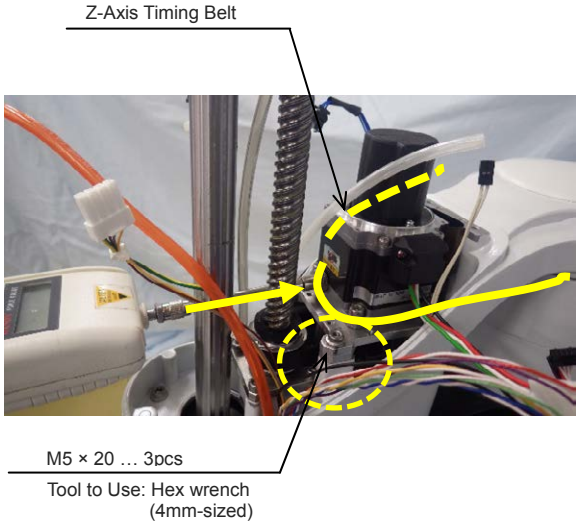
Model	Pressing Force
NSN450	120 ± 10N
NNN450	75 ± 10N
NSN600 NNN600	120 ± 10N

The belt tension should fall into the specification as shown below.

Model	Tension Specification
NSN450	60 ± 5N
NNN450	37.5 ± 5N
NSN600 NNN600	60 ± 5N

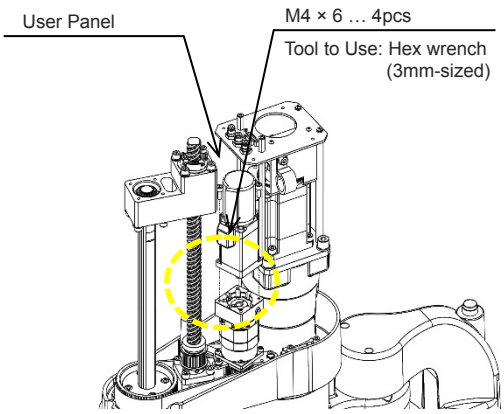
Keep the pressing force remained, and tighten up the hex socket head cap screws (M5 × 20) holding Z-axis motor assembly.

Tightening Torque
7.3N·m



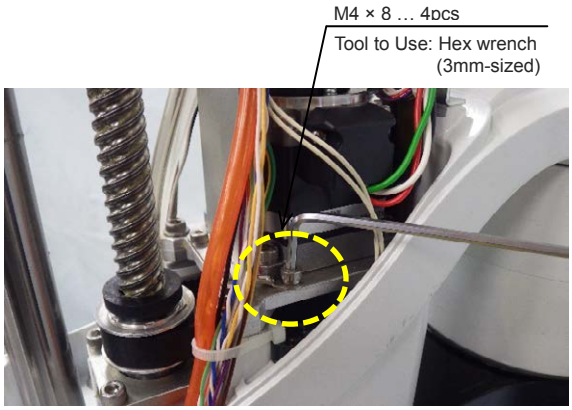
9 Put on the user panel.
Tighten the hex socket head cap screws (M4 × 6).
Put the cables back on affixed with cable ties.

Tightening Torque
3.6N·m

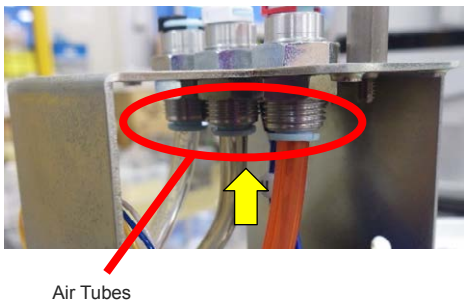


10 Affix the ground terminal with hexagon head screws with a captive washer (M4 × 8).

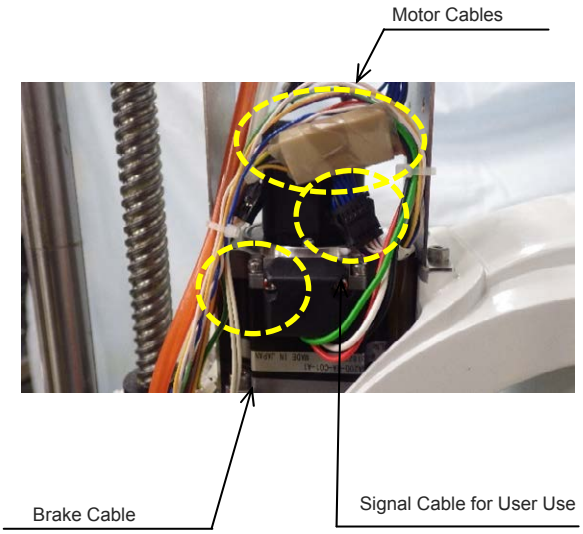
Tightening Torque
3.6N·m

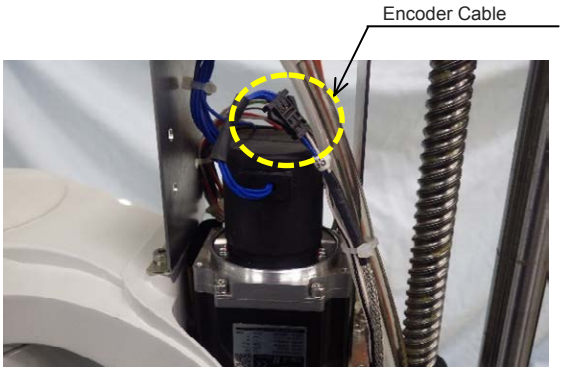


11 Join the three pieces of air tubes and the D-sub connector on the user panel.

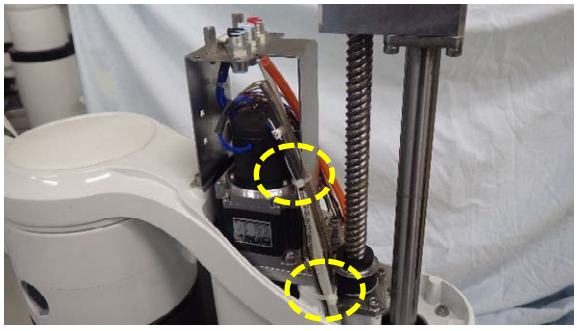


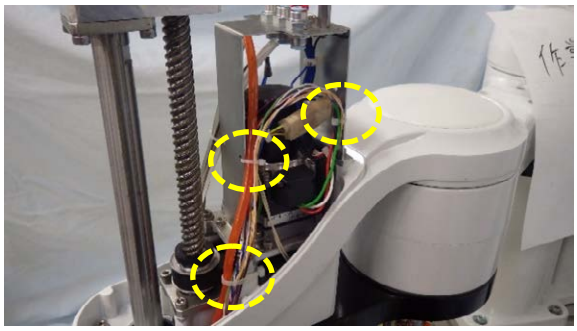
12 Plug in all the connectors.
Wrap up the motor connector with the teflon tape.



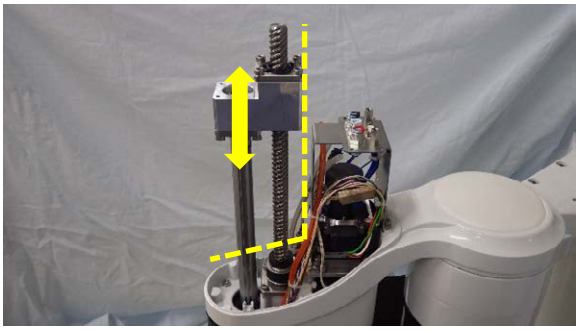


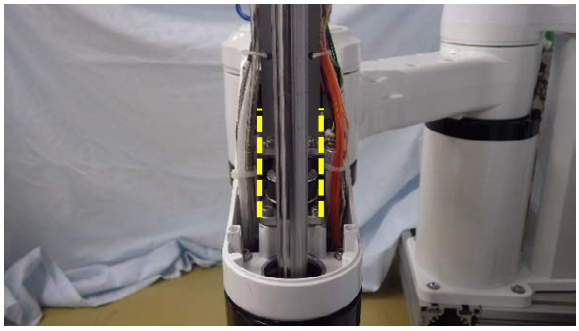
13 Affix the cables with cable ties.





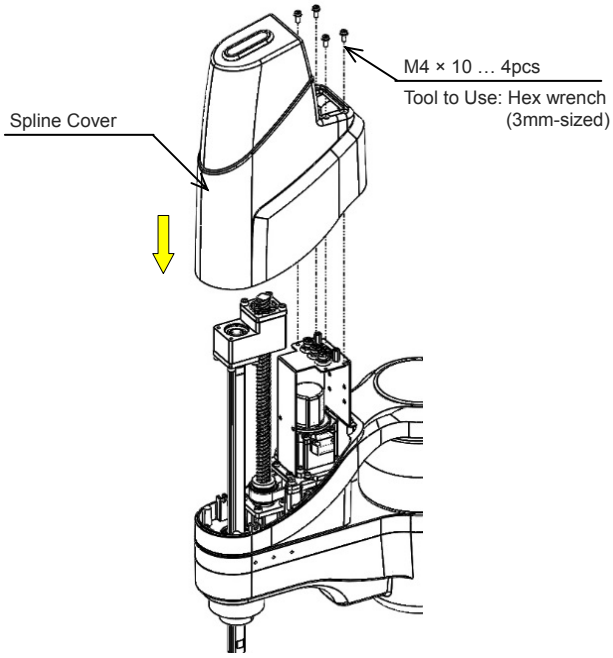
14 Move the Z-axis by either way of connecting the controller to move it with JOG or of moving manually using hand with the brake released, and check that there is no interference to cables.





15 Put on the spline cover.
Tighten the hex socket head cap screws (M4 × 10) on the top of the spline cover.

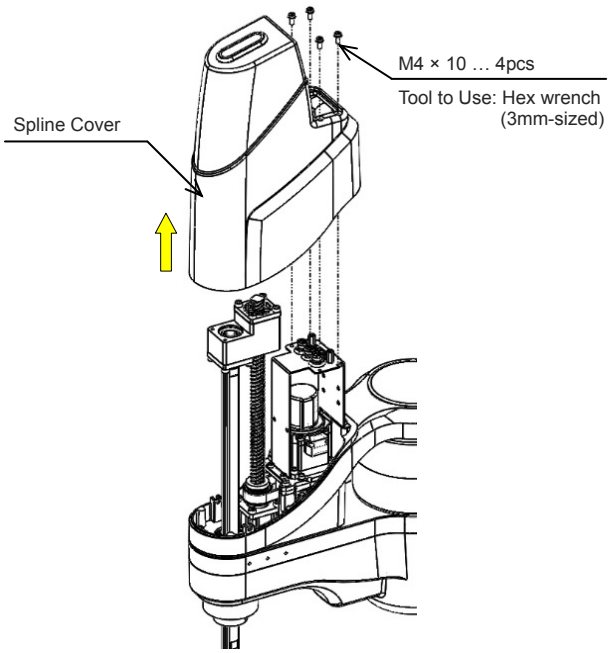
Tightening Torque
1.8N·m



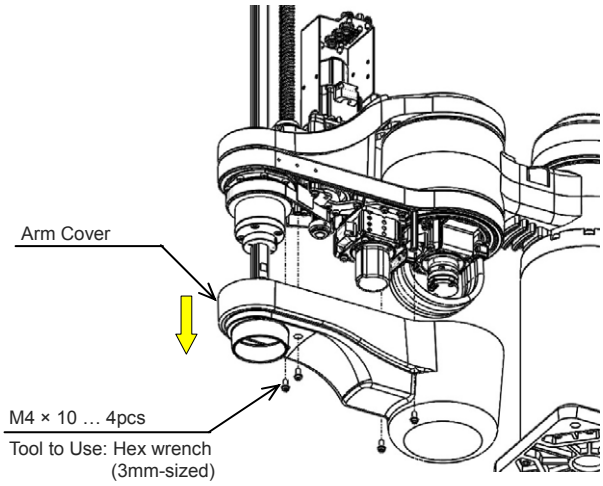
16 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

R-Axis

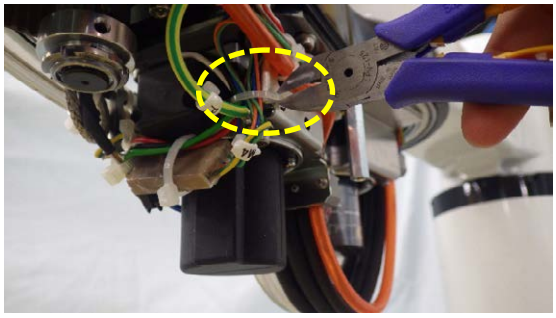
1 Take off the hex socket head cap screws (M4 × 10) on the top of the spline cover.
Detach the spline cover.

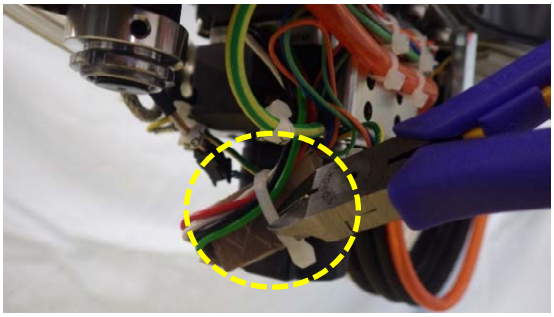


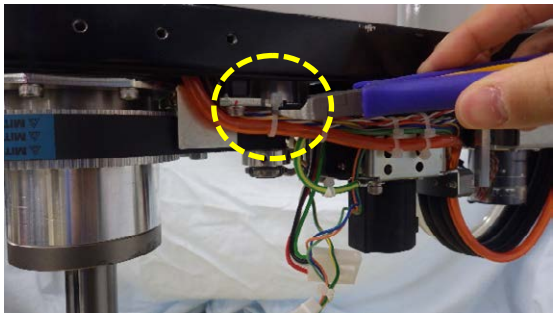
2 Take off the hex socket head cap screws (M4 × 10).
Detach the arm cover.

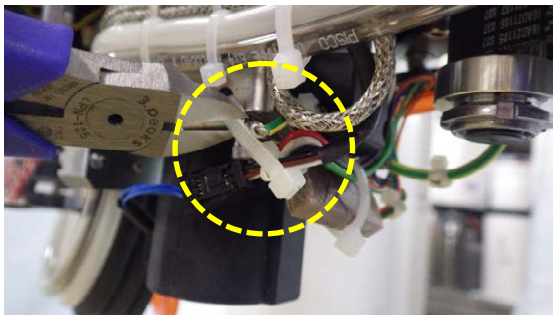


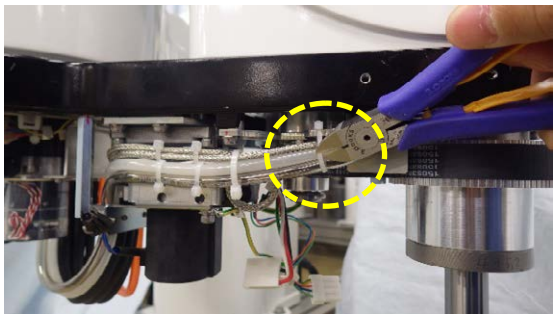
3 Cut the cable band at each point using a pair of nippers and release cables.

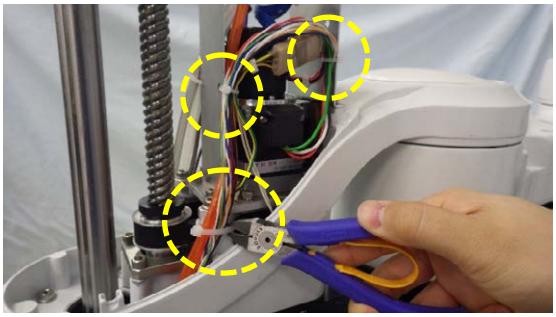


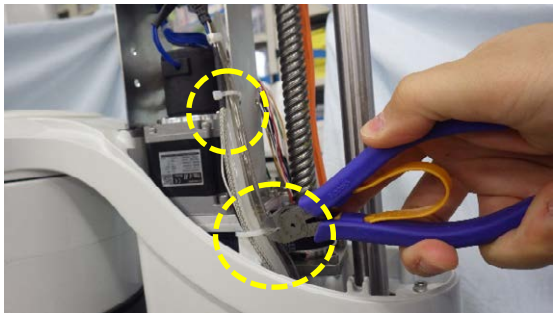




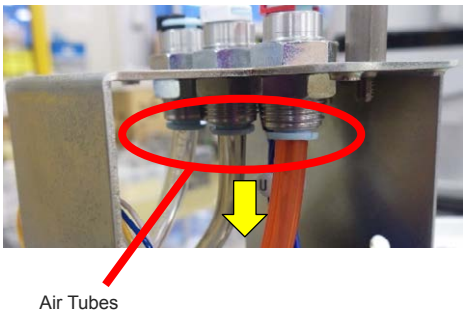




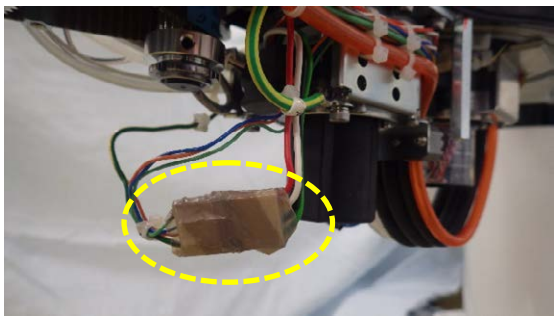


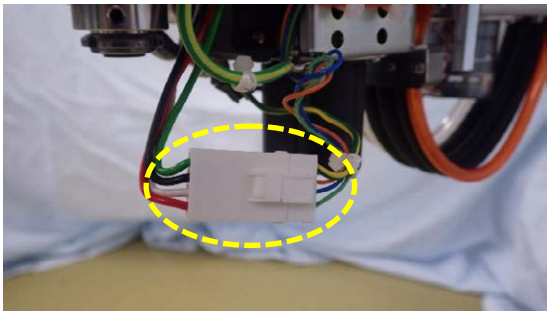


4 Take the three pieces of air tubes and the D-sub connector out of the user panel.

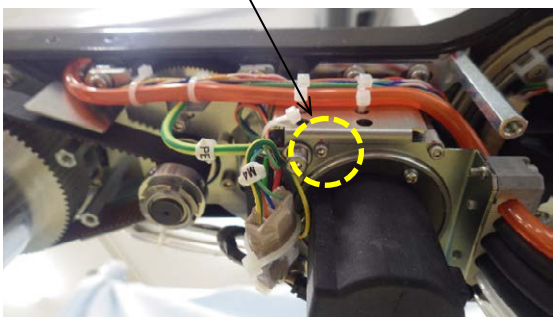


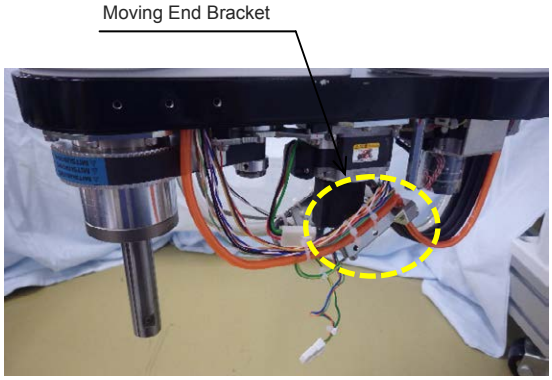
5 Take off the teflon tape applied around the motor connector.
Unplug the connectors.
(Note) Keep the teflon tape as it should be reused after the motor is replaced.



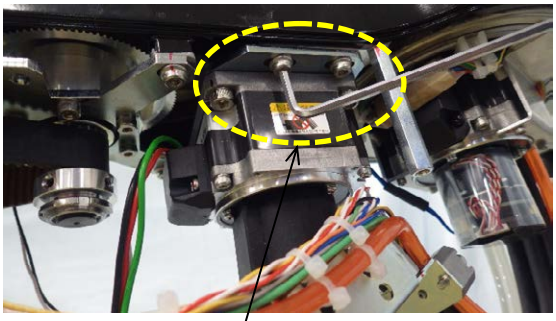


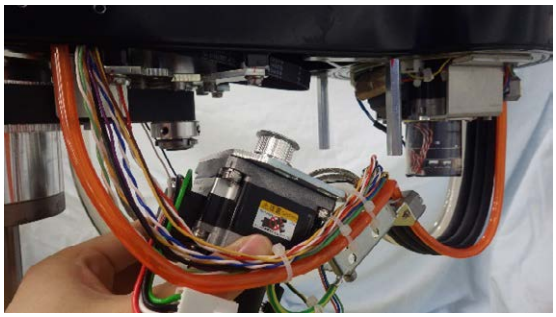
6 Remove the hex socket head cap screws (M2.5 × 6) holding the moving-end bracket to take it off.



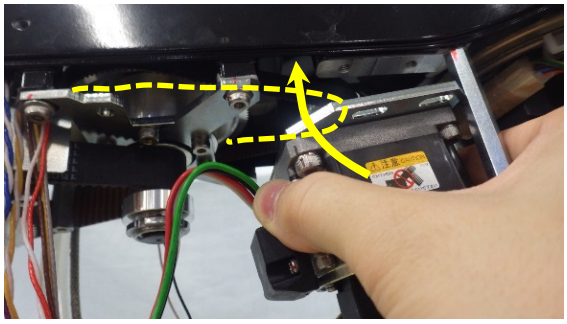


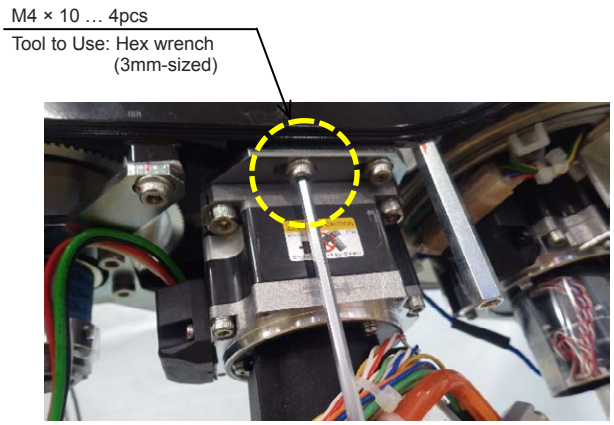
7 Remove the flanged hex socket head cap screws (M4 × 10) holding the motor and take off R-axis motor assembly.





8 Put the pulley on new R-axis motor assembly through the belt on the first step and loosely tighten it with flanged hex socket head cap screws (M4 × 10).

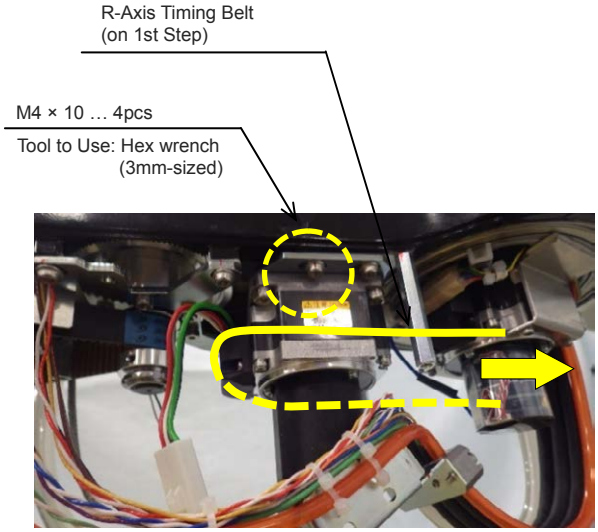




9 Hang R-axis motor ass'y on a string and pull it with a tension gauge in the tensile strength shown in the table. The belt tension should get to 18+/-5N, which is the specification.
Keep it pulled with the specified tensile strength while tightening the flange-headed hex socket head cap screws (M4 × 10) holding motor ass'y further.

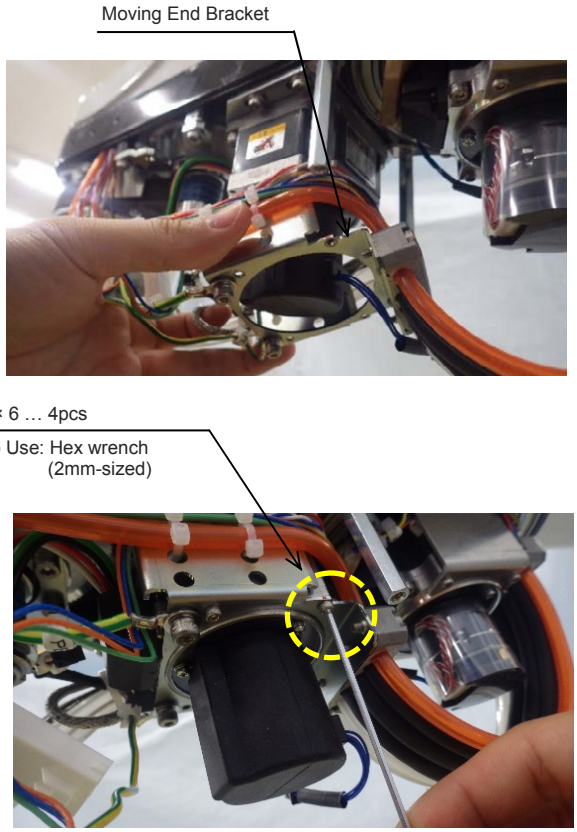
Tensile Force
36 ± 10N

Tightening Torque
3.6N·m

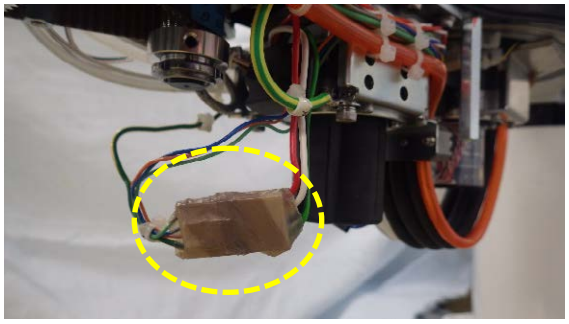


10 Attach the moving end bracket. Tighten the hex socket head cap screws (M2.5 × 6).

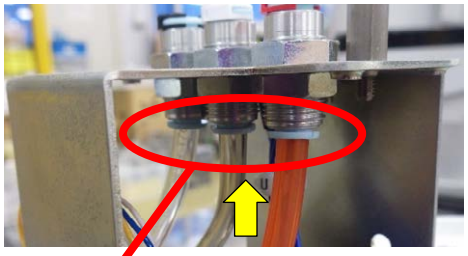
Tightening Torque
0.5N·m



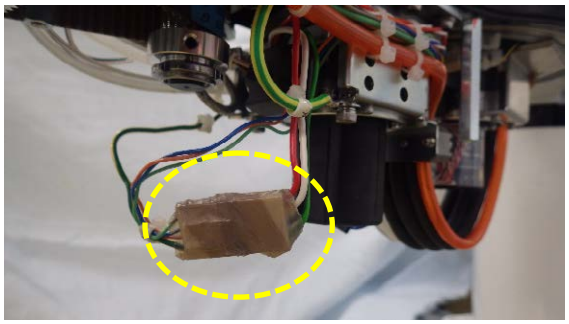
11 Plug in all the connectors.
Wrap up the motor connector with the teflon tape.

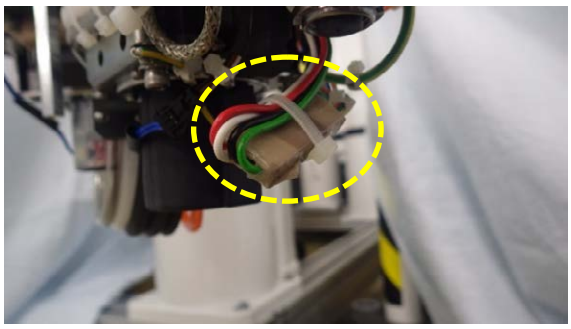


12 Join the three pieces of air tubes and the D-sub connector on the user panel.

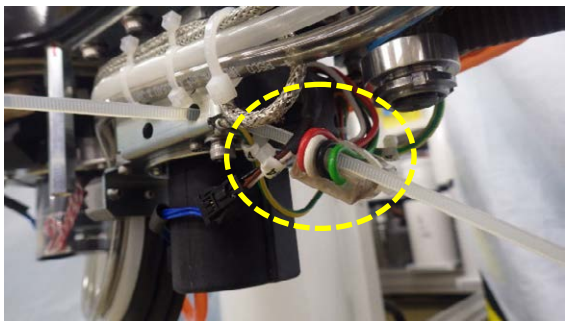


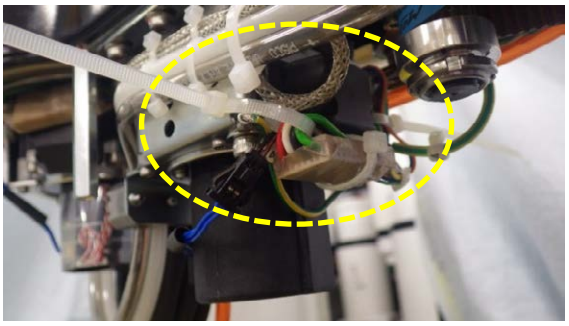
13 Affix the cables with cable ties.



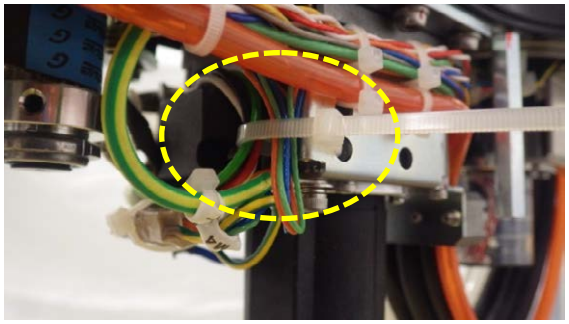


14 Affix the motor cable and encoder cable on the moving-end bracket using cable bands.

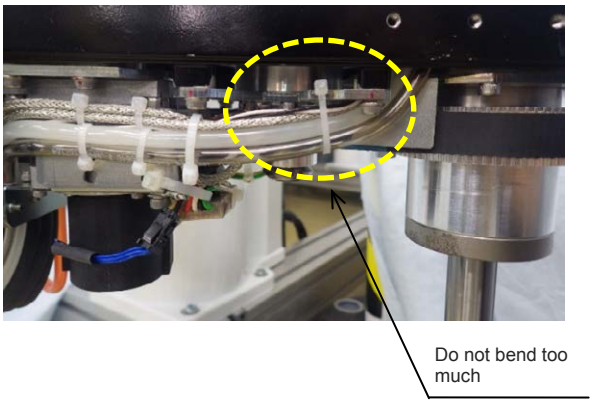


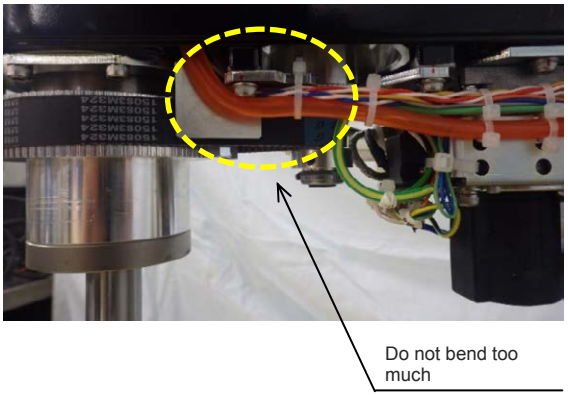


15 Affix the motor cable on the moving-end bracket using a cable band.



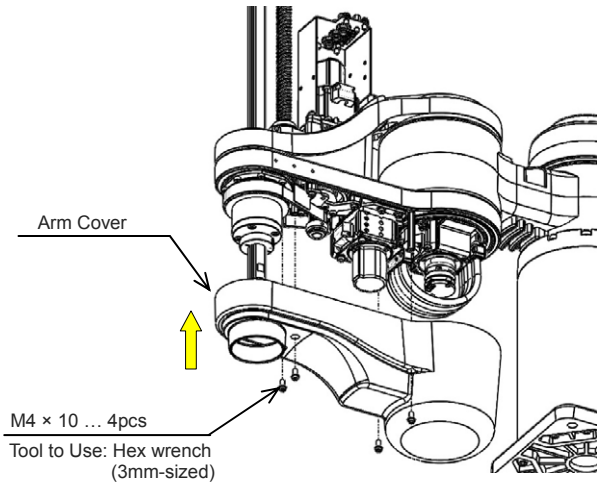
16 Affix the cables and the air tube on relay pulley assembly using cable bands.





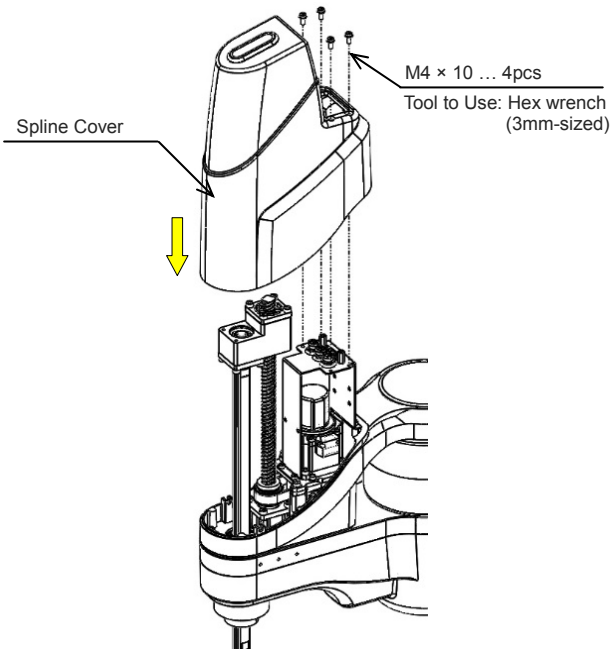
17 Put on the arm cover.
Tighten the hex socket head cap screws (M4 × 10)

Tightening Torque
1.8N·m



18 Put on the spline cover.
Tighten the hex socket head cap screws (M4 × 10) on the top of the spline cover.

Tightening Torque
1.8N·m



19 Conduct the absolute reset after replacement of motor.
Use the XSEL PC Software with its version V13.02.20.00 or later.

4.9 Absolute Reset

Conduct “Stopper Pressing Type Absolute Reset” if the motor was replaced.

→ Refer to How to Conduct Stopper Pressing Type Absolute Reset.

In the following case, conduct “Stopper pressing position acquirement” before having the absolute reset.

Do not execute it after it comes to a circumstance that requires the absolute reset. Have it done while the normal operation can be performed.

→ Refer to Procedure for Stopper Pressing Position Acquirement Operation.

- When the absolute reset cannot be performed in the direction of the stopper interfering movement with the initial posture at the delivery from the factory due to such reasons as interference to the peripheral equipment.
- There was a change in the stopper position due to such reasons as a removal of the stopper of the vertical axis.

It is necessary to prepare tools shown below for “Stopper Pressing Type Absolute Reset” and “Stopper Pressing Position Acquirement” for the four-axis type.

Model	Model Code
IXA-4NNN1805	JG-IXA2
IXA-4NNN3015/4NSN3015 IXA-4NNN45□□/4NSN45□□ IXA-4NNN60□□/4NSN60□□	JG-IXA1

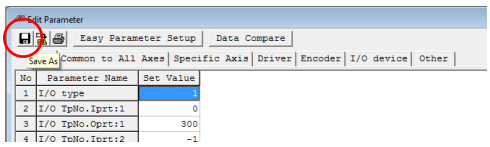
The procedure and displays of PC software screens of “Stopper Pressing Type Absolute Reset” and “Stopper Pressing Position Acquirement” are slightly different for three-axis and four-axis types.

3-axis Type	4-axis Type
IXA-3NNN1805	IXA-4NNN1805
IXA-3NNN3015/3NSN3015 IXA-3NNN45□□/3NSN45□□ IXA-3NNN60□□/3NSN60□□	IXA-4NNN3015/4NSN3015 IXA-4NNN45□□/4NSN45□□ IXA-4NNN60□□/4NSN60□□

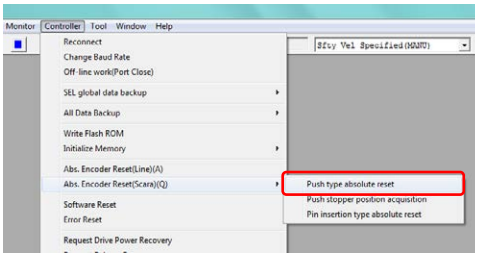
In order to conduct the absolute reset, use the XSEL PC Software with its version V13.02.20.00 or later (version V13.02.24.00 or later for IXA-□NNN1805).

Stopper Pressing System Absolute Reset Operation

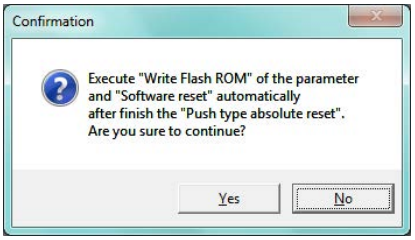
1 Backup the parameters so that they can be put back anytime to those before changing them. Select “Parameter” → “Edit” from PC Software Menu to show the Edit Parameter window.
Press the “Save As” button in the Edit Parameter window to store the parameters in the file.



2 Select “Controller” → “Abs. Encoder Reset (Scara) (Q)” → “Push type absolute reset” from the menu.



3 A Confirmation window shows up. Click “Yes”.

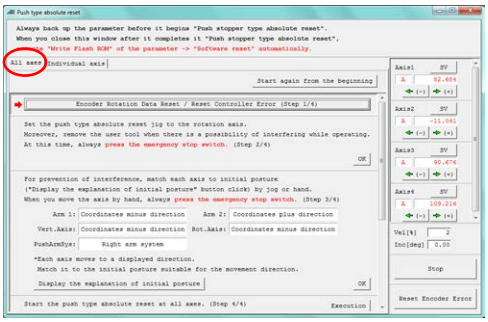


[1] When Performing Stopper Pressing Type Absolute Reset to All Axes at Once

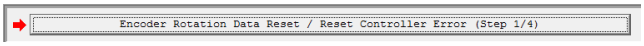
To have the push stopper type absolute reset for all the axes at once, follow the steps shown below.

1 Select “All axes”.

* The screenshot shows the screen for the four-axis type. Some contents should not be displayed in the three-axis type.



2 Click “Encoder Rotation Data Reset / Reset Controller Error (Step 1/4)”.



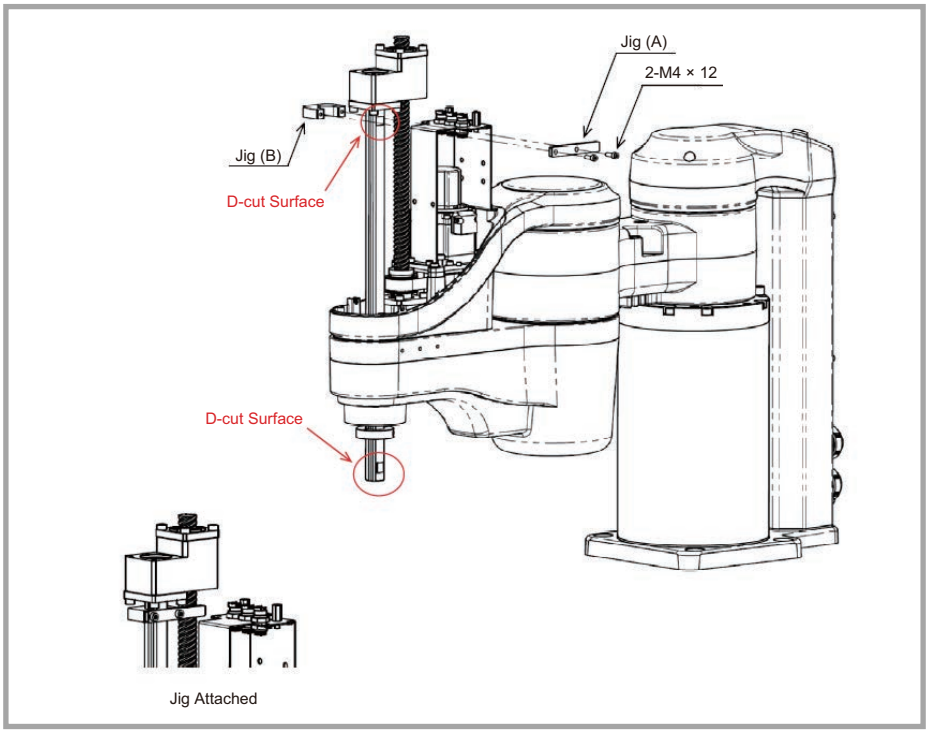
Attach the rotary axis pressing absolute reset tool for the four-axis type. (It is not necessary for the three-axis type.)
Have the work during the emergency stop condition.

Regarding the R-axis absolute reset tool, take off the spline cover, apply Jig (A) to the flat on the spline shaft and affix it to Jig (B) with screws. The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.
[For how to detach and attach the spline cover, refer to 4.6 How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis.]

Caution

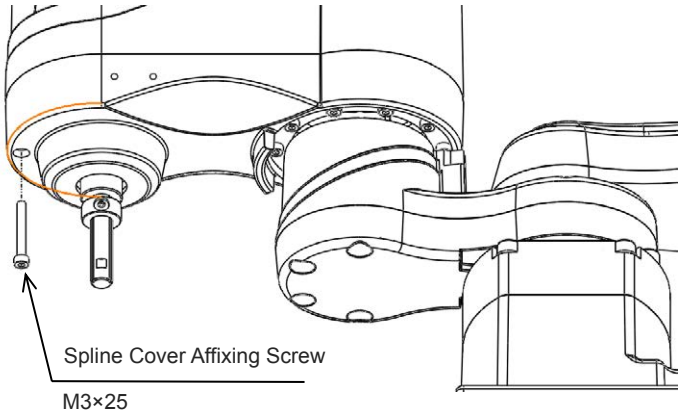
Make sure the cables and air tubes on the chucks and hands are not twisted before attaching the absolute reset jig.
The rotary axis resets the coordinates at the position that the absolute reset jig is attached. Having an absolute reset with the cables and air tubes being twisted, the coordinates will get reset with them kept twisted.
Rotating the axis should twist the cables and air tubes even more, which could cause to break cables and tubes.
If it is necessary to have the absolute reset executed with the cables and air tubes kept attached, operate the axis manually or in low speed after having the reset to make sure that there is not impact applied to the cables and tubes.
In case there is an impact, turn the rotation axis back till the twist is solved and then have the absolute reset executed again or have the cables and tubes connected again.

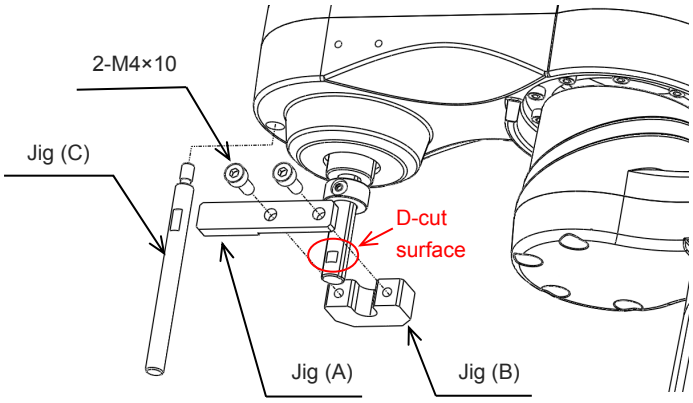
[Models Except for IXA-4NNN1805]

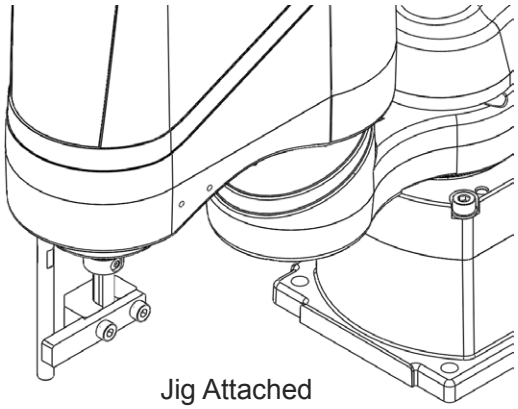


[IXA-4NNN1805]

Take off the J2 spline cover affixing screw (M3 × 25) on the bottom of the J2 main arm and attach Jig (C).
Align Jig (A) on the D-cut surface no the spline shaft and affix it with Jib (B) with screws.
The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.

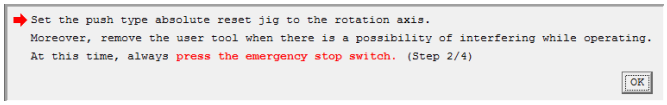




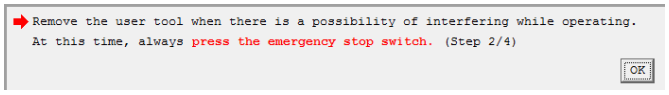


Jig Attached

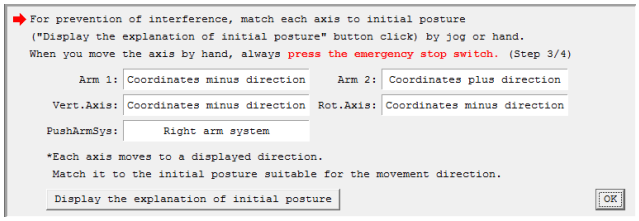
3 In case there is a concern that a load may interfere with surroundings at the absolute reset, detach the load.
Have the work during the emergency stop condition. After the work is finished, click on the “OK” button.
<For 4-Axis Type>



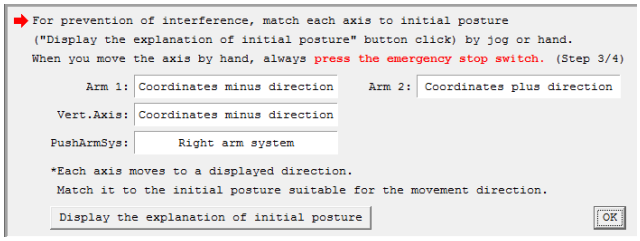
<For 3-Axis Type>



4 By referring to the displayed movement direction for each axis, adjust the axes to the initial posture. The posture differs depending on the movement direction. Make sure the work is conducted with the emergency stop activated when moving the axes by hand. Click on the “OK” button after the work is finished.
<For 4-Axis Type>



<For 3-Axis Type>

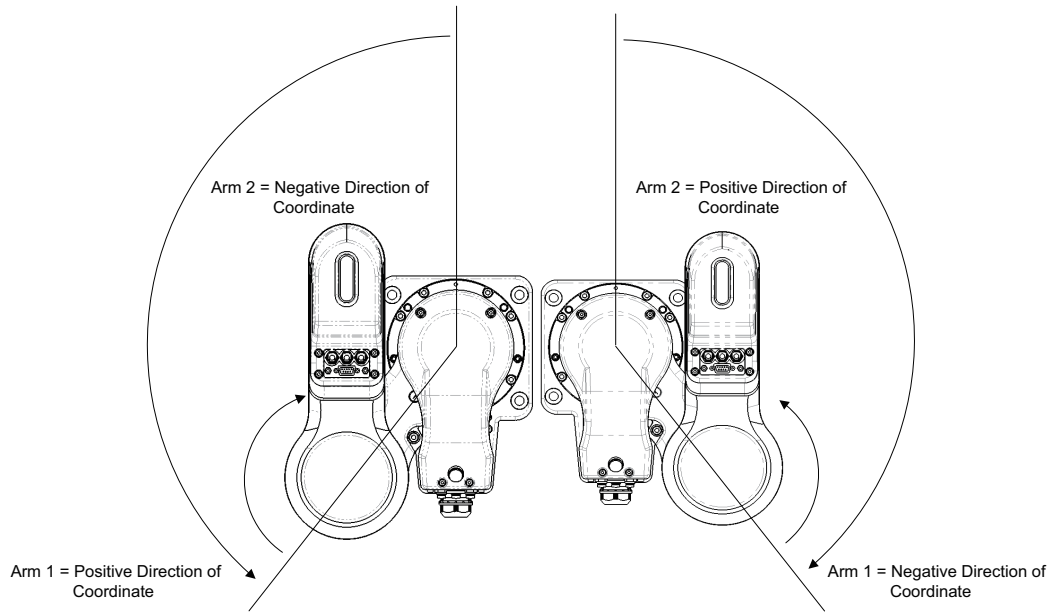


[Initial posture]

⊙ Arm1 and Arm 2

Considering the stopper pressing position, adjust the posture to either of right arm system or left arm system. When the product is delivered, it is set to the right arm system. Adjust to the right arm system. In case the arm interferes with the peripheral in the right arm system, set it to the left arm system in advance, conduct “stopper pressing position acquirement” and then adjust to the left arm system.

→ Refer to Procedure for Stopper Pressing Position Acquirement Operation.



Initial posture of left arm system	Initial posture of right arm system (At the delivery)
Arm 1 = Movement in Positive Side of Coordinate	Arm 1 = Movement in Negative Side of Coordinate
Arm 2 = Movement in Negative Side of Coordinate	Arm 2 = Movement in Positive Side of Coordinate

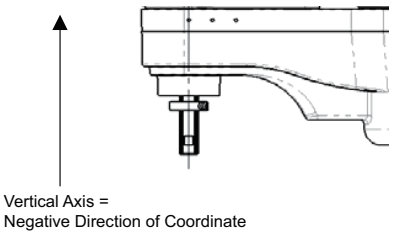
For the position, put it apart from the stopper position for 10deg or more.

Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

[Initial posture]

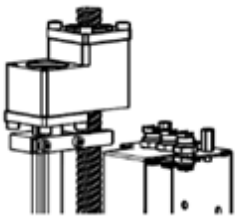
⊙ Vertical Axis

For the position, put it apart from the coordinate 0mm (upward end) for 10mm or more.
Setting it at 10mm or less, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

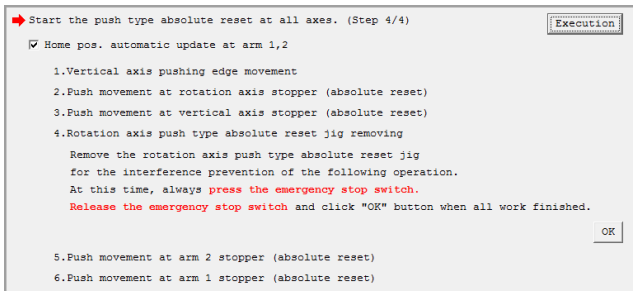


⊙ Rotation Axis (For 4-Axis Type Only)

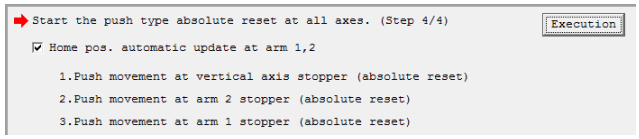
For the position, put it apart from the stopper position for 10deg or more.
Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.



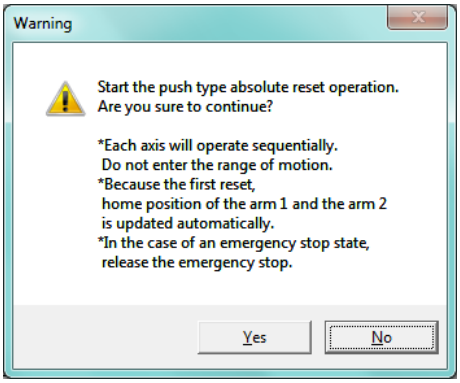
5 Click on the “Execution” button.
<For 4-Axis Type>



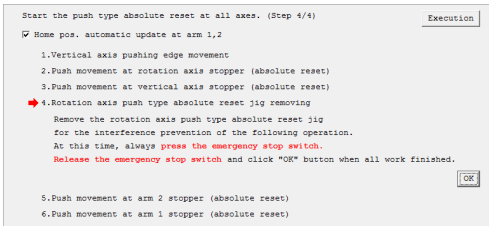
<For 3-Axis Type>



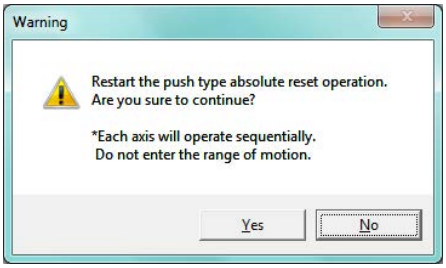
6 A Warning window shows up. Click on the “Yes”. Each operation for the push type absolute reset starts.



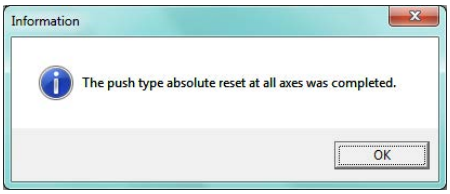
7 For the four-axis type, press Execution and proceed to “Removing”, and then take off the rotary axis pressing absolute reset jig. At this time, make sure the work is conducted with the emergency stop activated. Click on the “OK” button after the work is finished.



8 For the four-axis type, a Warning window will be displayed. Click “Yes”.
The stopper pressing system absolute reset operation will be resumed.



9 Once the push type absolute reset for all the axes is finished, the Information window will appear.
Click “OK” button.



10 Close the Push stopper position acquisition window by clicking “×” on the upper right side of the window. Once the window is closed, the parameters start to be written automatically to the flash ROM, and controller is rebooted by the software reset.

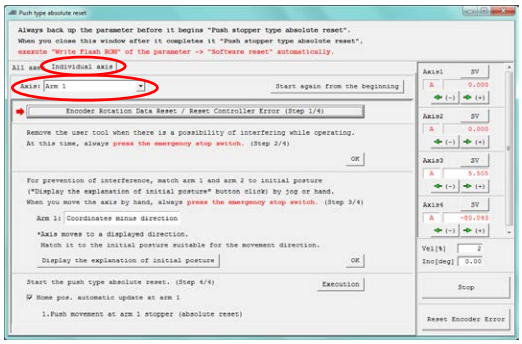
[2] When Performing Stopper Pressing Type Absolute Reset on Each Axis One by One

To have the push stopper type absolute reset for each axis one by one, follow the steps shown below.

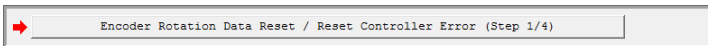
(1) 1st Arm and 2nd Arm

1 Select “Individual axis” in the Push type absolute reset window, and set Axis to “Arm 1” (or Arm 2).

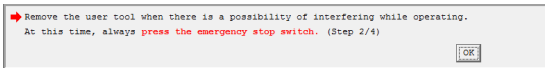
* The screenshot shows the screen for the four-axis type. Some contents should not be displayed in the three-axis type.



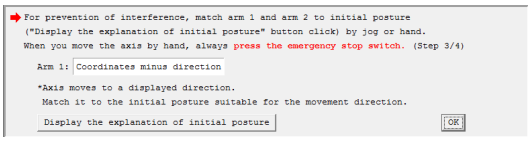
2 Click “Encoder Rotation Data Reset / Reset Controller Error (Step 1/4)”.



3 In case there is a concern that a load may interfere with surroundings at the absolute reset, detach the load. Have the work during the emergency stop condition. After the work is finished, click on the “OK” button.



4 By referring to the displayed movement direction for each axis, adjust the axes to the initial posture.
The posture differs depending on the movement direction.
Click on “Display the explanation of initial posture” to check the explanations. Make sure to work on with the emergency stop activated when moving the axes with hand.
Click on the “OK” button after the work is finished.

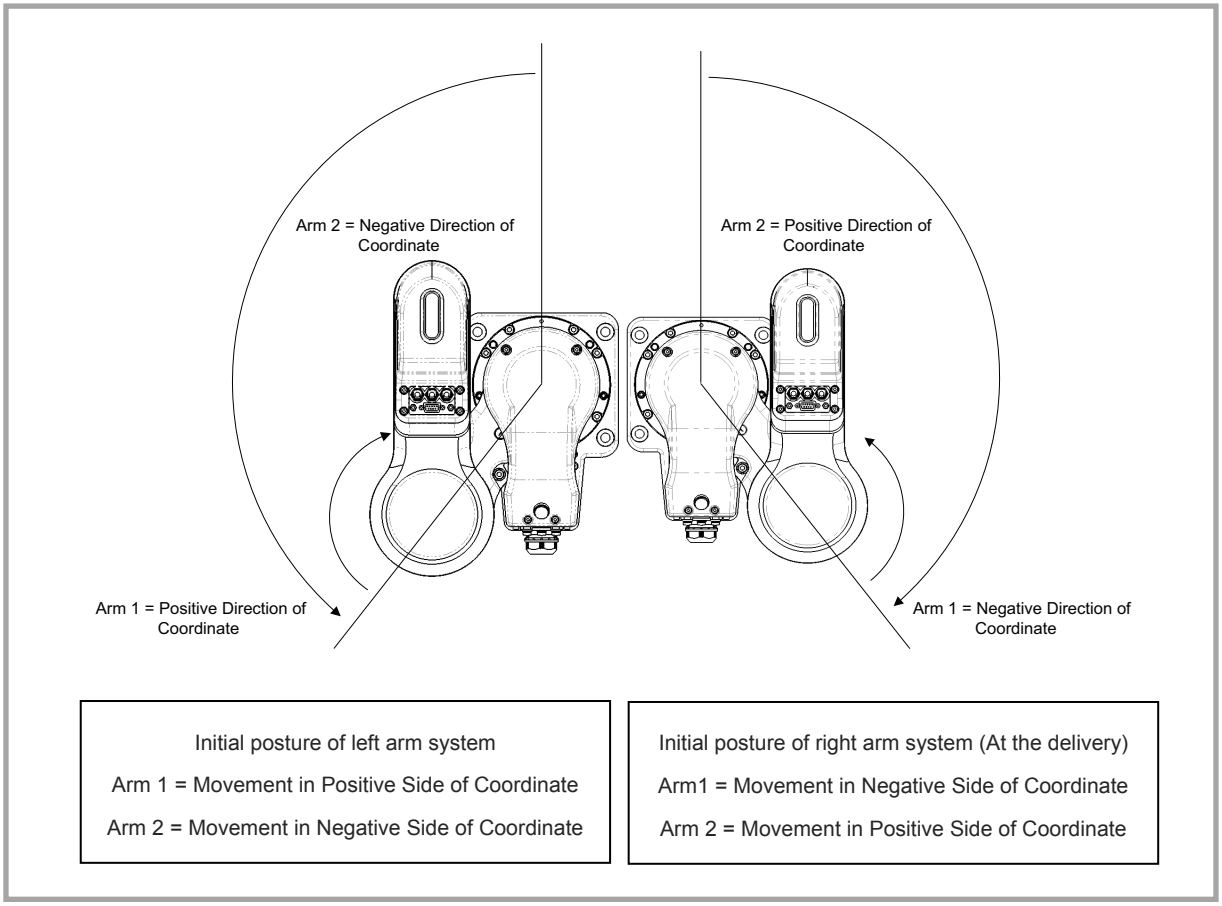


[Initial posture]

⊙ Arm 1 and Arm 2

Considering the stopper pressing position, adjust the posture to either of right arm system or left arm system. When the product is delivered, it is set to the right arm system. Adjust to the right arm system. In case the arm interferes with the peripheral in the right arm system, set it to the left arm system in advance, conduct “stopper pressing position acquirement” and then adjust to the left arm system.

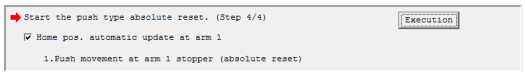
→ Refer to Procedure for Stopper Pressing Position Acquirement Operation.



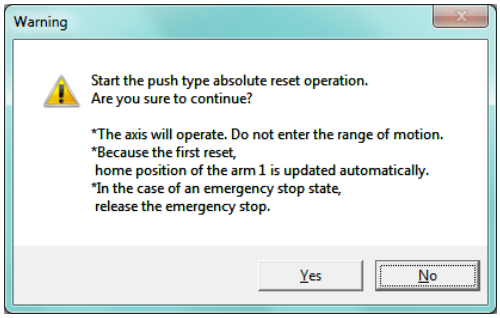
For the position, put it apart from the stopper position for 10deg or more.

Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

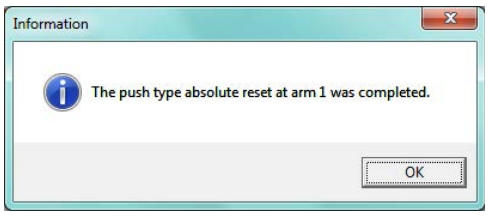
5 Click on the “Execution” button.



6 A Warning window shows up. Click on the “Yes”. Each operation for the push type absolute reset starts.



7 Once the push type absolute reset, the Information window will appear.
Click “OK” button.

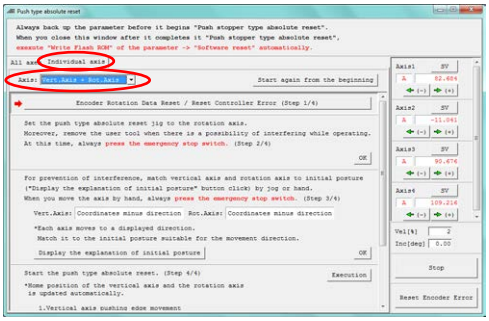


8 If it is necessary to have the push type absolute reset for another axis, move on to the axis selection. When finishing the process, click “×” on the upper right side of the window. Once the window is closed, the parameters start to be written automatically to the flash ROM, and controller is rebooted by the software reset.

(2) Vertical Axis and Rotation Axis

1 Select “Individual axis” in the Push type absolute reset window, and select “Vert. Axis + Rot. Axis” for the four-axis type and “Vert. Axis” for the three-axis type.

* The screenshot shows the screen for the four-axis type.
Some contents should not be displayed in the three-axis type.



2 Click “Encoder Rotation Data Reset / Reset Controller Error (Step 1/4)”.

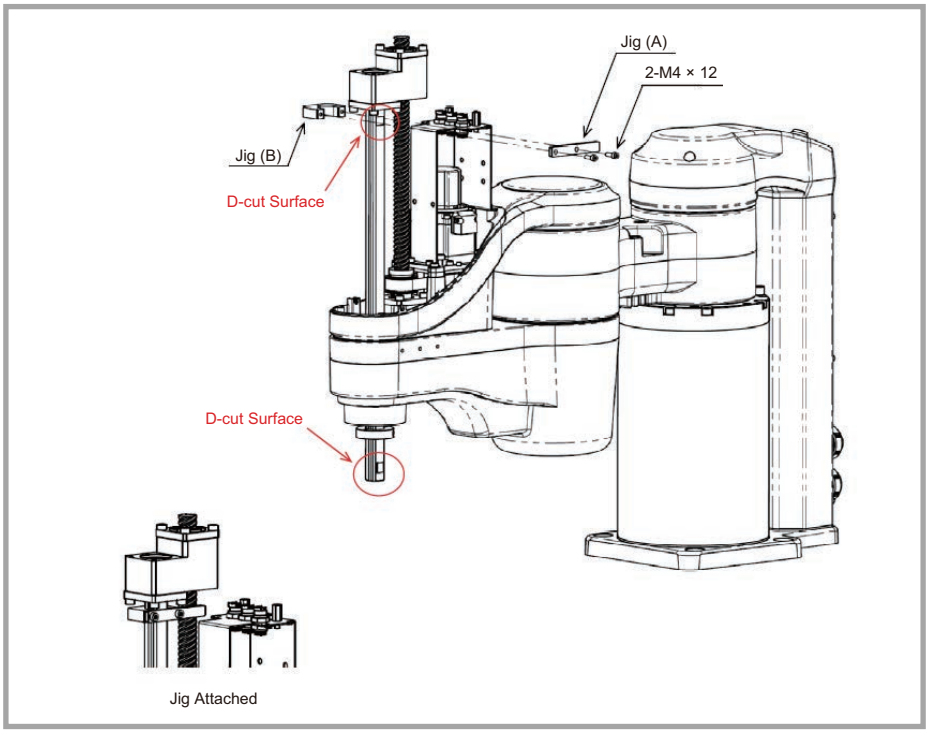
Attach the rotary axis pressing absolute reset tool for the four-axis type. (It is not necessary for the three-axis type.)
Have the work during the emergency stop condition.

Regarding the R-axis absolute reset tool, take off the spline cover, apply Jig (A) to the flat on the spline shaft and affix it to Jig (B) with screws. The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.
[For how to detach and attach the spline cover, refer to 4.6 How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis.]

Caution

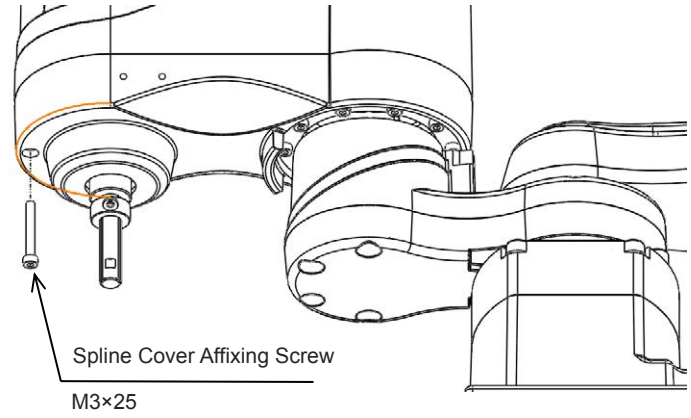
Make sure the cables and air tubes on the chucks and hands are not twisted before attaching the absolute reset jig.
The rotary axis resets the coordinates at the position that the absolute reset jig is attached. Having an absolute reset with the cables and air tubes being twisted, the coordinates will get reset with them kept twisted.
Rotating the axis should twist the cables and air tubes even more, which could cause to break cables and tubes.
If it is necessary to have the absolute reset executed with the cables and air tubes kept attached, operate the axis manually or in low speed after having the reset to make sure that there is not impact applied to the cables and tubes.
In case there is an impact, turn the rotation axis back till the twist is solved and then have the absolute reset executed again or have the cables and tubes connected again.

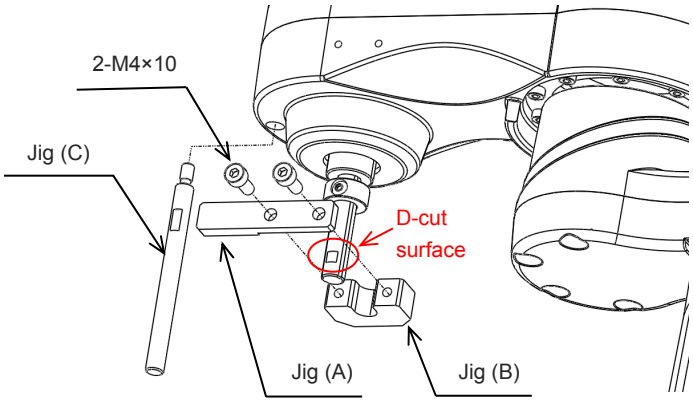
[Models Except for IXA-4NNN1805]

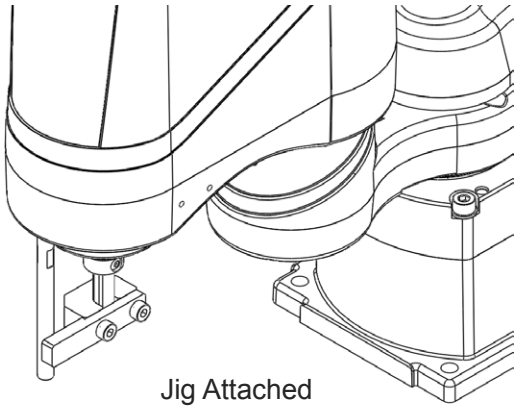


[IXA-4NNN1805]

Take off the J2 spline cover affixing screw (M3 × 25) on the bottom of the J2 main arm and attach Jig (C).
Align Jig (A) on the D-cut surface no the spline shaft and affix it with Jib (B) with screws.
The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.



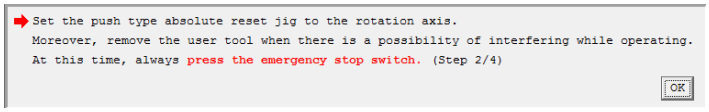




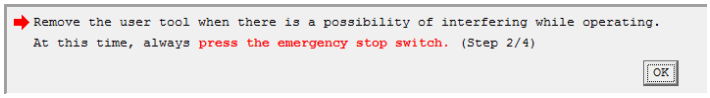
Jig Attached

3 In case there is a concern that a load may interfere with surroundings at the absolute reset, detach the load. Have the work during the emergency stop condition. After the work is finished, click on the “OK” button.

<For 4-Axis Type>

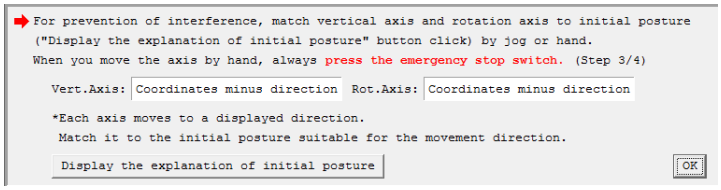


<For 3-Axis Type>

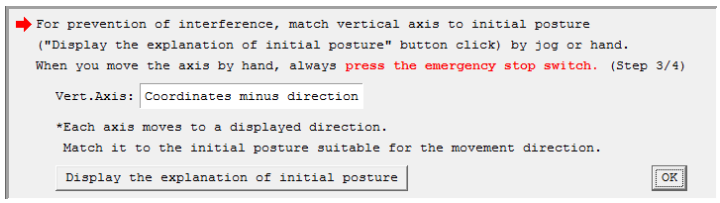


4 By referring to the displayed movement direction for each axis, adjust the axes to the initial posture. The posture differs depending on the movement direction.
Click on “Display the explanation of initial posture” to check the explanations. Make to work on with the emergency stop activated when moving the axes with hand.
Click on the “OK” button after the work is finished.

<For 4-Axis Type>



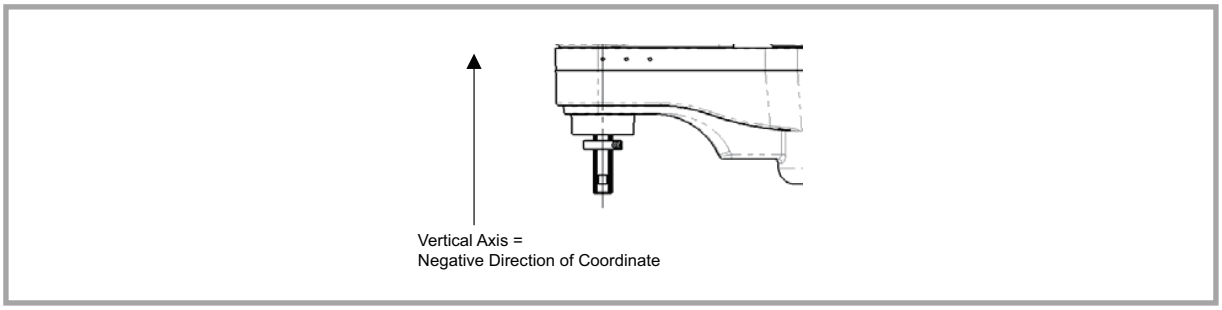
<For 3-Axis Type>



[Initial posture]

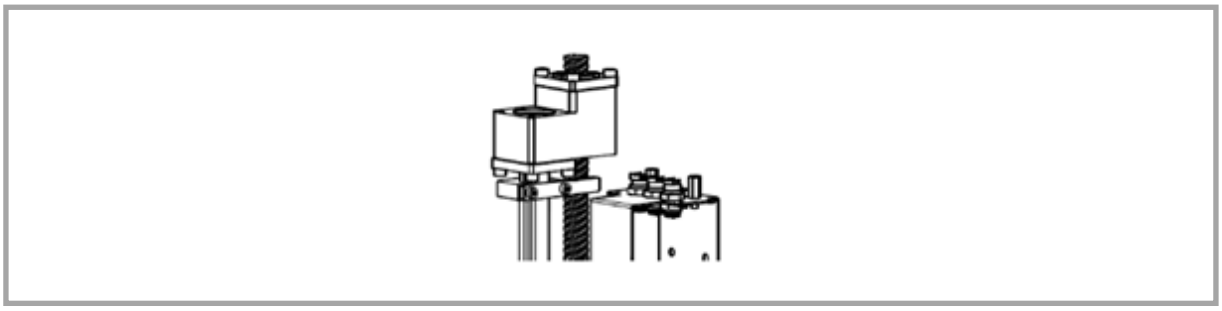
⊙ Vertical Axis

For the position, put it apart from the coordinate 0mm (upward end) for 10mm or more.
Setting it at 10mm or less, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.



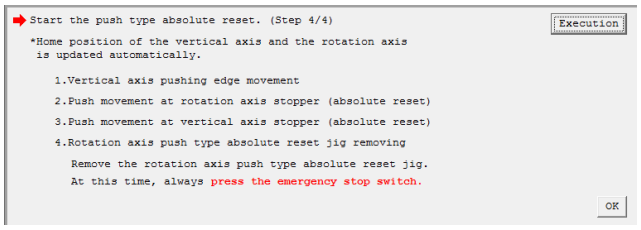
⊙ Rotation Axis (For 4-Axis Type Only)

For the position, put it apart from the stopper position for 10deg or more.
Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

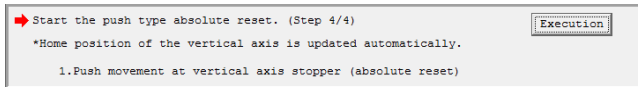


5 Click “Execution” button.

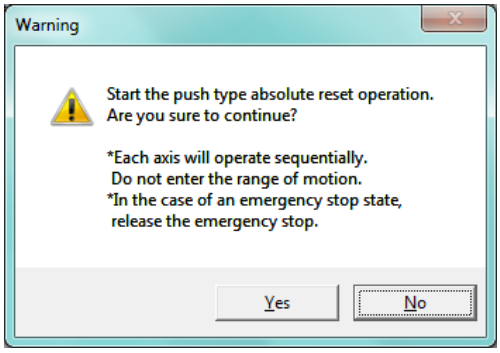
<For 4-Axis Type>



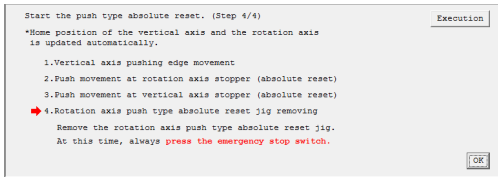
<For 3-Axis Type>



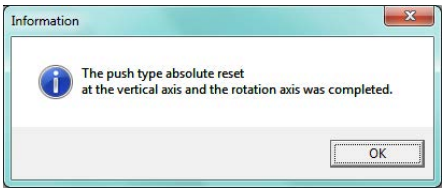
6 A Warning window shows up. Click “Yes”. The operation for the push type absolute reset starts.



7 For the four-axis type, press Execution and proceed to “Removing”, and then take off the rotary axis pressing absolute reset jig. At this time, make sure the work is conducted with the emergency stop activated.
Click on the “OK” button after the work is finished.



8 Once the push type absolute reset for the axis is complete, the Information window will appear.
Click “OK” button.



9 When finishing the process, click “×” on the upper right side of the window. Once the window is closed, the parameters start to be written automatically to the flash ROM, and controller is rebooted by the software reset.

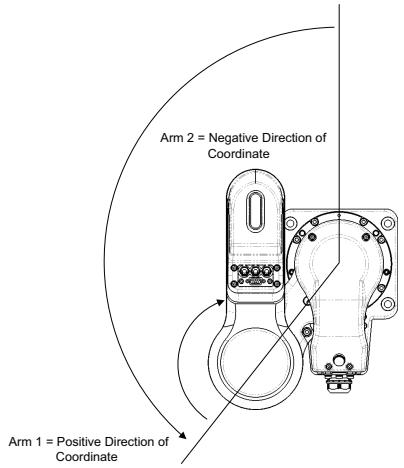
Procedure for Stopper Pressing Position Acquirement Operation

In the following case, conduct “Stopper pressing position acquirement (Note 1)” before having the absolute reset.

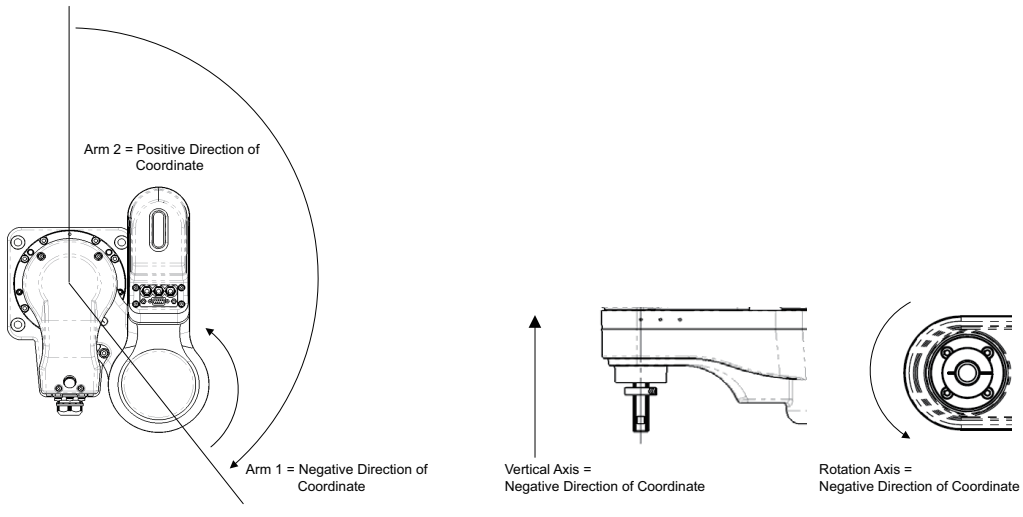
- When the absolute reset cannot be performed in the direction of the stopper interfering movement with the initial posture at the delivery from the factory due to such reasons as interference to the peripheral equipment
- There was a change in the stopper position due to such reasons as a removal of the stopper of the vertical axis

Note 1 In case that the absolute reset cannot be performed with the stopper pressing movement direction of the initial posture set at the delivery due to such as interference with peripheral devices, change the setting to the initial posture of the left arm system (stopper pressing direction on opposite side) and conduct the stopper pressing position acquirement.

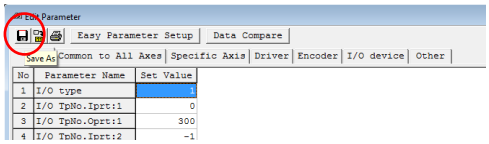
Initial Posture of Left Arm System (Opposite interfering direction)



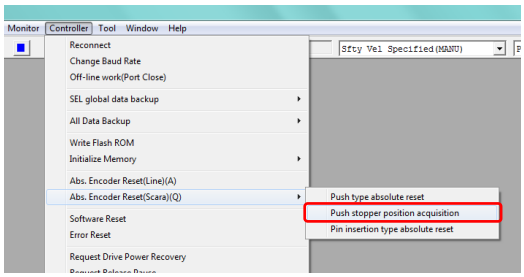
(Reference)



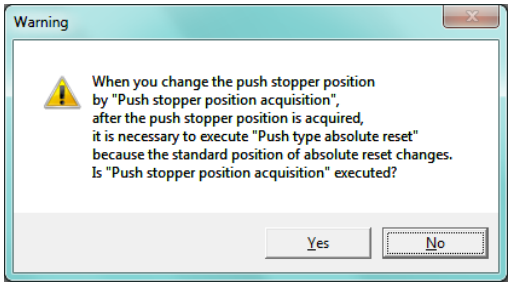
1 Backup the parameters so that they can be put back anytime to those before changing them. Select “Parameter” → “Edit” from PC Software Menu to show the Edit Parameter window.
Press the “Save As” button in the Edit Parameter window to store the parameters in the file.



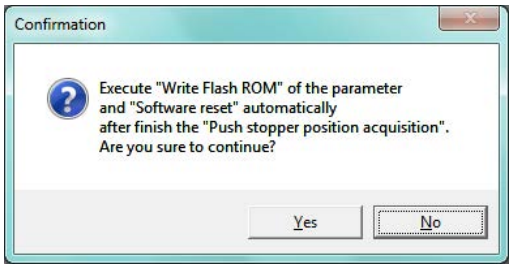
2 Select “Controller” → “Abs. Encoder Reset (Scara) (Q)” → “Push stopper position acquisition” from the menu.



3 A Warning window shows up. Click “Yes”.



4 A Confirmation window shows up. Click “Yes”.

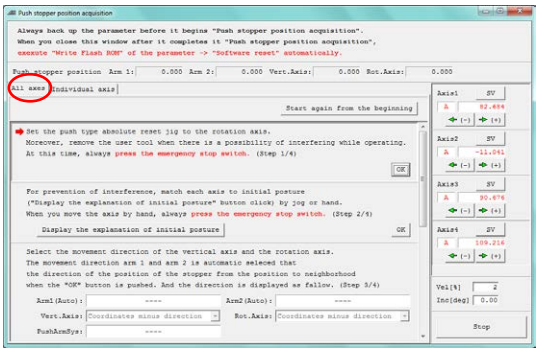


[1] When Acquiring Stopper Pressing Position for All Axes at Once

To acquire the push stopper position for all the axes at once, follow the steps shown below.

1 Select “All axes” in the Push stopper position acquisition window.

* The screenshot shows the screen for the four-axis type.
Some contents should not be displayed in the three-axis type.



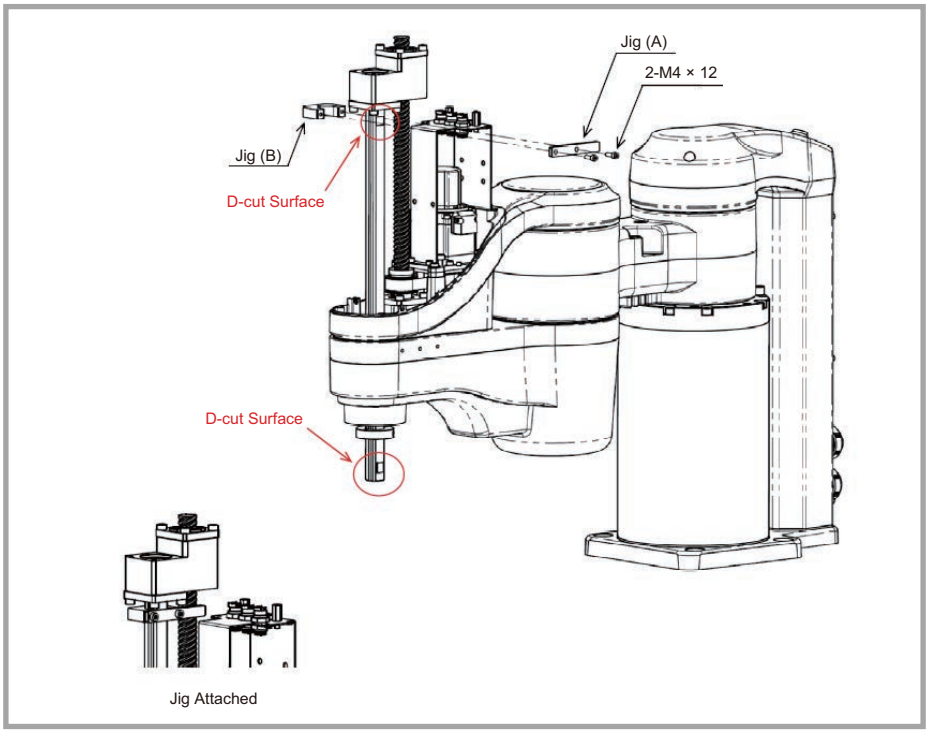
Attach the rotary axis pressing absolute reset tool for the four-axis type. (It is not necessary for the three-axis type.)
Have the work during the emergency stop condition.

Regarding the R-axis absolute reset tool, take off the spline cover, apply Jig (A) to the flat on the spline shaft and affix it to Jig (B) with screws. The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.
[For how to detach and attach the spline cover, refer to 4.6 How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis.]

Caution

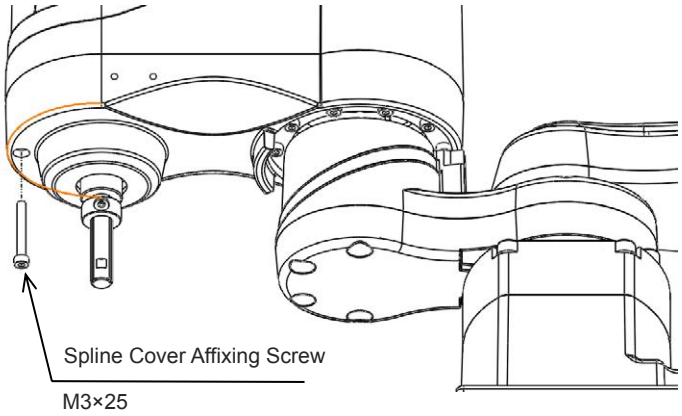
Make sure the cables and air tubes on the chucks and hands are not twisted before attaching the absolute reset jig.
The rotary axis resets the coordinates at the position that the absolute reset jig is attached. Having an absolute reset with the cables and air tubes being twisted, the coordinates will get reset with them kept twisted.
Rotating the axis should twist the cables and air tubes even more, which could cause to break cables and tubes.
If it is necessary to have the absolute reset executed with the cables and air tubes kept attached, operate the axis manually or in low speed after having the reset to make sure that there is not impact applied to the cables and tubes.
In case there is an impact, turn the rotation axis back till the twist is solved and then have the absolute reset executed again or have the cables and tubes connected again.

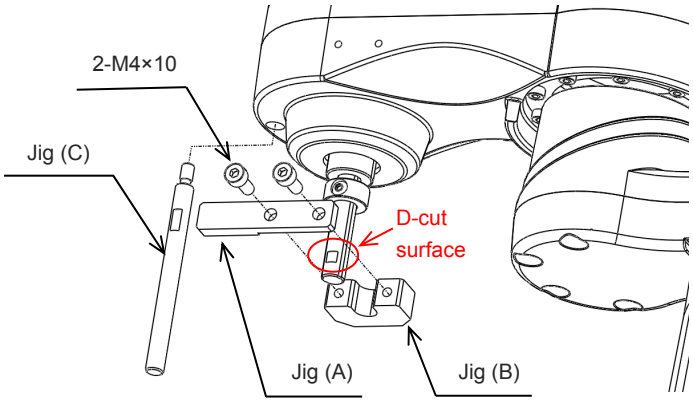
[Models Except for IXA-4NNN1805]

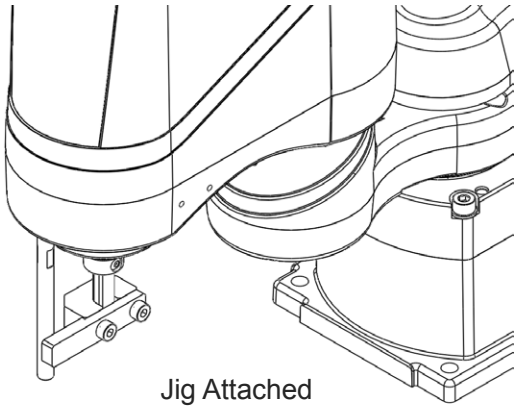


[IXA-4NNN1805]

Take off the J2 spline cover affixing screw (M3 × 25) on the bottom of the J2 main arm and attach Jig (C).
Align Jig (A) on the D-cut surface no the spline shaft and affix it with Jib (B) with screws.
The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.



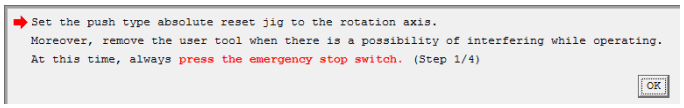




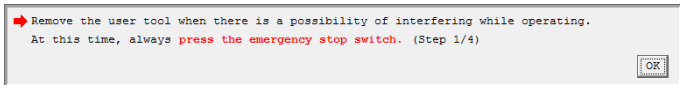
Jig Attached

2 In case there is a concern that a load may interfere with surroundings at the absolute reset, detach the load.
At this time, make sure the work is conducted with the emergency stop activated. After the work is finished, click on the “OK” button.

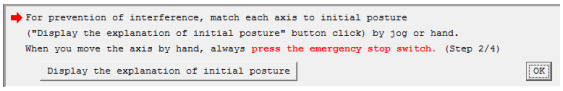
<For 4-Axis Type>



<For 3-Axis Type>



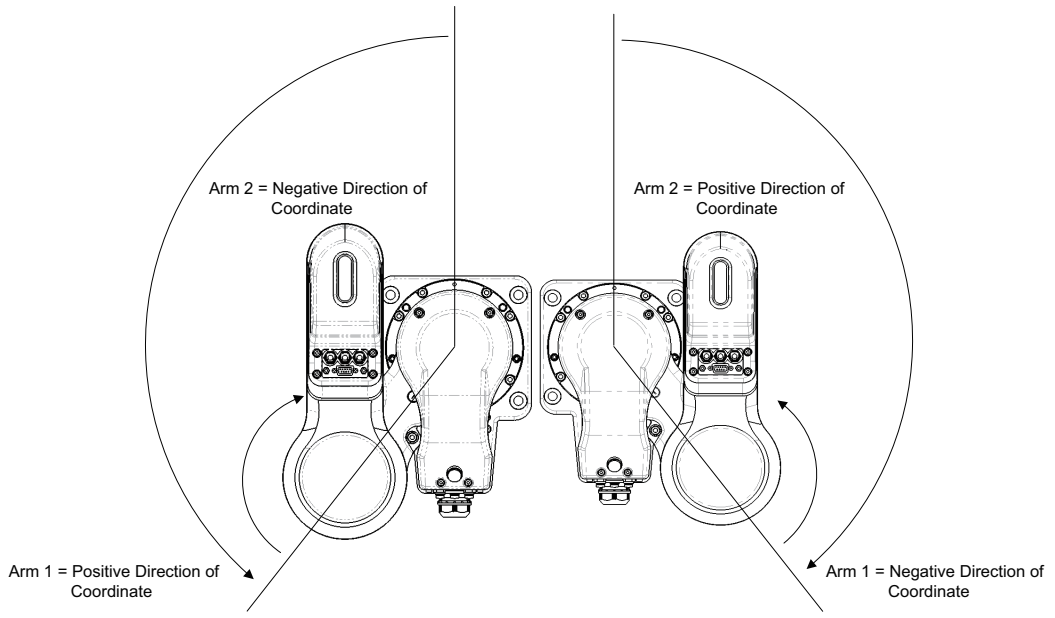
3 Adjust each axis to the initial posture.
The posture differs depending on the movement direction.
Click on “Display the explanation of initial posture” to check the explanations. Make to work on with the emergency stop activated when moving the axes with hand. Click on the “OK” button after the work is finished.



[Initial posture]

⊙ Arm 1 and Arm 2

Remove all the interferences of the peripheral devices, and set the posture to either of the left arm system or the right arm system. It is set to right arm system when the unit is shipped out.



Initial posture of left arm system	Initial posture of right arm system (At the delivery)
Arm 1 = Movement in Positive Side of Coordinate	Arm 1 = Movement in Negative Side of Coordinate
Arm 2 = Movement in Negative Side of Coordinate	Arm 2 = Movement in Positive Side of Coordinate

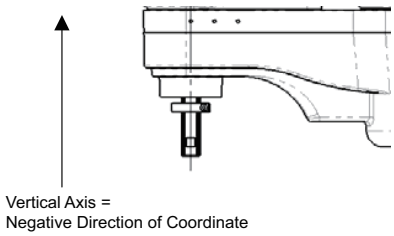
For the position, put it apart from the stopper position for 10deg or more.

Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

[Initial posture]

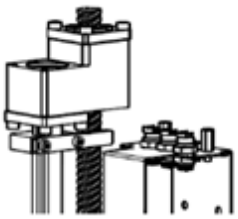
⊙ Vertical Axis

For the position, put it apart from the coordinate 0mm (upward end) for 10mm or more.
Setting it at 10mm or less, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.



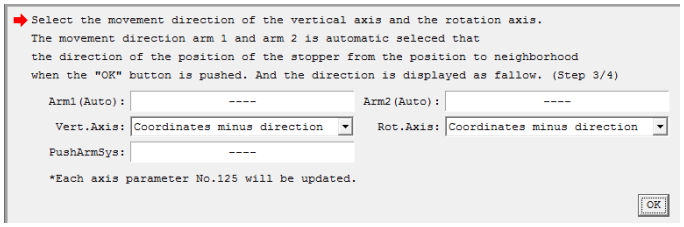
⊙ Rotation axis (For 4-Axis Type Only)

For the position, put it apart from the stopper position for 10deg or more.
Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

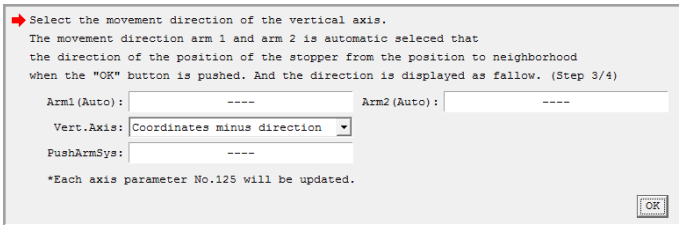


4 Select the direction to move for the vertical axis and rotation axis. It is not necessary to change the direction to move for the vertical axis and rotation axis. Make the Vert. Axis is in the Coordinates minus direction.
Once the selection is made, click on the “OK” button. At this time, the moving directions of Arm 1 (1st Arm) and Arm 2 (2nd Arm) should be automatically selected from the current position in the initial posture set in 3. Check the selected movement direction.

<For 4-Axis Type>

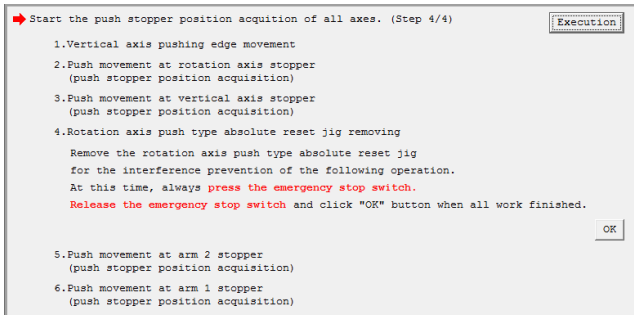


<For 3-Axis Type>

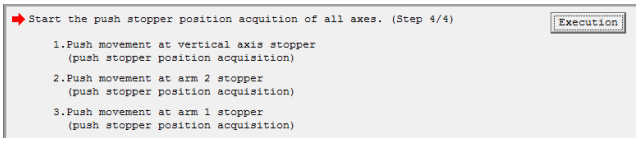


5 Click on the “Execution” button.

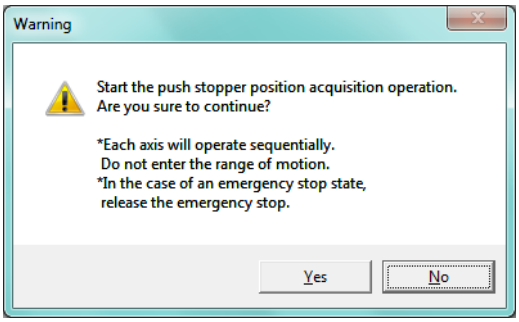
<For 4-Axis Type>



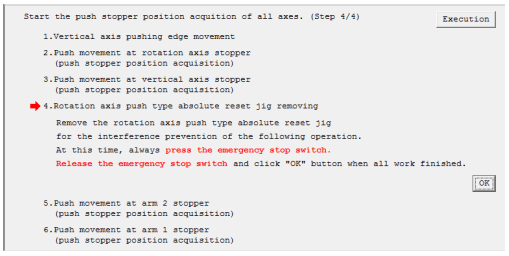
<For 3-Axis Type>



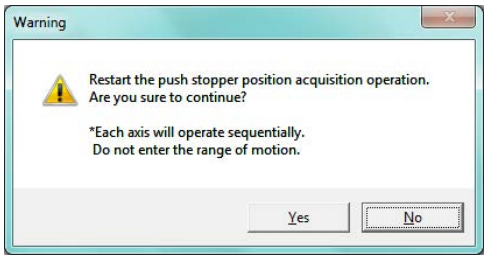
6 A Warning window shows up. Click “Yes”. Process to acquire the push stopper position will start.



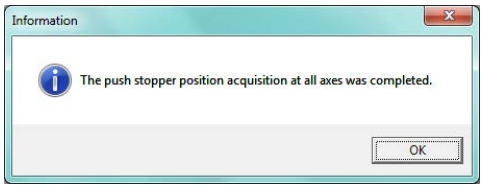
7 For the four-axis type, press Execution and proceed to “Removing”, and then take off the rotary axis pressing absolute reset jig. At this time, make sure the work is conducted with the emergency stop activated.
Click on the “OK” button after the work is finished.



8 For the four-axis type, a Warning window will be displayed. Click “Yes”.
Operation for the stopper pressing position acquirement will be resumed.



9 Once the push stopper position acquirement for all the axes is complete, the Information window will appear.
Click “OK” button.



10 Close the Push stopper position acquisition window by clicking “×” on the upper right side of the window. Once the window is closed, the parameters start to be written automatically to the flash ROM, and controller is rebooted by the software reset.

11 Once the controller reboot is finished, conduct the push type absolute reset on all the axes together.

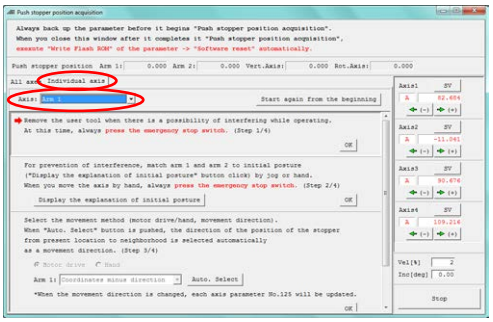
[2] When Acquiring Stopper Pressing Position on Each Axis One by One

Follow the steps below if it is necessary to acquire the stopper pressing position separately for each axis.

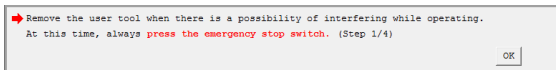
(1) 1st Arm and 2nd Arm

1 Select “Individual axis” in the Push stopper position acquisition window, and set Axis to “Arm 1” (or Arm 2).

* The screenshot shows the screen for the four-axis type. Some contents should not be displayed in the three-axis type.

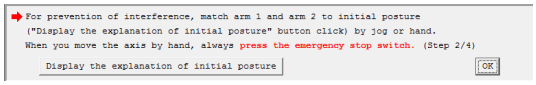


2 In case there is a concern that a load may interfere with surroundings at the absolute reset, detach the load. At this time, make sure the work is conducted with the emergency stop activated. After the work is finished, click on the “OK” button.



3 Adjust 1st Arm and 2nd Arm to the initial posture. The posture differs depending on the movement direction. Click on “Display the explanation of initial posture” to check the explanations.

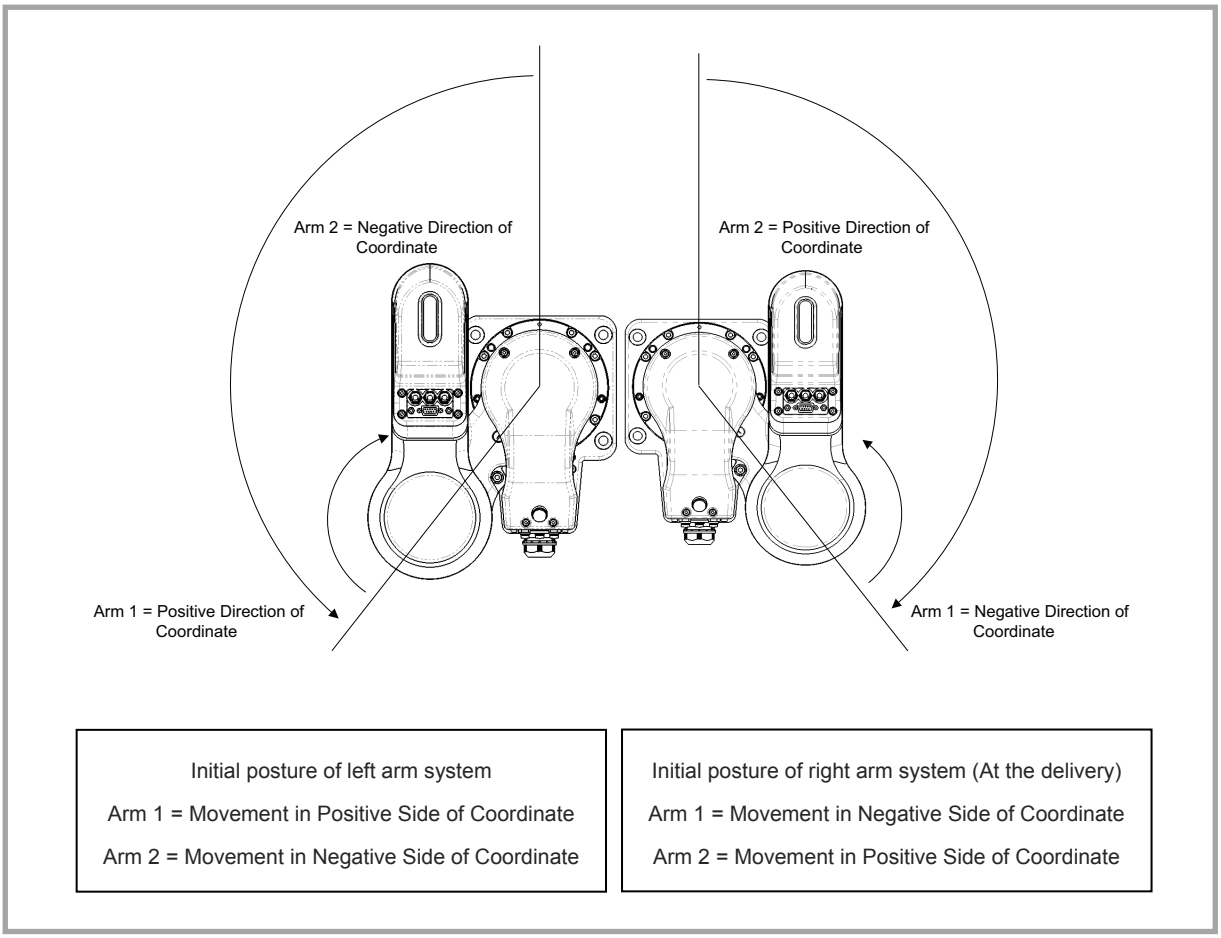
Make to work on with the emergency stop activated when moving the axes with hand. Click on the “OK” button after the work is finished.



[Initial posture]

⊙ Arm1 and Arm 2

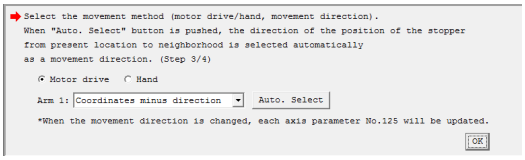
Remove all the interferences of the peripheral devices, and set the posture to either of the left arm system or the right arm system. It is set to right arm system when the unit is shipped out.



For the position, put it apart from the stopper position for 10deg or more.

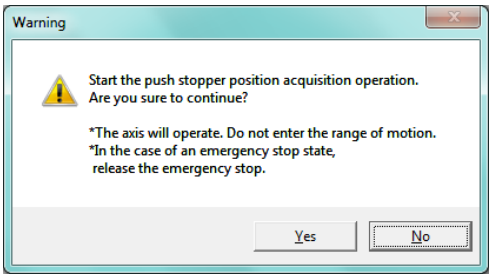
Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

4 Select the movement method. Make to select Motor drive on the selection of motor drive/hand. Change the movement direction if necessary. If clicking on “Auto. Select” button, the direction of movement from the current position of the initial posture is automatically selected. Once the selection is made, click on the “OK” button.

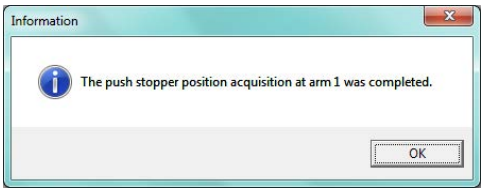


5 Click “Execution” button.

6 A Warning window shows up. Click “Yes”. Process to acquire the push stopper position will start.



7 Once the push stopper position acquisition is complete, the Information window will appear.
Click “OK” button.



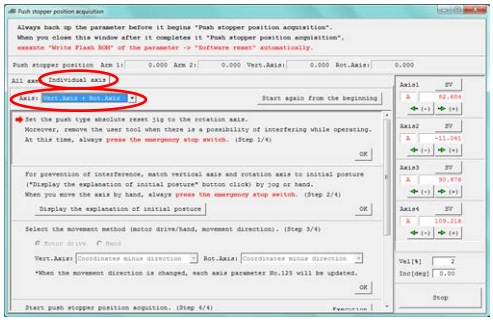
8 If it is necessary to have the push stopper position an acquisition for another axis, move on to the axis selection.
When finishing the process, click “×” on the upper right side of the Push stopper position acquisition window. Once the window is closed, the parameters start to be written automatically to the flash ROM, and controller is rebooted by the software reset.

9 Once the controller reboot is finished, conduct the push type absolute reset on the axis with the push stopper position acquisition.

(2) Vertical Axis and Rotation Axis

1 Select “Individual axis” in the Push stopper position acquisition window, and set Axis to “Vert. Axis + Rot. Axis”.

* The screenshot shows the screen for the four-axis type. Some contents should not be displayed in the three-axis type.



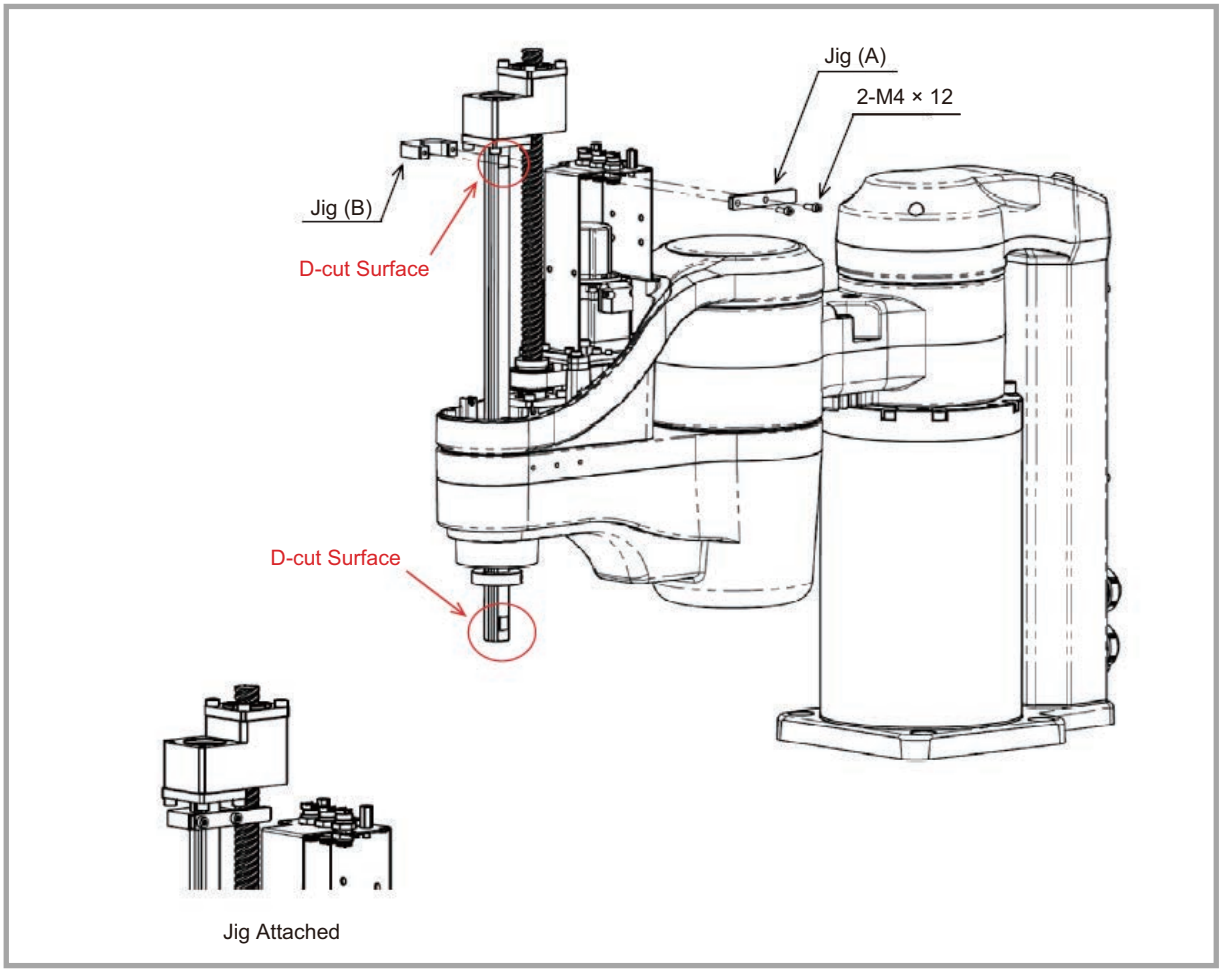
Attach the rotary axis pressing absolute reset tool for the four-axis type. (It is not necessary for the three-axis type.)
Have the work during the emergency stop condition.

Regarding the R-axis absolute reset tool, take off the spline cover, apply Jig (A) to the flat on the spline shaft and affix it to Jig (B) with screws. The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.
[For how to detach and attach the spline cover, refer to 4.6 How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis.]

Caution

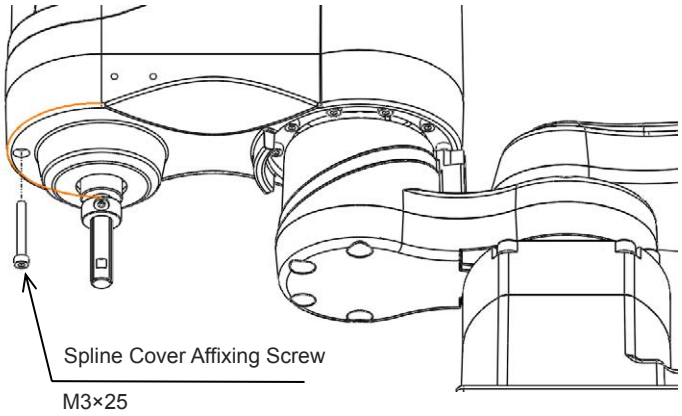
Make sure the cables and air tubes on the chucks and hands are not twisted before attaching the absolute reset jig.
The rotary axis resets the coordinates at the position that the absolute reset jig is attached. Having an absolute reset with the cables and air tubes being twisted, the coordinates will get reset with them kept twisted.
Rotating the axis should twist the cables and air tubes even more, which could cause to break cables and tubes.
If it is necessary to have the absolute reset executed with the cables and air tubes kept attached, operate the axis manually or in low speed after having the reset to make sure that there is not impact applied to the cables and tubes.
In case there is an impact, turn the rotation axis back till the twist is solved and then have the absolute reset executed again or have the cables and tubes connected again.

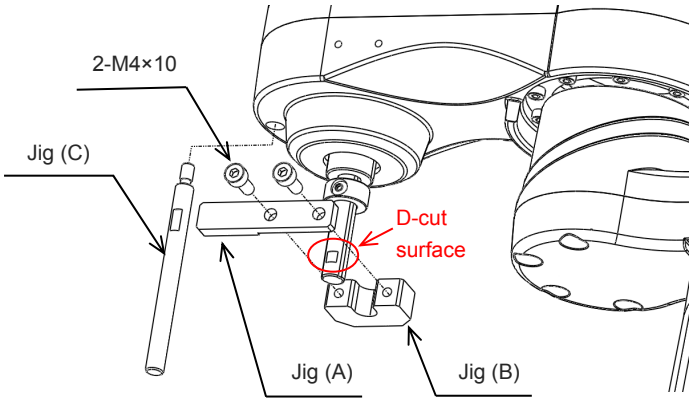
[Models Except for IXA-4NNN1805]

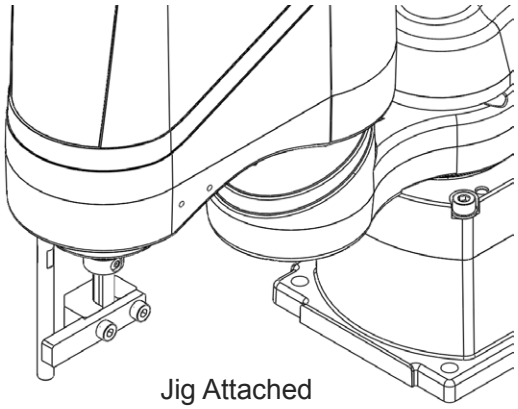


[IXA-4NNN1805]

Take off the J2 spline cover affixing screw (M3 × 25) on the bottom of the J2 main arm and attach Jig (C).
Align Jig (A) on the D-cut surface no the spline shaft and affix it with Jib (B) with screws.
The position where Jig (A) is attached on the ball screw becomes the home position of the R-axis. Pay attention to the orientation of the flat surface on the spline shaft.



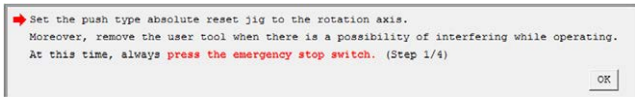




Jig Attached

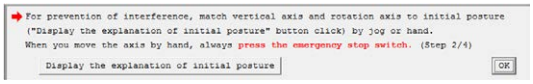
2 In case there is a concern that a load may interfere with surroundings at the absolute reset, detach the load. At this time, make sure the work is conducted with the emergency stop activated. After the work is finished, click on the “OK” button.

<For 4-Axis Type>



<For 3-Axis Type>

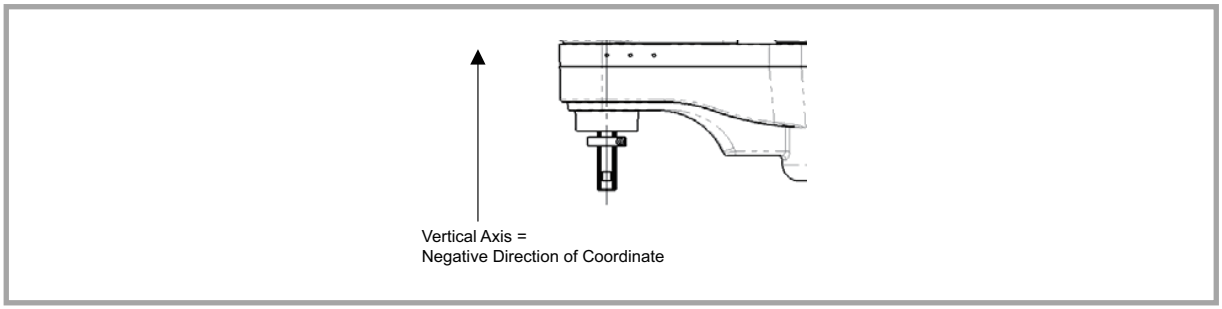
3 Adjust vertical axis to the initial posture. The posture differs depending on the movement direction.
Click on “Display the explanation of initial posture” to check the explanations. Make to work on with the emergency stop activated when moving the axes with hand. Click on the “OK” button after the work is finished.



[Initial posture]

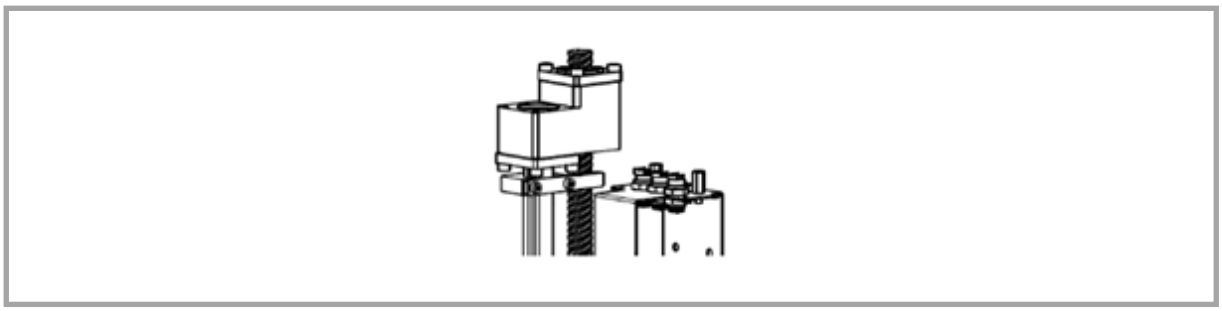
⊙ Vertical Axis

For the position, put it apart from the coordinate 0mm (upward end) for 10mm or more.
Setting it at 10mm or less, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.



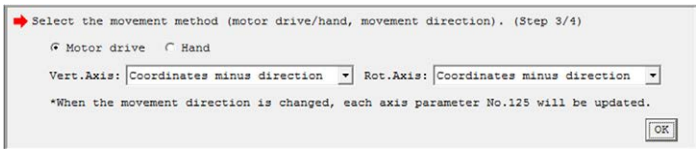
⊙ Rotation Axis (For 4-Axis Type Only)

For the position, put it apart from the stopper position for 10deg or more.
Setting it too close to the stopper, Error No. B0D “Stopper Pressing Operation Start Position Error” may occur at operation.

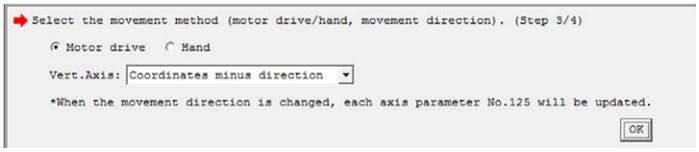


4 Select the movement method. Make to select Motor drive on the selection of motor drive/hand. It is not necessary to change the direction to move for the vertical axis and rotation axis. Make the Vert. Axis is in the Coordinates minus direction.
Once the selection is made, click on the “OK” button.

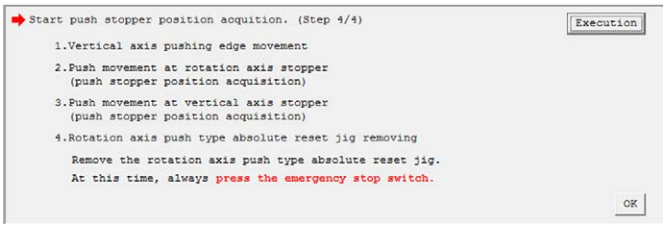
<For 4-Axis Type>



<For 3-Axis Type>

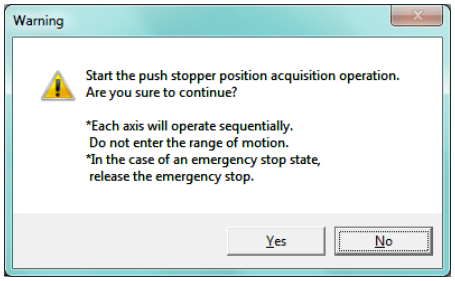


5 Click “Execution” button.
<For 4-Axis Type>

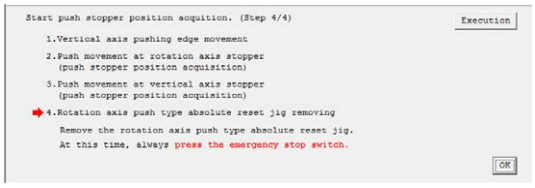


<For 3-Axis Type>

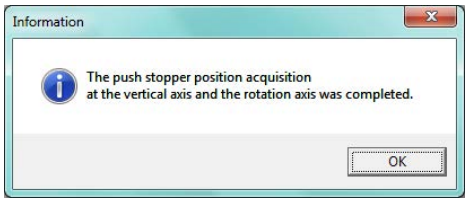
6 A Warning window shows up. Click “Yes”. Process to acquire the push stopper position will start.



7 For the four-axis type, press Execution and proceed to “Removing”, and then take off the rotary axis pressing absolute reset jig. At this time, make sure the work is conducted with the emergency stop activated. Click on the “OK” button after the work is finished.



8 Once the push stopper position acquisition is complete, the Information window will appear. Click “OK” button.



9 When finishing the process, click “×” on the upper right side of the Push stopper position acquisition window. Once the window is closed, the parameters start to be written automatically to the flash ROM, and controller is rebooted by the software reset.

10 Once the controller reboot is finished, conduct the push type absolute reset on the axis with the push stopper position acquisition.

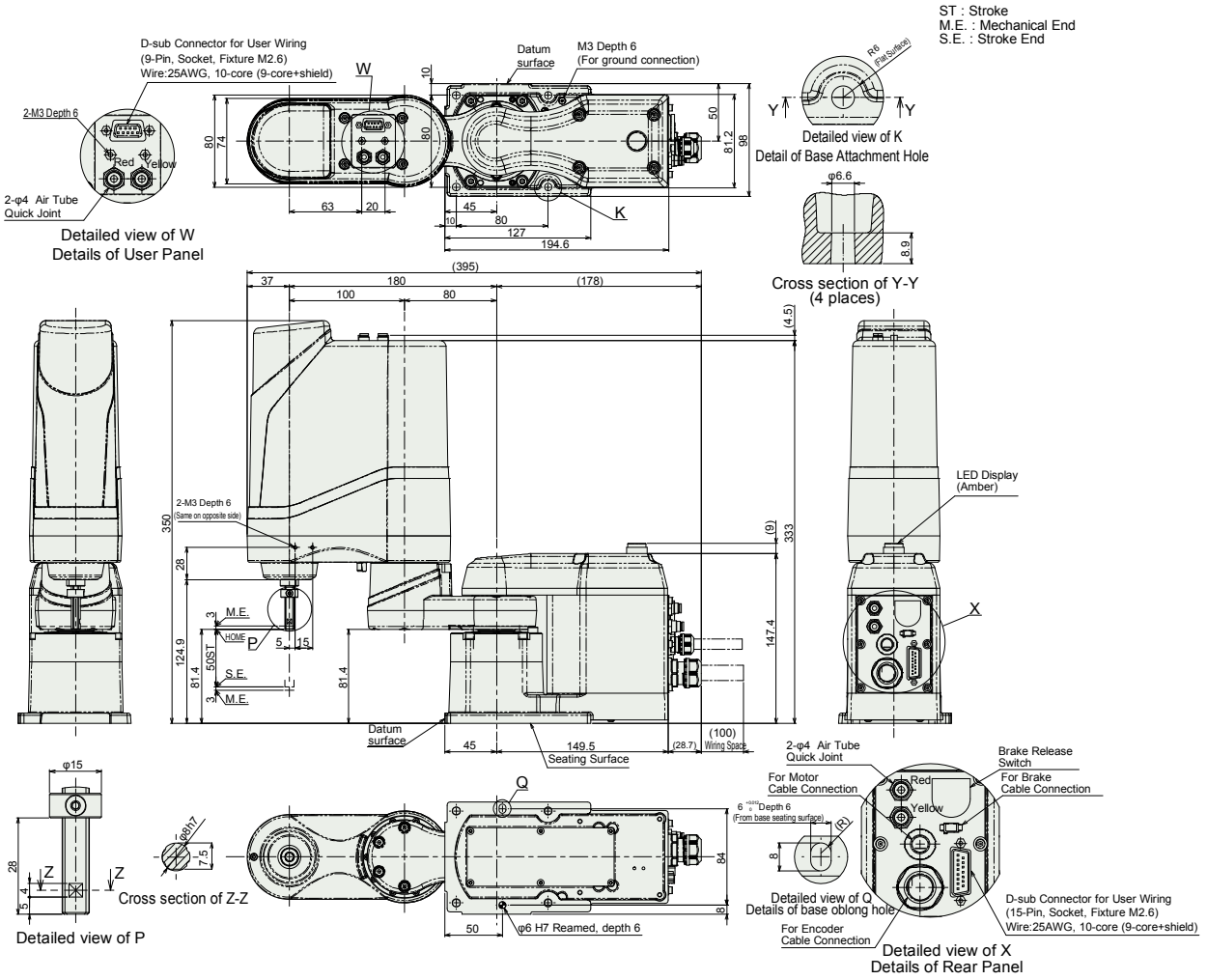
IXA SCARA Robot

Chapter 5

External Dimensions

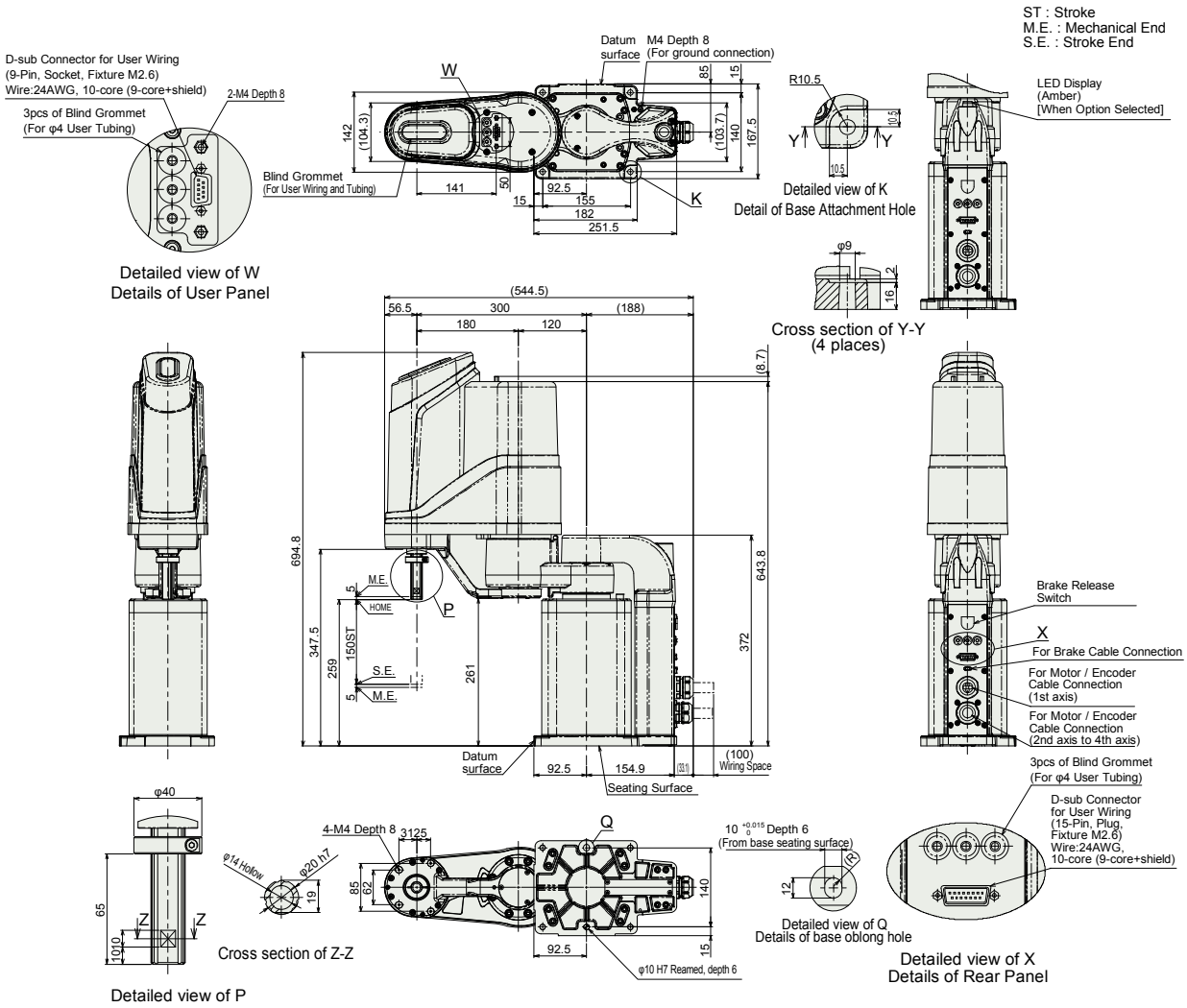
5.1 Appearance for Standard Type

IXA-□NNN1805



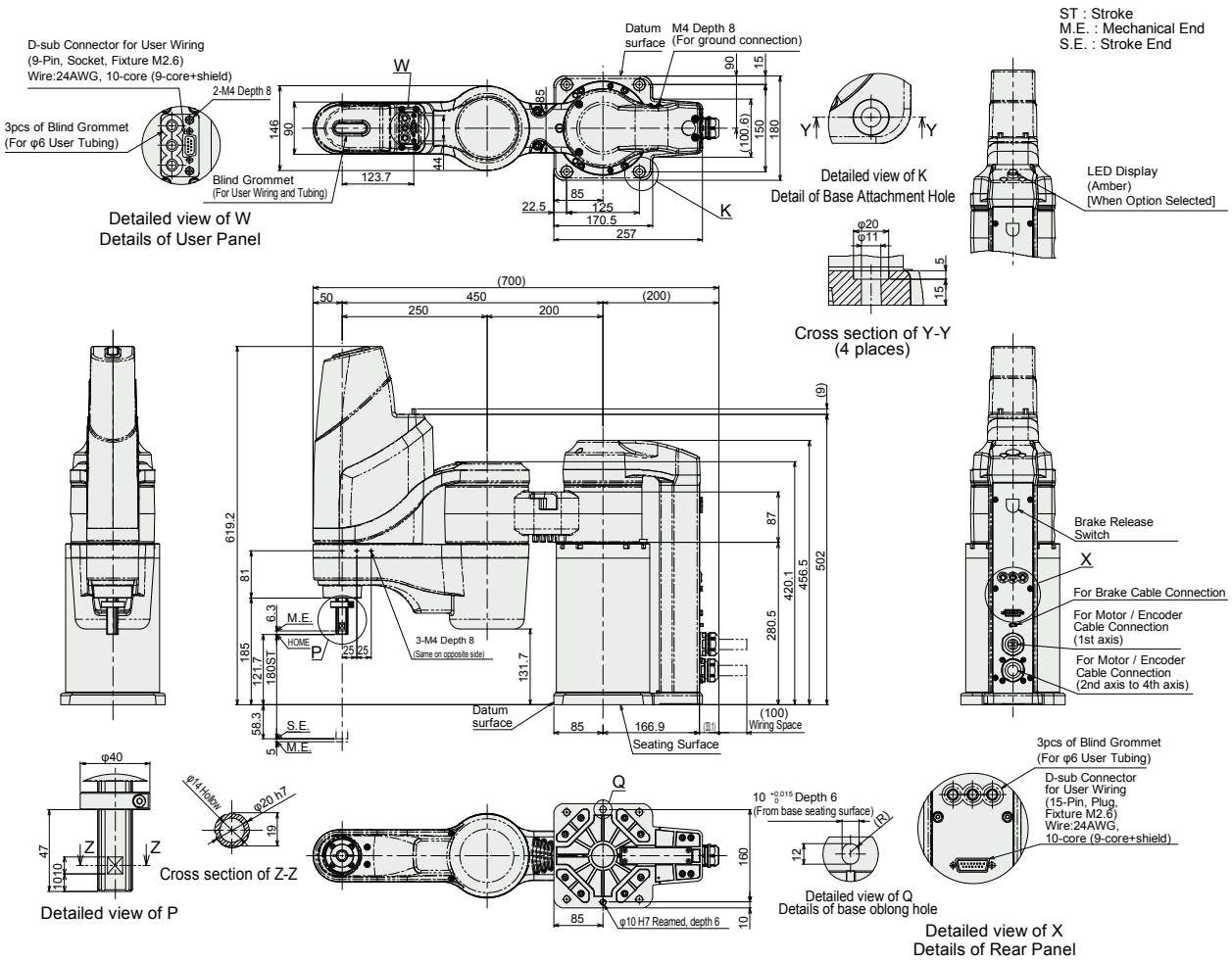
Mass	IXA-3NNN1805	5.8kg
	IXA-4NNN1805	6.2kg

IXA-□NNN3015



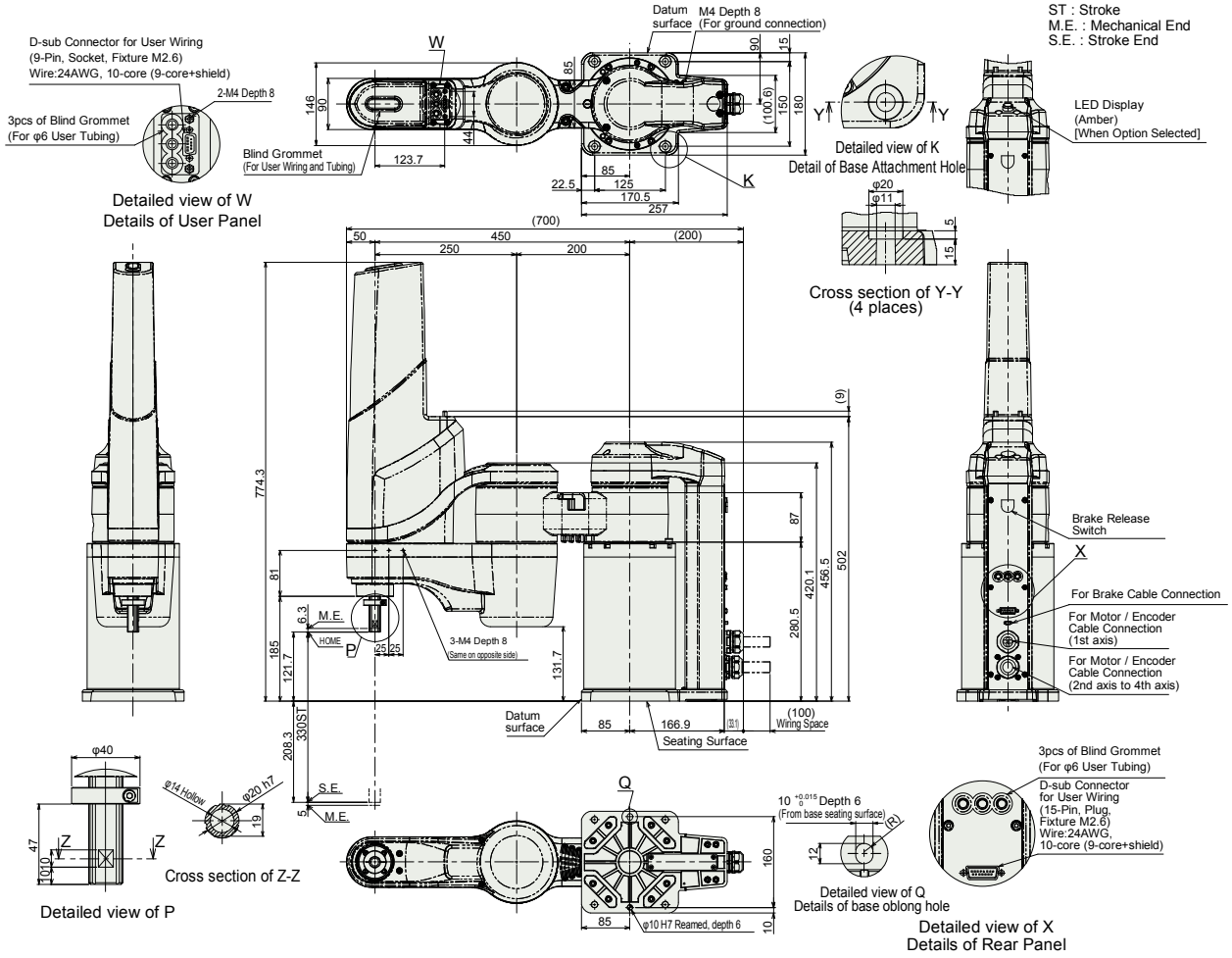
Mass	IXA-3NNN3015	21.0kg
	IXA-4NNN3015	22.0kg

IXA-□NNN4518



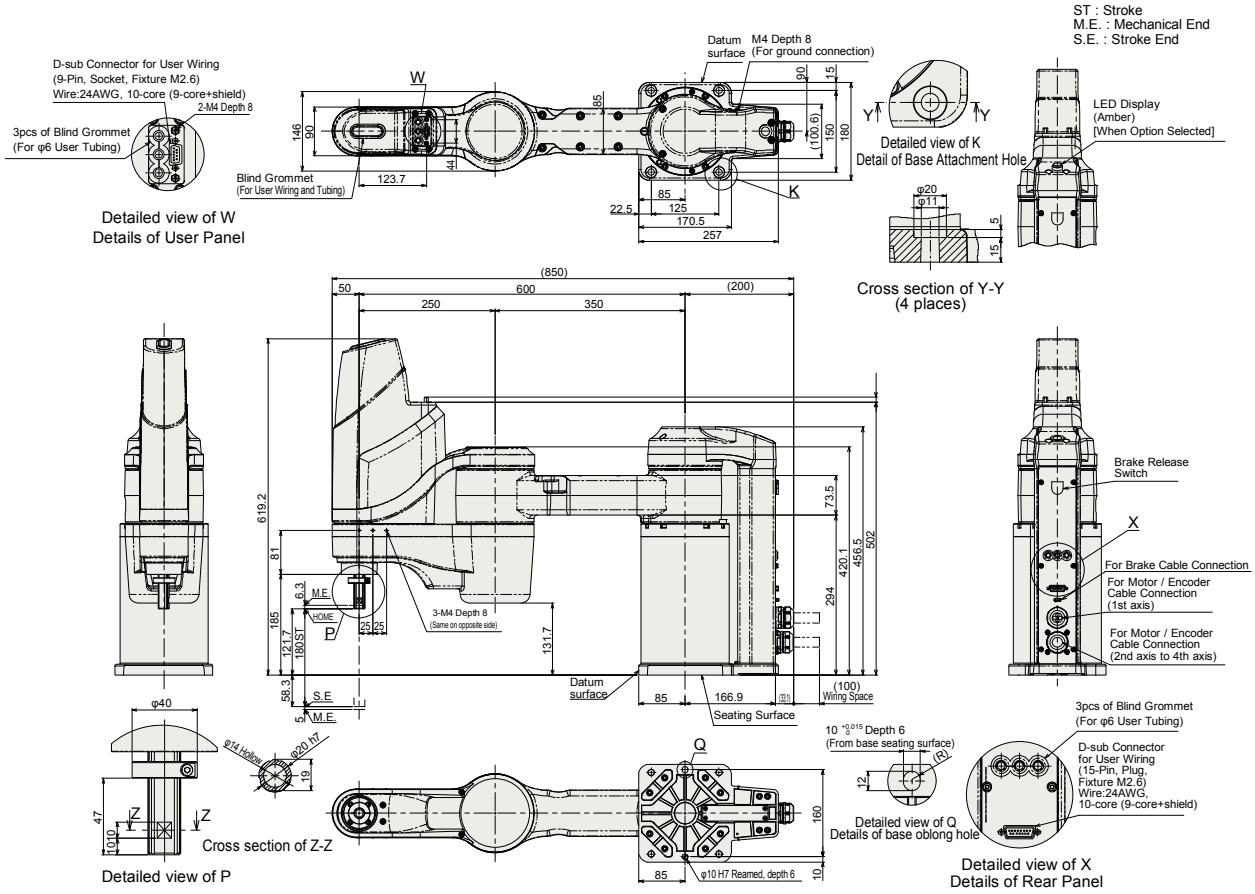
Mass	IXA-3NNN4518	25.5kg
	IXA-4NNN4518	27.0kg

IXA-□NNN4533



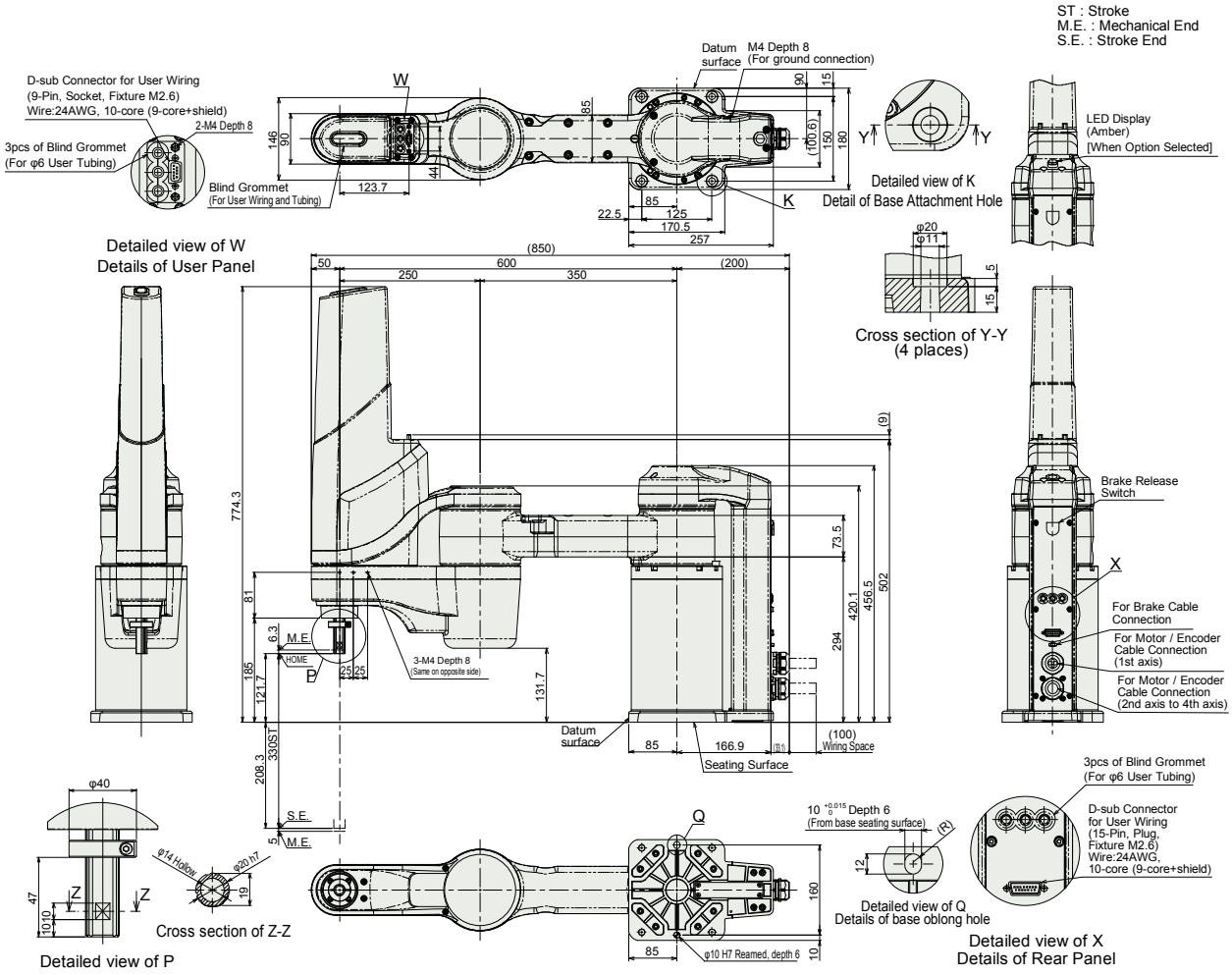
Mass	IXA-3NNN4533	26.0kg
	IXA-4NNN4533	27.5kg

IXA-□NNN6018



Mass	IXA-3NNN6018	30.5kg
	IXA-4NNN6018	32.0kg

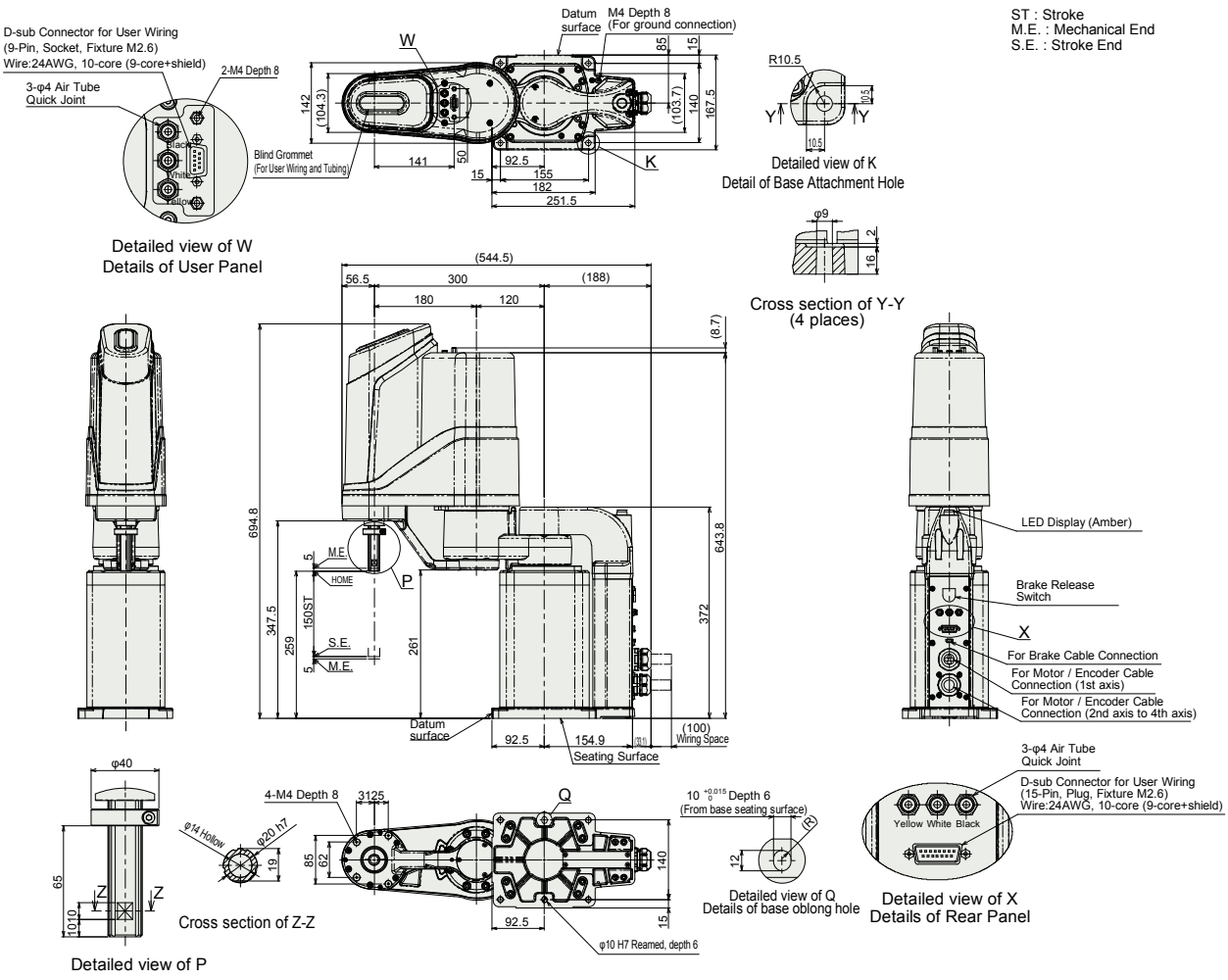
IXA-□NNN6033



Mass	IXA-3NNN6033	31.0kg
	IXA-4NNN6033	32.5kg

5.2 Appearance for High-Speed Type

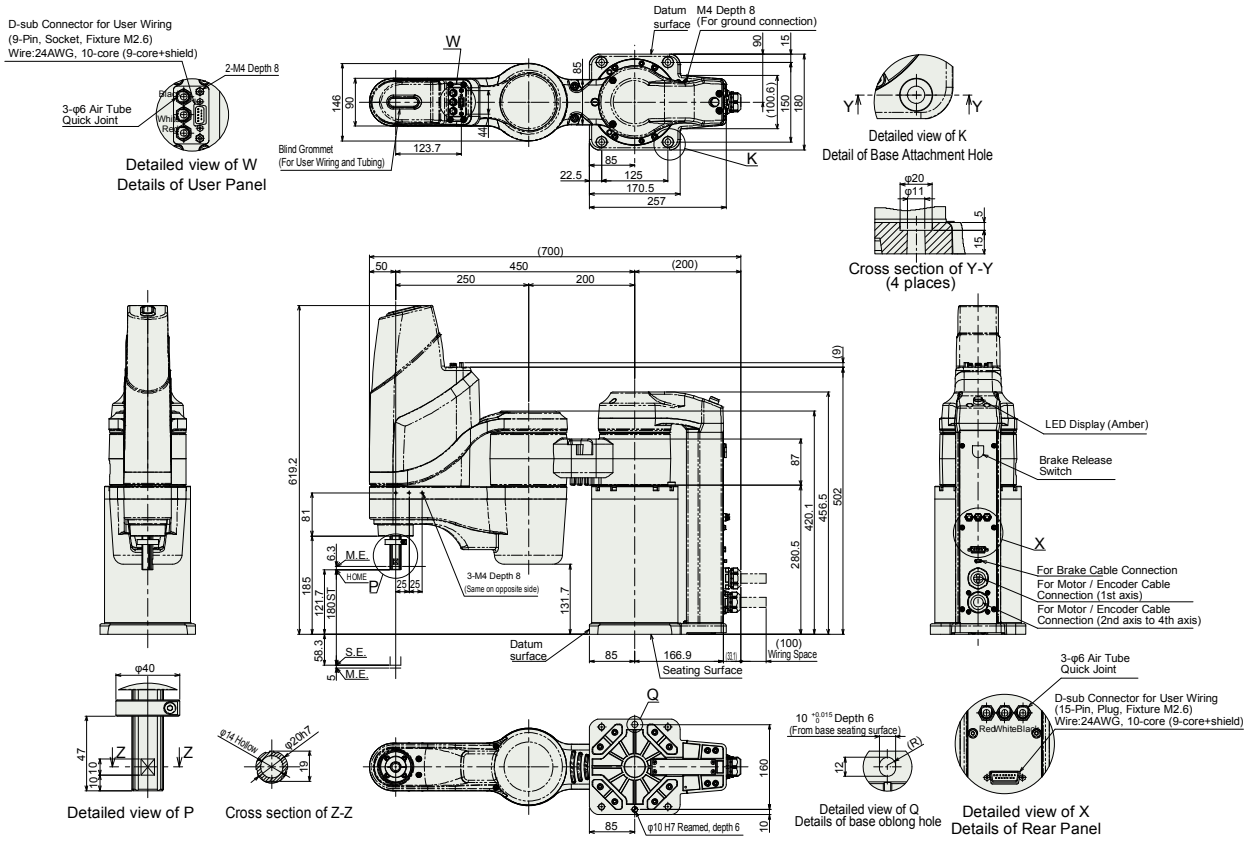
IXA-□NSN3015



Mass	IXA-3NSN3015	26.5kg
	IXA-4NSN3015	27.5kg

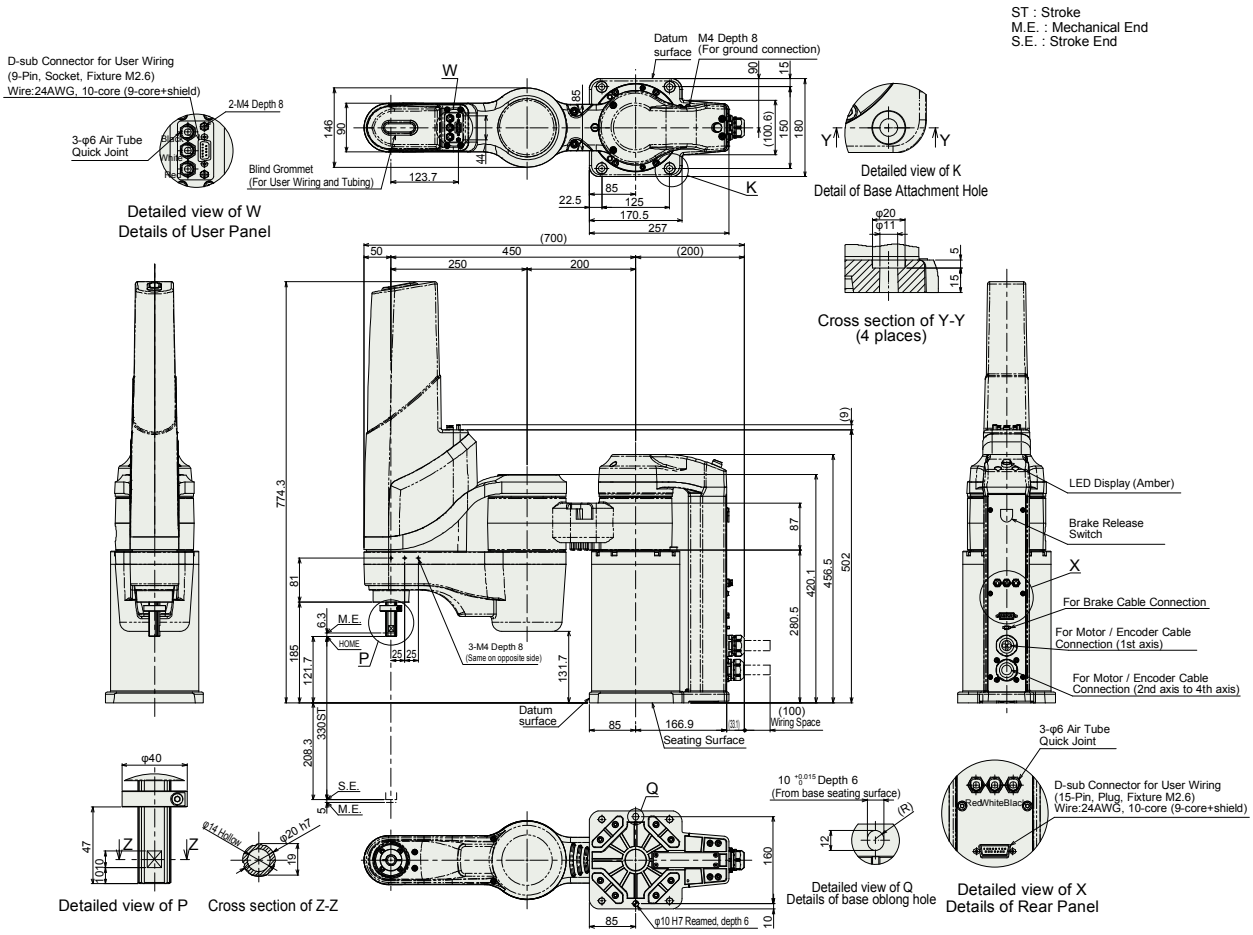
IXA-□NSN4518

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



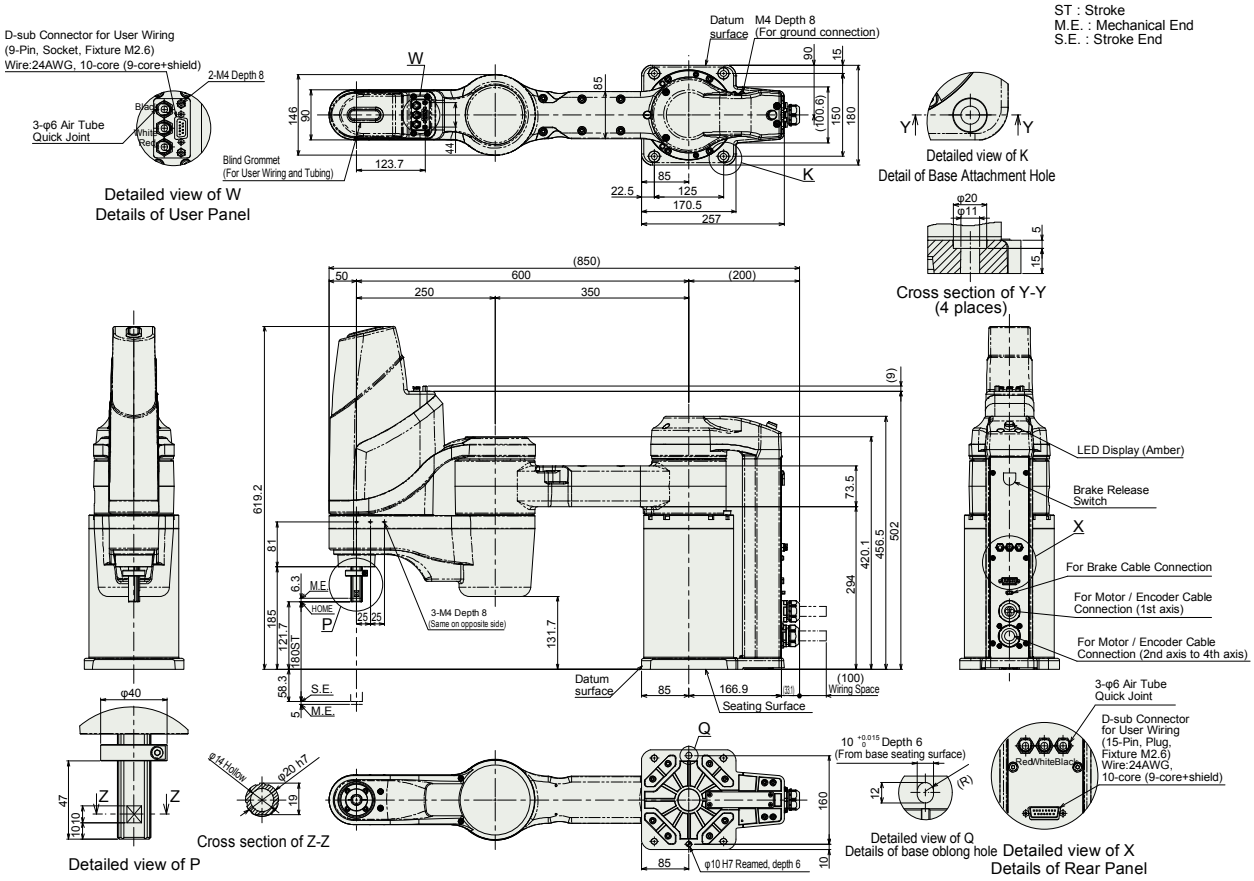
Mass	IXA-3NSN4518	31.0kg
	IXA-4NSN4518	32.5kg

IXA-□NSN4533



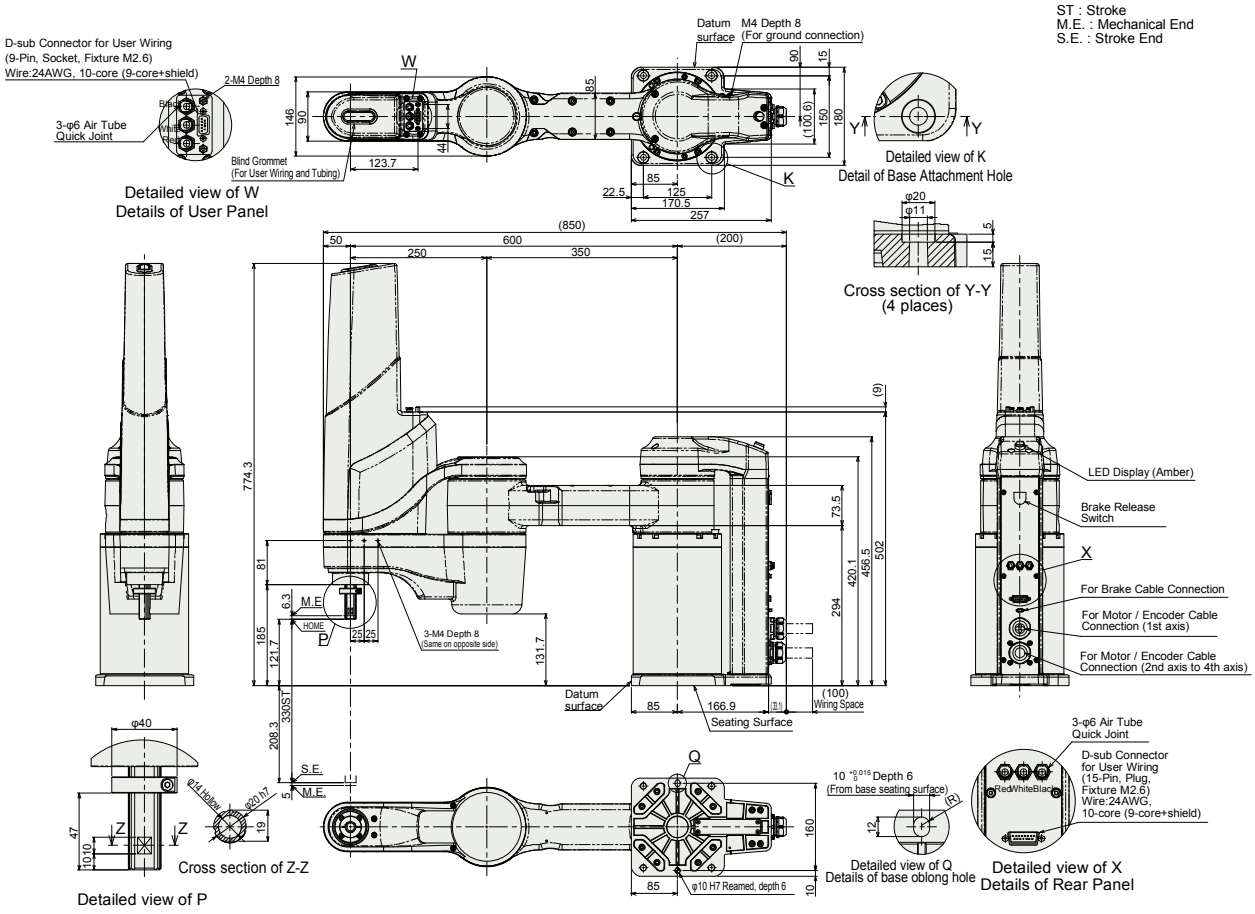
Mass	IXA-3NSN4533	31.5kg
	IXA-4NSN4533	33.0kg

IXA-□NSN6018



Mass	IXA-3NSN6018	31.5kg
	IXA-4NSN6018	33.0kg

IXA-□NSN6033



Mass	IXA-3NSN6033	32.0kg
	IXA-4NSN6033	33.5kg

IXA SCARA Robot

Chapter 6

Warranty

6.1 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

6.2 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.

6.3 Honoring the Warranty

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

6.4 Limit in Responsibility

(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.

6.5 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.

6.6 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

IXA SCARA Robot

Chapter 7

EC Declaration of Conformity

7.1 EC Declaration of Conformity

As this product is complied with Machinery Directive, hereafter attaches EC Declaration of Conformity.

IAI Quality and Innovation

IAI CORPORATION
577-1 Obane, Shimizu-Ku, Shizuoka City, Shizuoka 424-0103 Japan

EC DECLARATION OF CONFORMITY

Manufacturer:

IAI CORPORATION
577-1 Obane, Shimizu-Ku, Shizuoka City, Shizuoka 424-0103 Japan

Authorized representative within the Community:

IAI Industrieroboter GmbH
Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany

Hereby declares that the equipment described below
complies with the provisions of the below European Directives and the harmonized standards.

New SCARA Robot
(IXA series)

Models covered are shown in the next page

We can provide electronic data of relevant information on the partly completed machinery in response to a reasonable request by the national authorities.

And also we request that the partly completed machinery must not be put into service until the final machinery has been declared in conformity with the provisions of Machinery Directive.

- Machinery Directive: 2006/42/EC
  EN ISO 12100:2010, EN ISO 13849-1:2008,
  EN ISO 10218-1:2011
- EMC Directive: 2014/30/EU
  EN 55011: 2009/A1:2010, EN 61000-6-2: 2005,
  EN 61000-3-2: 2014, EN 61000-3-3: 2013
  EN 61000-3: 2004/A1: 2012
- RoHS Directive: 2011/65/EU
  EN 50581: 2012

Done at Shizuoka, Japan,

On 8. Jul. , 2019

President Toru Ishida

ORIGINAL

Declaration of Conformity for IXA SCARA Ver.003 Page 1 of 2

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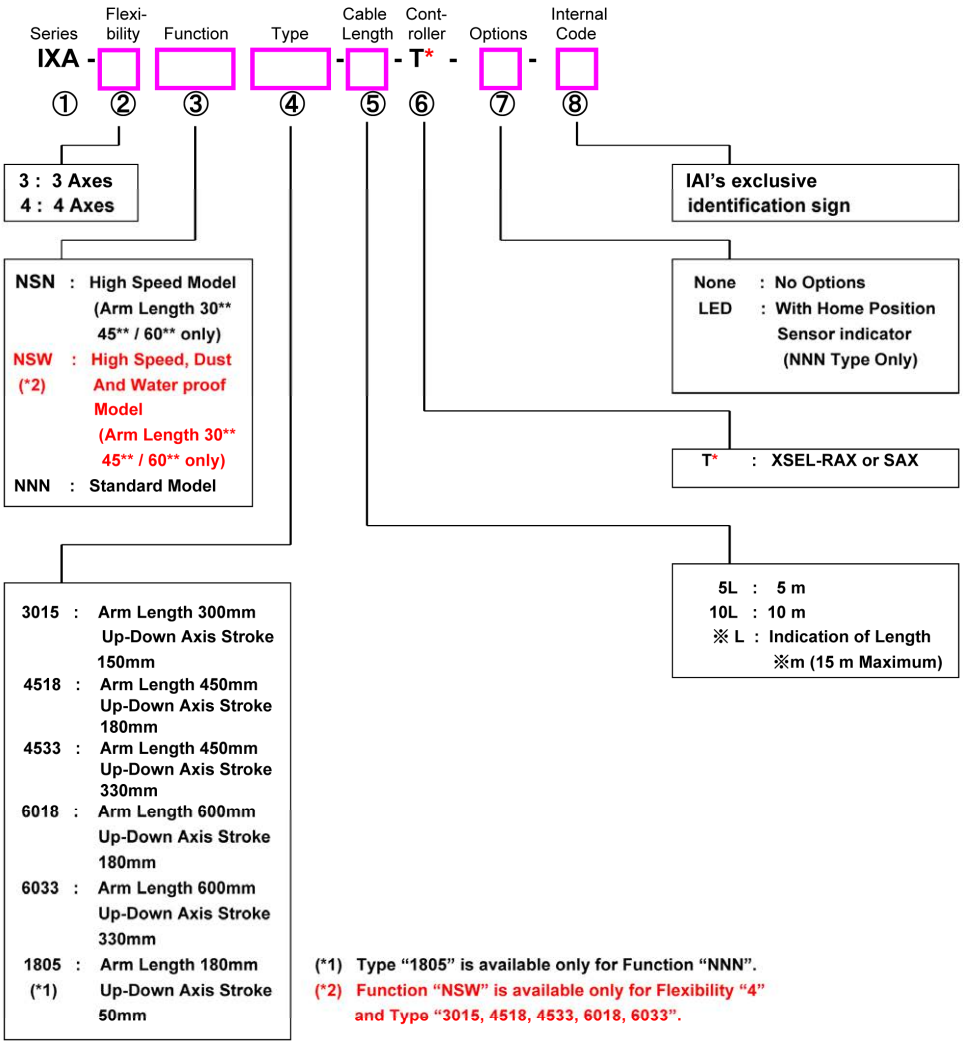
IXA Series



(*1) Type "1805" is available only for Function "NNN".
(*2) Function "NSW" is available only for Flexibility "4" and Type "3015, 4518, 4533, 6018, 6033".

IXA SCARA Robot

Chapter 8

Appendix

8.1 Index

8.2 Revision History

Revision Date	Revision Contents
2017.12	First Edition
2018.02	1B Edition • Pg. 1-36, 4-79 Model code changed to JG-IXA1 • Pg. 5-1, 5-6 Dimension added for attachment holes
2018.03	1C Edition • Pg. 1-21 Change Graphs
2018.03	1D Edition • Pg. 1-11 Caution note added for pressing velocity • Pg. 1-19 Contents added for optimum acceleration/deceleration feature
2018.05	1E Edition 4.8 How to Replace Components Change made to procedures for belt replacement and motor replacement Change made to model codes individuals of replacement belt and replacement motor
2018.09	1F Edition • Pg. 3-7 Description added for +24V power supply to brake.
2018.11	1G Edition • Pg. 2-10 Correction made partly in contents for installation platform
2019.01	1H Edition • Pg. 3-11 Model code added for user connector on base side
2019.01	1I Edition • Pg. 1-24, 1-25 Description added stating acceleration/deceleration (G) in graph should be proportional values
2019.01	1J Edition • Pg. 1-24 Description added in graph of operation only of vertical axis (Z-axis) for IXA-□NNN45/□NSN45 stating acceleration / deceleration (G) of NNN shows proportional values
2019.03	1L Edition • Pg. 3-7 Note added for Operation on Brake Release Switch
2019.05	1M Edition • Pg. 1-3 N: None added in cable length variety in model code
2019.06	1N Edition • Pg. 1-6, 1-9 Max. Operation Speed in PTP Operation changed IXA-□NNN45□□ 1 axis 6920mm/s → 7453mm/s IXA-□NSN45□□ 1 axis 7583mm/s → 8282mm/s

Revision Date	Revision Contents
2019.10	Second Edition Contents added for IXA-□NNN1805 Chapter 7 EC Declaration of Conformity added
2020.01	2B Edition • Pg. 3-11 Note added describing user tubings on IXA-□NNN3015 are blinded with blind grommet • Pg. 4-153, 4-164, 4-172, 4-184 Caution note added for when attaching rotary axis pressing absolute reset tool

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