

# IXP

## Intelligent Actuator

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### Horizontal Articulated Robot – IXP Series PowerCon SCARA

Standard Type, Arm Length 180/250/350/450/550/650

IXP-3N1808, IXP-4N1808

IXP-3N2508, IXP-4N2508

IXP-3N3515, IXP-4N3515

IXP-3N4515, IXP-4N4515

IXP-3N5520, IXP-4N5520

IXP-3N6520, IXP-4N6520

Instruction Manual Fifth Edition





## Please Read Before Use

Thank you for purchasing our product.

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

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

This product is designed assuming that installation to the factory equipment is held by educated operators.

Please contact IAI if purposed for another use.

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.
- Using or copying all or part of this Instruction Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.



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## Safety Guide

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“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/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 Description | Description   |
|-----|-----------------------|---|
| 1   | Model Selection       | <ul style="list-style-type: none"> <li>● This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications.               <ol style="list-style-type: none"> <li>1) Medical equipment used to maintain, control or otherwise affect human life or physical health.</li> <li>2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)</li> <li>3) Important safety parts of machinery (Safety device, etc.)</li> </ol> </li> <li>● Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product.</li> <li>● Do not use it in any of the following environments.               <ol style="list-style-type: none"> <li>1) Location where there is any inflammable gas, inflammable object or explosive</li> <li>2) Place with potential exposure to radiation</li> <li>3) Location with the ambient temperature or relative humidity exceeding the specification range</li> <li>4) Location where radiant heat is added from direct sunlight or other large heat source</li> <li>5) Location where condensation occurs due to abrupt temperature changes</li> <li>6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)</li> <li>7) Location exposed to significant amount of dust, salt or iron powder</li> <li>8) Location subject to direct vibration or impact</li> </ol> </li> <li>● For the robot with an actuator used in vertical orientation, there is a lineup which is equipped with a brake in standard. In case of applying load more than the maximum transportable weight, the brake may not work and may cause an accident such as an injury or damage on the work piece. Do not attempt to use in such a condition.</li> </ul> |



| No. | Operation Description    | Description   |
|-----|--------------------------|---|
| 2   | Transportation           | <ul style="list-style-type: none"> <li>● When carrying a heavy object (approx. 20kg or more, with a caution label for heavy cargo), consider to do the work with two or more persons or to utilize equipment such as crane to avoid injury such as back pain.</li> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped.</li> <li>● Transport it using an appropriate transportation measure.<br/>The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model.</li> <li>● Do not step or sit on the package.</li> <li>● Do not put any heavy thing that can deform the package, on it.</li> <li>● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work.</li> <li>● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit.</li> <li>● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength.</li> <li>● Do not get on the load that is hung on a crane.</li> <li>● Do not leave a load hung up with a crane.</li> <li>● Do not stand under the load that is hung up with a crane.</li> </ul> |
| 3   | Storage and Preservation | <ul style="list-style-type: none"> <li>● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.</li> <li>● Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.</li> </ul>  |
| 4   | Installation and Start   | <p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> <li>● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product due to acts of God such as the earthquake and tsunami may cause damage or injury. Also, without securing the hold and fixation, operation noise may get loud due to resonance.</li> <li>● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life.</li> <li>● When using the product in any of the places specified below, provide a sufficient shield.             <ol style="list-style-type: none"> <li>1) Location where electric noise is generated</li> <li>2) Location where high electrical or magnetic field is present</li> <li>3) Location with the mains or power lines passing nearby</li> <li>4) Location where the product may come in contact with water, oil or chemical droplets</li> </ol> </li> </ul>  |

| No. | Operation Description  | Description  |
|-----|------------------------|--|
| 4   | Installation and Start | <p>(2) Cable Wiring</p> <ul style="list-style-type: none"> <li>● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool.</li> <li>● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error.</li> <li>● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error.</li> <li>● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction.</li> <li>● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product.</li> <li>● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.</li> </ul> <p>(3) Grounding</p> <ul style="list-style-type: none"> <li>● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm<sup>2</sup> (AWG20 or equivalent) or more for grounding work.</li> <li>● It is mandatory to conduct grounding for purposes of electric shock prevention, prevention for static electricity electrification, improvement of anti-noise performance and control of unnecessary electromagnetic radiation.</li> </ul> |





| No. | Operation Description  | Description  |
|-----|------------------------|--|
| 4   | Installation and Start | <p>(4) Safety Measures</p> <ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● When the product is under operation or in the ready mode, take the safety measures (The safety protection fence: Reference of 2.3.3) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury.<br/>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.</li> <li>● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation.</li> <li>● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product.</li> <li>● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input.</li> <li>● When the installation or adjustment operation is to be performed with the robot not operated, make sure to unplug the power supply cable on the controller before starting to work. Sudden power input may cause an electric shock or injury.</li> <li>● Take the measure so that the work part is not dropped in power failure or emergency stop.</li> <li>● If an operator is compelled to work in the safety protection fence, make sure to wear helmet, goggle and safety shoes to secure safety.</li> <li>● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury or damage to the product.</li> <li>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> <li>● When declaring equipment conformity to EC, put a clamp filter to the actuator cable and relay cable as necessary to comply with EMC Directive.</li> </ul> |

| No. | Operation Description | Description  |
|-----|-----------------------|--|
| 5   | Teaching              | <ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well.</li> <li>● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>● Place a sign “Under Operation” at the position easy to see.</li> <li>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> </ul> |
| 6   | Trial Operation       | <ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation.</li> <li>● Make sure to perform the programmed operation check at the safety speed. It may cause an accident due to unexpected motion caused as it is feasible to build a program to move the actuator in speed of 250mm/s or more.</li> <li>● Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.</li> </ul>  |
| 7   | Automatic Operation   | <ul style="list-style-type: none"> <li>● Have a safety protection fence if necessary to make sure nobody gets close around the actuator in automatic operation.</li> <li>● Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence.</li> <li>● Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication.</li> <li>● Make sure to operate automatic operation start from outside of the safety protection fence.</li> <li>● In the case that there is any abnormal heating, smoke, offensive smell or abnormal noise in the product, immediately turn off the power switch and unplug the power supply cable on the controller. Failure to do so may result in a fire or damage to the product.</li> <li>● When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.</li> </ul>  |

| No. | Operation Description      | Description   |
|-----|----------------------------|---|
| 8   | Maintenance and Inspection | <ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well.</li> <li>● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch.</li> <li>● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>● Place a sign “Under Operation” at the position easy to see.</li> <li>● For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model.</li> <li>● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product.</li> <li>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> <li>● The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation.</li> <li>● Pay attention not to lose the cover or untightened screws, and make sure to put the product back to the original condition after maintenance and inspection works.<br/>Use in incomplete condition may cause damage to the product or an injury.</li> </ul> |
| 9   | Modification and Dismantle | <ul style="list-style-type: none"> <li>● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.</li> </ul>  |
| 10  | Disposal                   | <ul style="list-style-type: none"> <li>● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste.</li> <li>● When removing the robot for disposal, pay attention to drop of components when detaching screws.</li> <li>● Do not put the product in a fire when disposing of it.<br/>The product may burst or generate toxic gases.</li> </ul>   |
| 11  | Other                      | <ul style="list-style-type: none"> <li>● See Overseas Specifications Compliance Manual to check whether complies if necessary.</li> <li>● This product is designed assuming that installation to the factory equipment is held by a specialist (who has read the contents of the instruction manual narrowly and understands how to use, or who has attended to the necessary trainings held by IAI).</li> <li>● Work operation in any trouble or maintenance is also allowed only to the specialists.</li> </ul>   |

## Alert Indication

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

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

## Caution in Handling

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1. Ensure use of the product in the specified conditions, environments and ranges.  
In case it is not secured, it may cause a drop in performance or malfunction of the product.
2. Do not conduct any treatment or operation that is not stated in this instruction manual.
3. It is recommended to apply our products for the wiring between the robot and the controller.
4. Positioning Repeatability Does Not Change Even If the Positioning Band is Changed.  
It would not improve the positioning accuracy repeatability even if setting the positioning band narrower than it originally was at the delivery. The change of the positioning width is to change the timing to output the positioning complete signal when a positioning is conducted. The positioning complete signal is output when the residual amount of movement gets into the range that is set as the positioning band.
5. Make sure to attach Robot properly by following this instruction manual.



**Danger:** Connect to the robot of the serial number specified on the robot designation label provided on the front panel of the controller. The controller will not operate properly if any other robot is connected. Failure to observe this warning may cause the robot to malfunction, resulting in a serious accident.

6. Make sure to connect the robot and controller with the same serial number.  
Even if the controller is a model that is applicable for the robot, a misalignment in position will occur if the serial number is not matched.
7. Do not attempt to move the vertical axis manually by hand.  
In case the vertical axis is moved by hand, excessive moment will be applied to the bearings on the J1 and J2 axes, which may cause to generate abnormal noise and vibration, malfunction or drop of the product life.  
Move it on a teaching tool such as PC, or detach the arm cover and slide the timing pulley of the vertical axis.  
[Refer to 4.3 How to Move Vertical Axis Manually]

## International Standards Compliances

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

|                             |                |
|-----------------------------|----------------|
| CE Mark Machinery Directive | RoHS Directive |
| ○                           | ○              |

○ : Complied in standard      ● : Complied with option

When you desire to declare conformity to EC with this product in your facility, this product itself is declared to conform to EC under specific conditions as described below. You can use this declaration for your facility.

### EU Directives declared for conformity to EC

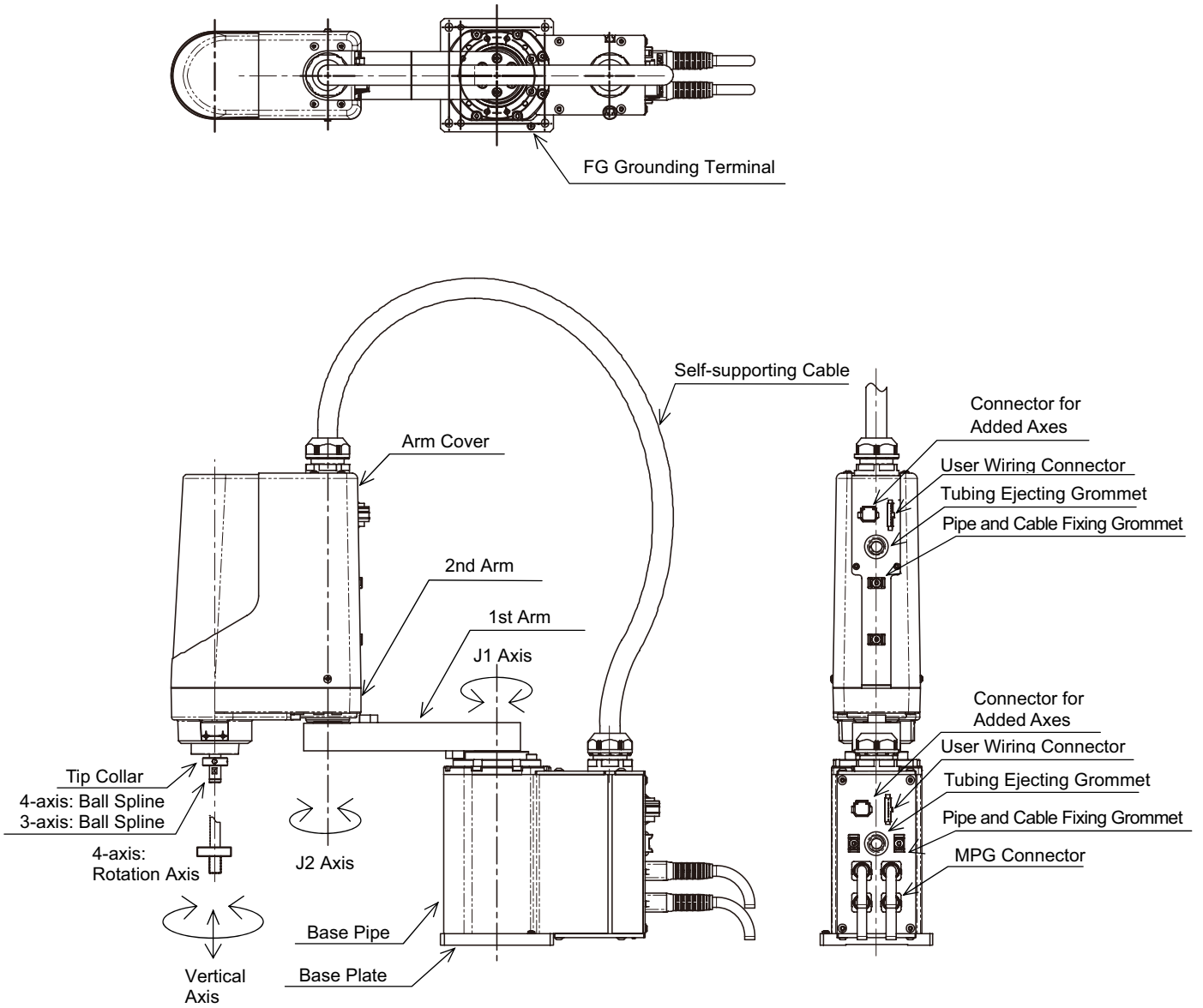
- EMC Directive (2014/30/EU)      · · · Confirm with CE mark printed on the product label
- RoHS Directive (2011/65/EU)      · · · Same as above
- Machinery Directive (2006/42/EC) · · · Confirm with attached Declaration of Conformity to EC

There is Declaration of Conformity to EC attached in Appendix 8 to prove that the product is complied with Machinery Directive.  
 This Declaration of Conformity to EC may change without any notice in case of new addition of complied models or any specification change. Please contact our sales person when you need the latest one.

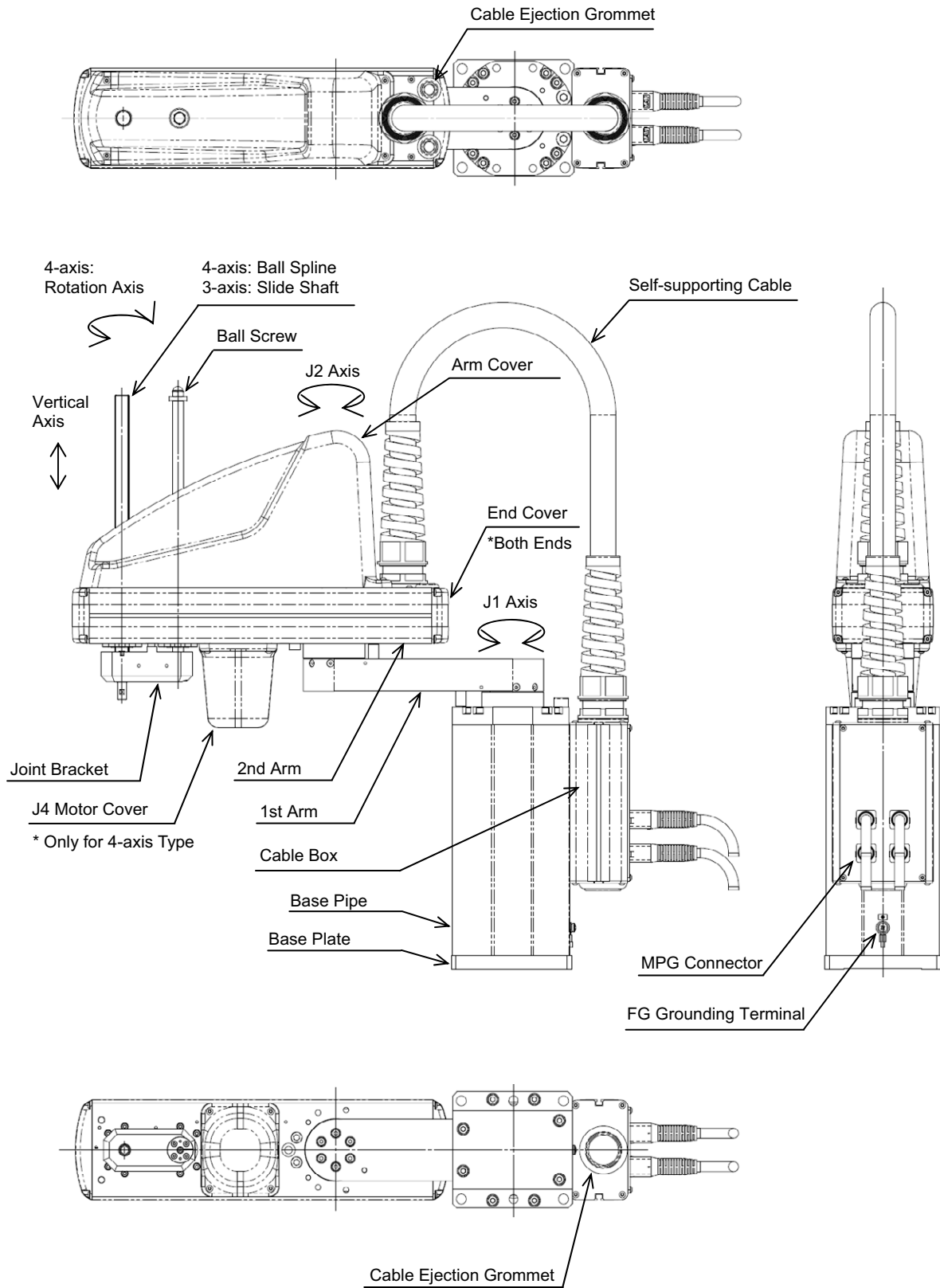


## Names of the Parts

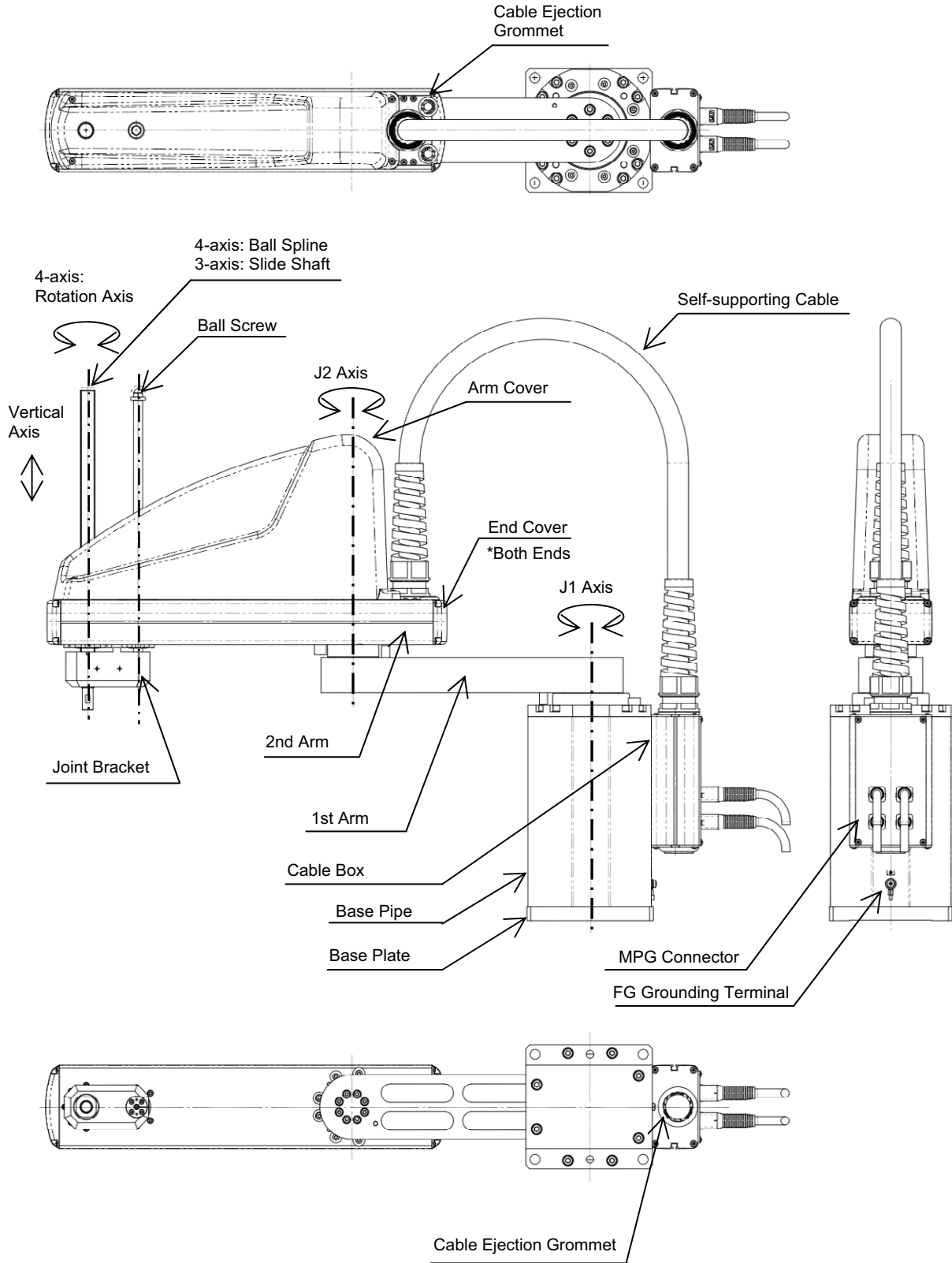
[IXP-3N1808/3N2508/4N1808/4N2508]



[IXP-3N3515/3N4515/4N3515/4N4515]



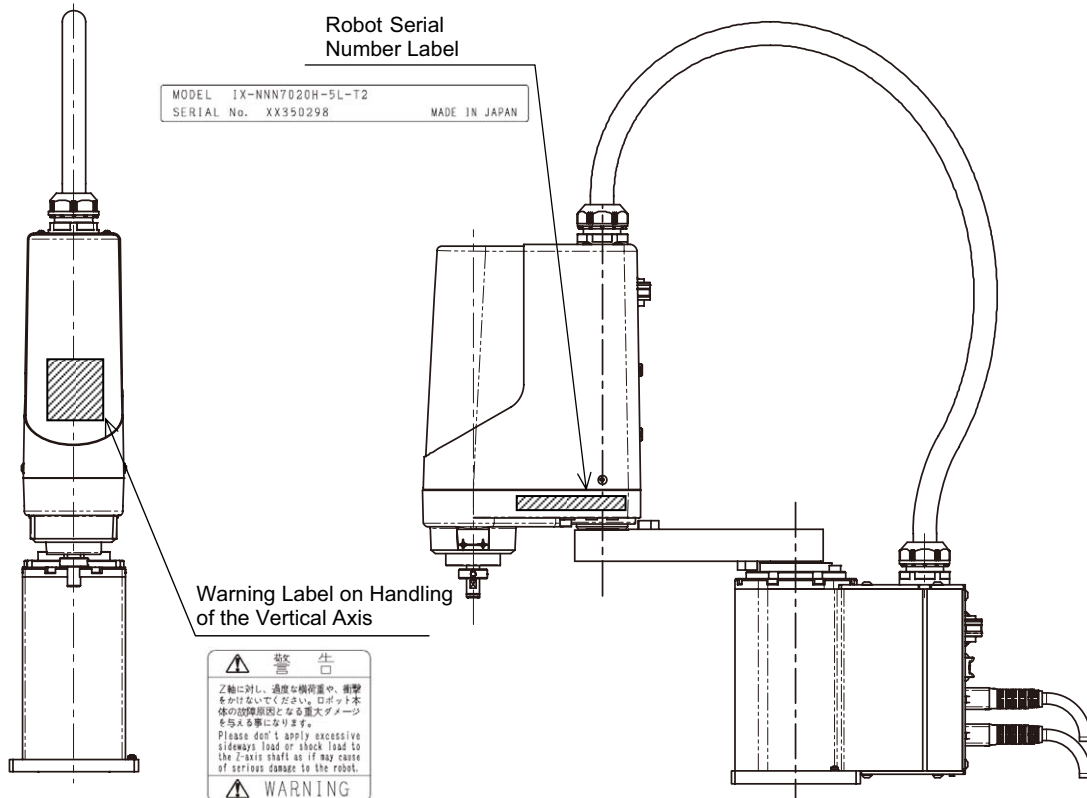
[IXP-3N5520/3N6520/4N5520/4N6520]



[Labels]

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.

[IXP-3N1808/3N2508/4N1808/4N2508]

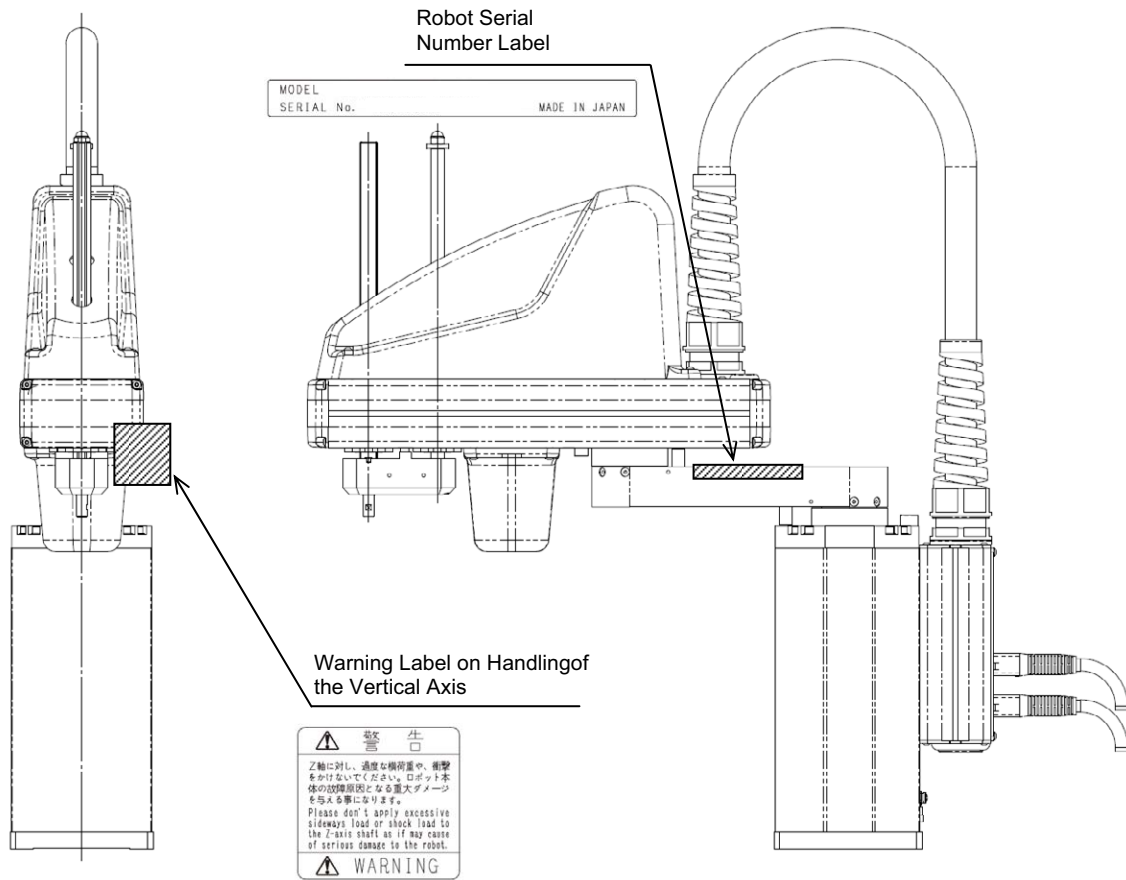


Prohibition Label of Entry into the Operation Area



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

[IXP-3N3515/3N4515/4N3515/4N4515]

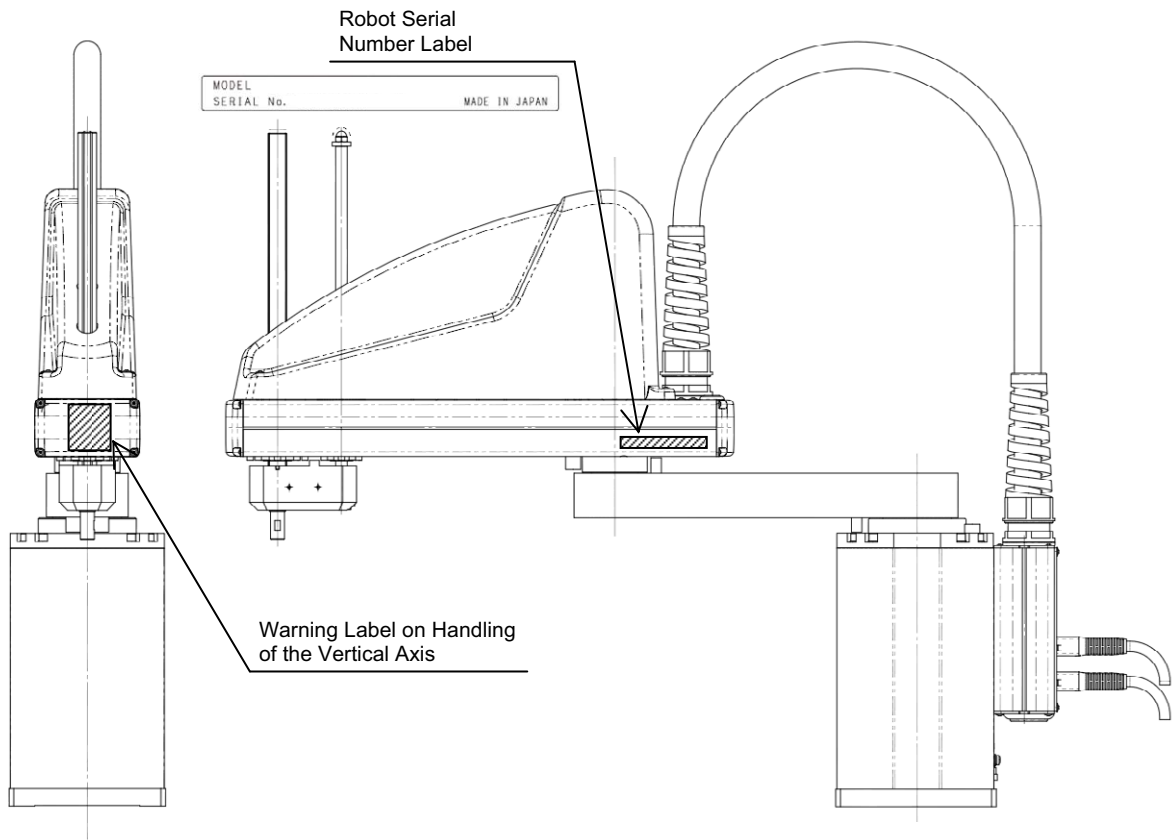


Prohibition Label of Entry into the Operation Area



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

[IXP-3N5520/3N6520/4N5520/4N6520]



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. Specifications Check

### 1.1 Product Check

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

#### 1.1.1 Parts

| No.         | Item   | Model Number   | Quantity                  |                           |                           | Remarks                                     |
|-------------|--|--|---------------------------|---------------------------|---------------------------|---|
|             |  |  | Arm length<br>180/<br>250 | Arm length<br>350/<br>450 | Arm length<br>550/<br>650 |   |
| 1           | Robot  | Refer to "How to Read the Model Nameplate" and "How to Read the Model Number." | 1 set                     | 1 set                     | 1 set                     |   |
| 2           | Dedicated Controller                         |  | 1 set                     | 1 set                     | 1 set                     |   |
| Accessories |  |  |                           |                           |                           |   |
| 3           | Motor • Encoder Cables                       | CB-CAN-MPA***  | 3                         | 3                         | 3                         | For 3-axis Type                             |
|             |  | CB-CAN-MPA***-RB   | 4                         | 4                         | 4                         | For 4-axis Type                             |
| 4           | Home-Position Adjusting Tool ( $\phi 4$ )    |  | 2                         | 1                         | 1                         |   |
| 5           | Home-Position Adjusting Tool ( $\phi 3$ )    |  | -                         | 1                         | 1                         | Enclosed in Tip Rotation Axis Specification |
| 6           | Hex Socket Head Screw (M5×6/Black)           |  | 4                         | -                         | -                         | J1·J2 Turning Limiting Stopper              |
| 7           | Hex Socket Head Screw (M8×8/Black)           |  | -                         | 2                         | -                         | J1 Turning Limiting Stopper                 |
| 8           | Hex Socket Head Screw (M6×6/Black)           |  | -                         | 2                         | -                         | J2 Turning Limiting Stopper                 |
| 9           | J12 Stopper Pin                              |  | -                         | -                         | 4                         | J1·J2 Turning Limiting Stopper              |
| 10          | Hex Socket Head Screw (M4×15)                |  | -                         | -                         | 2                         | J1 Turning Limiting for Stopper fixed       |
| 11          | Hex Socket Head Screw (M4×12)                |  | -                         | -                         | 2                         | J2 Turning Limiting for Stopper fixed       |
| 12          | Positioning Mark Label                       |  | 1 set                     | 1 set                     | 1 set                     | To check misalignment and positions         |
| 13          | MPG Connector Seal                           |  | -                         | 1                         | 1                         | To cover up MPG connector opening           |
| 14          | Prohibition of Entry into the Operation Area |  | 2                         | 2                         | 2                         |   |
| 15          | Marking Tube                                 |  | 2                         | 2                         | 2                         | Printed "USER"                              |
| 16          | User Connector                               |  | 1 set                     | -                         | -                         | Connector 2pcs<br>Pin contacts 20pcs        |
| 17          | First Step Guide                             |  | 1                         | 1                         | 1                         |   |
| 18          | Instruction Manual (DVD)                     |  | 1                         | 1                         | 1                         |   |
| 19          | Safety Guide                                 |  | 1                         | 1                         | 1                         |   |

## 1.1.2 Instruction Manuals related to this product, which are contained in the DVD.

| No. | Item  | Control No. |
|-----|---|-------------|
| 1   | Instruction Manual for MSEL-PC/PG/PCX/PGX Controller  | ME0336      |
| 2   | Instruction Manual for PC Software IA-101-X-MW/IA-101-X-USBMW                                     | ME0154      |
| 3   | Instruction Manual for Touch Panel Teaching TB-01/01D/01DR<br>(Applicable for Program Controller) | ME0325      |
| 4   | Instruction Manual for Teaching Pendant SEL-T/TD/TG   | ME0183      |

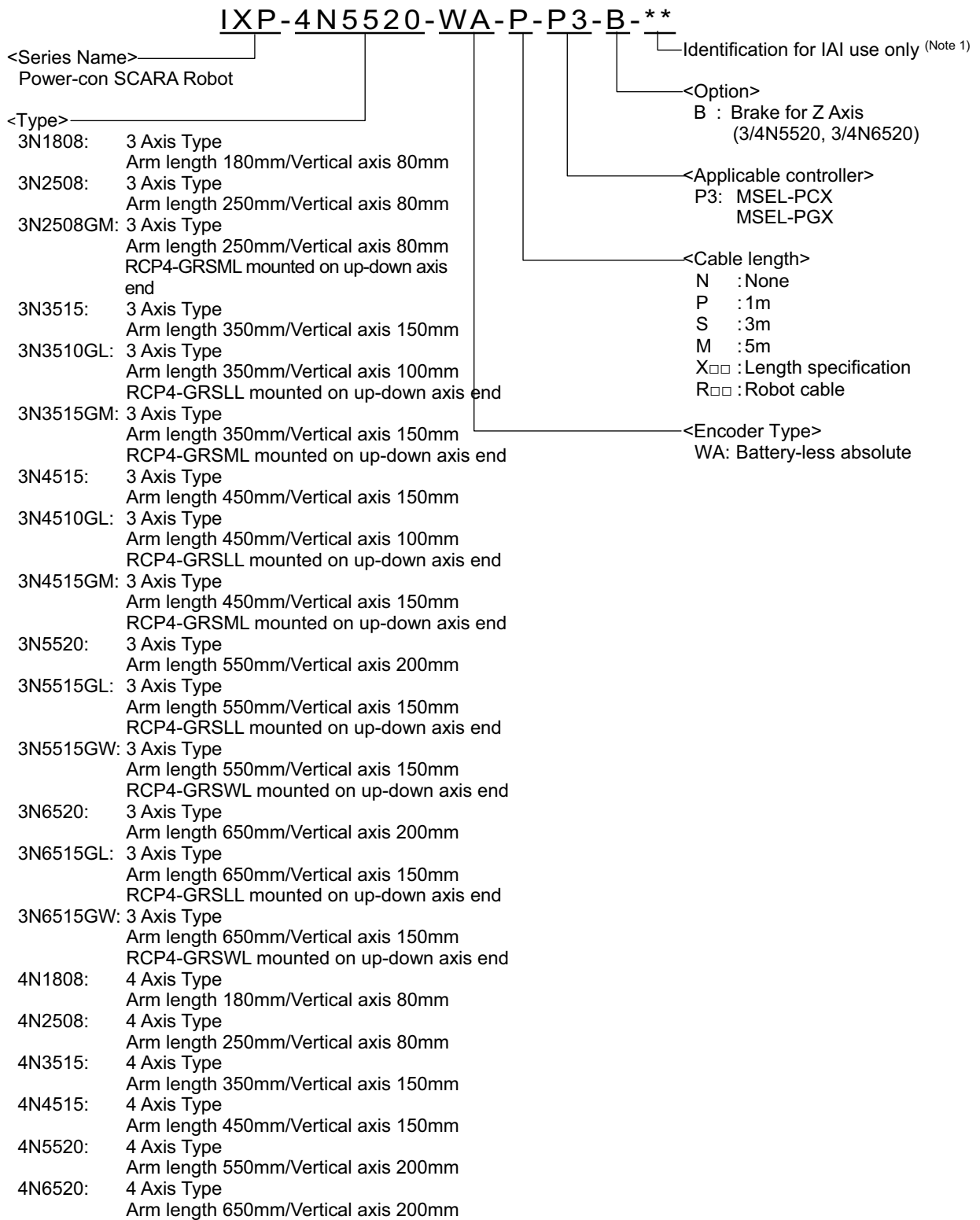
## 1.1.3 How to Read the Model Nameplate



|                         |   |
|-------------------------|---|
| MODEL                   | : Model Code                              |
| ARM LENGTH              | : Arm Length                              |
| PAYLOAD                 | : Transportable Mass<br>Rated and Maximum |
| WEIGHT                  | : Mass                                    |
| DATE                    | : Date of Production                      |
| Manufacturer            |   |
| Address of manufacturer | CE Mark                                   |



## 1.1.4 How to Read the Model Number



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.

## 1.2 Specifications

### 1.2.1 Basic Specifications List

[1] IXP-3N1808, 3N2508, 4N1808, 4N2508

(1) Without Loaded Axis (Gripper)

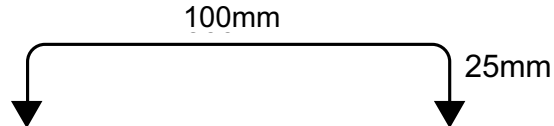
| Item   |   |                   | Specifications   |            |             |            |
|--|---|-------------------|--|------------|-------------|------------|
|  |   |                   | IXP-3N1808   | IXP-3N2508 | IXP-4N1808  | IXP-4N2508 |
| Degrees of Freedom                                   |   |                   | 3 Axis   |            | 4 Axis      |            |
| Overall arm Length                                   | mm                                      |                   | 180  | 250        | 180         | 250        |
| 1st Arm Length                                       | mm                                      |                   | 80   | 150        | 80          | 150        |
| 2nd Arm Length                                       | mm                                      |                   | 100  |            | 100         |            |
| Movement Range                                       | J1 axis (1st arm)                       | degree            | ±125   | ±135       | ±125        | ±135       |
|  | J2 axis (2nd arm)                       | degree            | ±125   | ±135       | ±125        | ±135       |
|  | Vertical axis                           | mm                | 0 to 80  |            | 0 to 80     |            |
|  | Rotation axis                           | degree            | -  |            | ±360        |            |
| Maximum Composite Speed (J1 Axis + J2 Axis) (Note 1) |   | mm/s              | 2053   | 2151       | 2053        | 2151       |
| Maximum Speed  | J1 axis (1st arm)                       | degree/s          | 420  | 325        | 420         | 325        |
|  | J2 axis (2nd arm)                       | degree/s          | 420  |            | 420         |            |
|  | Vertical axis                           | mm/s              | 350  |            | 350         |            |
|  | Rotation axis                           | degree/s          | -  |            | 1200        |            |
| Standard cycle time (Note 2)                         |   | sec               | 0.57   | 0.79       | 0.57        | 0.79       |
| Positioning Repeatability Precision (Note 3)         | On horizontal plane (J1 axis + J2 axis) | ±0.01             | ±0.01  | ±0.02      | ±0.01       | ±0.02      |
|  | Vertical axis                           | mm                | ±0.02  |            | ±0.02       |            |
|  | Rotation axis                           | degree            | -  |            | ±0.01       |            |
| Positioning Resolution (Note 4)                      | J1 axis (1st arm)                       | degree            | 0.014  |            | 0.014       |            |
|  | J2 axis (2nd arm)                       | degree            | 0.022  |            | 0.022       |            |
|  | Vertical axis                           | mm                | 0.011  |            | 0.011       |            |
|  | Rotation axis                           | degree            | -  |            | 0.099       |            |
| Lost Motion  | J1 axis (1st arm)                       | arc min           | 3 or less  |            | 3 or less   |            |
|  | J2 axis (2nd arm)                       | arc min           | 5 or less  |            | 5 or less   |            |
|  | Vertical axis                           | mm                | 0.1 or less  |            | 0.1 or less |            |
|  | Rotation axis                           | arc min           | -  |            | 3 or less   |            |
| Loading Capacity                                     | Rated                                   | kg                | 1  |            | 1           |            |
|  | Maximum                                 | kg                | 3  |            | 3           |            |
| Allowable Load Moment of Inertia (Note 5)            | Rated                                   | kg·m <sup>2</sup> | 0.001  |            | 0.001       |            |
|  | Maximum                                 | kg·m <sup>2</sup> | 0.01   |            | 0.003       |            |
| Tip Axis Shaft                                       | Allowable torque (Rotation axis)        | N·m               | -  |            | 0.28        |            |
|  | Allowable moment                        | N·m               | 0.7  |            | 0.7         |            |
| Allowable Load Diameter (Note 6)                     |   | mm                | 85   |            | 85          |            |
| Vertical Axis Pressing (Note 7)                      |   |                   | Unavailable  |            |             |            |
| Home-Position Detection                              |   |                   | Battery-less absolute  |            |             |            |
| User Wiring  |   |                   | Signal wire: 8-core / AWG26 / Rating 30V/MAX1A                     |            |             |            |
| User Tubing  |   |                   | 2 places / O.D. φ4 / I.D. φ2.5 / Max. Pressure 0.8MPa              |            |             |            |
| Environment  | Surrounding air temperature             |                   | 0 to 40°C  |            |             |            |
|  | Surrounding humidity                    |                   | Humidity: 20 to 85%RH or less (non-condensing)                     |            |             |            |
|  | Surrounding environment                 |                   | Refer to "2.2 Installation and Storage • Preservation Environment" |            |             |            |
|  | Surrounding storage temperature         |                   | -10 to 50°C  |            |             |            |
|  | Surrounding storage humidity            |                   | Humidity: 20 to 85%RH or less (non-condensing)                     |            |             |            |
| Protection class                                     |   |                   | IP20   |            |             |            |
| Noise (Note 8)                                       |   | dB                | 75 or less   |            |             |            |

Note 1 Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.

Note 2 It is the required time to run back and forth between positions that enable the fastest motion under the following condition. [Refer to 1.2.4 Ambient Temperature and Duty Setting for continuous operation in maximum velocity]

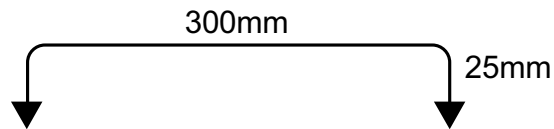
Arm Length 180:

It is the time for back and forth cycle with 1kg of carrier, 25mm of vertical movement and 100mm of horizontal movement.



Arm Length 250:

It is the time for back and forth cycle with 1kg of carrier, 25mm of vertical movement and 300mm of horizontal movement.



Note 3 It is when repeated operation is performed from the same start position, with the same speed, acceleration / deceleration, arm system and load (transported work piece), to one setting position. The positioning accuracy repeatability may not be achieved in such cases as when the arm system is switched or when positioning is performed to one setting position from several different positions.

At a constant surrounding air temperature of 20°C. It is not the absolute positioning accuracy.

Note 4 The positions available to perform positioning are limited by resolution. [Refer to 4.1 Scattered Positioning Points]

Note 5 It is the allowable value for the moment of inertia calculated at the center of the tip shaft. [Refer to 2.3.2 [2] Installation of Load for the amount of offset from the center of the tip shaft to the center of gravity of the load]

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.

Note 6 It is the diameter of the load assumed for the allowable load moment of inertia. Use the product with the moment below the allowable load moment of inertia by referring to the load allowable diameter.

There may be a risk of the load interfering to the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Pay attention not to have interference at teaching.

Also, there is a risk of interference to the robot itself even if it is in the allowable diameter.

Note 7 Pressing operation cannot be performed.

However, the allowable pressing force that the arm can accept is 45N or less when a tool or a buffer such as a spring on the pressed side is equipped.

Note that the pressing direction is only from bottom to top along the up-down axis.

Note 8 They are the values when operation is performed with the maximum combined speed (J1 axis + J2 axis). The tone of the noise fluctuates depending on the operation speed. The sound level is A-weighted sound pressure level.



- Caution:**
- If the robot is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
  - If the robot is operated under a load equal to or greater than the allowable moment of inertia, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.
  - Attaching a load beyond the allowable overhang length may generate vibration or abnormal noise.

## (2) Equipped with Loaded Axis (Gripper) (Option)

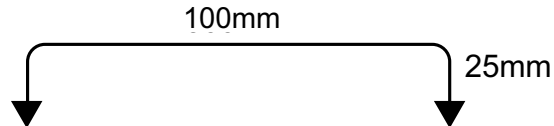
| Item   |  | Specifications   |                          |
|--|--|--|--------------------------|
|  |  | IXP-3N2508GM   |                          |
|  |  | RCP4-GRSML Gripper   |                          |
| Degrees of Freedom   |  | SCARA 3 + Gripper 1  |                          |
| Overall arm Length   | mm   | 250  |                          |
| 1st Arm Length   | mm   | 150  |                          |
| 2nd Arm Length   | mm   | 100  |                          |
| Movement Range   | J1 axis (1st arm)                          | degree   | ±135                     |
|  | J2 axis (2nd arm)                          | degree   | ±135                     |
|  | Vertical axis                              | mm   | 0 to 80                  |
|  | Gripper                                    | mm   | 14<br>(Two-sided finger) |
| Maximum Composite Speed<br>(J1 Axis + J2 Axis) (Note 1)    |  | mm/s   | 2151                     |
| Maximum Speed  | J1 axis (1st arm)                          | degree/s   | 325                      |
|  | J2 axis (2nd arm)                          | degree/s   | 420                      |
|  | Vertical axis                              | mm/s   | 350                      |
|  | Gripper                                    | degree/s   | 94<br>(One-sided finger) |
| Standard cycle time (Note 2)                               | SCARA Robot                                | sec  | 0.79                     |
|  | Gripper                                    | sec  | 0.51                     |
| Positioning Repeatability Precision (Note 3)               | On horizontal plane<br>(J1 axis + J2 axis) | mm   | ±0.02                    |
|  | Vertical axis                              | mm   | ±0.02                    |
|  | Gripper                                    | mm   | ±0.01                    |
| Home-Returning Accuracy                                    | Gripper                                    | mm   | ±0.3 or less             |
| Positioning Resolution (Note 4)                            | J1 axis (1st arm)                          | degree   | 0.014                    |
|  | J2 axis (2nd arm)                          | degree   | 0.022                    |
|  | Vertical axis                              | mm   | 0.011                    |
|  | Gripper                                    | mm   | 0.003                    |
| Lost Motion  | J1 axis (1st arm)                          | degree   | 3 or less                |
|  | J2 axis (2nd arm)                          | degree   | 5 or less                |
|  | Vertical axis                              | mm   | 0.1 or less              |
|  | Gripper                                    | mm   | 0.15 or less             |
| Loading Capacity   | Maximum                                    | kg   | 0.5                      |
| Allowable Load Moment of Inertia (Note 5)                  | Maximum                                    | kg·m <sup>2</sup>  | 0.001                    |
| Tip Axis Shaft   | Allowable Load Momen                       | N·m  | 0.7                      |
| Allowable Load Diameter (Note 6)                           |  | mm   | 85                       |
| Vertical Axis Pressing (Note 7)                            |  | Unavailable  |                          |
| Max. Grip Force of Gripper<br>(Current Limiting Value 70%) |  | N  | 87                       |
| Gripper Velocity at Pressing Operation                     |  | mm/s   | 5                        |
| Home-Position Detection                                    | SCARA Robot                                | Battery-less absolute  |                          |
|  | Gripper                                    | Incremental (Pressing home-return)                                 |                          |
| User Wiring  |  | Signal wire: 8-core / AWG26 / Rating 30V/MAX1A                     |                          |
| User Tubing  |  | 2 places / O.D. φ4 / I.D. φ2.5 / Max. Pressure 0.8MPa              |                          |
| Environment  | Surrounding air temperature                | 0 to 40°C  |                          |
|  | Surrounding humidity                       | Humidity: 20 to 85%RH or less (non-condensing)                     |                          |
|  | Surrounding environment                    | Refer to "2.2 Installation and Storage • Preservation Environment" |                          |
|  | Surrounding storage temperature            | -10 to 50°C  |                          |
|  | Surrounding storage humidity               | Humidity: 20 to 85%RH or less (non-condensing)                     |                          |
| Protection class   |  | IP20   |                          |
| Noise (Note 8)   |  | dB   | 75 or less               |
|  |  |  | 75 or less               |

Note 1 Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.

Note 2 It is the required time to run back and forth between positions that enable the fastest motion under the following condition. [Refer to 1.2.4 Ambient Temperature and Duty Setting for continuous operation in maximum velocity]

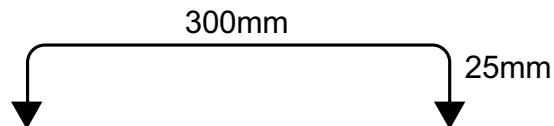
Arm Length 180:

It is the time for back and forth cycle with 1kg of carrier, 25mm of vertical movement and 100mm of horizontal movement.



Arm Length 250:

It is the time for back and forth cycle with 1kg of carrier, 25mm of vertical movement and 300mm of horizontal movement.



The standard cycle time of the gripper is the time when movement is made through the whole stroke.

Note 3 It is when repeated operation is performed from the same start position, with the same speed, acceleration / deceleration, arm system and load (transported work piece), to one setting position. The positioning accuracy repeatability may not be achieved in such cases as when the arm system is switched or when positioning is performed to one setting position from several different positions.  
At a constant surrounding air temperature of 20°C. It is not the absolute positioning accuracy.

Note 4 The positions available to perform positioning are limited by resolution.  
[Refer to 4.1 Scattered Positioning Points]

Note 5 It is the allowable value for the moment of inertia calculated at the center of the tip shaft.  
[Refer to 2.3.2 [2] Installation of Load for the amount of offset from the center of the tip shaft to the center of gravity of the load]  
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.

Note 6 It is the diameter of the load assumed for the allowable load moment of inertia. Use the product with the moment below the allowable load moment of inertia by referring to the load allowable diameter.  
There may be a risk of the load interfering to the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Pay attention not to have interference at teaching.  
Also, there is a risk of interference to the robot itself even if it is in the allowable diameter.

Note 7 Pressing operation cannot be performed.  
However, the allowable pressing force that the arm can accept is 45N or less when a tool or a buffer such as a spring on the pressed side is equipped.

Note 8 They are the values when operation is performed with the maximum combined speed (J1 axis + J2 axis). The tone of the noise fluctuates depending on the operation speed.  
The sound level is A-weighted sound pressure level.



**Caution:**

- If the robot is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
- If the robot is operated under a load equal to or greater than the allowable moment of inertia, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.
- Attaching a load beyond the allowable overhang length may generate vibration or abnormal noise.

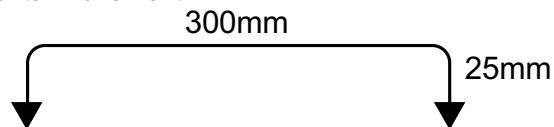
[2] IXP-3N3515, 3N4515, 4N3515, 4N4515

(1) Without Loaded Axis (Gripper)

| Item  |   |                   | Specifications   |            |            |            |
|---|---|-------------------|--|------------|------------|------------|
|   |   |                   | IXP-3N3515   | IXP-3N4515 | IXP-4N3515 | IXP-4N4515 |
| Degrees of Freedom  |   |                   | 3 Axis   |            | 4 Axis     |            |
| Overall arm Length  | mm                                      |                   | 350  | 450        | 350        | 450        |
| 1st Arm Length  | mm                                      |                   | 160  | 260        | 160        | 260        |
| 2nd Arm Length  | mm                                      |                   | 190  |            | 190        |            |
| Movement Range  | J1 axis (1st arm)                       | degree            | ±127   |            | ±127       |            |
|   | J2 axis (2nd arm)                       | degree            | ±127   |            | ±127       |            |
|   | Vertical axis                           | mm                | 0 to 150   |            | 0 to 150   |            |
|   | Rotation axis                           | degree            | -  |            | ±360       |            |
| Maximum Composite Speed (J1 Axis + J2 Axis) <small>(Note 1)</small> |   | mm/s              | 2726   | 2438       | 2726       | 2438       |
| Maximum Speed   | J1 axis (1st arm)                       | degree/s          | 240  | 150        | 240        | 150        |
|   | J2 axis (2nd arm)                       | degree/s          | 380  |            | 380        |            |
|   | Vertical axis                           | mm/s              | 270  |            | 270        |            |
|   | Rotation axis                           | degree/s          | -  |            | 1000       |            |
| Standard cycle time <small>(Note 2)</small>                         |   | sec               | 0.69   | 0.67       | 0.69       | 0.67       |
| Positioning Repeatability Precision <small>(Note 3)</small>         | On horizontal plane (J1 axis + J2 axis) | mm                | ±0.03  |            | ±0.03      |            |
|   | Vertical axis                           | mm                | ±0.02  |            | ±0.02      |            |
|   | Rotation axis                           | degree            | -  |            | ±0.02      |            |
| Positioning Resolution <small>(Note 4)</small>                      | J1 axis (1st arm)                       | degree            | 0.022  | 0.014      | 0.022      | 0.014      |
|   | J2 axis (2nd arm)                       | degree            | 0.022  |            | 0.022      |            |
|   | Vertical axis                           | mm                | 0.009  |            | 0.009      |            |
|   | Rotation axis                           | degree            | -  |            | 0.113      |            |
| Lost Motion   | J1 axis (1st arm)                       | arc min           | 1  |            | 1          |            |
|   | J2 axis (2nd arm)                       | arc min           | 1  |            | 1          |            |
|   | Vertical axis                           | mm                | 0.1  |            | 0.1        |            |
|   | Rotation axis                           | arc min           | -  |            | 3          |            |
| Loading Capacity  | Rated                                   | kg                | 1  |            | 1          |            |
|   | Maximum                                 | kg                | 3  |            | 3          |            |
| Allowable Load Moment of Inertia <small>(Note 5)</small>            | Rated                                   | kg·m <sup>2</sup> | 0.003  |            | 0.003      |            |
|   | Maximum                                 | kg·m <sup>2</sup> | 0.01   |            | 0.003      |            |
| Tip Axis Shaft  | Allowable torque (Rotation axis)        | N·m               | -  |            | 1.4        |            |
|   | Allowable moment                        | N·m               | 2.9  |            | 2.9        |            |
| Allowable Load Diameter <small>(Note 6)</small>                     |   | mm                | 85   |            | 85         |            |
| Vertical Axis Pressing <small>(Note 7)</small>                      |   |                   | Unavailable  |            |            |            |
| Home-Position Detection   |   |                   | Incremental (Pressing home-return), Battery-less absolute  |            |            |            |
| User Wiring   |   |                   | Driving lines: 6-core/AWG24/Rating 30V/MAX2A<br>Signal wire: 10-core (5P)/AWG26(Shield)/Rating 30V/MAX1A |            |            |            |
| User Tubing   |   |                   | 3 places / O.D. φ4 / I.D. φ2.5 / Max. Pressure 0.8MPa  |            |            |            |
| Environment   | Surrounding air temperature             |                   | 0 to 40°C  |            |            |            |
|   | Surrounding humidity                    |                   | Humidity: 20 to 85%RH or less (non-condensing)   |            |            |            |
|   | Surrounding environment                 |                   | Refer to "2.2 Installation and Storage • Preservation Environment"                                       |            |            |            |
|   | Surrounding storage temperature         |                   | -10 to 50°C  |            |            |            |
|   | Surrounding storage humidity            |                   | Humidity: 20 to 85%RH or less (non-condensing)   |            |            |            |
| Protection class  |   |                   | IP20   |            |            |            |
| Noise <small>(Note 8)</small>                                       |   | dB                | 75 or less   |            |            |            |

- Note 1 Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- Note 2 It is the required time to run back and forth between positions that enable the fastest motion under the following condition. [Refer to 1.2.4 Ambient Temperature and Duty Setting for continuous operation in maximum velocity]

It is the time for back and forth cycle with 1kg of carrier, 25mm of vertical movement and 300mm of horizontal movement.



- Note 3 It is when repeated operation is performed from the same start position, with the same speed, acceleration / deceleration, arm system and load (transported work piece), to one setting position. The positioning accuracy repeatability may not be achieved in such cases as when the arm system is switched or when positioning is performed to one setting position from several different positions.  
At a constant surrounding air temperature of 20°C. It is not the absolute positioning accuracy.
- Note 4 The positions available to perform positioning are limited by resolution.  
[Refer to 4.1 Scattered Positioning Points]
- Note 5 It is the allowable value for the moment of inertia calculated at the center of the tip shaft (3-axis type: center of guide shaft, 4-axis type: center of rotation axis).  
[Refer to 2.3.2 [2] Installation of Load for the amount of offset from the center of the tip shaft to the center of gravity of the load]  
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.
- Note 6 It is the diameter of the load assumed for the allowable load moment of inertia. Use the product with the moment below the allowable load moment of inertia by referring to the load allowable diameter.  
There may be a risk of the load interfering to the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Pay attention not to have interference at teaching.
- Note 7 Pressing operation cannot be performed.  
However, the allowable pressing force that the arm can accept is 60N or less when a tool or a buffer such as a spring on the pressed side is equipped.
- Note 8 They are the values when operation is performed with the maximum combined speed (J1 axis + J2 axis). The tone of the noise fluctuates depending on the operation speed.  
The sound level is A-weighted sound pressure level.

**⚠ Caution:**

- If the robot is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
- If the robot is operated under a load equal to or greater than the allowable moment of inertia, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.
- Attaching a load beyond the allowable overhang length may generate vibration or abnormal noise.

## (2) Equipped with Loaded Axis (Gripper) (Option)

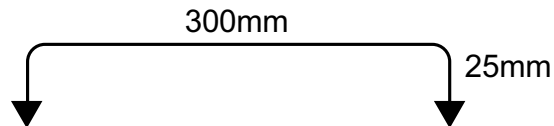
| Item  |   |                   | Specifications   |                                       |                                       |                                       |
|---|---|-------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
|   |   |                   | IXP-3N3515GM<br>RCP4-GRSML<br>Gripper                              | IXP-3N3510GL<br>RCP4-GRSLL<br>Gripper | IXP-3N4515GM<br>RCP4-GRSML<br>Gripper | IXP-3N4510GL<br>RCP4-GRSLL<br>Gripper |
| Degrees of Freedom                                      |   |                   | SCARA 3 + Gripper 1  |                                       | SCARA 3 + Gripper 1                   |                                       |
| Overall arm Length                                      | mm                                      |                   | 350  |                                       | 450                                   |                                       |
| 1st Arm Length  | mm                                      |                   | 160  |                                       | 260                                   |                                       |
| 2nd Arm Length  | mm                                      |                   | 190  |                                       | 190                                   |                                       |
| Movement Range  | J1 axis (1st arm)                       | degree            | ±127   |                                       | ±127                                  |                                       |
|   | J2 axis (2nd arm)                       | degree            | ±127   |                                       | ±127                                  |                                       |
|   | Vertical axis                           | mm                | 0 to 150   | 0 to 100<br>Be careful to stroke      | 0 to 150                              | 0 to 100<br>Be careful to stroke      |
|   | Gripper                                 | mm                | 14<br>(Two-sided finger)   | 22<br>(Two-sided finger)              | 14<br>(Two-sided finger)              | 22<br>(Two-sided finger)              |
| Maximum Composite Speed<br>(J1 Axis + J2 Axis) (Note 1) |   | mm/s              | 2726   | 1908                                  | 2438                                  | 2060                                  |
| Maximum Speed   | J1 axis (1st arm)                       | degree/s          | 240  | 168                                   | 240                                   | 150                                   |
|   | J2 axis (2nd arm)                       | degree/s          | 380  | 266                                   | 380                                   | 266                                   |
|   | Vertical axis                           | mm/s              | 270  | 189                                   | 270                                   | 189                                   |
|   | Gripper                                 | degree/s          | 94<br>(One-sided finger)   | 125<br>(One-sided finger)             | 94<br>(One-sided finger)              | 125<br>(One-sided finger)             |
| Standard cycle time (Note 2)                            | SCARA Robot                             | sec               | 0.69   | 1.08                                  | 0.67                                  | 0.95                                  |
|   | Gripper                                 | sec               | 0.51   | 0.56                                  | 0.51                                  | 0.56                                  |
| Positioning Repeatability Precision (Note 3)            | On horizontal plane (J1 axis + J2 axis) | mm                | ±0.03  |                                       | ±0.03                                 |                                       |
|   | Vertical axis                           | mm                | ±0.02  |                                       | ±0.02                                 |                                       |
|   | Gripper                                 | mm                | ±0.01  |                                       | ±0.01                                 |                                       |
| Home-Returning Accuracy                                 | Gripper                                 | mm                | ±0.3 or less   |                                       | ±0.3 or less                          |                                       |
| Positioning Resolution (Note 4)                         | J1 axis (1st arm)                       | degree            | 0.022  |                                       | 0.014                                 |                                       |
|   | J2 axis (2nd arm)                       | degree            | 0.022  |                                       | 0.022                                 |                                       |
|   | Vertical axis                           | mm                | 0.009  |                                       | 0.009                                 |                                       |
|   | Gripper                                 | mm                | 0.003  | 0.004                                 | 0.003                                 | 0.004                                 |
| Lost Motion   | J1 axis (1st arm)                       | degree            | 1  |                                       | 1                                     |                                       |
|   | J2 axis (2nd arm)                       | degree            | 1  |                                       | 1                                     |                                       |
|   | Vertical axis                           | mm                | 0.1  |                                       | 0.1                                   |                                       |
|   | Gripper                                 | mm                | 0.15 or less   |                                       | 0.15 or less                          |                                       |
| Loading Capacity  | Maximum                                 | kg                | 0.5  | 1.5                                   | 0.5                                   | 1.5                                   |
| Allowable Load Moment of Inertia (Note 5)               | Maximum                                 | kg·m <sup>2</sup> | 0.002  | 0.009                                 | 0.002                                 | 0.009                                 |
| Allowable Load Moment                                   | Ma                                      | N·m               | 1.9  | 2.9                                   | 1.9                                   | 2.9                                   |
|   | Mb                                      | N·m               | 2.7  | 2.9                                   | 2.7                                   | 2.9                                   |
|   | Mc                                      | N·m               | 2.9  |                                       | 2.9                                   |                                       |
| Allowable Load Diameter (Note 6)                        |   | mm                | 85   |                                       | 85                                    |                                       |
| Vertical Axis Pressing (Note 7)                         |   |                   | Unavailable  |                                       | Unavailable                           |                                       |
| Max. Grip Force of Gripper (Current Limiting Value 70%) |   | N                 | 87   | 140                                   | 87                                    | 140                                   |
| Gripper Velocity at Pressing Operation                  |   | mm/s              | 5  |                                       |                                       |                                       |
| Home-Position Detection                                 | SCARA Robot                             |                   | Battery-less absolute  |                                       |                                       |                                       |
|   | Gripper                                 |                   | Incremental (Pressing home-return)                                 |                                       |                                       |                                       |
| User Tubing   |   |                   | 3 places / O.D. φ4 / I.D. φ2.5 / Max. Pressure 0.8MPa              |                                       |                                       |                                       |
| Environment   | Surrounding air temperature             |                   | 0 to 40°C  |                                       |                                       |                                       |
|   | Surrounding humidity                    |                   | Humidity: 20 to 85%RH or less (non-condensing)                     |                                       |                                       |                                       |
|   | Surrounding environment                 |                   | Refer to "2.2 Installation and Storage • Preservation Environment" |                                       |                                       |                                       |
|   | Surrounding storage temperature         |                   | -10 to 50°C  |                                       |                                       |                                       |
|   | Surrounding storage humidity            |                   | Humidity: 20 to 85%RH or less (non-condensing)                     |                                       |                                       |                                       |
| Protection class  |   |                   | IP20   |                                       |                                       |                                       |
| Noise (Note 8)  |   | dB                | 75 or less   | 75 or less                            | 75 or less                            | 75 or less                            |



Note 1 Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.

Note 2 It is the required time to run back and forth between positions that enable the fastest motion under the following condition. [Refer to 1.2.4 Ambient Temperature and Duty Setting for continuous operation in maximum velocity]

It is the time for back and forth cycle with 1kg of carrier including gripper for GM and 3kg of carrier including gripper for GL, 25mm of vertical movement and 300mm of horizontal movement.



The standard cycle time of the gripper is the time when movement is made through the whole stroke.

Note 3 It is when repeated operation is performed from the same start position, with the same speed, acceleration / deceleration, arm system and load (transported work piece), to one setting position. The positioning accuracy repeatability may not be achieved in such cases as when the arm system is switched or when positioning is performed to one setting position from several different positions. At a constant surrounding air temperature of 20°C. It is not the absolute positioning accuracy.

Note 4 The positions available to perform positioning are limited by resolution. [Refer to 4.1 Scattered Positioning Points]

Note 5 It is the allowable value for the moment of inertia calculated at the center of the tip shaft (3-axis type: center of guide shaft, 4-axis type: center of rotation axis). [Refer to 2.3.2 [2] Installation of Load for the amount of offset from the center of the tip shaft to the center of gravity of the load] 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.

Note 6 It is the diameter of the load assumed for the allowable load moment of inertia. Use the product with the moment below the allowable load moment of inertia by referring to the load allowable diameter. There may be a risk of the load interfering to the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Pay attention not to have interference at teaching.

Note 7 Pressing operation cannot be performed. However, the allowable pressing force that the arm can accept is 60N or less when a tool or a buffer such as a spring on the pressed side is equipped.

Note 8 They are the values when operation is performed with the maximum combined speed (J1 axis + J2 axis). The tone of the noise fluctuates depending on the operation speed. The sound level is A-weighted sound pressure level.

**⚠ Caution:**

- If the robot is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
- If the robot is operated under a load equal to or greater than the allowable moment of inertia, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.
- Attaching a load beyond the allowable overhang length may generate vibration or abnormal noise.

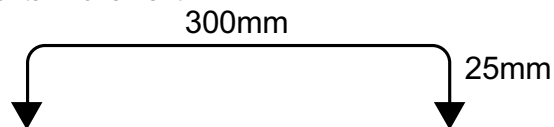
[3] IXP-3N5520, 3N6520, 4N5520, 4N6520

(1) Without Loaded Axis (Gripper)

| Item  |   |                   | Specifications   |            |             |            |      |
|---|---|-------------------|--|------------|-------------|------------|------|
|   |   |                   | IXP-3N5520   | IXP-3N6520 | IXP-4N5520  | IXP-4N6520 |      |
| Degrees of Freedom  |   |                   | 3 Axis   |            | 4 Axis      |            |      |
| Overall arm Length  | mm                                      |                   | 550  | 650        | 550         | 650        |      |
| 1st Arm Length  | mm                                      |                   | 260  | 360        | 260         | 360        |      |
| 2nd Arm Length  | mm                                      |                   | 290  |            | 290         |            |      |
| Movement Range  | J1 axis (1st arm)                       | degree            | ±127   |            | ±127        |            |      |
|   | J2 axis (2nd arm)                       | degree            | ±127   |            | ±127        |            |      |
|   | Vertical axis                           | mm                | 0 to 200   |            | 0 to 200    |            |      |
|   | Rotation axis                           | degree            | -  |            | ±360        |            |      |
| Maximum Composite Speed (J1 Axis + J2 Axis) <small>(Note 1)</small> |   |                   | mm/s   | 2943       | 2916        | 2943       | 2916 |
| Maximum Speed   | J1 axis (1st arm)                       | degree/s          | 180  | 150        | 180         | 150        |      |
|   | J2 axis (2nd arm)                       | degree/s          | 240  |            | 240         |            |      |
|   | Vertical axis                           | mm/s              | 240  |            | 240         |            |      |
|   | Rotation axis                           | degree/s          | -  |            | 700         |            |      |
| Standard cycle time <small>(Note 2)</small>                         |   |                   | sec  | 0.73       | 0.81        | 0.73       | 0.81 |
| Positioning Repeatability Precision <small>(Note 3)</small>         | On horizontal plane (J1 axis + J2 axis) | mm                | ±0.04  |            | ±0.04       |            |      |
|   | Vertical axis                           | mm                | ±0.02  |            | ±0.02       |            |      |
|   | Rotation axis                           | degree            | -  |            | ±0.02       |            |      |
| Positioning Resolution <small>(Note 4)</small>                      | J1 axis (1st arm)                       | degree            | 0.014  |            | 0.014       |            |      |
|   | J2 axis (2nd arm)                       | degree            | 0.014  |            | 0.014       |            |      |
|   | Vertical axis                           | mm                | 0.009  |            | 0.009       |            |      |
|   | Rotation axis                           | degree            | -  |            | 0.053       |            |      |
| Lost Motion   | J1 axis (1st arm)                       | arc min           | 3 or less  |            | 3 or less   |            |      |
|   | J2 axis (2nd arm)                       | arc min           | 3 or less  |            | 3 or less   |            |      |
|   | Vertical axis                           | mm                | 0.1 or less  |            | 0.1 or less |            |      |
|   | Rotation axis                           | arc min           | -  |            | 5 or less   |            |      |
| Loading Capacity  | Rated                                   | kg                | 2  |            | 2           |            |      |
|   | Maximum                                 | kg                | 6  |            | 6           |            |      |
| Allowable Load Moment of Inertia <small>(Note 5)</small>            | Rated                                   | kg·m <sup>2</sup> | 0.01   |            | 0.01        |            |      |
|   | Maximum                                 | kg·m <sup>2</sup> | 0.03   |            | 0.01        |            |      |
| Tip Axis Shaft  | Allowable torque (Rotation axis)        | N·m               | -  |            | 3.06        |            |      |
|   | Allowable moment                        | N·m               | 9.4  |            | 9.4         |            |      |
| Allowable Load Diameter <small>(Note 6)</small>                     |   |                   | mm   | 115        |             | 115        |      |
| Vertical Axis Pressing <small>(Note 7)</small>                      |   |                   | Unavailable  |            |             |            |      |
| Home-Position Detection   |   |                   | Battery-less absolute  |            |             |            |      |
| User Wiring   |   |                   | Driving lines: 6-core/AWG24/Rating 30V/MAX2A<br>Signal wire: 10-core (5P)/AWG26(Shield)/Rating 30V/MAX1A |            |             |            |      |
| User Tubing   |   |                   | 3 places / O.D. φ4 / I.D. φ2.5 / Max. Pressure 0.8MPa  |            |             |            |      |
| Environment   | Surrounding air temperature             |                   | 0 to 40°C  |            |             |            |      |
|   | Surrounding humidity                    |                   | Humidity: 20 to 85%RH or less (non-condensing)   |            |             |            |      |
|   | Surrounding environment                 |                   | Refer to "2.2 Installation and Storage • Preservation Environment"                                       |            |             |            |      |
|   | Surrounding storage temperature         |                   | -10 to 50°C  |            |             |            |      |
|   | Surrounding storage humidity            |                   | Humidity: 20 to 85%RH or less (non-condensing)   |            |             |            |      |
| Protection class  |   |                   | IP20   |            |             |            |      |
| Noise <small>(Note 8)</small>                                       |   |                   | dB   | 78 or less |             |            |      |

- Note 1 Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- Note 2 It is the required time to run back and forth between positions that enable the fastest motion under the following condition. [Refer to 1.2.4 Ambient Temperature and Duty Setting for continuous operation in maximum velocity]

It is the time for back and forth cycle with 2kg of carrier, 25mm of vertical movement and 300mm of horizontal movement.



- Note 3 It is when repeated operation is performed from the same start position, with the same speed, acceleration / deceleration, arm system and load (transported work piece), to one setting position. The positioning accuracy repeatability may not be achieved in such cases as when the arm system is switched or when positioning is performed to one setting position from several different positions.  
At a constant surrounding air temperature of 20°C. It is not the absolute positioning accuracy.
- Note 4 The positions available to perform positioning are limited by resolution.  
[Refer to 4.1 Scattered Positioning Points]
- Note 5 It is the allowable value for the moment of inertia calculated at the center of the tip shaft (3-axis type: center of guide shaft, 4-axis type: center of rotation axis).  
[Refer to 2.3.2 [2] Installation of Load for the amount of offset from the center of the tip shaft to the center of gravity of the load]  
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.
- Note 6 It is the diameter of the load assumed for the allowable load moment of inertia. Use the product with the moment below the allowable load moment of inertia by referring to the load allowable diameter.  
There may be a risk of the load interfering to the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Pay attention not to have interference at teaching.
- Note 7 Pressing operation cannot be performed.  
However, the allowable pressing force that the arm can accept is 90N or less when a tool or a buffer such as a spring on the pressed side is equipped.
- Note 8 They are the values when operation is performed with the maximum combined speed (J1 axis + J2 axis). The tone of the noise fluctuates depending on the operation speed.  
The sound level is A-weighted sound pressure level.

**⚠ Caution:**

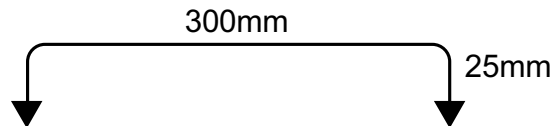
- If the robot is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
- If the robot is operated under a load equal to or greater than the allowable moment of inertia, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.
- Attaching a load beyond the allowable overhang length may generate vibration or abnormal noise.

## (2) Equipped with Loaded Axis (Gripper) (Option)

| Item   |  |                   | Specifications   |                                       |                                       |                                       |
|--|--|-------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
|  |  |                   | IXP-3N5515GL<br>RCP4-GRSLL<br>Gripper                              | IXP-3N5515GW<br>RCP4-GRSWL<br>Gripper | IXP-3N6515GL<br>RCP4-GRSLL<br>Gripper | IXP-3N6510GW<br>RCP4-GRSWL<br>Gripper |
| Degrees of Freedom   |  |                   | SCARA 3 + Gripper 1  |                                       | SCARA 3 + Gripper 1                   |                                       |
| Overall arm Length   | mm   |                   | 550  |                                       | 650                                   |                                       |
| 1st Arm Length   | mm   |                   | 260  |                                       | 360                                   |                                       |
| 2nd Arm Length   | mm   |                   | 290  |                                       | 290                                   |                                       |
| Movement Range   | J1 axis (1st arm)                          | degree            | ±127   |                                       | ±127                                  |                                       |
|  | J2 axis (2nd arm)                          | degree            | ±127   |                                       | ±127                                  |                                       |
|  | Vertical axis                              | mm                | 0 to 150<br>Be careful to stroke                                   |                                       | 0 to 150<br>Be careful to stroke      |                                       |
|  | Gripper                                    | mm                | 22<br>(Two-sided finger)   | 30<br>(Two-sided finger)              | 22<br>(Two-sided finger)              | 30<br>(Two-sided finger)              |
| Maximum Composite Speed<br>(J1 Axis + J2 Axis) (Note 1)    |  | mm/s              | 2943   | 2916                                  | 2943                                  | 2916                                  |
| Maximum Speed  | J1 axis (1st arm)                          | degree/s          | 180  |                                       | 150                                   |                                       |
|  | J2 axis (2nd arm)                          | degree/s          | 240  |                                       | 240                                   |                                       |
|  | Vertical axis                              | mm/s              | 240  |                                       | 240                                   |                                       |
|  | Gripper                                    | degree/s          | 125<br>(One-sided finger)  | 157<br>(One-sided finger)             | 125<br>(One-sided finger)             | 157<br>(One-sided finger)             |
| Standard cycle time (Note 2)                               | SCARA Robot                                | sec               | 0.73   |                                       | 0.81                                  |                                       |
|  | Gripper                                    | sec               | 0.56   | 0.60                                  | 0.56                                  | 0.60                                  |
| Positioning Repeatability Precision (Note 3)               | On horizontal plane<br>(J1 axis + J2 axis) | mm                | ±0.04  |                                       | ±0.04                                 |                                       |
|  | Vertical axis                              | mm                | ±0.02  |                                       | ±0.02                                 |                                       |
|  | Gripper                                    | mm                | ±0.01  |                                       | ±0.01                                 |                                       |
| Home-Returning Accuracy                                    | Gripper                                    | mm                | ±0.3 or less   |                                       | ±0.3 or less                          |                                       |
| Positioning Resolution (Note 4)                            | J1 axis (1st arm)                          | degree            | 0.014  |                                       | 0.014                                 |                                       |
|  | J2 axis (2nd arm)                          | degree            | 0.014  |                                       | 0.014                                 |                                       |
|  | Vertical axis                              | mm                | 0.009  |                                       | 0.009                                 |                                       |
|  | Gripper                                    | mm                | 0.004  | 0.004                                 | 0.004                                 | 0.004                                 |
| Lost Motion  | J1 axis (1st arm)                          | degree            | 0.3 or less  |                                       | 0.3 or less                           |                                       |
|  | J2 axis (2nd arm)                          | degree            | 0.3 or less  |                                       | 0.3 or less                           |                                       |
|  | Vertical axis                              | mm                | 0.1  |                                       | 0.1                                   |                                       |
|  | Gripper                                    | mm                | 0.15 or less   |                                       | 0.15 or less                          |                                       |
| Loading Capacity   | Maximum                                    | kg                | 1.5  |                                       | 2.5                                   |                                       |
| Allowable Load Moment of Inertia (Note 5)                  | Maximum                                    | kg·m <sup>2</sup> | 0.026  | 0.024                                 | 0.026                                 | 0.024                                 |
| Allowable Load Moment                                      | Ma   | N·m               | 3.8  | 9.4                                   | 3.8                                   | 9.4                                   |
|  | Mb   | N·m               | 5.5  | 9.4                                   | 5.5                                   | 9.4                                   |
|  | Mc   | N·m               | 9.4  |                                       | 9.4                                   |                                       |
| Allowable Load Diameter (Note 6)                           |  | mm                | 115  |                                       | 115                                   |                                       |
| Vertical Axis Pressing (Note 7)                            |  |                   | Unavailable  |                                       | Unavailable                           |                                       |
| Max. Grip Force of Gripper<br>(Current Limiting Value 70%) |  | N                 | 140  | 220                                   | 140                                   | 220                                   |
| Gripper Velocity at Pressing Operation                     |  | mm/s              | 5  |                                       |                                       |                                       |
| Home-Position Detection                                    | SCARA Robot                                |                   | Battery-less absolute  |                                       |                                       |                                       |
|  | Gripper                                    |                   | Incremental (Pressing home-return)                                 |                                       |                                       |                                       |
| User Tubing  |  |                   | 3 places / O.D. φ4 / I.D. φ2.5 / Max. Pressure 0.8MPa              |                                       |                                       |                                       |
| Environment  | Surrounding air temperature                |                   | 0 to 40°C  |                                       |                                       |                                       |
|  | Surrounding humidity                       |                   | Humidity: 20 to 85%RH or less (non-condensing)                     |                                       |                                       |                                       |
|  | Surrounding environment                    |                   | Refer to "2.2 Installation and Storage • Preservation Environment" |                                       |                                       |                                       |
|  | Surrounding storage temperature            |                   | -10 to 50°C  |                                       |                                       |                                       |
|  | Surrounding storage humidity               |                   | Humidity: 20 to 85%RH or less (non-condensing)                     |                                       |                                       |                                       |
| Protection class   |  |                   | IP20   |                                       |                                       |                                       |
| Noise (Note 8)   |  | dB                | 78 or less   | 78 or less                            | 78 or less                            | 78 or less                            |

- Note 1 Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- Note 2 It is the required time to run back and forth between positions that enable the fastest motion under the following condition. [Refer to 1.2.4 Ambient Temperature and Duty Setting for continuous operation in maximum velocity]

It is the time for back and forth cycle with 2kg of carrier including gripper, 25mm of vertical movement and 300mm of horizontal movement.



The standard cycle time of the gripper is the time when movement is made through the whole stroke.

- Note 3 It is when repeated operation is performed from the same start position, with the same speed, acceleration / deceleration, arm system and load (transported work piece), to one setting position. The positioning accuracy repeatability may not be achieved in such cases as when the arm system is switched or when positioning is performed to one setting position from several different positions.  
At a constant surrounding air temperature of 20°C. It is not the absolute positioning accuracy.
- Note 4 The positions available to perform positioning are limited by resolution.  
[Refer to 4.1 Scattered Positioning Points]
- Note 5 It is the allowable value for the moment of inertia calculated at the center of the tip shaft (3-axis type: center of guide shaft, 4-axis type: center of rotation axis).  
[Refer to 2.3.2 [2] Installation of Load for the amount of offset from the center of the tip shaft to the center of gravity of the load]  
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.
- Note 6 It is the diameter of the load assumed for the allowable load moment of inertia. Use the product with the moment below the allowable load moment of inertia by referring to the load allowable diameter.  
There may be a risk of the load interfering to the main body of the robot when the center of gravity of the load is far from the center of the tip shaft. Pay attention not to have interference at teaching.
- Note 7 Pressing operation cannot be performed.  
However, the allowable pressing force that the arm can accept is 90N or less when a tool or a buffer such as a spring on the pressed side is equipped.
- Note 8 They are the values when operation is performed with the maximum combined speed (J1 axis + J2 axis). The tone of the noise fluctuates depending on the operation speed.  
The sound level is A-weighted sound pressure level.

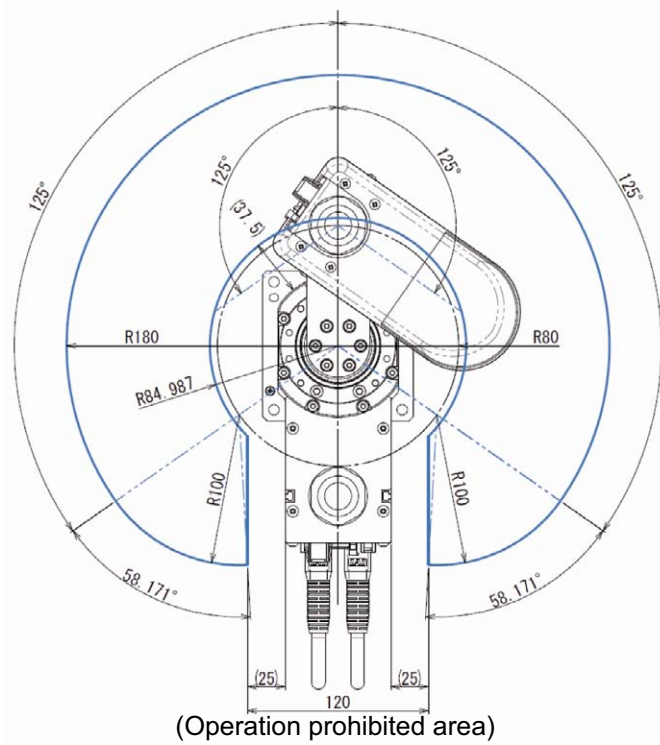
**⚠ Caution:**

- If the robot is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
- If the robot is operated under a load equal to or greater than the allowable moment of inertia, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.
- Attaching a load beyond the allowable overhang length may generate vibration or abnormal noise.

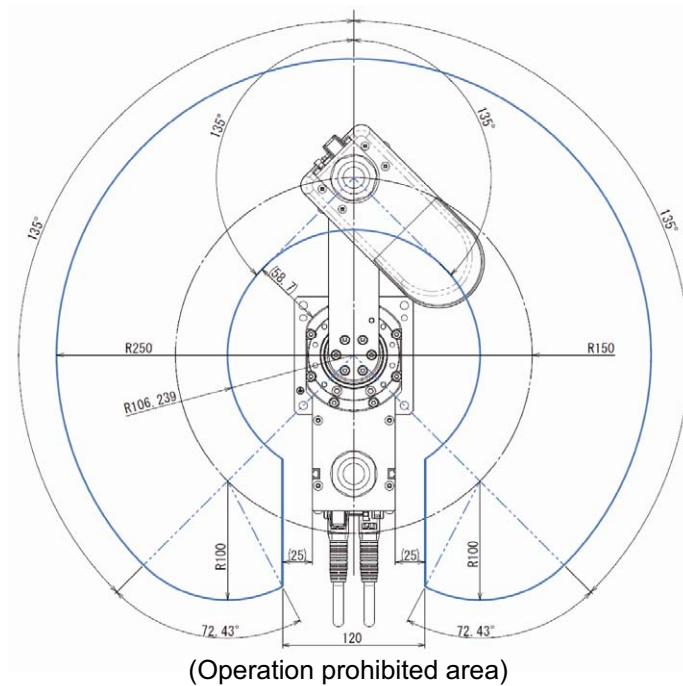
## 1.2.2 Operation Range and Operation Limit

### [1] Operation Range

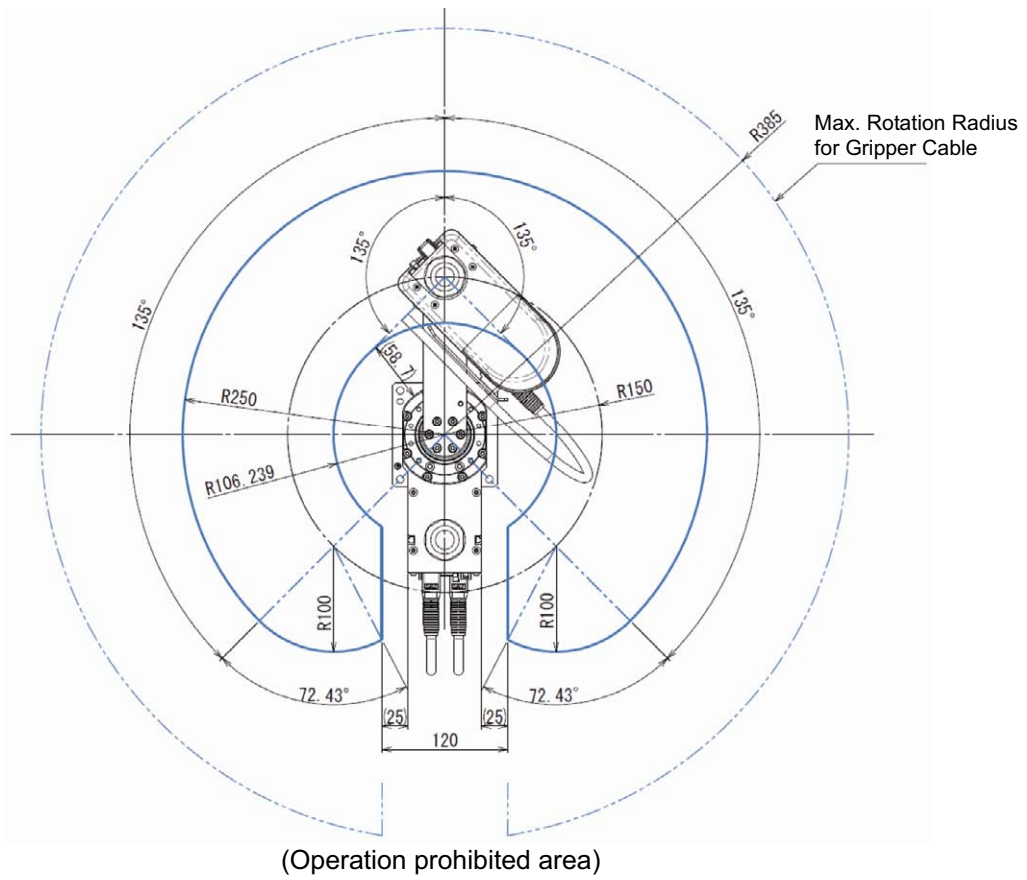
- IXP-3N1808, 4N1808 Without Loaded Axis (Gripper)



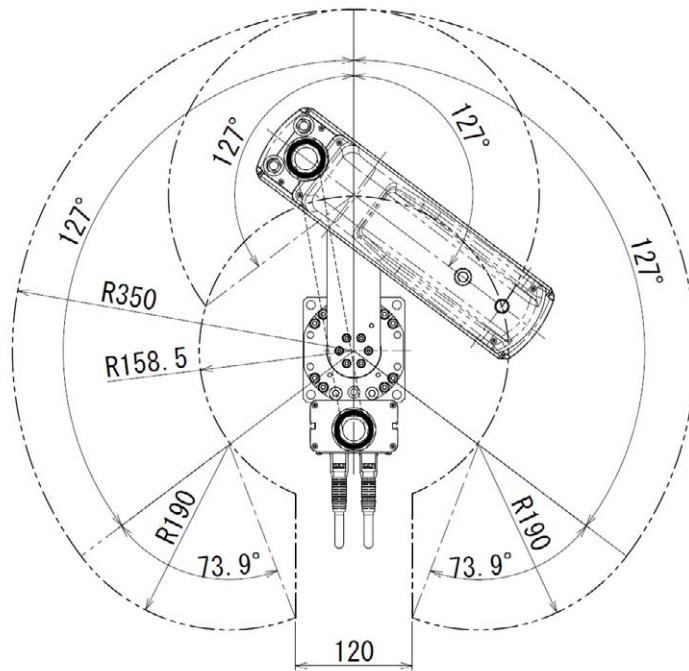
- IXP-3N2508, 4N2508 Without Loaded Axis (Gripper)



- IXP-3N2508GM Equipped with Loaded Axis (Gripper) (Option)

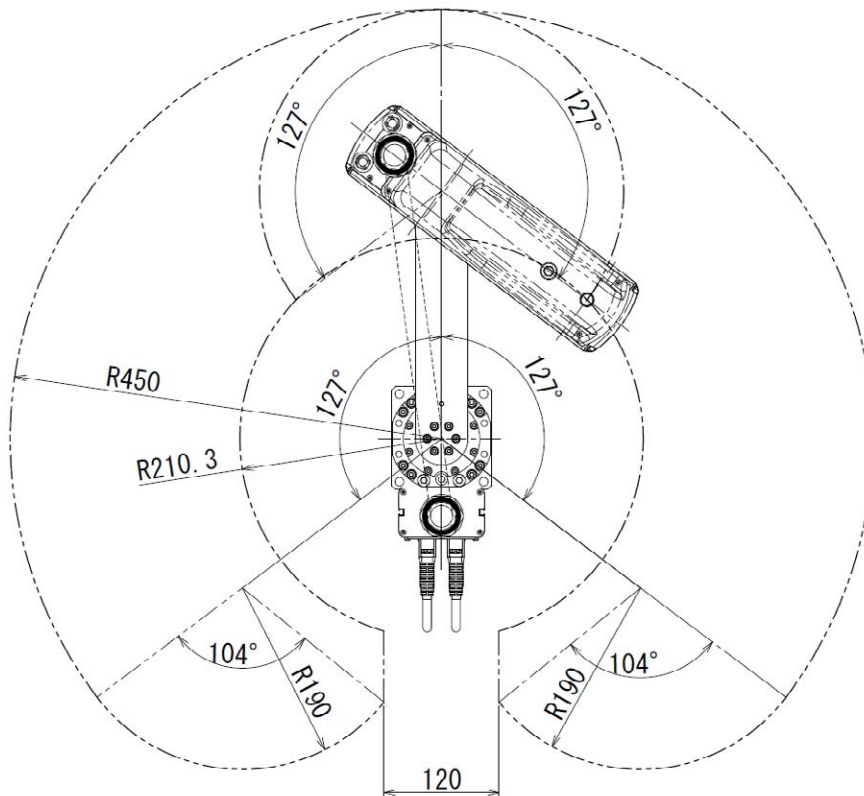


- IXP-3N3515, 4N3515



(Operation prohibited area)

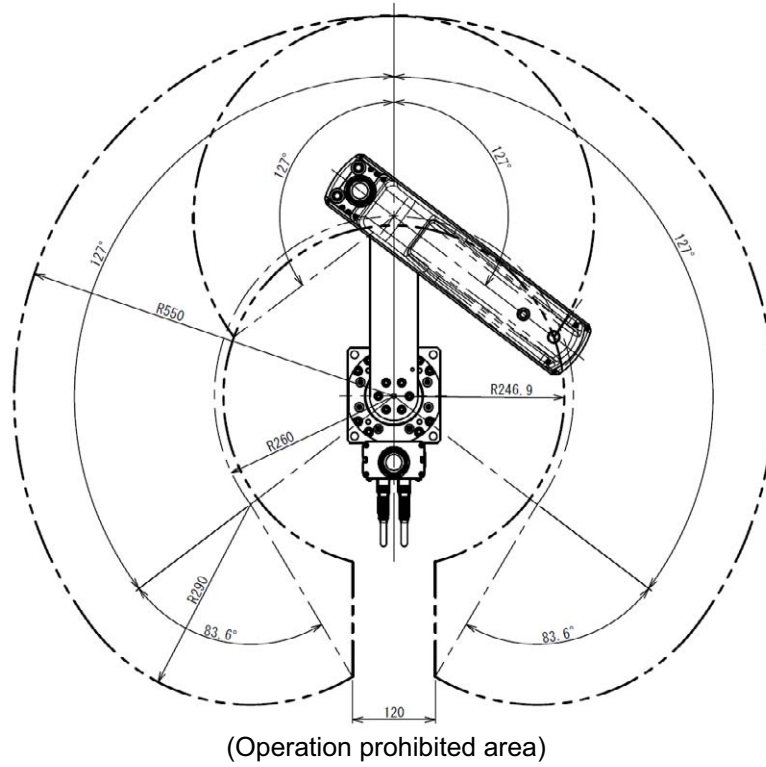
- IXP-3N4515, 4N4515



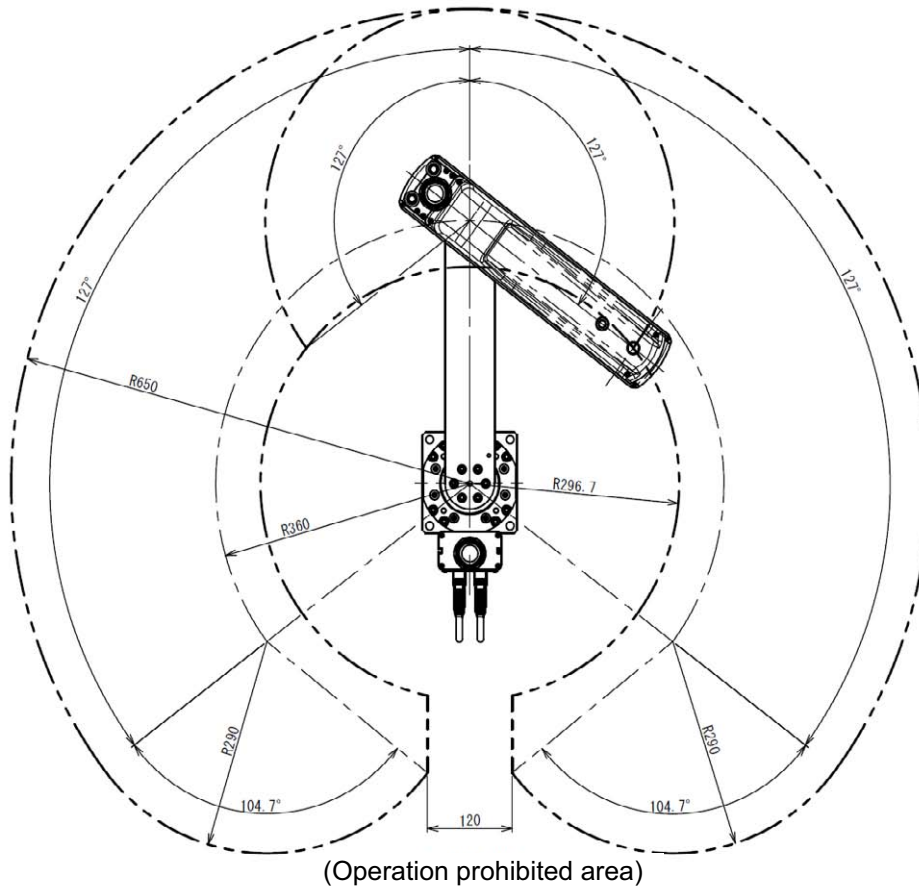
(Operation prohibited area)



- IXP-3N5520, 4N5520



- IXP-3N6520, 4N6520



## [2] Operation Limit

When the load or the arm interferes with peripheral equipment or the home-return posture is to be changed, attach the enclosed hex socket head cap screw to the tapped hole for turning limitation on J1 axis or J2 axis for all the models except for IXP-3/4N5520 and 6520.

For IXP-3/4N5520 and 6520, remove the hex socket head cap screw already attached in the tapped hole for turning limitation on J1 axis or J2 axis, attach enclosed J12 Stopper Pin and fix it with the enclosed hex socket head cap screw.

Change the soft limit value in Each Axis Parameter No. 7 or No. 8.

[Refer to (1) J1-Axis Operation Limit Angle and (2) J2-Axis Operation Limit Angle for the soft limit values]

(1) J1-Axis Turning Limit Angle

Have the turning of J1 axis limited by following the procedure stated below.

[Procedure]

- 1) Attach the enclosed hex socket head cap screw (M5×6 / black) to the tapped hole for turning limitation on J1 axis at the targeted position.
- 2) Select “the soft limit value (1st axis) in Each Axis Parameter No. 7 or No. 8” from the table below and change the value.

**⚠ 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 and the home-position adjustment are not conducted after the turning limiting stopper is attached.

[IXP-3/4N1808]

Angle of J1 Axis Turning Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] (Note 1) | Parameter (Each Axis No. 7 / No. 8, 1st Axis) |        |
|-----|--------------------------------|------------------------------|--|---|--------|
| 1   | 140                            | 125                          | 15   | No.7  | 215000 |
| 2   | 90                             | 85                           | 5  |   | 175000 |
| 3   | 60                             | 55                           | 5  |   | 145000 |
| 4   | -60                            | -55                          | 5  | No.8  | 35000  |
| 5   | -90                            | -85                          | 5  |   | 5000   |
| 6   | -140                           | -125                         | 15   |   | -35000 |

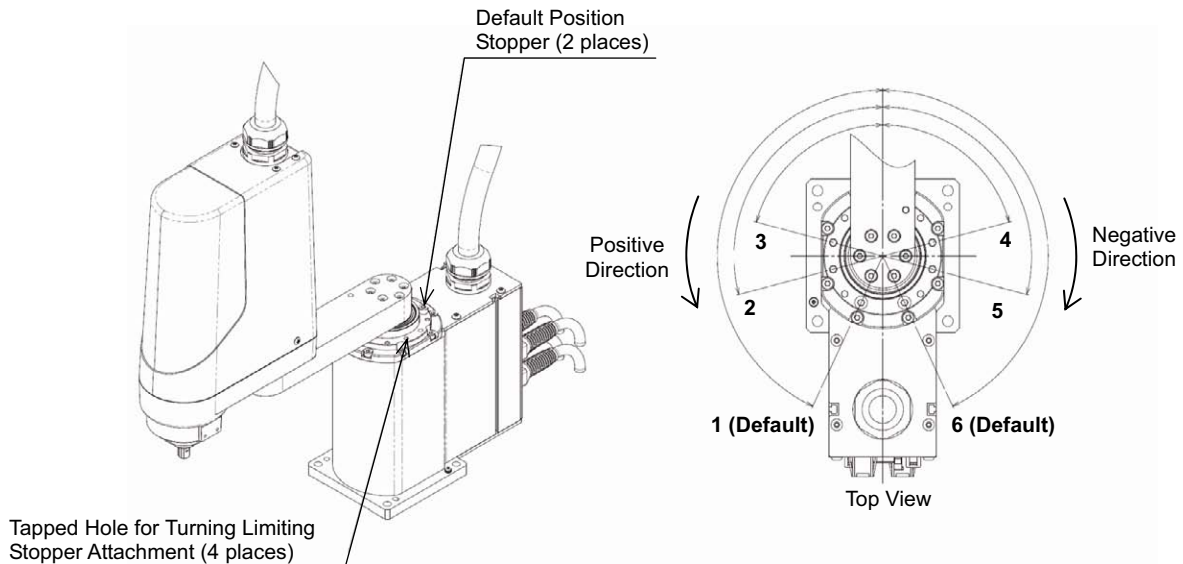
(Note 1) It can be revised by home-position adjustment.

[IXP-3/4N2508]

Angle of J1 Axis Turning n Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] (Note 1) | Parameter (Each Axis No. 7 / No. 8, 1st Axis) |        |
|-----|--------------------------------|------------------------------|--|---|--------|
| 1   | 140                            | 135                          | 5  | No.7  | 225000 |
| 2   | 90                             | 85                           | 5  |   | 175000 |
| 3   | 60                             | 55                           | 5  |   | 145000 |
| 4   | -60                            | -55                          | 5  | No.8  | 35000  |
| 5   | -90                            | -85                          | 5  |   | 5000   |
| 6   | -140                           | -135                         | 5  |   | -45000 |

(Note 1) It can be revised by home-position adjustment.

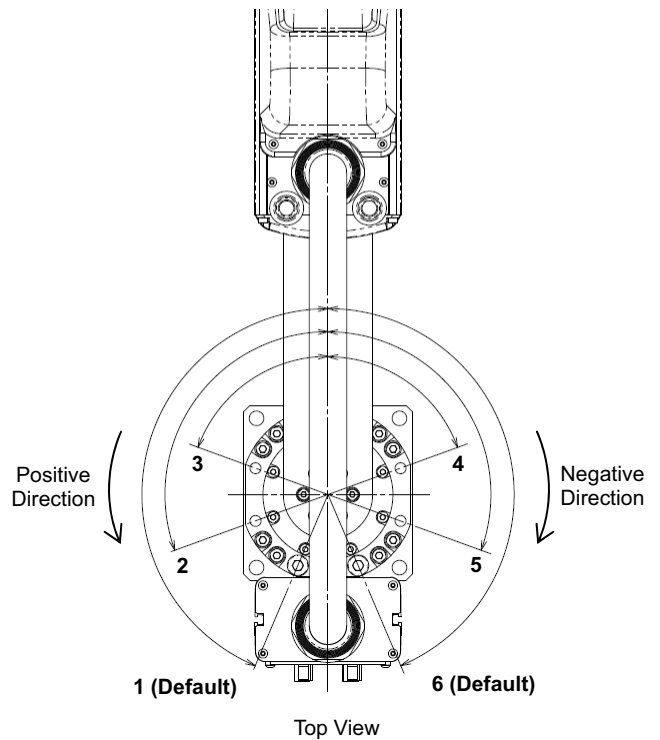
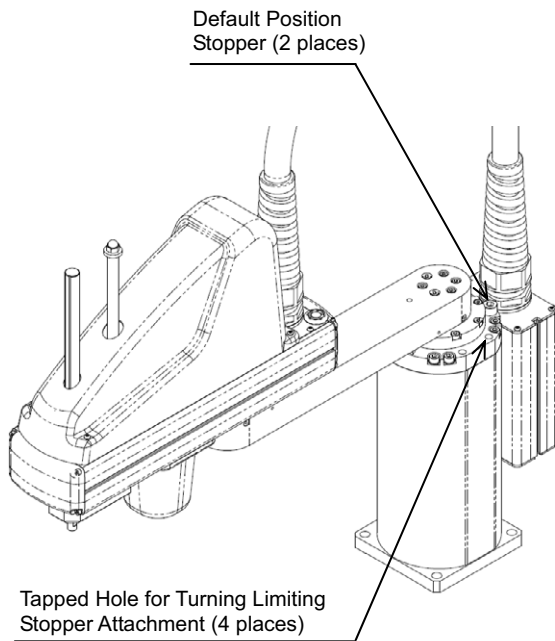


[IXP-3/4N3515, 4515]

## Angle of J1 Axis Turning Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] <sup>(Note 1)</sup> | Parameter (Each Axis No. 7 / No. 8, 1st Axis) |        |
|-----|--------------------------------|------------------------------|---|---|--------|
| 1   | 130                            | 127                          | 3   | No.7  | 217000 |
| 2   | 83                             | 80                           | 3   |   | 170000 |
| 3   | 43                             | 40                           | 3   |   | 130000 |
| 4   | -43                            | -40                          | 3   | No.8  | 50000  |
| 5   | -83                            | -80                          | 3   |   | 10000  |
| 6   | -130                           | -127                         | 3   |   | -37000 |

(Note 1) It can be revised by home-position adjustment.



[IXP-3/4N5520, 6520]

[Procedure]

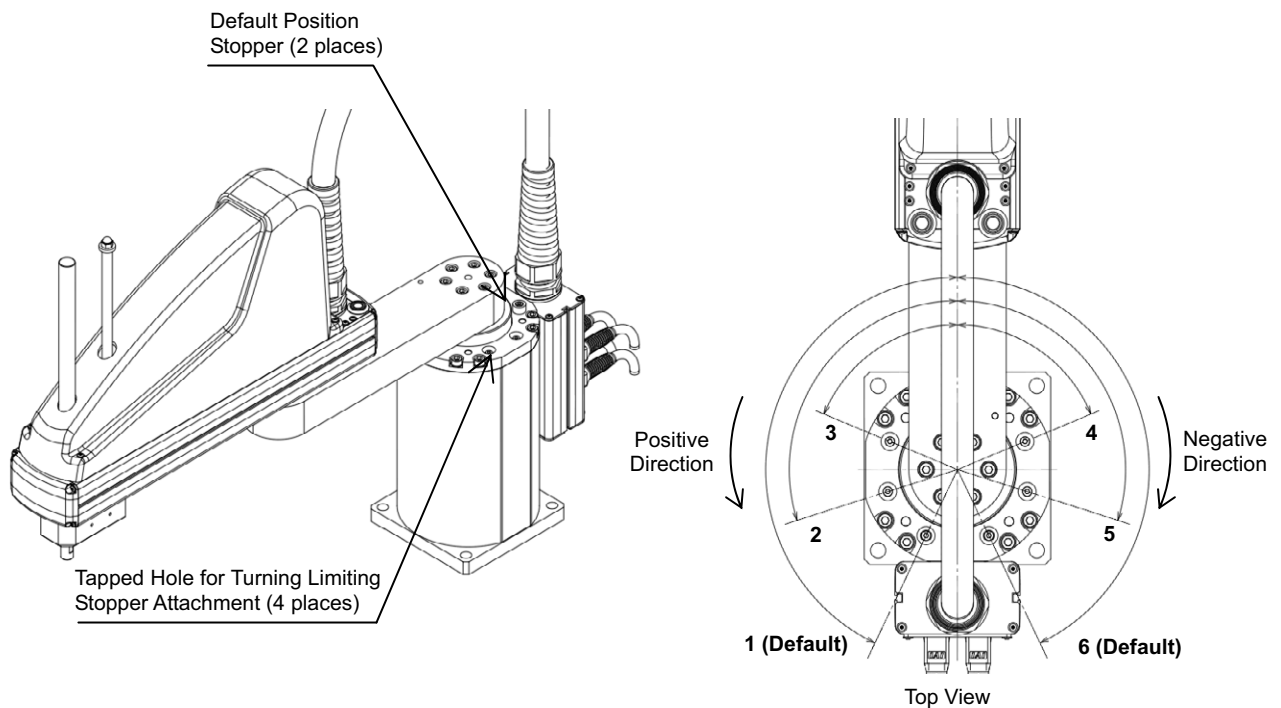
- 1) Remove the hex socket head cap screw already attached in the tapped hole for turning limitation on J1 axis.
- 2) Attach enclosed J12 Stopper Pin at the target position and fix it with the enclosed hex socket head cap screw (M4 × 15).
- 3) Select “the soft limit value (1st axis) in Each Axis Parameter No. 7 or No. 8” from the table below and change the value.

**⚠ 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 and the home-position adjustment are not conducted after the turning limiting stopper is attached.

Angle of J1 Axis Turning Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] (Note 1) | Parameter (Each Axis No. 7 / No. 8, 1st Axis) |        |
|-----|--------------------------------|------------------------------|--|---|--------|
| 1   | 130                            | 127                          | 3  | No.7  | 217000 |
| 2   | 83                             | 80                           | 3  |   | 170000 |
| 3   | 43                             | 40                           | 3  |   | 130000 |
| 4   | -43                            | -40                          | 3  | No.8  | 50000  |
| 5   | -83                            | -80                          | 3  |   | 10000  |
| 6   | -130                           | -127                         | 3  |   | -37000 |

(Note 1) It can be revised by home-position adjustment.



## (2) J2-Axis Turning Limit Angle

Have the turning of J2 axis limited by following the procedure stated below.

[Procedure]

- 1) Attach the enclosed hex socket head cap screw (M5×6 / black) to the tapped hole for turning limitation on J2 axis at the targeted position.
- 2) Select “the soft limit value (2nd axis) in Each Axis Parameter No. 7 or No. 8” from the table below and change the value.

**⚠ 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 and the home-position adjustment are not conducted after the turning limiting stopper is attached.

[IXP-3/4N1808]

Angle of J2 Axis Turning Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] <small>(Note 1)</small> | Parameter (Each Axis No. 7 / No. 8, 2st Axis) |         |
|-----|--------------------------------|------------------------------|---|---|---------|
| 1   | 140                            | 125                          | 15  | No.7  | 125000  |
| 2   | 90                             | 85                           | 5   |   | 85000   |
| 3   | 60                             | 55                           | 5   |   | 55000   |
| 4   | -60                            | -55                          | 5   | No.8  | -55000  |
| 5   | -90                            | -85                          | 5   |   | -85000  |
| 6   | -140                           | -125                         | 15  |   | -125000 |

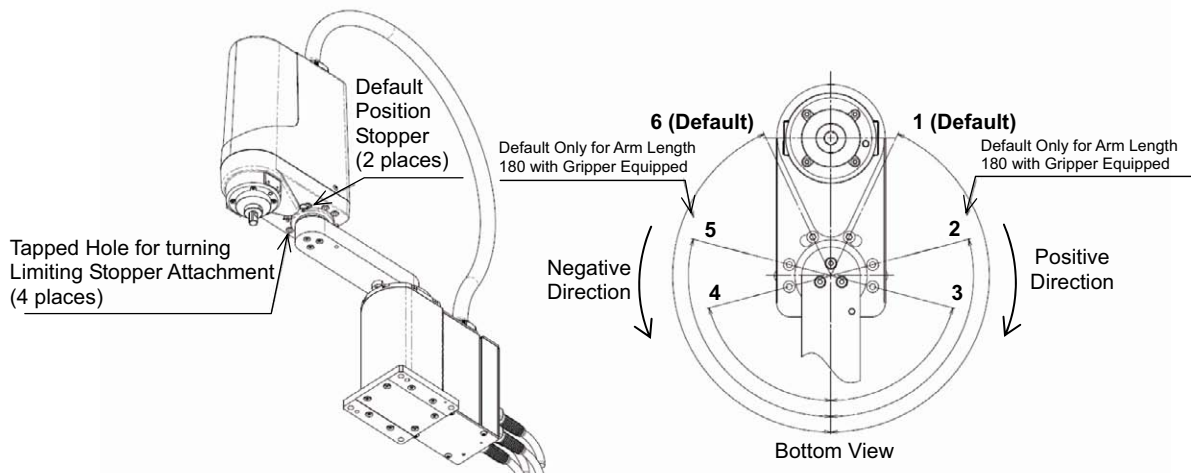
(Note 1) It can be revised by home-position adjustment.

[IXP-3/4N2508]

Angle of J2 Axis Turning Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] <small>(Note 1)</small> | Parameter (Each Axis No. 7 / No. 8, 2st Axis) |         |
|-----|--------------------------------|------------------------------|---|---|---------|
| 1   | 140                            | 135                          | 5   | No.7  | 135000  |
| 2   | 90                             | 85                           | 5   |   | 85000   |
| 3   | 60                             | 55                           | 5   |   | 55000   |
| 4   | -60                            | -55                          | 5   | No.8  | -55000  |
| 5   | -90                            | -85                          | 5   |   | -85000  |
| 6   | -140                           | -135                         | 5   |   | -135000 |

(Note 1) It can be revised by home-position adjustment.

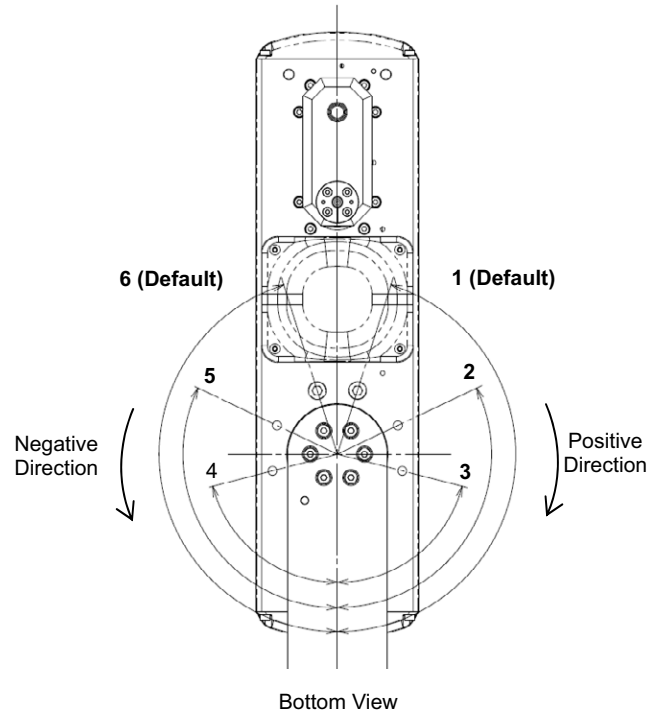
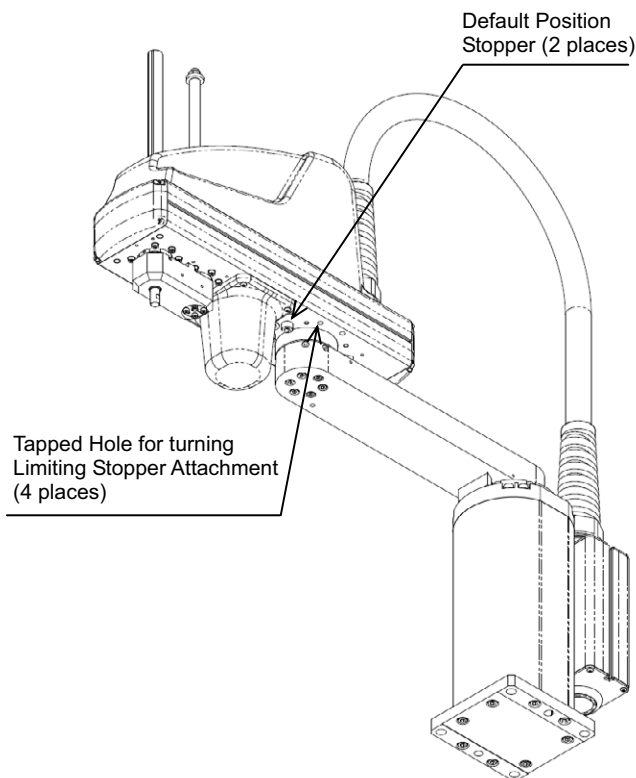


[IXP-3/4N3515, 4515]

## Angle of J2 Axis Turning Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] <sup>(Note 1)</sup> | Parameter (Each Axis No. 7 / No. 8, 2nd Axis) |         |
|-----|--------------------------------|------------------------------|---|---|---------|
| 1   | 130                            | 127                          | 3   | No.7  | 127000  |
| 2   | 83                             | 80                           | 3   |   | 80000   |
| 3   | 43                             | 40                           | 3   |   | 40000   |
| 4   | -43                            | -40                          | 3   | No.8  | -40000  |
| 5   | -83                            | -80                          | 3   |   | -80000  |
| 6   | -130                           | -127                         | 3   |   | -127000 |

(Note 1) It can be revised by home-position adjustment.



[IXP-3/4N5520, 6520]

[Procedure]

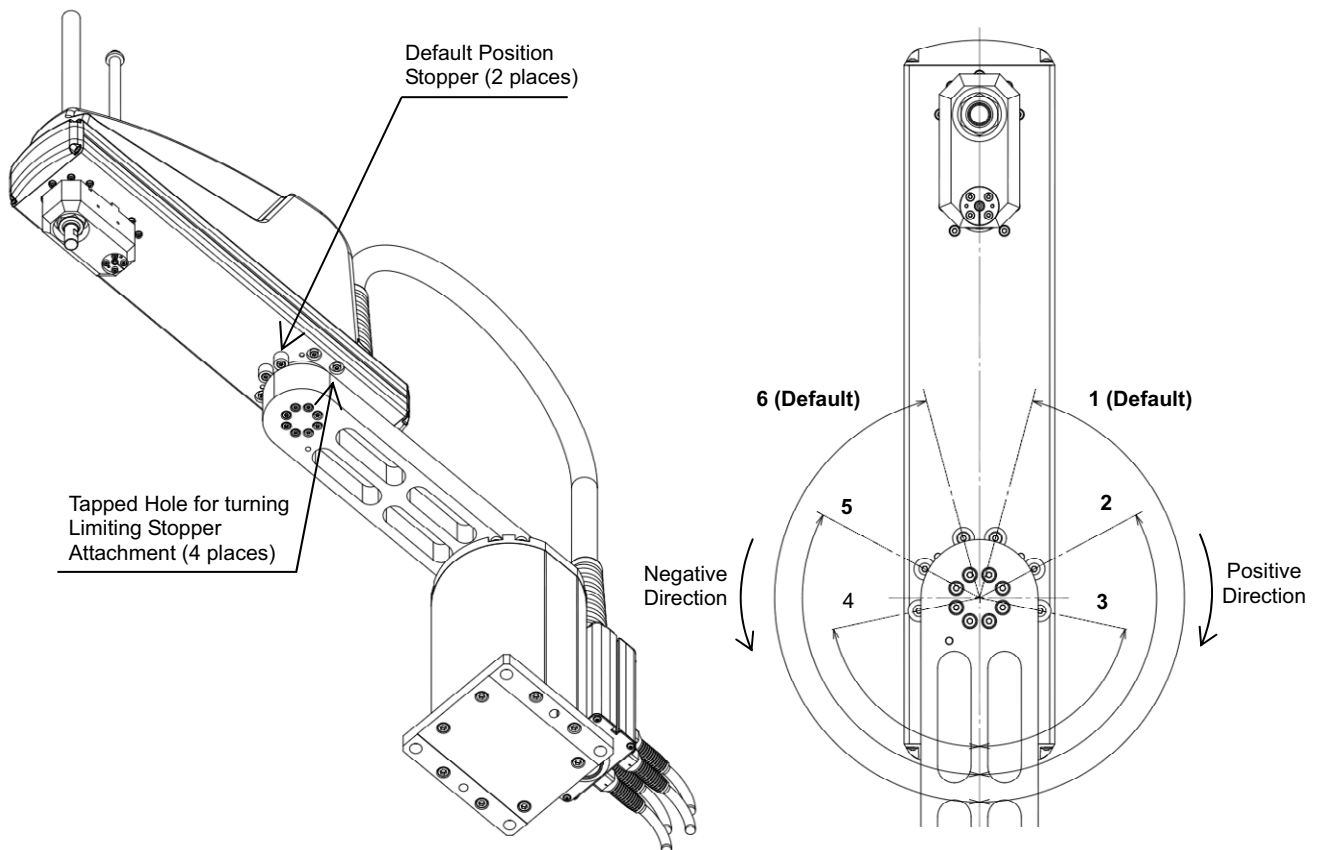
- 1) Remove the hex socket head cap screw already attached in the tapped hole for turning limitation on J2 axis.
- 2) Attach enclosed J12 Stopper Pin at the target position and fix it with the enclosed hex socket head cap screw (M4 × 12).
- 3) Select “the soft limit value (1st axis) in Each Axis Parameter No. 7 or No. 8” from the table below and change the value.

**⚠ 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 and the home-position adjustment are not conducted after the turning limiting stopper is attached.

Angle of J2 Axis Turning Limit and Parameters

| No. | Stopper Position (ME) [degree] | Software Limitation [degree] | Angle from Software Limitation to ME [degree] <small>(Note 1)</small> | Parameter (Each Axis No. 7 / No. 8, 1st Axis) |         |
|-----|--------------------------------|------------------------------|---|---|---------|
| 1   | 130                            | 127                          | 3   | No.7  | 217000  |
| 2   | 83                             | 80                           | 3   |   | 80000   |
| 3   | 43                             | 40                           | 3   |   | 40000   |
| 4   | -43                            | -40                          | 3   | No.8  | -40000  |
| 5   | -83                            | -80                          | 3   |   | -80000  |
| 6   | -130                           | -127                         | 3   |   | -217000 |

(Note 1) It can be revised by home-position adjustment.





## 1.2.3 Speed / Acceleration/Deceleration and Transfer Load

### (1) PTP Operation

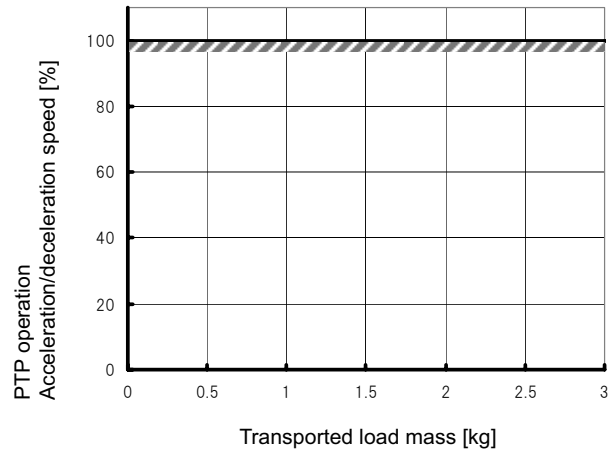
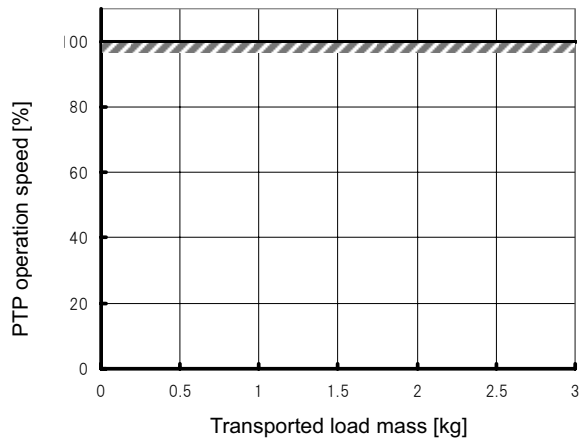
For the speed and acceleration/deceleration, the operational values with the transported load mass and driving posture are applied as 100% (Optimum speed and optimum acceleration/deceleration function.) Perform adjustment to obtain the targeted speed and acceleration/deceleration.

- ⚠ Caution:**
- Optimum speed and 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.
  - Establish the appropriate settings for the load mass and the moment of inertia by using WGHT Command in a program.  
[Refer to SEL Language Programing Manual for how to establish settings]
  - For gripper-equipped type, set WGHT Command as shown below.

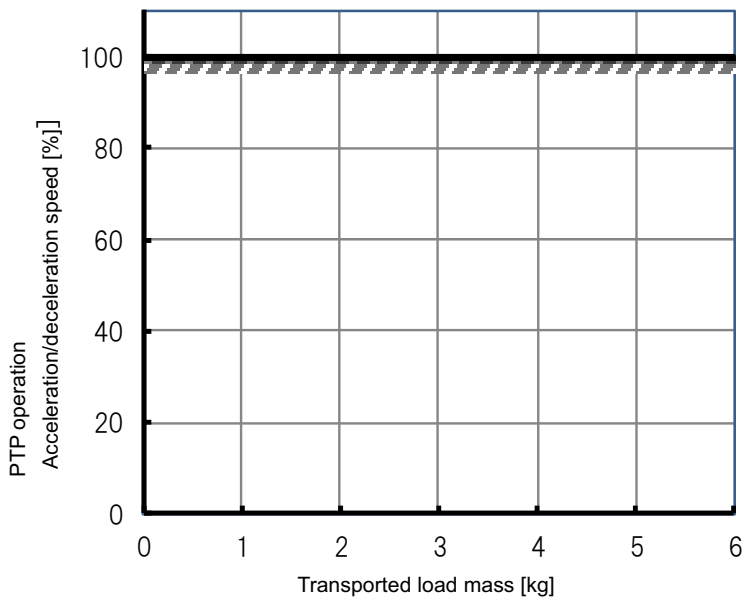
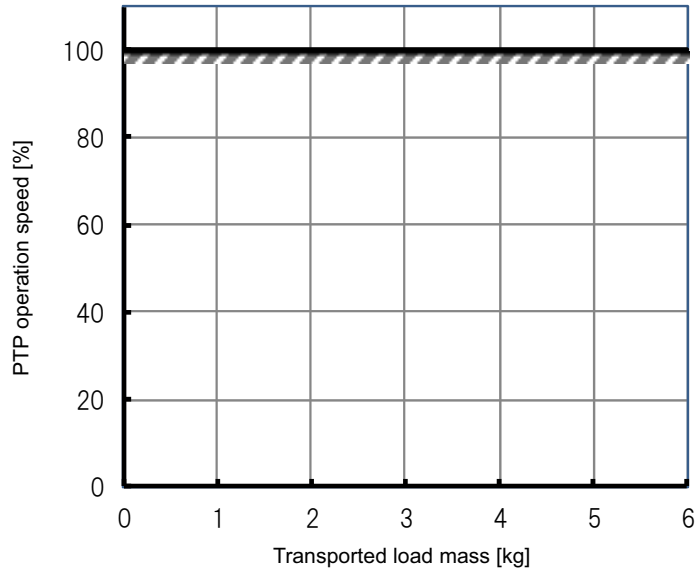
| Model Number         | Gripper    | Max. Load Mass | WGHT Setting <sup>(Note 1)</sup> |
|----------------------|------------|----------------|----------------------------------|
| 3N2508GM             | RCP4-GRSML | 500g           | 500g or more, 1000g or less      |
| 3N3515GM<br>3N4515GM | RCP4-GRSML | 500g           | 500g or more, 1000g or less      |
| 3N3510GL<br>3N4510GL | RCP4-GRSLL | 1500g          | 1500g or more, 3000g or less     |
| 3N5510GL<br>3N6510GL | RCP4-GRSLL | 1500g          | 1500g or more, 3000g or less     |
| 3N5510GW<br>3N6510GW | RCP4-GRSWL | 2500g          | 2000g or more, 4500g or less     |

Note 1 Establish the setting with the sum of total mass of gripper + plate (GRSML: 500g, GRSLL: 1500g, GRSWL: 2000g) and load.

[IXP-3/4N1808, 2508, 3515, 4515]




[IXP-3/4N5520, 6520]



## (2) CP Operation

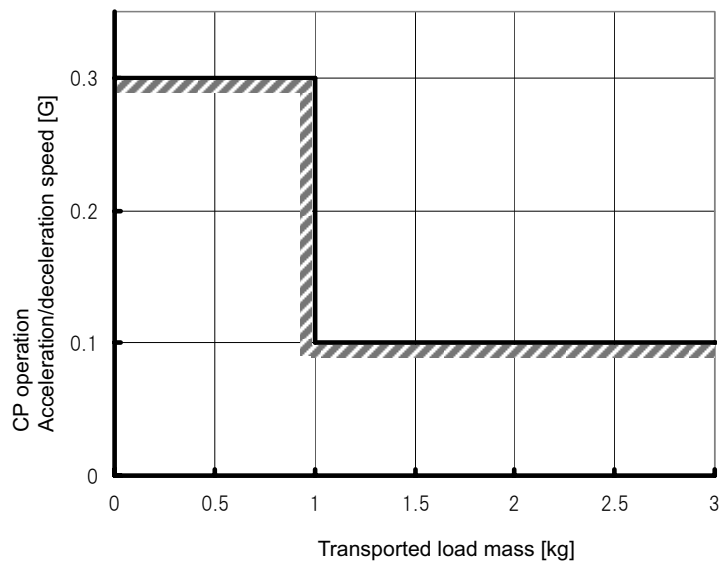
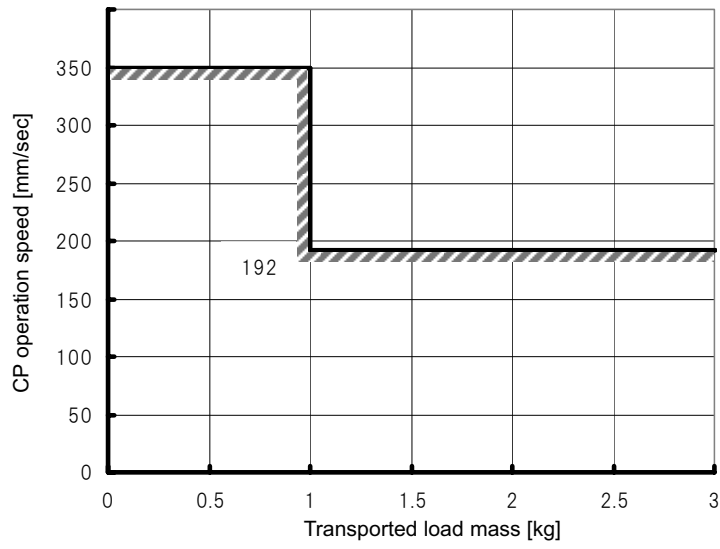
Set the speed and acceleration/deceleration with the value shown in the graph below as the upper limit.

-  **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.
  - Establish the appropriate settings for the load mass and the moment of inertia by using WGHT Command in a program.  
[Refer to SEL Language Programing Manual for how to establish settings]
  - For gripper-equipped type, set WGHT Command as shown below.

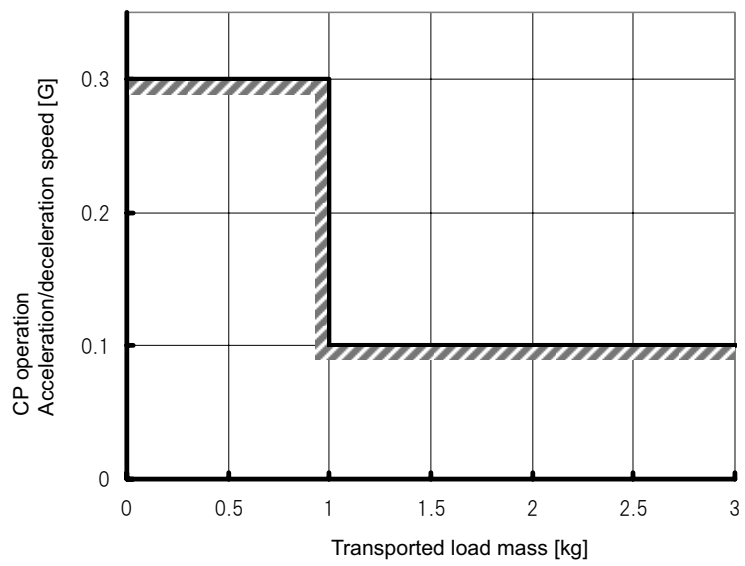
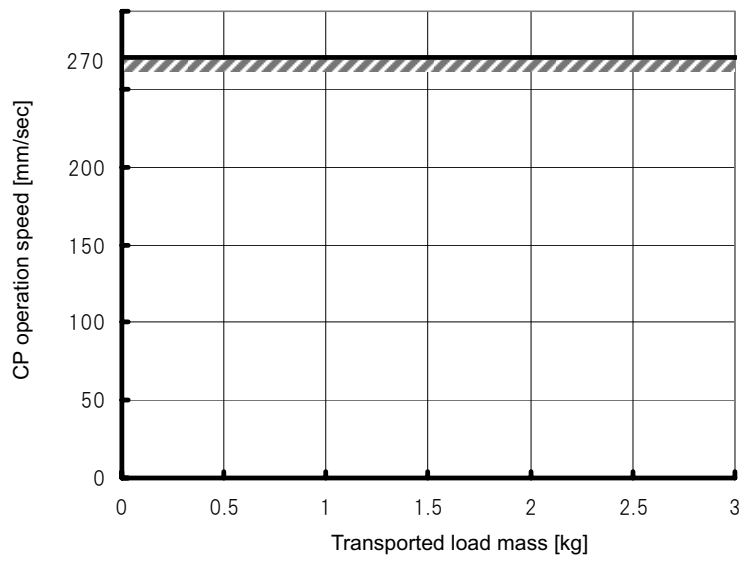
| Model Number         | Gripper    | Max. Load Mass | WGHT Setting <sup>(Note 1)</sup> |
|----------------------|------------|----------------|----------------------------------|
| 3N2508GM             | RCP4-GRSML | 500g           | 500g or more, 1000g or less      |
| 3N3515GM<br>3N4515GM | RCP4-GRSML | 500g           | 500g or more, 1000g or less      |
| 3N3510GL<br>3N4510GL | RCP4-GRSLL | 1500g          | 1500g or more, 3000g or less     |
| 3N5515GL<br>3N6515GL | RCP4-GRSLL | 1500g          | 1500g or more, 3000g or less     |
| 3N5515GW<br>3N6515GW | RCP4-GRSWL | 2500g          | 2000g or more, 4500g or less     |

Note 1 Establish the setting with the sum of total mass of gripper + plate (GRSML: 500g, GRSLL: 1500g, GRSWL: 2000g) and load.

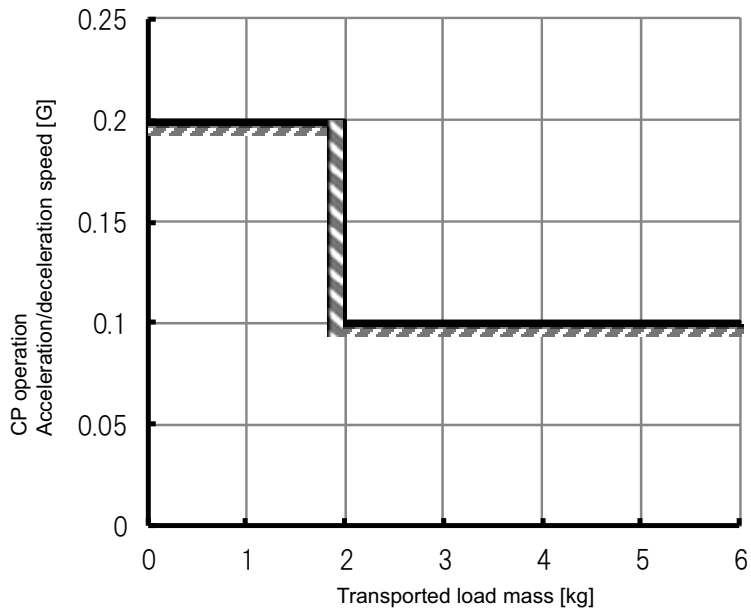
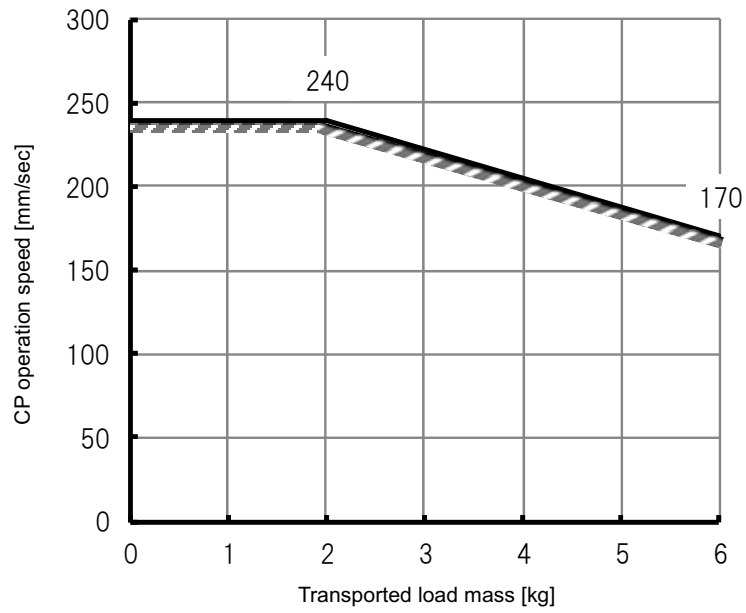
[IXP-3/4N1808, 2508]



[IXP-3/4N3515, 4515]



[IXP-3/4N5520, 6520]

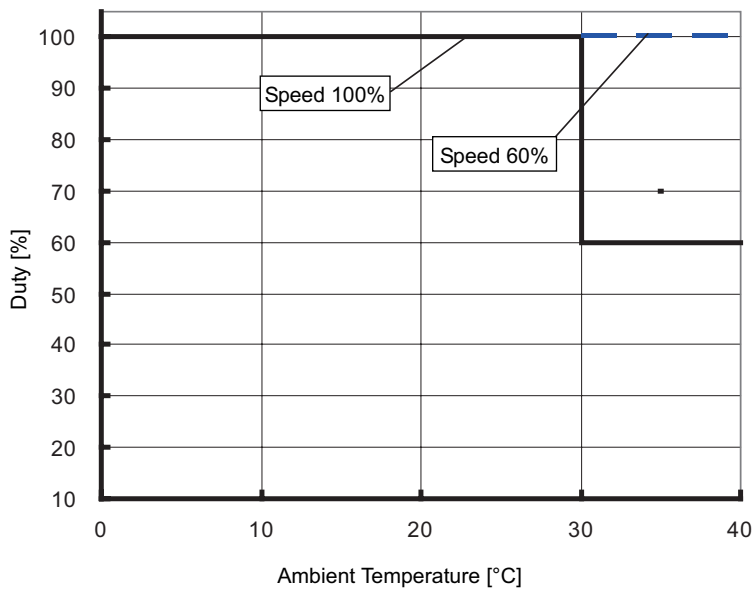


## 1.2.4 Ambient Temperature and Duty

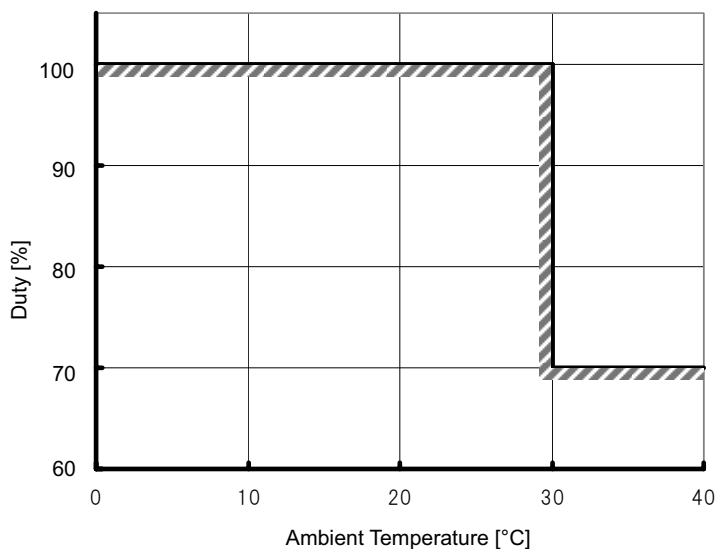
Duty is the rate of operation expressed in % that presents the time of the robot being operated in 1 cycle of operation. To suppress the generation of heat on the motor unit and speed reducer, duty limitation considering the ambient temperature is established. Make operation with the value in the graph below as the upper limit for both PTP operation and CP operation. Also, make operation within 30 (min.) for the continuous operation time ( $T_M$ ) under the ambient temperature 30°C or more.

**⚠ Caution:** Do not attempt to operation with the duty above the upper limit as it may drop the life of the motor unit and speed reducer.

[IXP-3/4N1808, 2508]



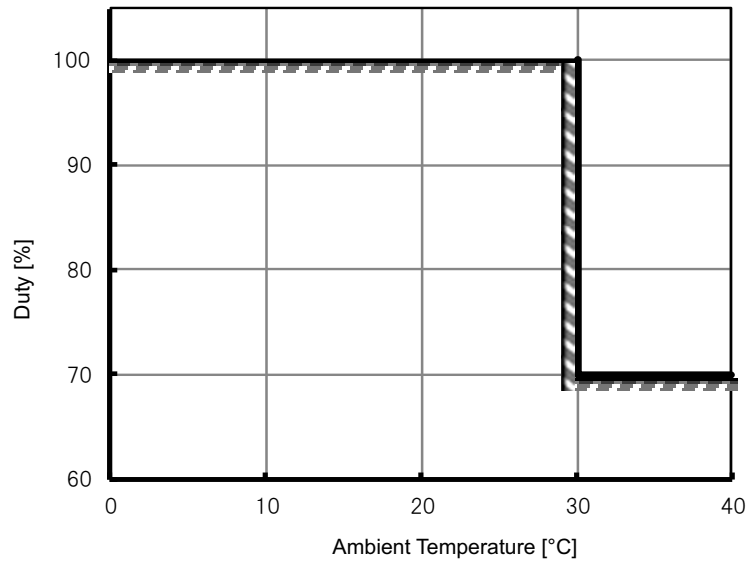
[IXP-3/4N3515, 4515]



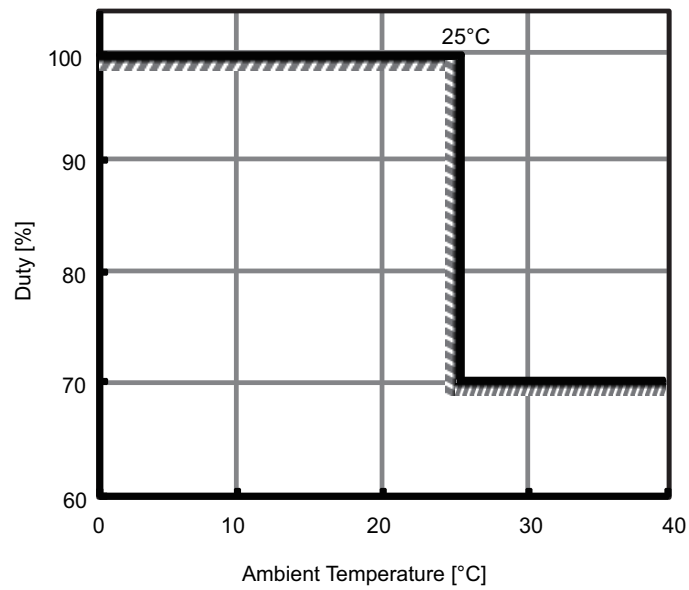


[IXP-3/4N5520, 6520]

- ◎ Continuous Operation for Z-Axis with no brake equipped
- ◎ Compound Operation (not continuous operation of Z-axis only) for Z-Axis Equipped with Brake (Option Model Code: B)



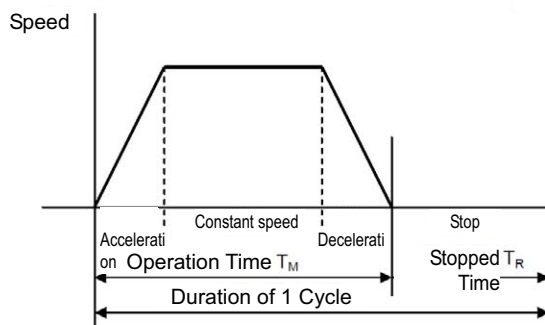
- ◎ Continuous Operation of Z-Axis Only for Z-Axis Equipped with Brake (Option Model Code: B)



[Appendix]

$$D = \frac{T_M}{T_M + T_R} \times 100 \text{ [%]}$$

D: Duty  
 T<sub>M</sub>: Operation Time

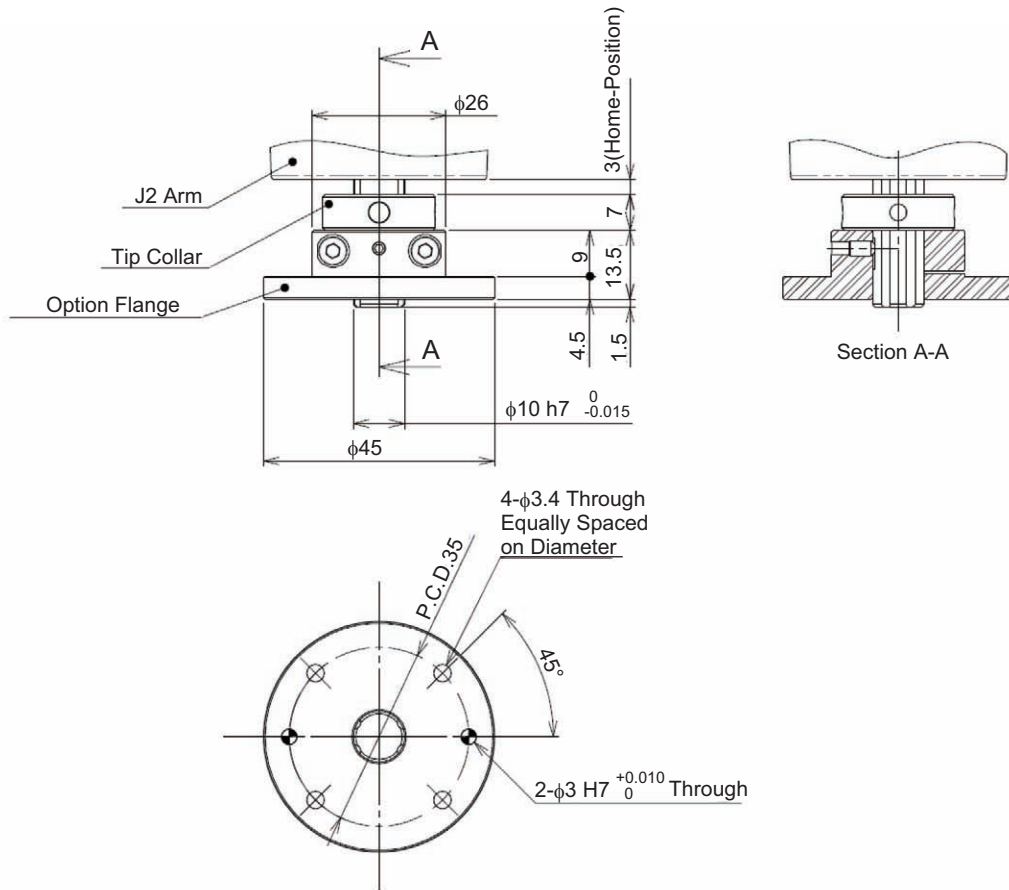


## 1.3 Option

### 1.3.1 Flange

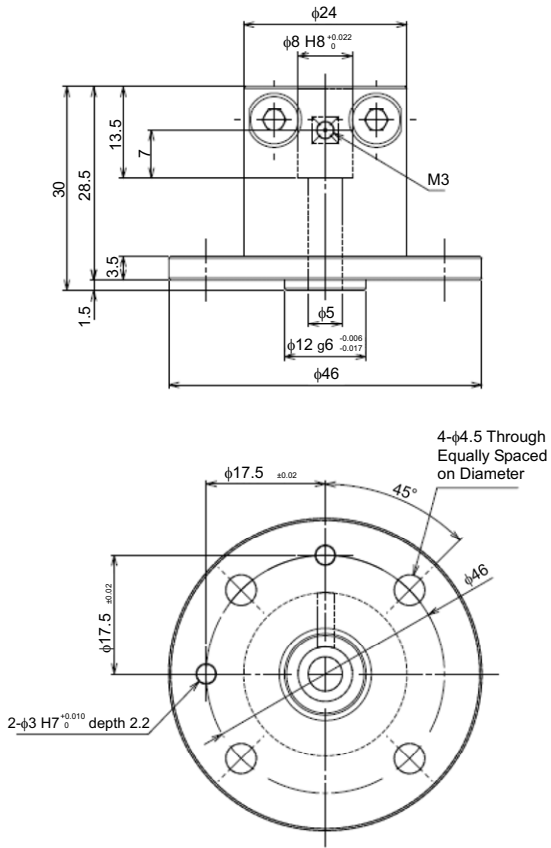
It is the flange to be used when attaching a load on the end of the vertical axis arm.

[IXP-3/4N1808, 2508]  
Option Model : IXP-FL-1



|          |    |
|----------|----|
| Mass [g] | 80 |
|----------|----|

[IXP-3/4N3515, 4515]  
Option Model : IXP-FL-2



|          |     |
|----------|-----|
| Mass [g] | 120 |
|----------|-----|

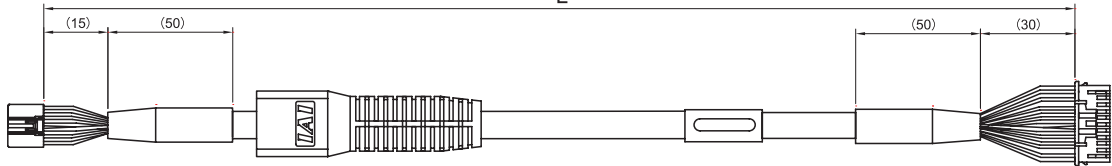


## 1.4 Motor • Encoder Cables

### 1.4.1 Motor • Encoder Integrated Cables

CB-CAN-MPA□□□

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



#### Actuator side

Connector: DF62B-24S-2.2C  
Contact: DF62-2428SCFA (AWG26)  
DF62-22SCFA (AWG22)

#### Controller side

Connector: PADP-24V-1-S  
Contact: SPND-002T-C0.5 (AWG26)  
SPND-001T-C0.5 (AWG22)

#### Connection diagram

#### Actuator side

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

#### Controller side

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

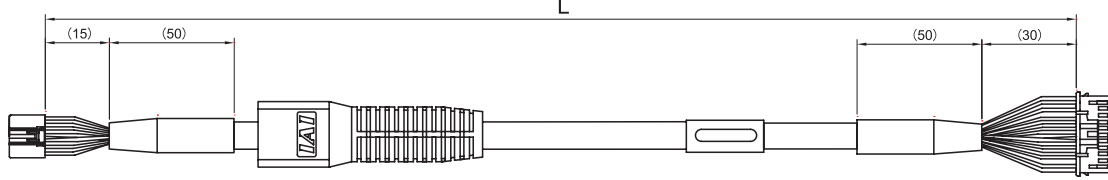
(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

## 1.4.2 Motor • Encoder Integrated Cables Robot Type

### CB-CAN-MPA□□□-RB

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



#### Actuator side

Connector: DF62B-24S-2.2C  
Contact: DF62-2428SCFA (AWG26)  
DF62-22SCFA (AWG22)

#### Controller side

Connector: PADP-24V-1-S  
Contact: SPND-002T-C0.5 (AWG26)  
SPND-001T-C0.5 (AWG22)

### Connection diagram

#### Actuator side

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

#### Controller side

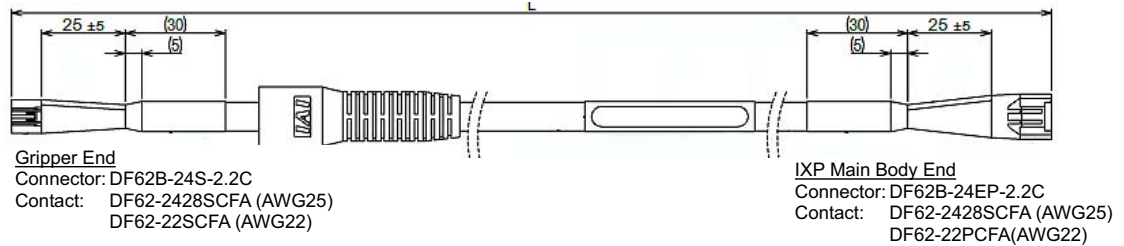
| Pin No. | Signal Name | Electric Wire Color | Thickness |
|---------|-------------|---------------------|-----------|
| 1       | $\phi$ A    | Blue                | AWG22/19  |
| 2       | VMM         | Orange              | AWG22/19  |
| 3       | $\phi$ B    | Brown               | AWG22/19  |
|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

(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

## 1.4.3 RCP4-GRS Connection Relay Cable for Gripper Attachment

CB-IXP-AT008-AS  
(Cable length = 0.8 for 008)



Connection diagram

| Actuator side |                     |             |         | Controller side |             |                     |           |
|---------------|---------------------|-------------|---------|-----------------|-------------|---------------------|-----------|
| Thickness     | Electric Wire Color | Signal Name | Pin No. | Pin No.         | Signal Name | Electric Wire Color | Thickness |
| AWG22         | Black               | $\phi_A$    | 3       | 3               | $\phi_A$    | Black               | AWG22     |
| AWG22         | White               | VMM         | 5       | 5               | VMM         | White               | AWG22     |
| AWG22         | Red                 | $\phi_A$    | 4       | 4               | $\phi_A$    | Red                 | AWG22     |
| AWG22         | Green               | $\phi_B$    | 10      | 10              | $\phi_B$    | Green               | AWG22     |
| AWG22         | Yellow              | VMM         | 9       | 9               | VMM         | Yellow              | AWG22     |
| AWG22         | Brown               | $\phi_B$    | 15      | 15              | $\phi_B$    | Brown               | AWG22     |
| AWG25         | Black               | LSG         | 13      | 13              | LSG         | Black               | AWG25     |
| -             | -                   | -           | -       | -               | -           | -                   | -         |
| AWG25         | White               | LS+         | 14      | 14              | LS+         | White               | AWG25     |
| AWG25         | Yellow              | LS-         | 8       | 8               | LS-         | Yellow              | AWG25     |
| AWG25         | Red                 | A+          | 1       | 1               | A+          | Red                 | AWG25     |
| AWG25         | Green               | A-          | 6       | 6               | A-          | Green               | AWG25     |
| AWG25         | Black(Taped)        | B+          | 11      | 11              | B+          | Black(Taped)        | AWG25     |
| AWG25         | Brown(Taped)        | B-          | 16      | 16              | B-          | Brown(Taped)        | AWG25     |
| -             | -                   | -           | 12      | 12              | -           | -                   | -         |
| AWG25         | Yellow(Taped)       | VPS         | 18      | 18              | VPS         | Yellow(Taped)       | AWG25     |
| AWG25         | Red(Taped)          | VCC         | 21      | 21              | VCC         | Red(Taped)          | AWG25     |
| AWG25         | Green(Taped)        | GND         | 7       | 7               | GND         | Green(Taped)        | AWG25     |
| -             | Shield              | FG          | 24      | 24              | FG          | Shield              | -         |

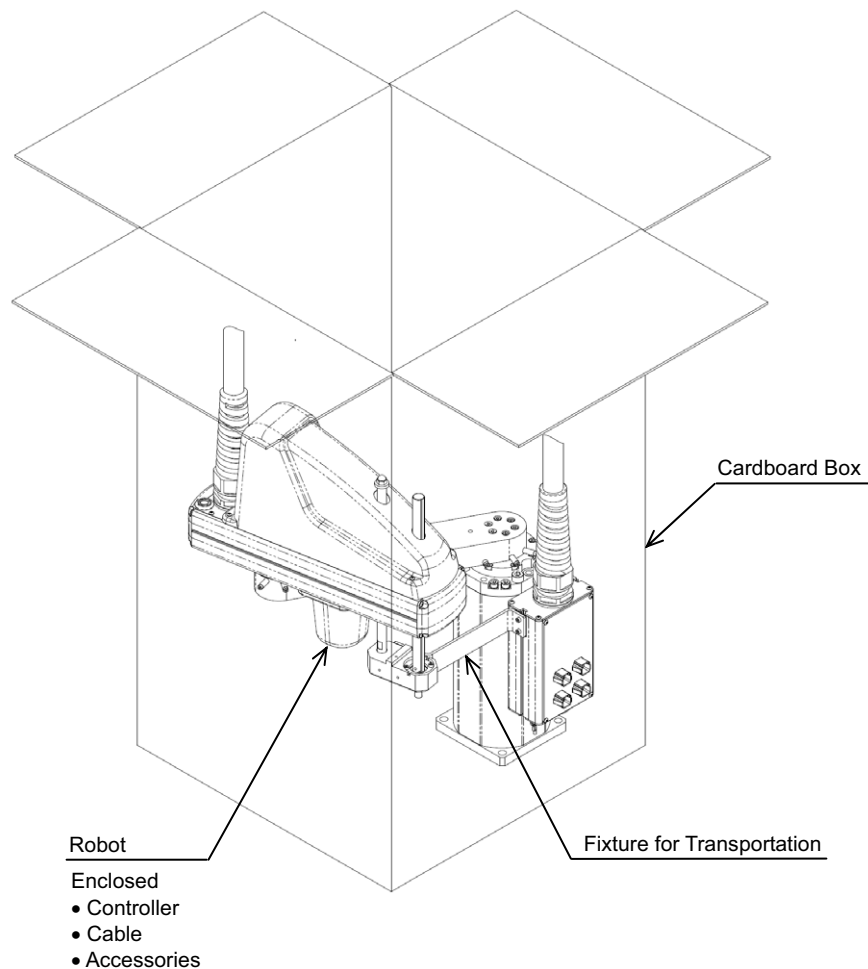
## 2. Installation

### 2.1 Transportation

#### 2.1.1 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.
  - Keep the transportation fixture so it can be used when transporting or moving the robot.
  - The robot taken out of the cardboard box cannot stand by itself. If it is necessary to put it down temporarily, put a cushioning underneath and lay down the robot body. Do not keep it laid down in such a condition for long time.



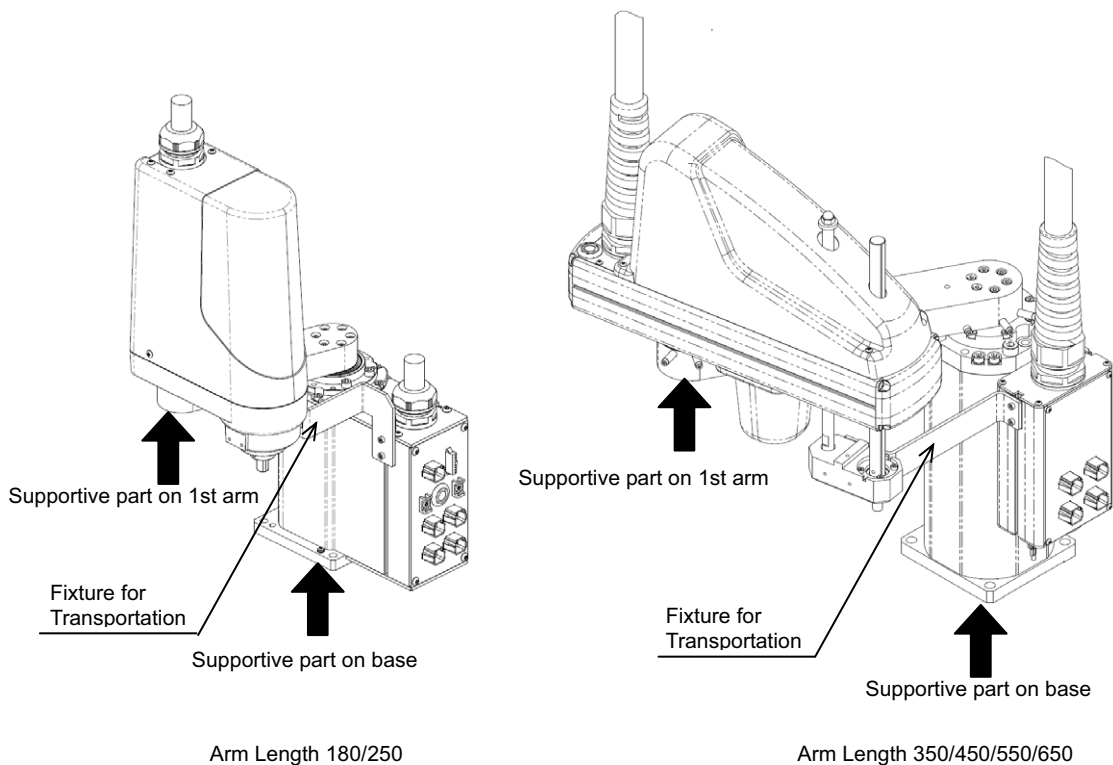


## [1] Handling of the Carton

- 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.

## [2] Handling after Unpackaged

- Transport the robot with the transportation fixture attached on the body.
- Hold the base and the supportive part on the 1st arm as shown in the figure below during transportation. Do not attempt to hold the 2nd arm or vertical axis when transporting.
- Do not apply too much force on each part of the robot.



### 2.1.2 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.

- Make sure to attach the transportation fixture on the robot body during transportation.
- When suspending the mechanical equipment (system) with ropes, avoid applying force to robot, connector, etc. Also, avoid the cables being pinched or caused an excessive deformation.

**⚠ 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

### [1] Installation Environment

Do not use this product in the following environments.

Also make sure to keep enough work space necessary for maintenance.

- 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

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

- 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

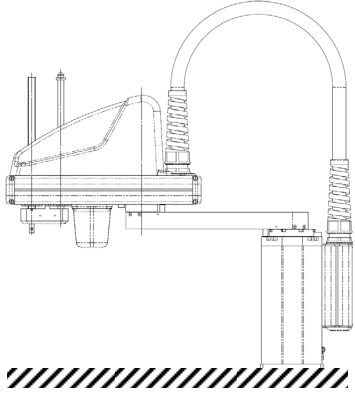
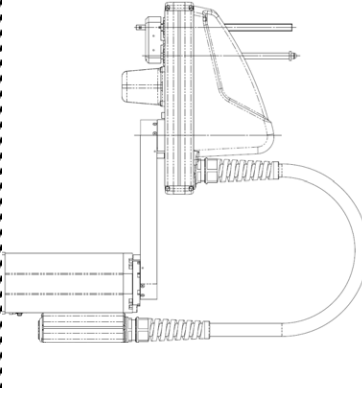
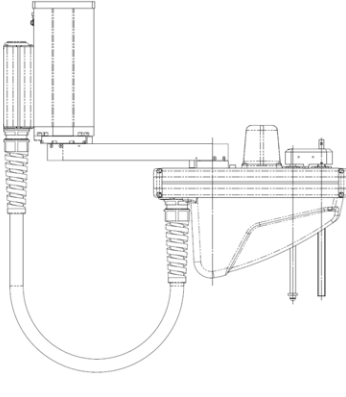
### [2] Storage • Preservation Environment

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

## 2.3 How to Install

### 2.3.1 Installation Orientation

○ : Available    × : Not available

| Horizontally Oriented Mount   | Wall-Mount  | Ceiling-Mount   |
|---|---|---|
|  |  |  |
| ○   | ×   | ×   |

## 2.3.2 Installation

### [1] Installation of the Main Unit

The platform on which to install the robot receives a significant reactive force. Be certain the platform has sufficient rigidity to withstand the anticipated force.

#### (1) Installation Platform

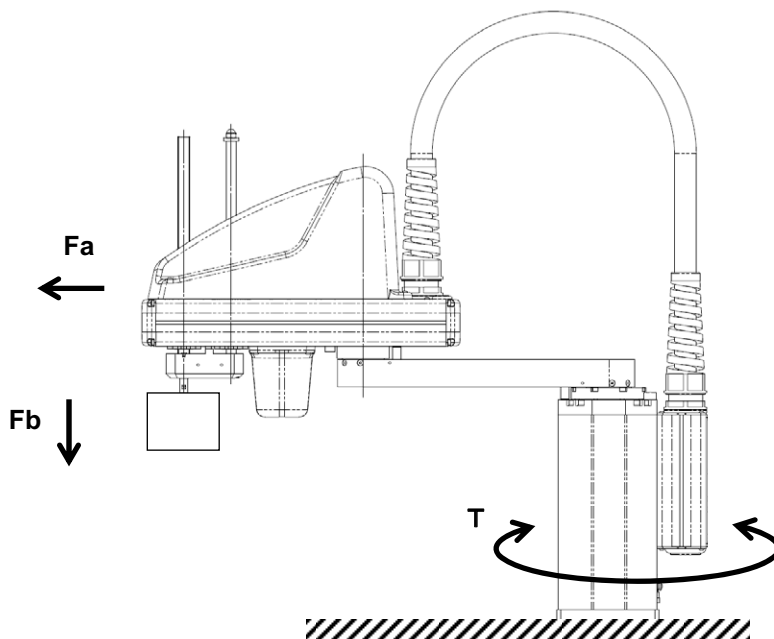
- The surface on which the robot is fixed must have a thickness of 20mm or more. The levelness of the robot installation surface must be at least 0.05mm/500mm or less.
- Have tapped holes prepared on the installation surface on the platform.

| Model Number       | Tapped Holes                               |
|--------------------|--|
| IXP-3/4N1808, 2508 | M6 with the effective length 12mm or more  |
| IXP-3/4N3515, 4515 | M8 with the effective length 16mm or more  |
| IXP-3/4N5520, 6520 | M10 with the effective length 20mm or more |

- There will be a reaction force as shown in the figure below applied to the robot during an operation.  
For the platform to attach the robot, consider enough strength, stiffness and stability to endure the reaction force generated during the operations listed in the table as well as to stand the mass of the robot.

Maximum Reaction Force during Robot Operation

| Model Number | Fa (Max.) |     | Fb (Max.) |      | T (Max.) |       |
|--------------|-----------|-----|-----------|------|----------|-------|
|              | N         | kgf | N         | kgf  | N•m      | kgf•m |
| IXP-3/4N1808 | 34.4      | 3.5 | 63.3      | 6.5  | 9.2      | 0.94  |
| IXP-3/4N2508 | 27.4      | 2.8 | 67.6      | 6.9  | 9.2      | 0.94  |
| IXP-3/4N3515 | 70        | 7   | 78        | 8    | 32       | 3     |
| IXP-3/4N4515 | 57        | 6   | 87        | 9    | 50       | 5     |
| IXP-3/4N5520 | 85        | 8.7 | 125       | 12.8 | 66       | 7     |
| IXP-3/4N6520 | 79        | 8.1 | 129       | 13.2 | 66       | 7     |



#### (2) 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 installed on in horizontally.

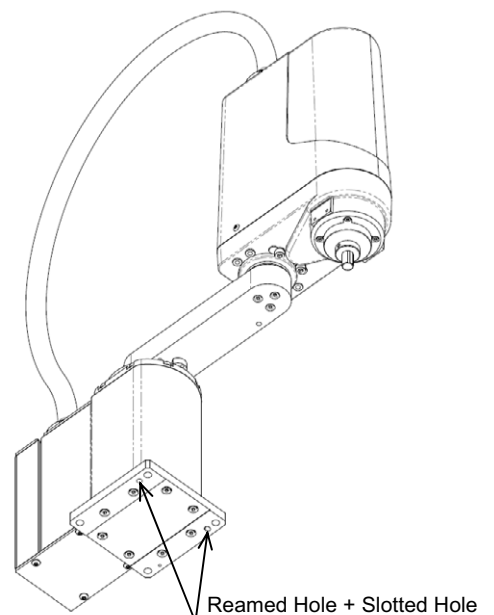
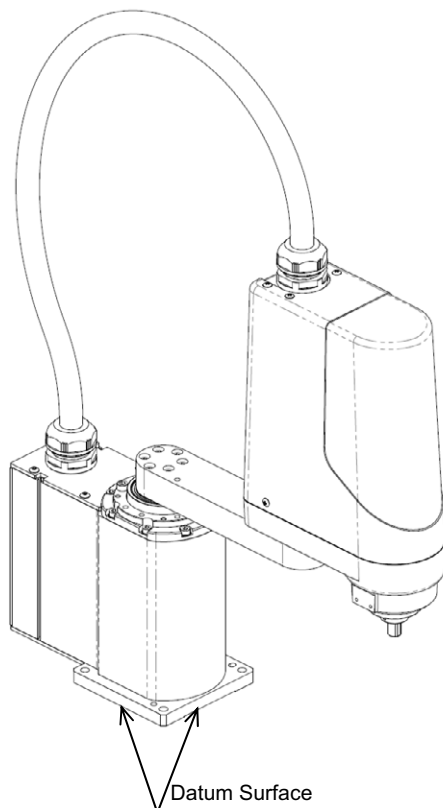
### (3) Installation of the Robot

- The robot body has to be securely fastened with using hex socket cap screws and steel ring plain washers (4pcs each).

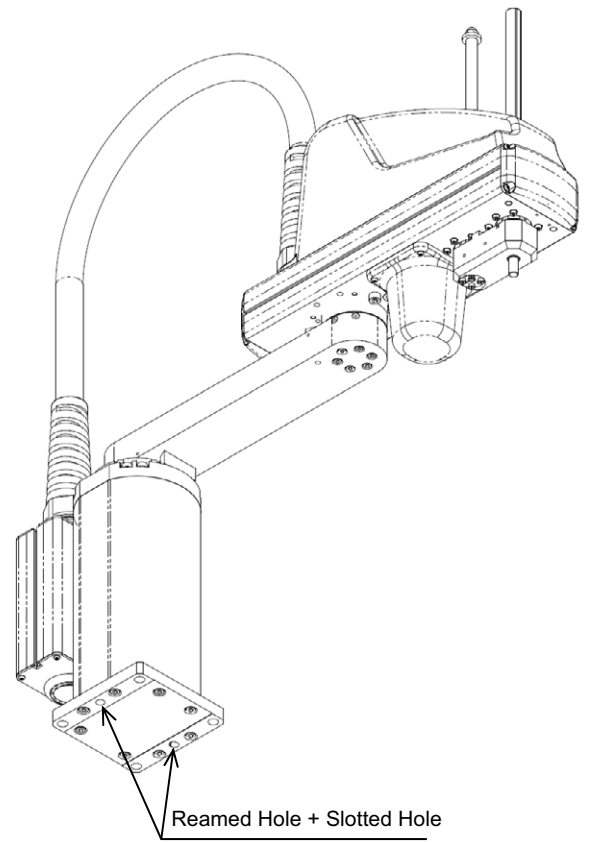
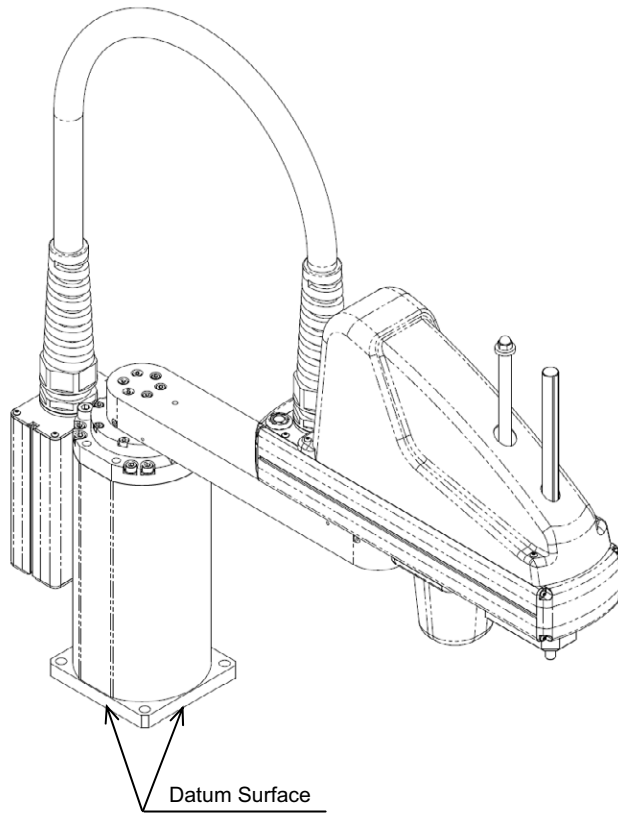
| Model Number       | Attachment Hole  | Attachment Screw | Steel ring plain Washer | Tightening Torque |
|--------------------|--|------------------|-------------------------|-------------------|
| IXP-3/4N1808, 2508 | φ7 through<br>(Dimension from the seat to the installation surface is 10mm)  | M6               | 6.5×13×1.0              | 12.3N•m           |
| IXP-3/4N3515, 4515 | φ9 through<br>(Dimension from the seat to the installation surface is 12mm)  | M8               | 8.5×16×1.2              | 30N•m             |
| IXP-3/4N5520, 6520 | φ10 through<br>(Dimension from the seat to the installation surface is 15mm) | M10              | 10.5×18×1.6             | 59N•m             |

- Apply high-tensile bolts with 10.9 or more of the tensile class for the attachment bolts.
- For the positioning of the attachment to the robot body, have the datum surfaces as the reference or insert parallel pins to the reamed hole and oblong hole.

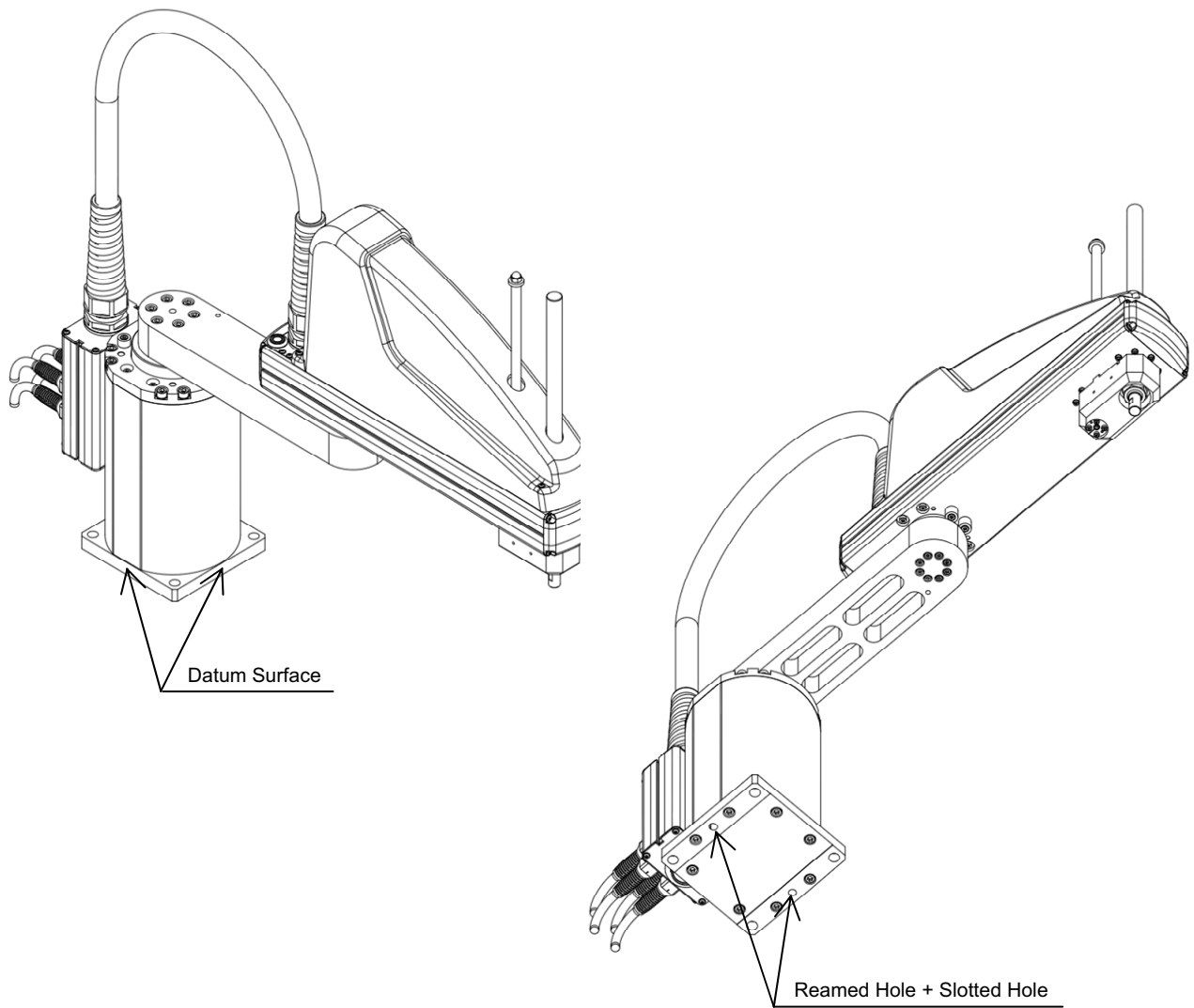
[IXP-3/4N1808, 2508]



[IXP-3/4N3515, 4515]



[IXP-3/4N5520, 6520]

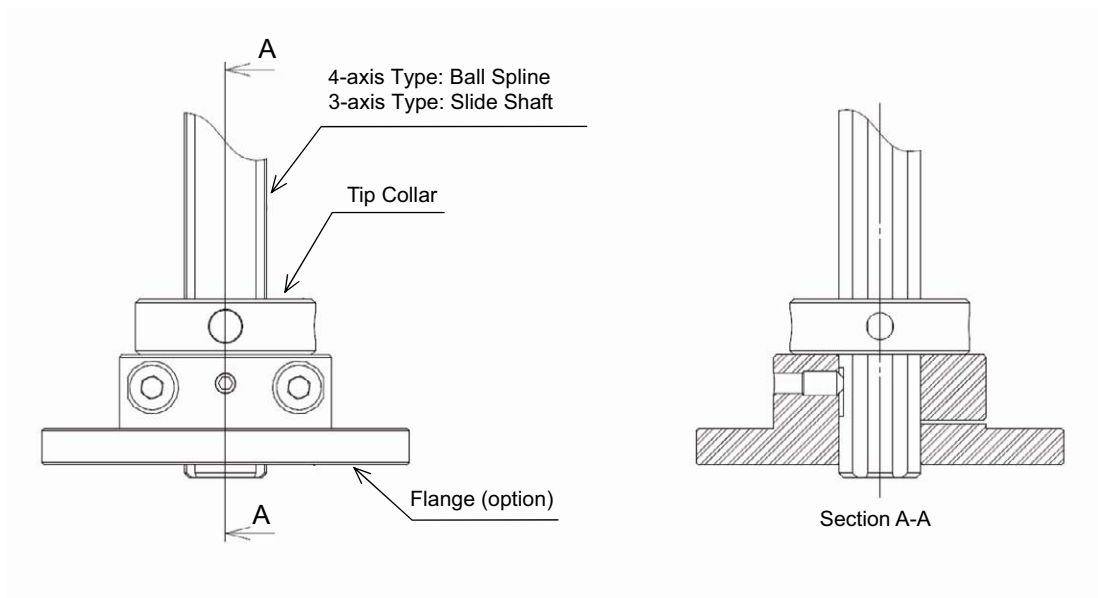


## [2] Attachment of the Load

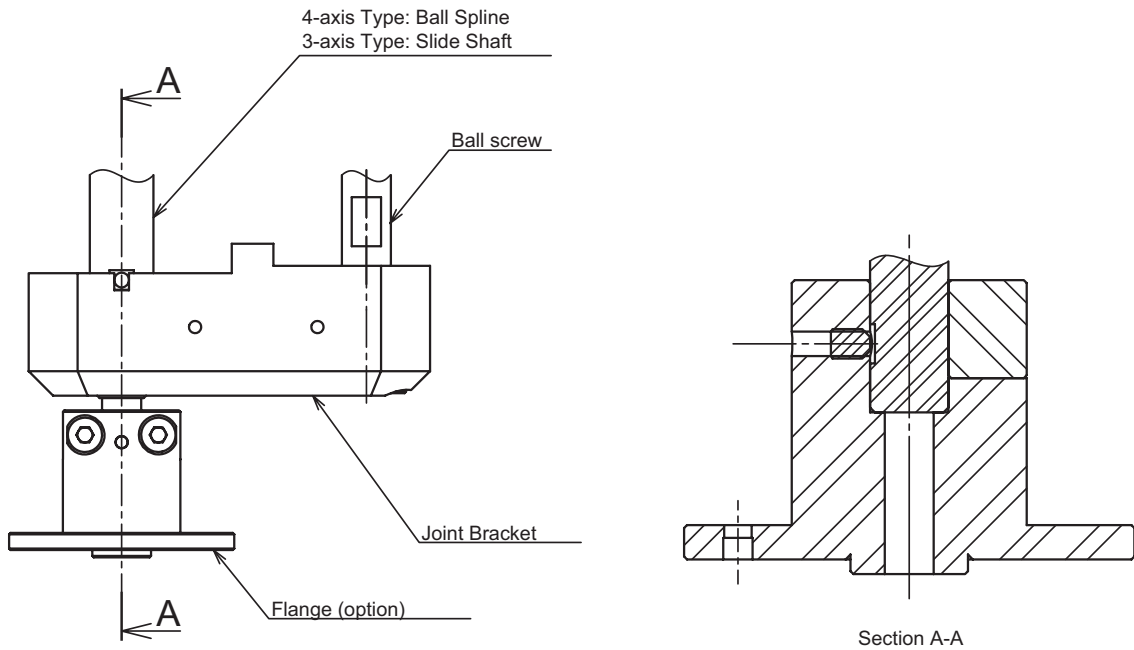
- To attach the load, use a bracket with tightening force that possesses enough strength and stiffness, and would not slip.

Shown in the figure below is an example of attachment when the optional flange is used.

[IXP-3/4N1808, 2508]

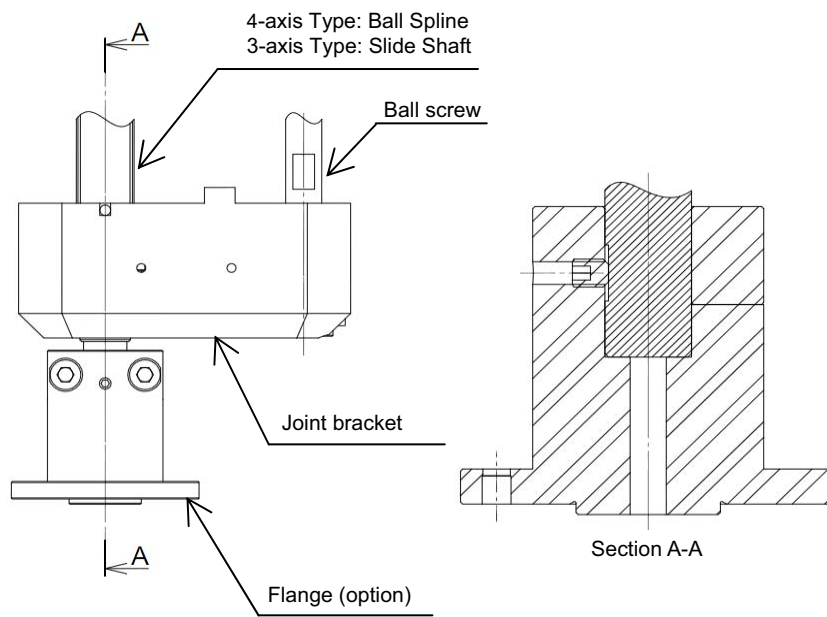


[IXP-3/4N3515, 4515]



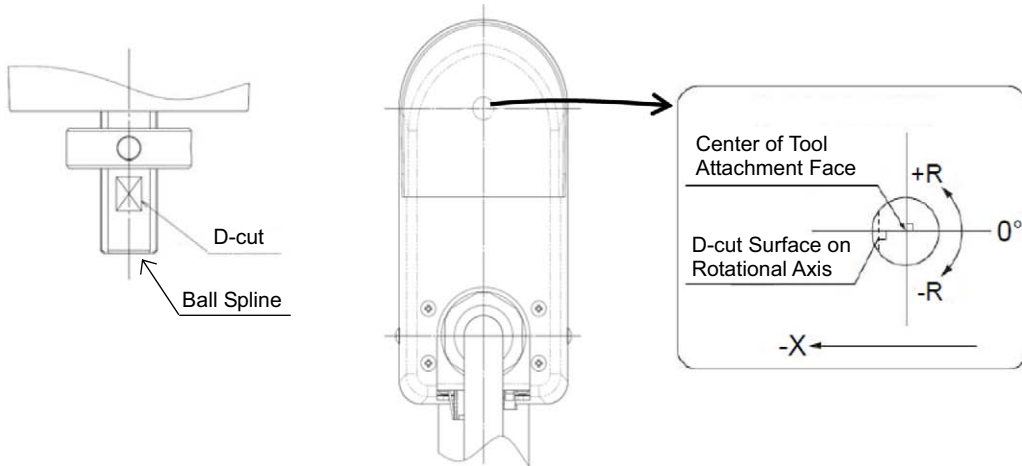


[IXP-3/4N5520, 6520]

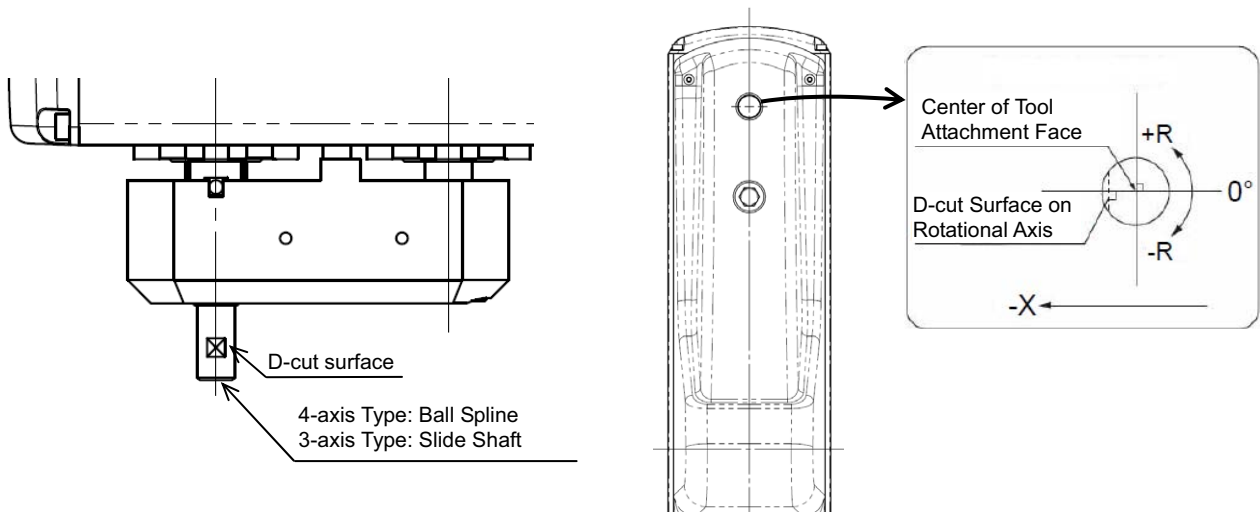


- Utilize the D-cut surface on the ball spline/ slide shaft tip as the surface to determine the position (direction) for rotational axis.

[IXP-3/4N1808, 2508]

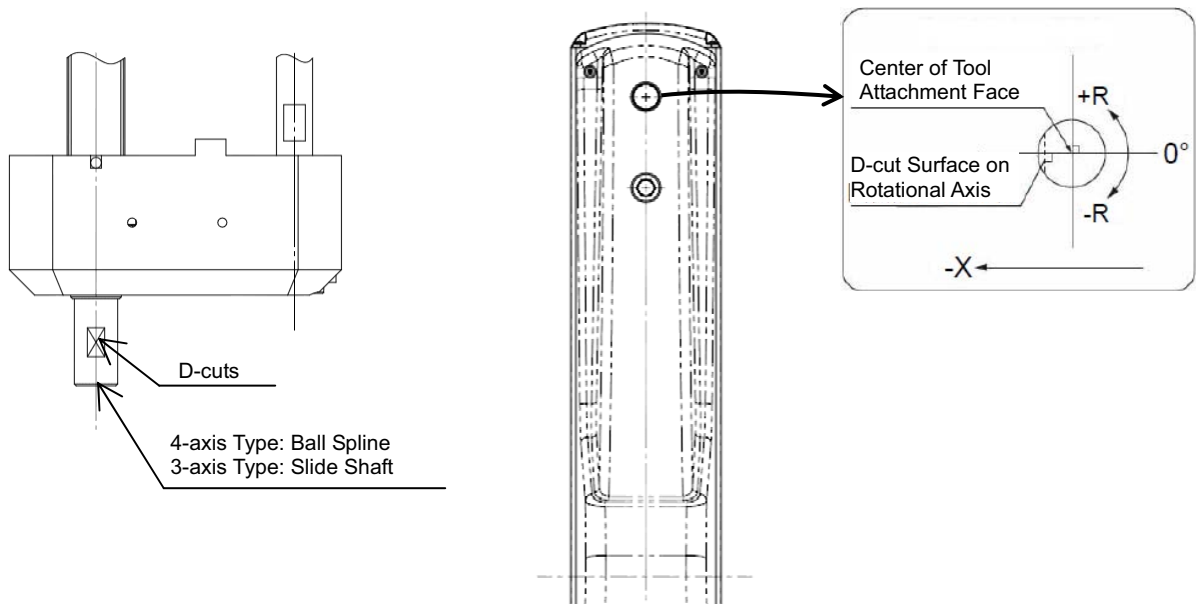


[IXP-3/4N3515, 4515]



(Note) The D-cut surface is not for attachment purpose. Do not attempt to hold a bolt or set screw against this surface to fix a load. Use such tools as split clamp or locking assemblies to mount a load.

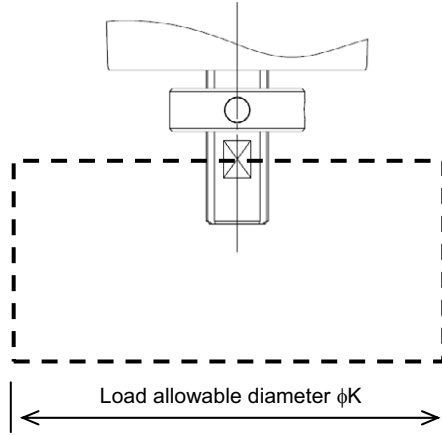
[IXP-3/4N5520, 6520]



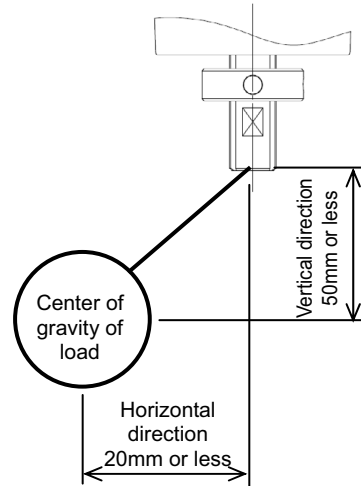
(Note) The D-cut surface is not for attachment purpose. Do not attempt to hold a bolt or set screw against this surface to fix a load. Use such tools as split clamp or locking assemblies to mount a load.

- For the attachment of the load, make sure to keep it below the allowable load diameter, load offset, transportable load mass and allowable moment of inertia.

[IXP-3/4N1808, 2508]

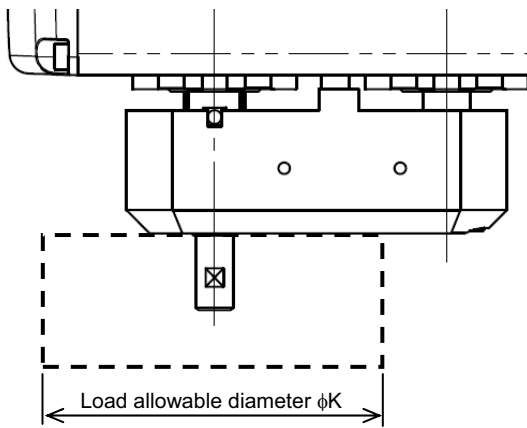


Load Diameter

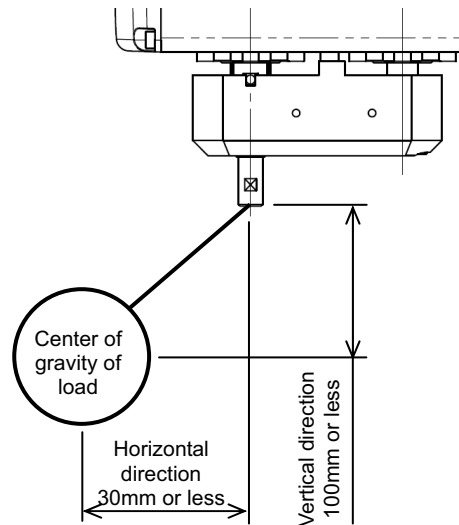


Load Offset

[IXP-3/4N3515, 4515]



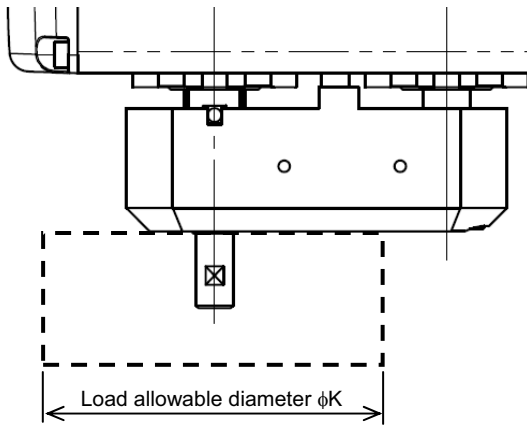
Load Diameter



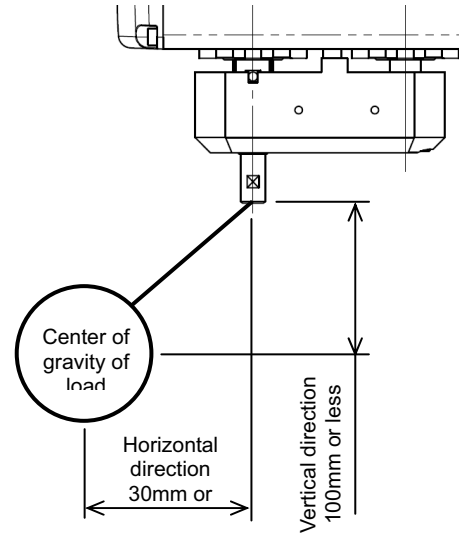
Load Offset

| Model Number | Load Diameter K (Note 1) [mm] | Load Center of Gravity (positions of centers) and offset |               | Transported Load Mass [kg] |      | Rotation Axis Allowable Moment of Inertia [kg·m <sup>2</sup> ] |         |
|--------------|-------------------------------|--|---------------|----------------------------|------|--|---------|
|              |                               | Horizontal   | Vertical      | Rated                      | Max. | Rated  | Maximum |
| 3N1808, 2508 | 85                            | 20mm or less [See the next page in sequence]             | 50mm or less  | 1                          | 3    | 0.001  | 0.01    |
| 4N1808, 2508 |                               |  |               |                            |      |  | 0.003   |
| 3N3515, 4515 | 85                            | 30mm or less [See the next page in sequence]             | 100mm or less | 1                          | 3    | 0.003  | 0.01    |
| 4N3515, 4515 |                               |  |               |                            |      |  | 0.003   |

[IXP-3/4N5520, 6520]



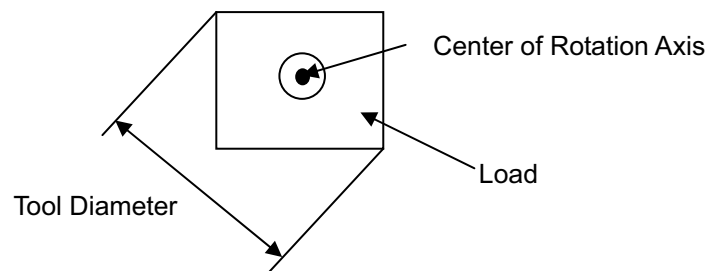
Load Diameter



Load Offset

| Model Number | Load Diameter K (Note 1) [mm] | Load Center of Gravity (positions of centers) and offset |               | Transported Load Mass [kg] |      | Rotation Axis Allowable Moment of Inertia [kg·m <sup>2</sup> ] |         |
|--------------|-------------------------------|--|---------------|----------------------------|------|--|---------|
|              |                               | Horizontal   | Vertical      | Rated                      | Max. | Rated  | Maximum |
| 3N5520, 6520 | 115                           | 30mm or less [See the next page in sequence]             | 100mm or less | 2                          | 6    | 0.01   | 0.03    |
| 4N5520, 6520 |                               |  |               |                            |      |  | 0.01    |

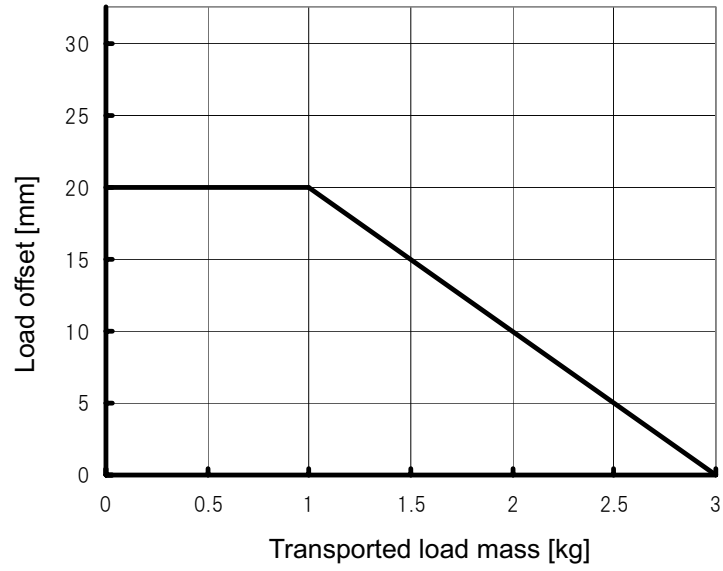
(Note 1) Load diameter is determined by the furthest point from the turning center. For example, if the load is in a rectangular shape, the tool diameter is a diagonal line as shown in the figure below.



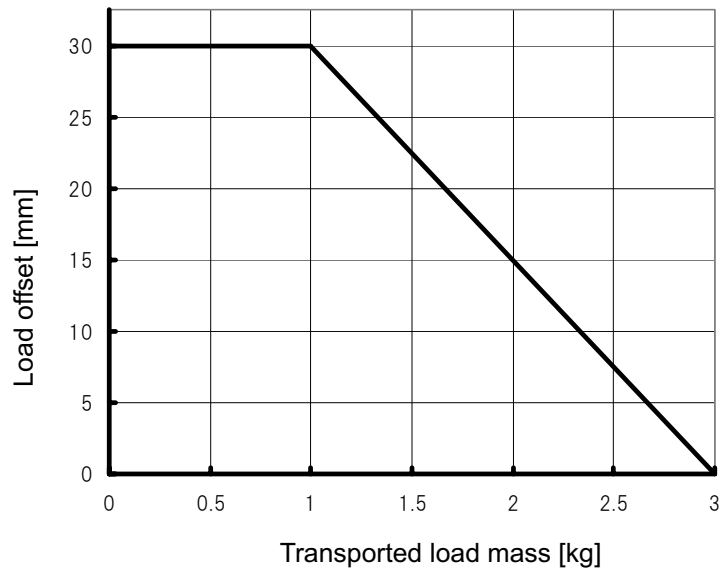
- (Note)
- If the center of the load in horizontal direction exceeds the offset stated in the table, put some weight on the other side to balance and shift the center of the gravity to the range of allowance. At this time, pay attention not to exceed the maximum transportable load mass or the allowable moment of inertia.
  - In case it exceeds 1kg of the rated transportable mass, follow the table in the next page to decrease the load offset.
  - Exceeding the limit of the load offset, transportable load mass or moment of inertia may cause abnormal noise, vibration malfunction or drop of the product life.

[Load and Offset]

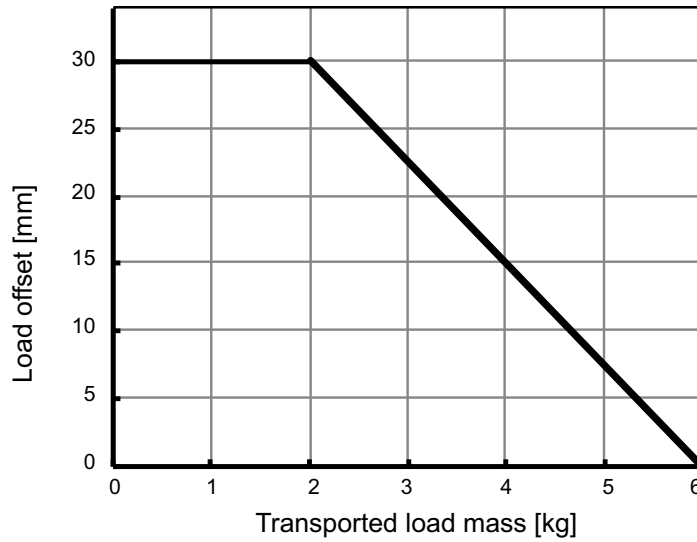
[IXP-3/4N1808, 2508]



[IXP-3/4N3515, 4515]



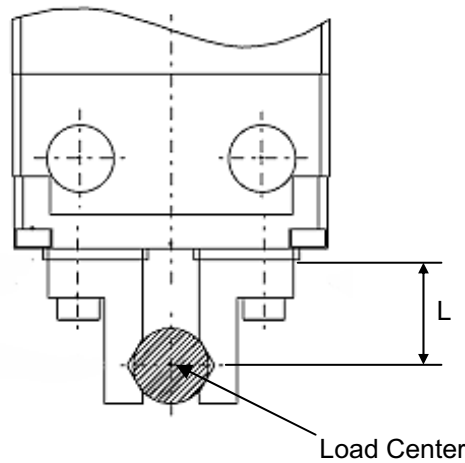
[IXP-3/4N5520, 6520]



[Offset for Gripper-Equipped Type]

Keep the offset below the value shown below for the attachment of load on the gripper-equipped type.

Also, note that offset to the horizontal direction is not available as shown in the table below.



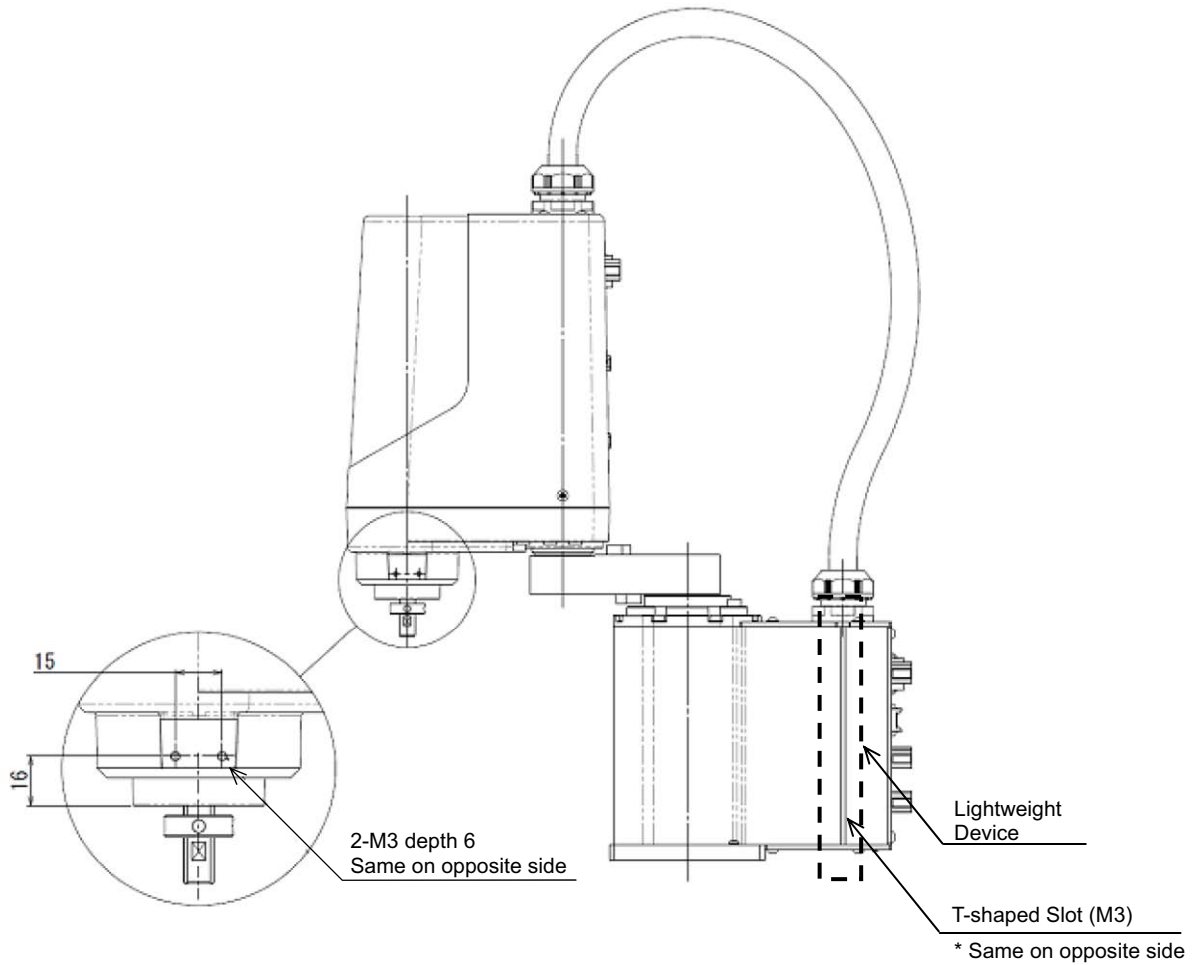
| Model Number                                 | Load Center (Center of Gravity) and Offset |                    |
|--|--|--------------------|
|  | Horizontal Direction                       | Vertical Direction |
| 3N2508GM                                     | 0mm  | 20mm or less       |
| 3N3515GM<br>3N3510GL<br>3N4515GM<br>3N4510GL | 0mm  | 50mm or less       |
| 3N5515GL, GW<br>3N6515GL, GW                 | 0mm  | 50mm or less       |



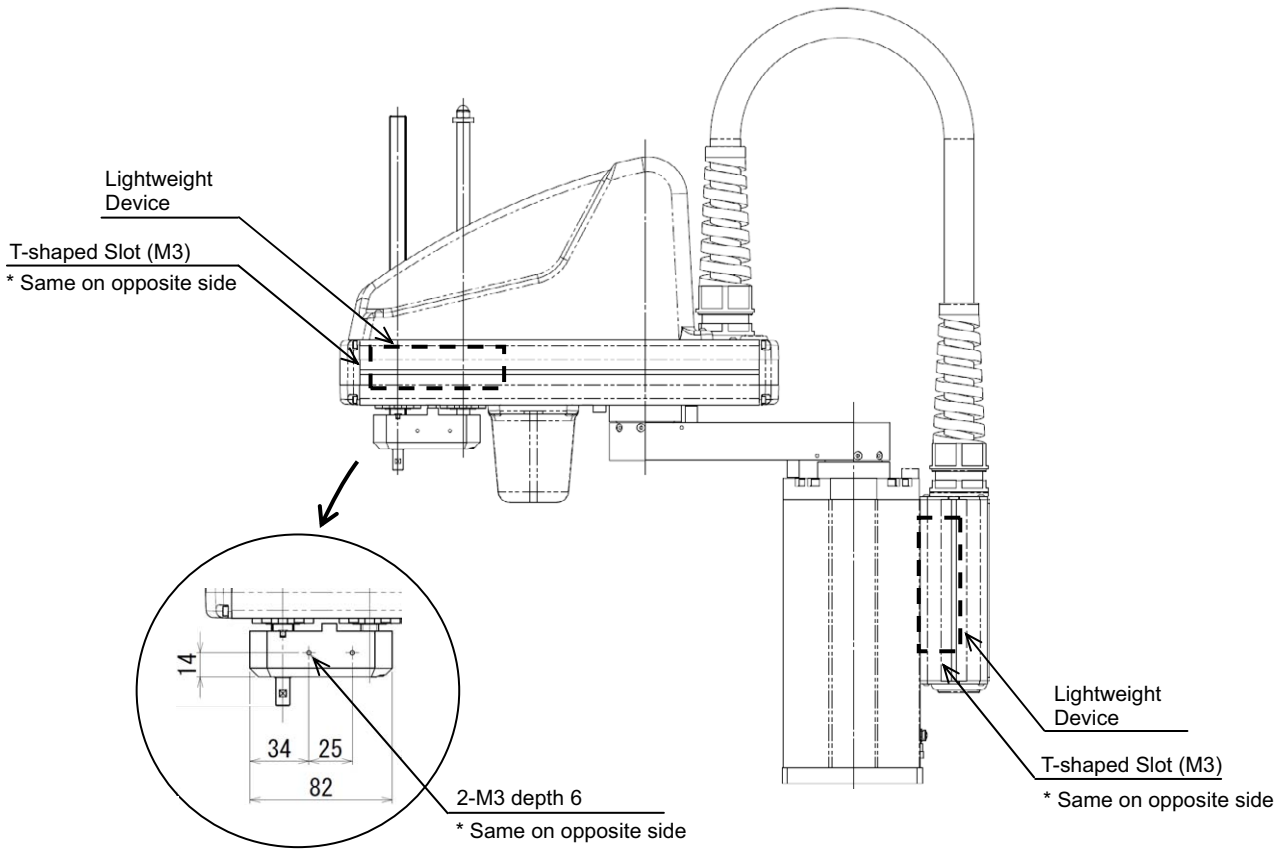
### [3] Attachment using user tapped hole and user T-shaped slot

- There is a user tapped hole equipped on the bottom of the vertical axis. Utilize it for tool wiring and piping.
- There are T-shaped slots equipped on the base. Also, there are T-shaped slots on the sides of the 2<sup>nd</sup> arm for IXP-3/4N3515 and 4515. Utilize them for tool wiring and piping, or attachment of a device in light weight.

[IXP-3/4N1808, 2508]

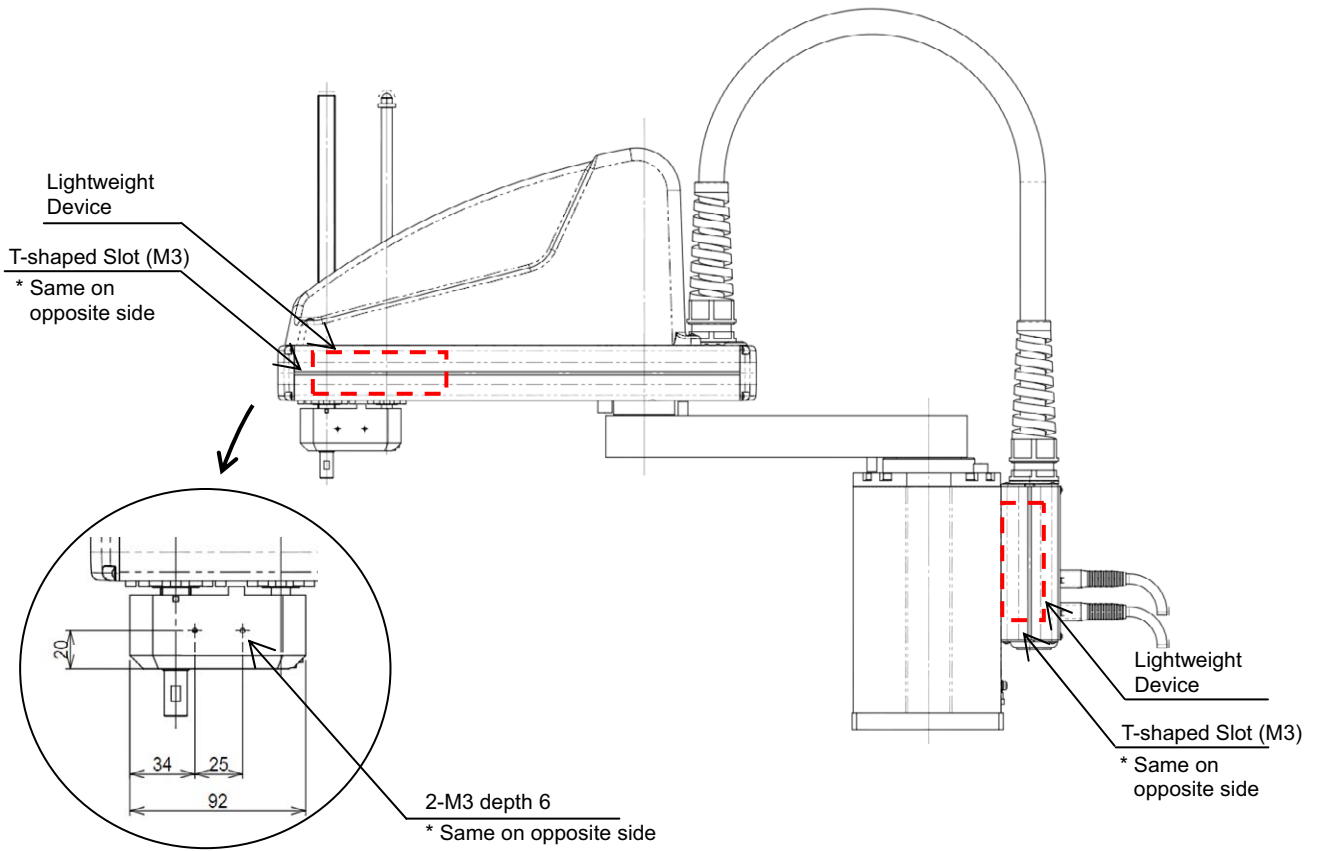


[IXP-3/4N3515, 4515]



(Note) Make sure to set the mass of the light-weighted work piece applied on the sides of the 2<sup>nd</sup> arm on IXP-3/4N3515 and 4515 not to exceed 3kg, which is the maximum transportable mass, in total of it with hand and work piece on up-down axis.

[IXP-3/4N5520, 6520]



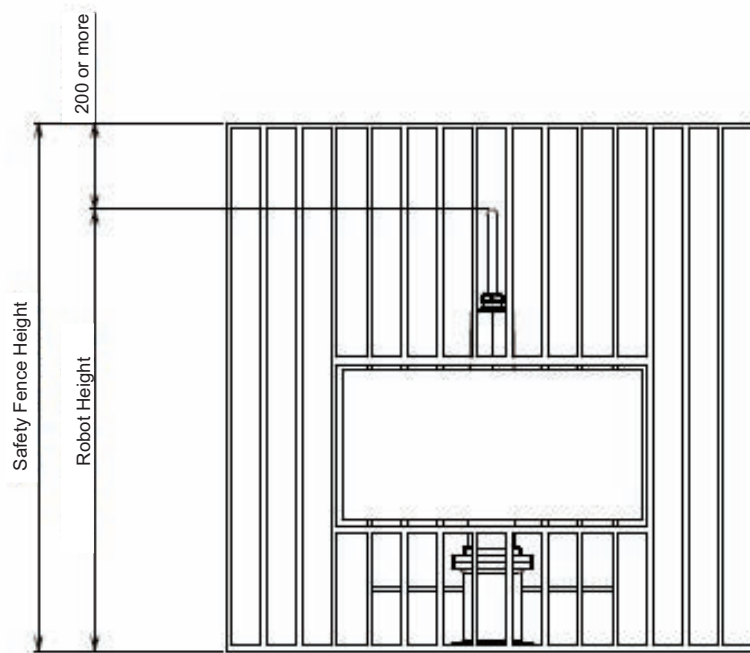
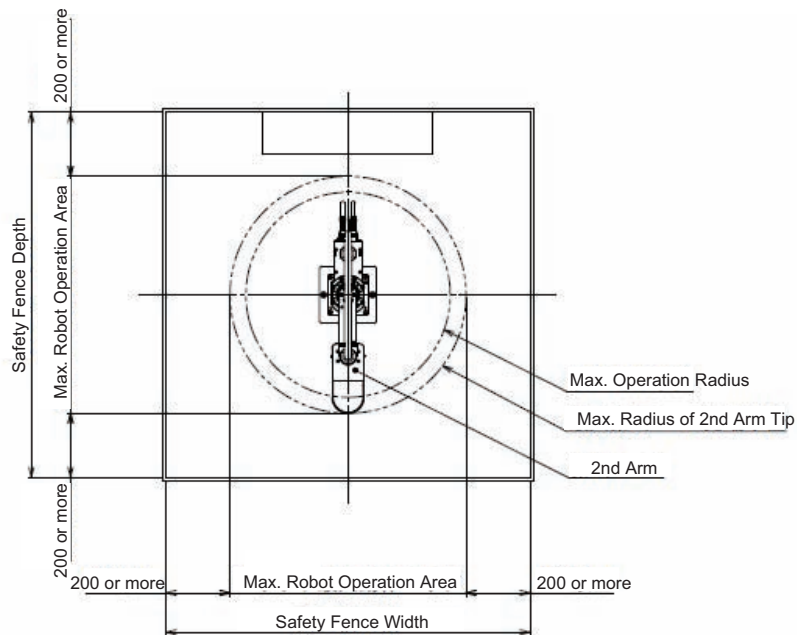
(Note) Make sure to set the mass of the light-weighted work piece applied on the sides of the 2<sup>nd</sup> arm on IXP-3/4N5520 and 6520 not to exceed 6kg, which is the maximum transportable mass, in total of it with hand and work piece on up-down axis.

## 2.3.3 Equipping with Safety Protection Fence

Considering safety, it is recommended to have a safety protection fence to prevent possible danger.

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.

### ●Dimensions for Safety Protection Fence Installation



● Angled Front View (Reference)



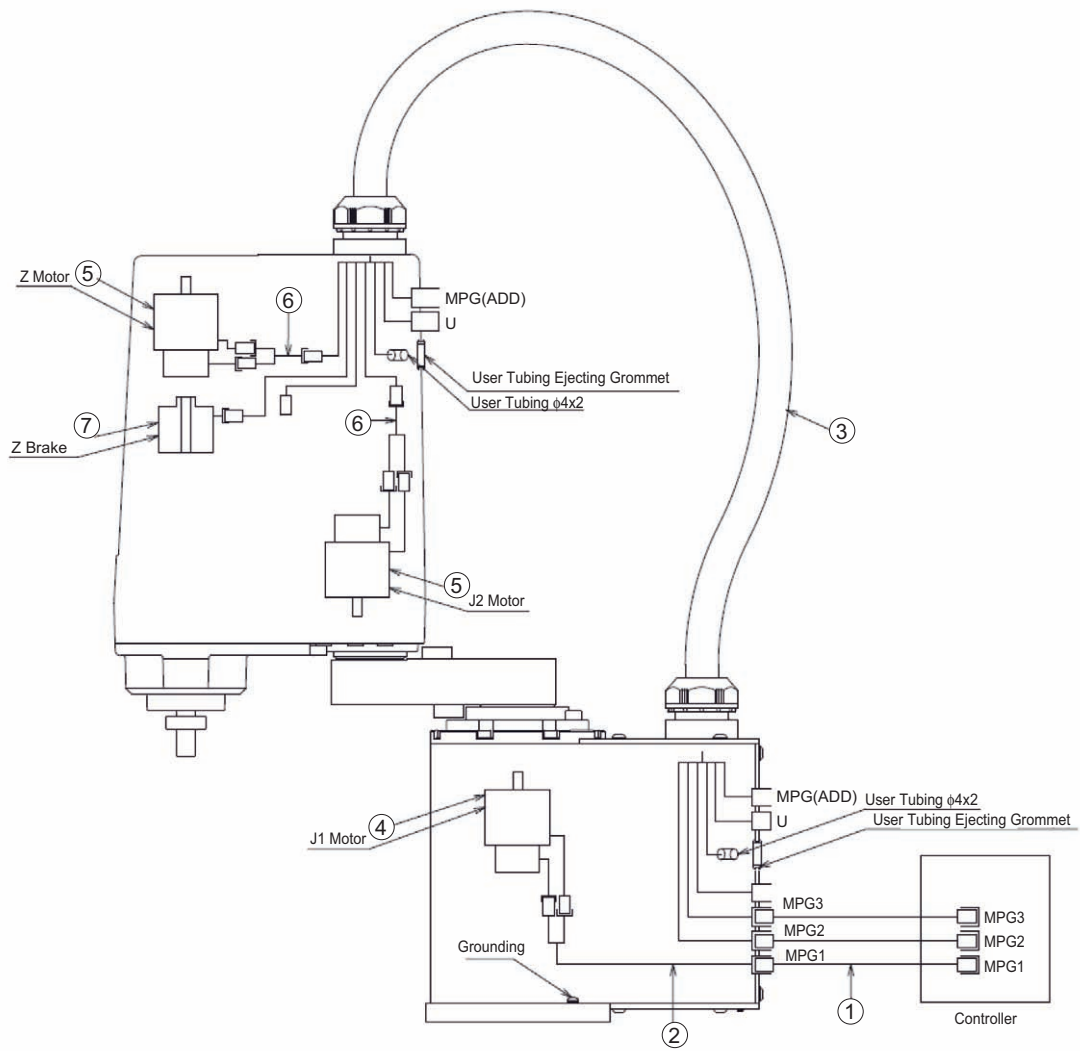
● Angled Rear View (Reference)



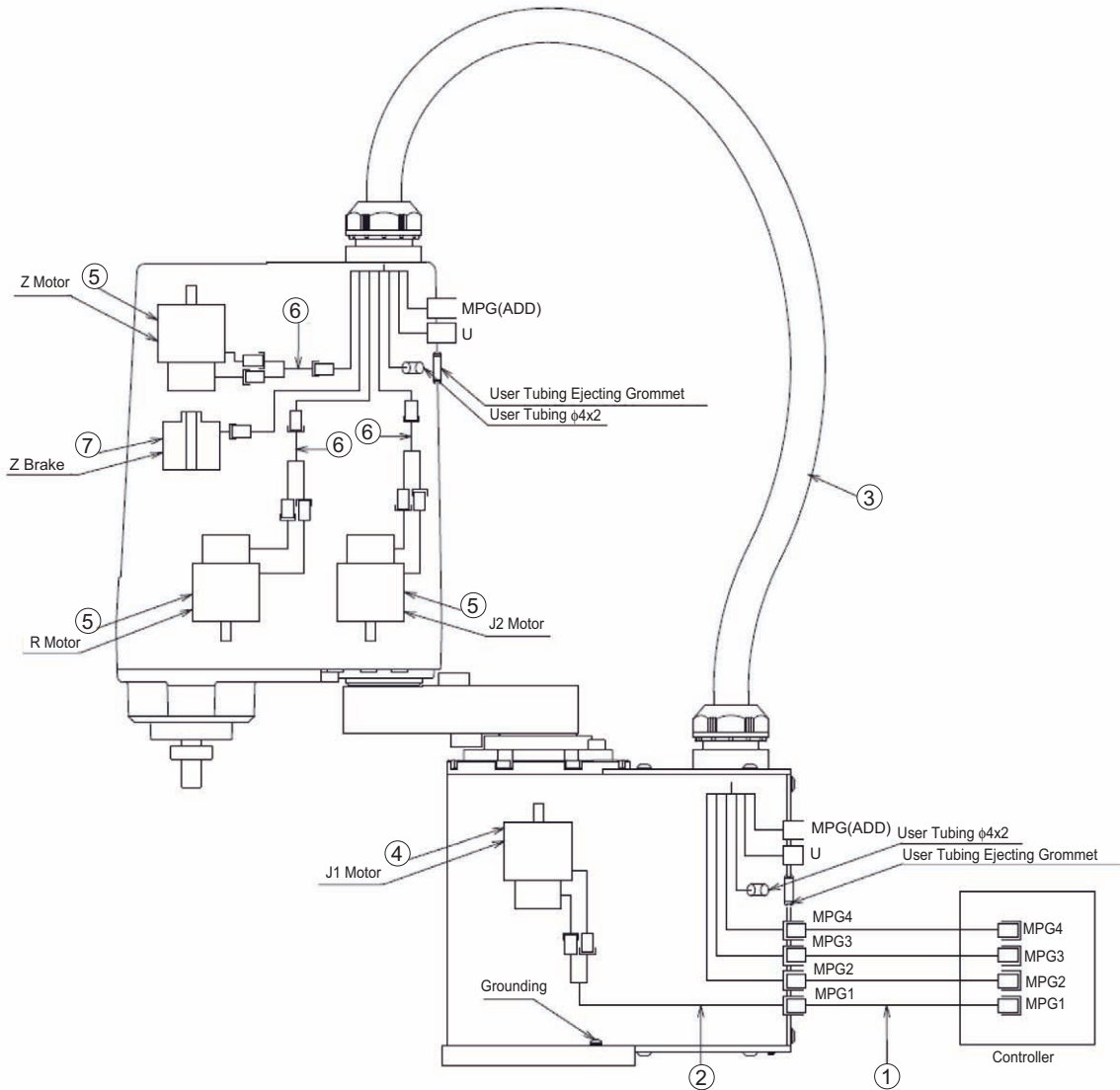
### 3. Wiring and Tubing

#### 3.1 Wiring and Tubing in the Body

(1) IXP-3N1808, 3N2508



(2) IXP-4N1808, 4N2508

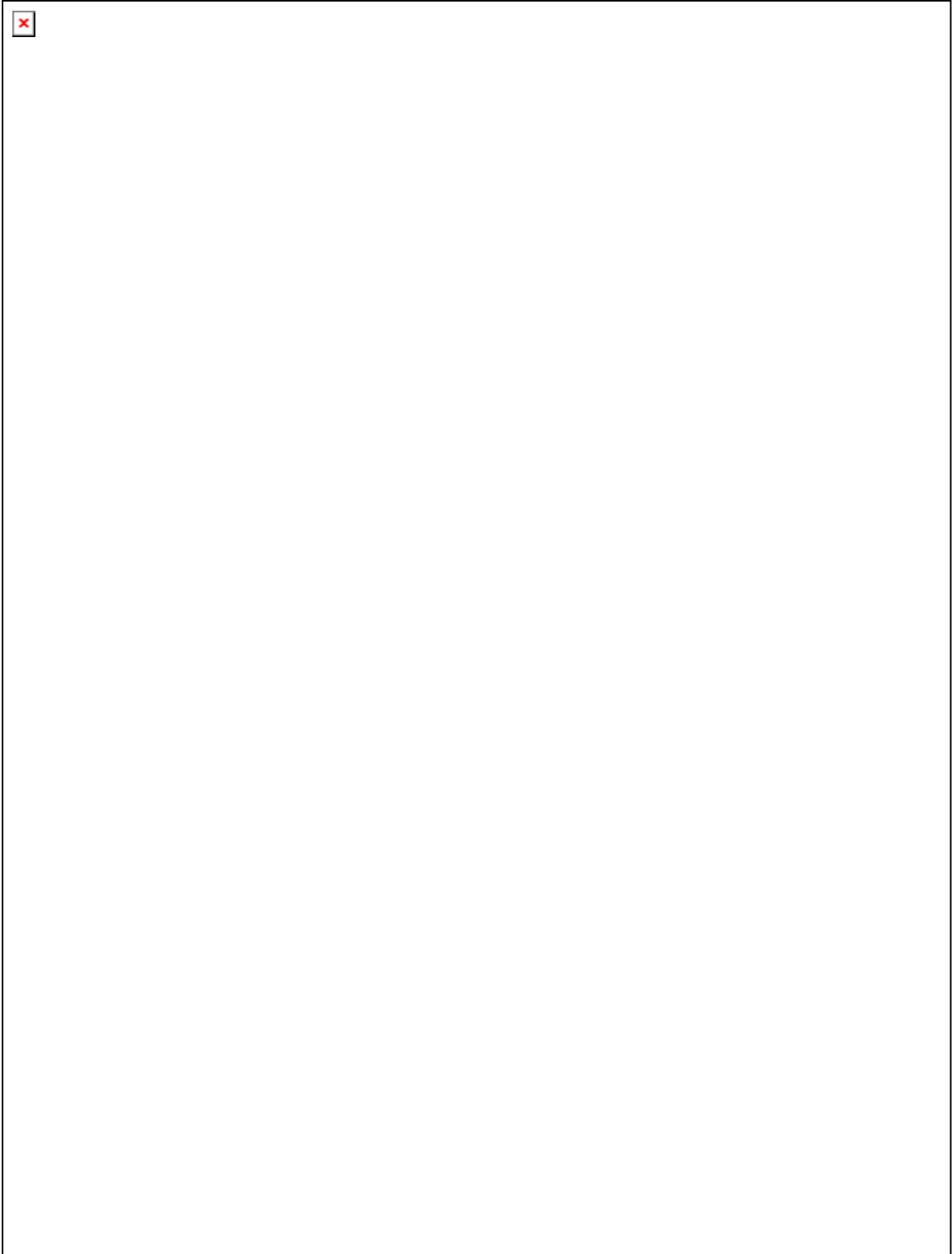


IXP-3N1808, 3N2508, IXP-4N1808, 4N2508

| No. | Parts Name                                      | Remarks                            | Quantity |        |
|-----|---|------------------------------------|----------|--------|
|     |   |                                    | 3-axis   | 4-axis |
| 1   | Motor•Encoder Integrated Cables                 | CB-CAN-MPA□□□/<br>CB-CAN-MPA□□□-RB | 3        | 4      |
| 2   | Inside Mechanism J1 Connection Cable Ass'y      |                                    | 1        | 1      |
| 3   | Self-supporting Ass'y                           |                                    | 1        | 1      |
| 4   | Motor for J1 Axis                               |                                    | 1        | 1      |
| 5   | Motor for J2 Axis / Vertical Axis / Rotary Axis |                                    | 2        | 3      |
| 6   | Inside Mechanism J2 Connection Cable            |                                    | 2        | 3      |
| 7   | Brake for Z Axis                                |                                    | 1        | 1      |

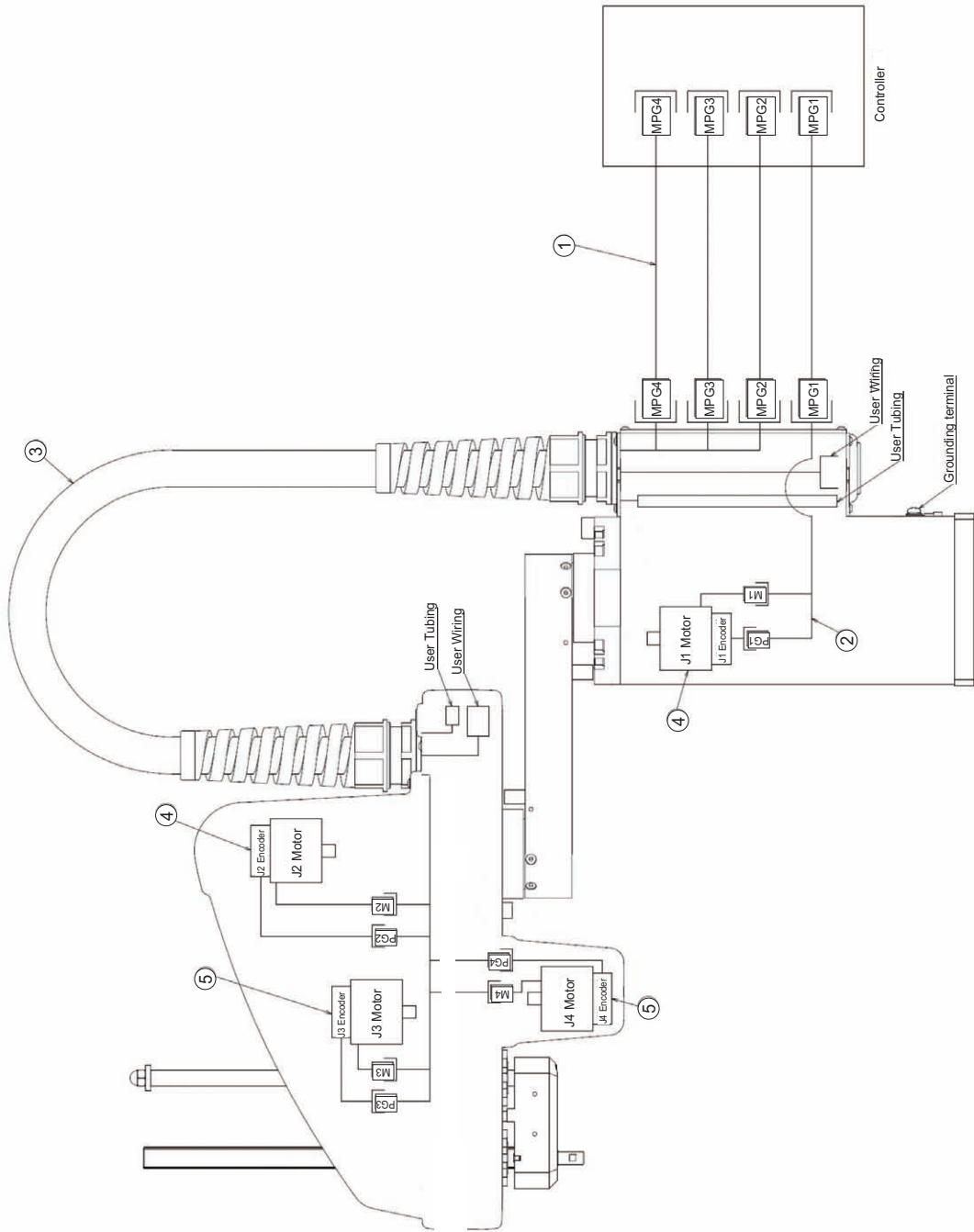
[Refer to 1.4 Motor • Encoder Cables for the wiring layout of Motor Cable and Encoder Cable.]

(3) IXP-3N3515, 3N4515





(4) IX-4N3515, 4N4515

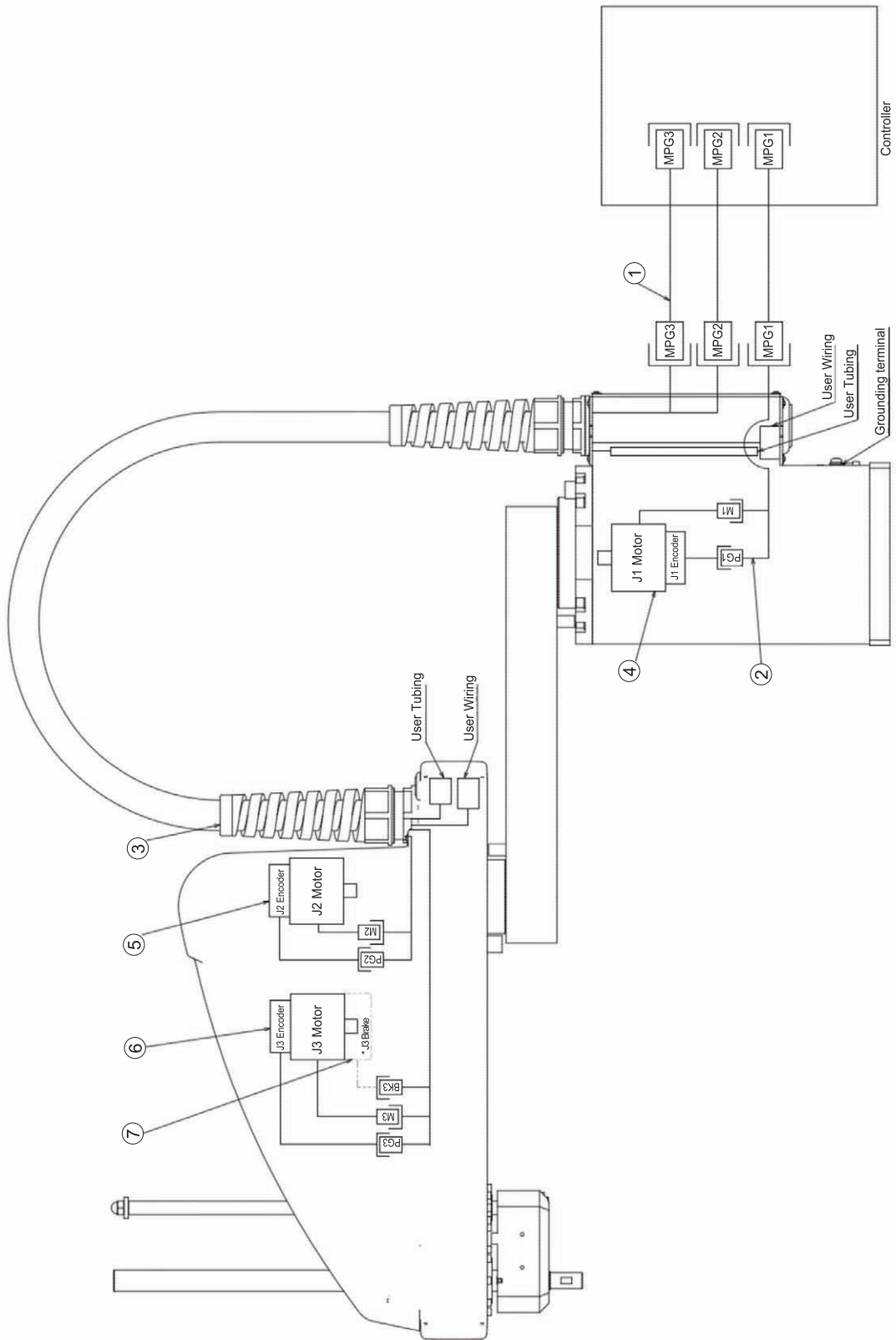


IXP-3N3515, 3N4515, IXP-4N3515, 4N4515

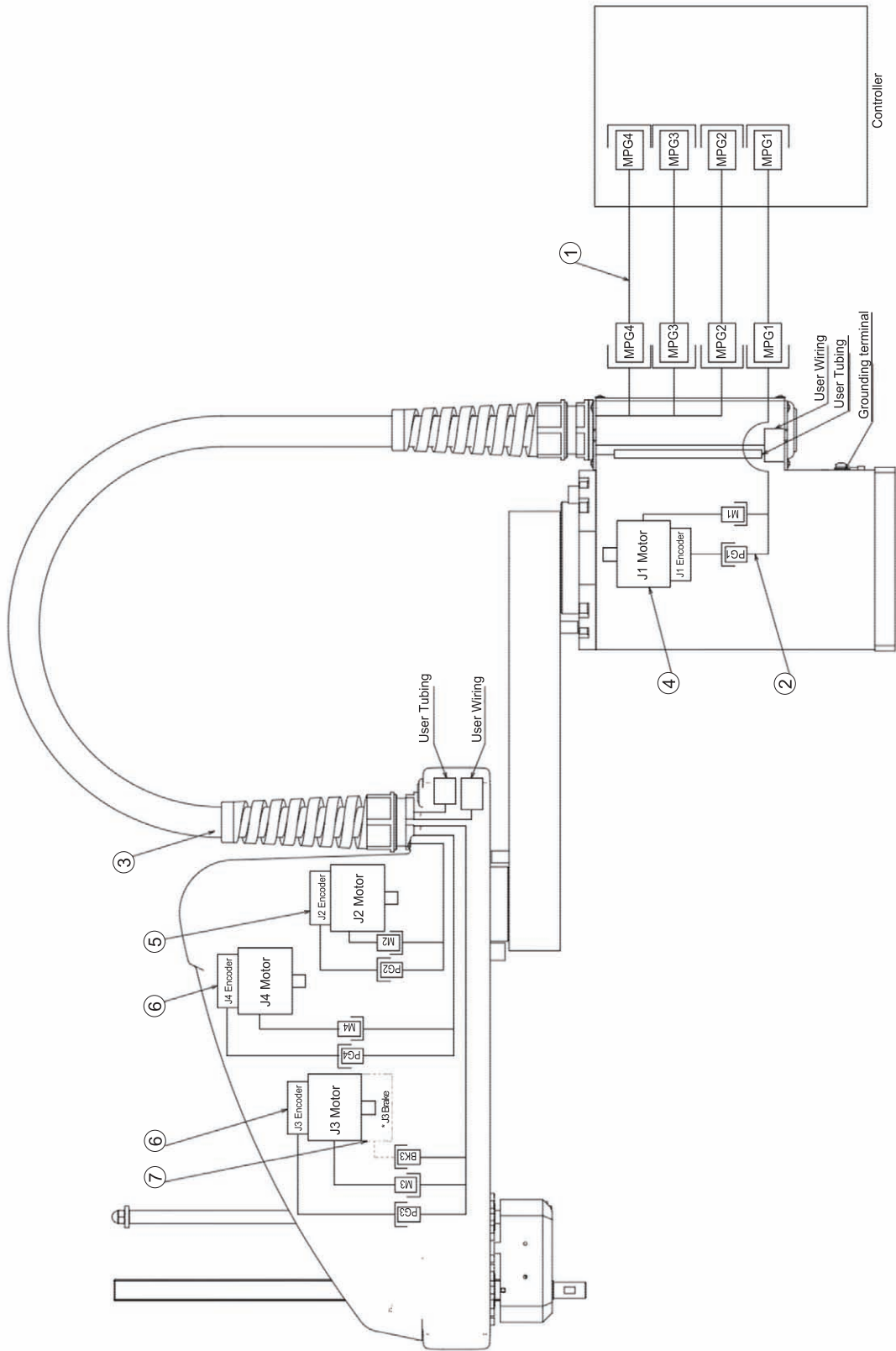
| No. | Parts Name                                 | Remarks                            | Quantity |        |
|-----|--|------------------------------------|----------|--------|
|     |  |                                    | 3-axis   | 4-axis |
| 1   | Motor•Encoder Integrated Cables            | CB-CAN-MPA□□□/<br>CB-CAN-MPA□□□-RB | 3        | 4      |
| 2   | Inside Mechanism J1 Connection Cable Ass'y |                                    | 1        | 1      |
| 3   | Self-supporting Ass'y                      |                                    | 1        | 1      |
| 4   | Motor for J1 Axis / J2 Axis                |                                    | 2        | 2      |
| 5   | Motor for Vertical Axis / Rotary Axis      |                                    | 1        | 2      |

[Refer to 1.4 Motor • Encoder Cables for the wiring layout of Motor Cable and Encoder Cable.]

(5) IX-3N5520, 4N6520



(6) IX-4N5520, 4N6520



IXP-3N5520, 3N6520, IXP-4N5520, 4N6520

| No. | Parts Name                                    | Remarks                            | Quantity |        |        |        |
|-----|---|------------------------------------|----------|--------|--------|--------|
|     |   |                                    | 3-axis   | 3-axis | 4-axis | 4-axis |
| 1   | Motor•Encoder<br>Integrated Cables            | CB-CAN-MPA□□□/<br>CB-CAN-MPA□□□-RB | 3        | 3      | 4      | 4      |
| 2   | Inside Mechanism J1<br>Connection Cable Ass'y |                                    | 1        | 1      | 1      | 1      |
| 3   | Self-supporting Ass'y                         |                                    | 1        | 1      | 1      | 1      |
| 4   | Motor for J1 Axis                             |                                    | 1        | 1      | 1      | 1      |
| 5   | Motor for J2 Axis                             |                                    | 1        | 1      | 1      | 1      |
| 6   | Vertical Axis /<br>Rotary Axis                |                                    | 1        | 2      | 1      | 2      |
| 7   | Brake for Z Axis                              |                                    | -        | -      | 1      | 1      |

[Refer to 1.4 Motor • Encoder Cables for the wiring layout of Motor Cable and Encoder Cable.]

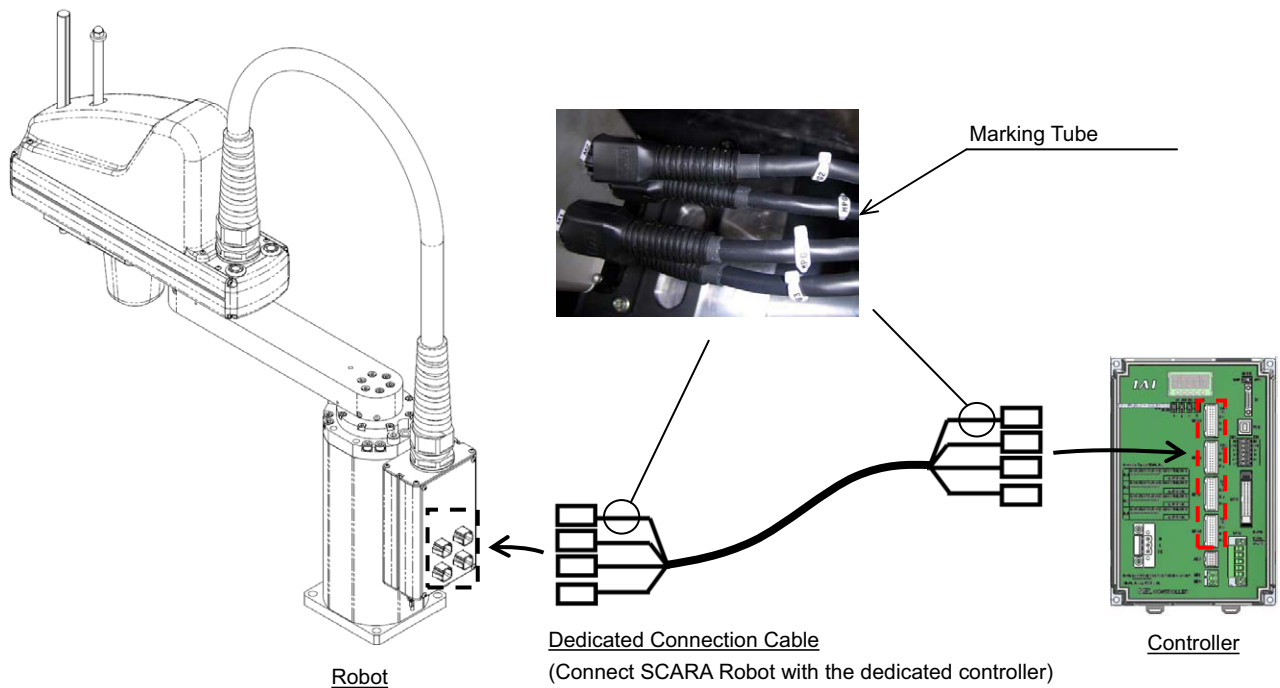
## 3.2 Connection to the Controller

Use the dedicated controller and connection cables of IAI for the controller and the connection cables for this SCARA Robot.

- If the dedicated connection cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Do not cut and reconnect the dedicated connection cable for extension or shorten the cable.
- Do not pull on the dedicated connection cable or bend it forcibly.

Contact us if you wish to have a change to the specifications of the dedicated cables.

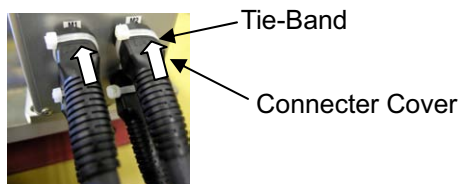
[MSEL-PCX/PGX Connecting to the Controller]



- Robot cable
  - : 5m or less r=68mm or more (Movable Use)
  - : 5m or more r=73mm or more (Movable Use)
- Standard cable
  - : 5m or less r=85mm or more (Fixed Use)
  - : 5m or more r=91mm or more (Fixed Use)

- Motor • Encoder Integrated Cables CB-CAN-MPA□□□
  - Motor • Encoder Integrated Cables Robot Type CB-CAN-MPA□□□
- indicates the cable length L (Example. 030 = 3m) Max.20m

**⚠ Caution:** Attach a connector cover on the connection cable. It is recommended to tighten up the cover with a tie-band, so it would not come off. Put the cover on, or the connectors (pins) could get exposed to load and may cause electric line breakage.





**Warning:**

- Connect to the robot of the serial number specified on the robot designation label provided on the front panel of the controller. The controller will not operate properly if any other robot is connected. Failure to observe this warning may cause the robot to malfunction, resulting in a serious accident.
- Do not attempt to use a cable out of the dedicated cable for connection. Doing so may cause not only error operation or malfunction, but also may cause a critical accident such as fire or injury.
- When the cable is connected or disconnected, make to turn off the power to the controller.  
Working with the power being kept on may cause the robot to have an error operation, which may lead to a critical accident resulting in injury or death.
- When the connector connection is not correct, it would be dangerous because of a malfunction of the robot. Make sure to plug in the connectors to the right ones.
- Connect the cables securely after confirming that they are free from damage or bent connector pins.
- A mistake in the connector connections may cause an error operation. Check the connector name before plugging in.  
Connect each cable by aligning the indication on the marking tube on the cable with the indication on the controller panel.
- When installing the PG connector (D-sub connector), ensure correct orientation of the connector.

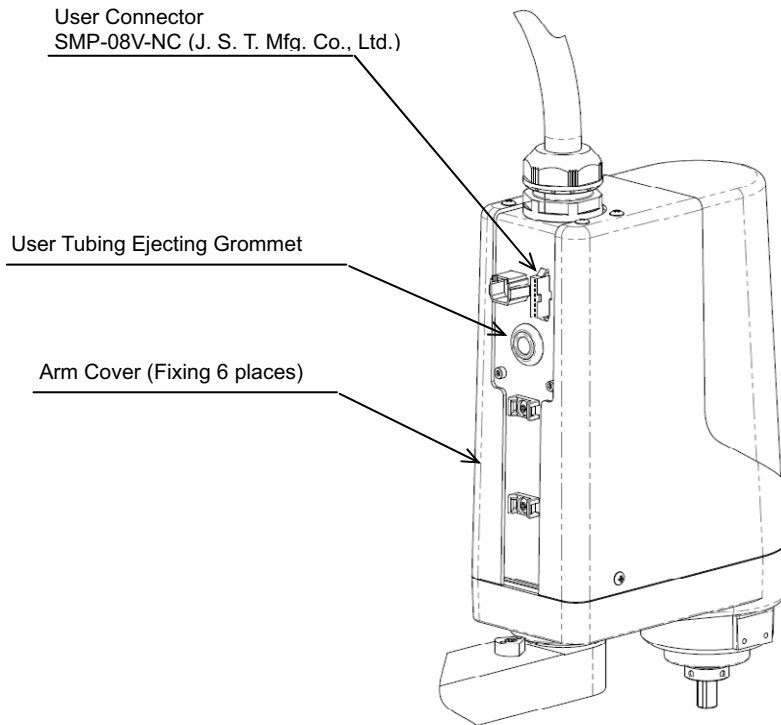
Refer to the Instruction manuals for the controller and PC software for the procedures to connect the I/O cable, controller power cable, PC connection cable, etc.

## 3.3 User Wiring and Tubing

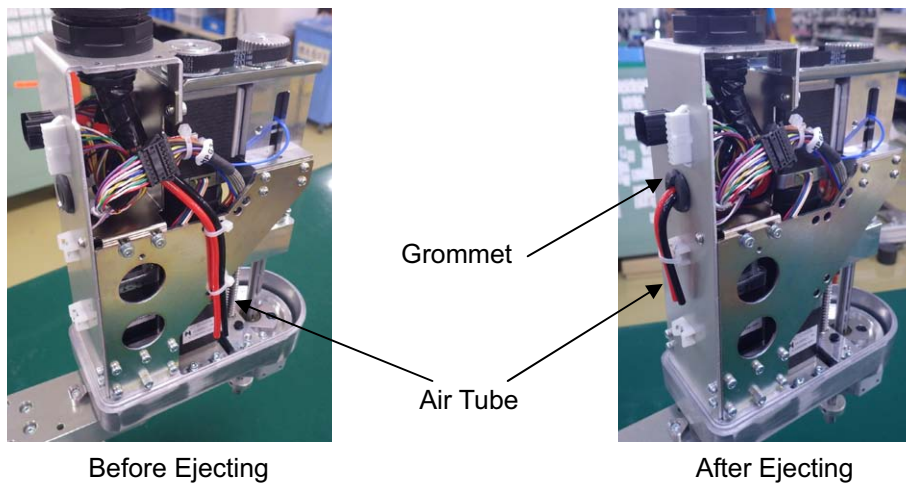
### 3.3.1 IXP-3/4N1808, 2508

There are cables and pipes prepared in the unit so a user can use freely. The pipe is stored inside. Make sure to use them within the specifications.

- Tool Side (in 2nd arm)

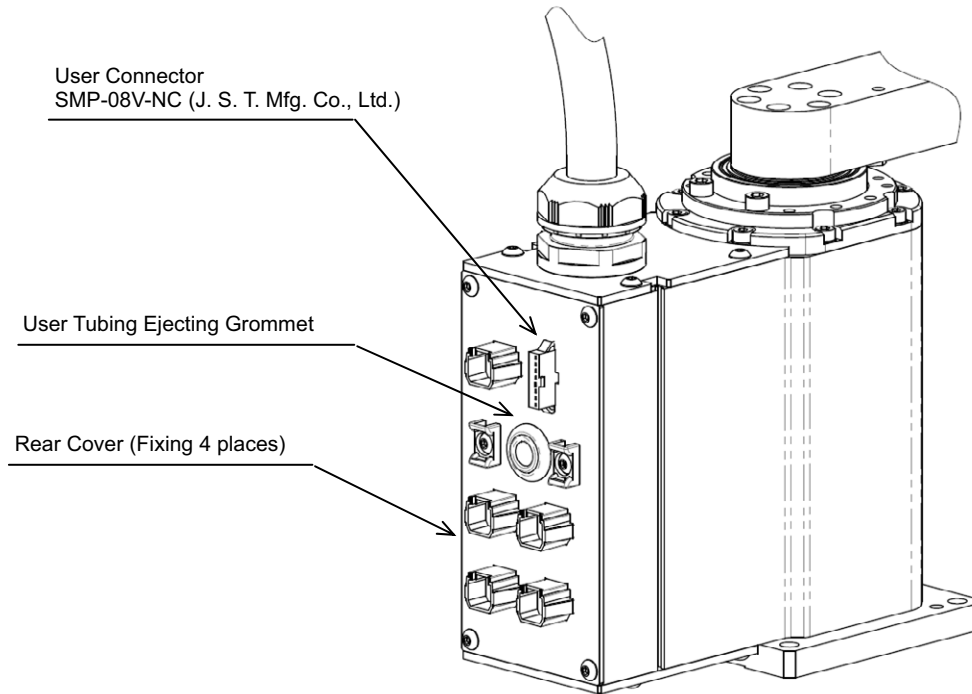


Air tube is fixed inside the 2<sup>nd</sup> arm. Detach the arm cover and eject it out of the user pipe ejecting grommet.

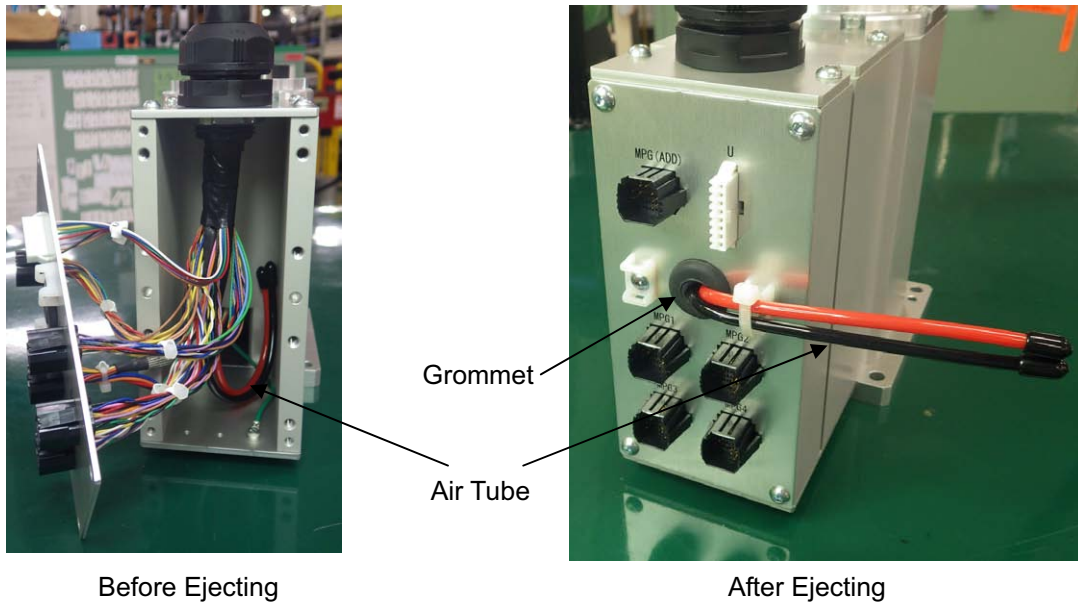




- Host Side such as PLC (inside cable box)



Air tube is stored inside the base. Detach the arm cover and eject it out of the user pipe ejecting grommet.



**⚠ Caution:**

- When having a cable ejection work, make sure not to pinch cables.
- Do not attempt to lay out cables and pipes on the self-supporting cable.

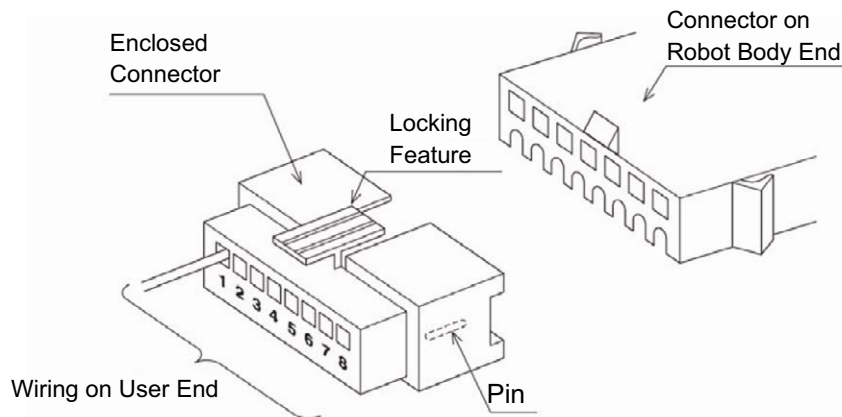
## (1) User Wiring

Mating connector (SMR-08V-N, 2pcs) and pin contacts (SYM-001T-P0.6, 20pcs) are enclosed. Cramp cables that you have prepared to the pin contacts, insert them to the receptacle housing and connect it to the user connector. Also, to cramp the pin contacts, it is necessary to prepare a manual cramping tool (YC-121R / J. S. T. Mfg. Co., Ltd.) Have an operator with cramping skill to follow the process recommended by the connector supplier when performing cramping.

The specifications of the user connector (wiring) are as shown below.

|                                    |          |
|------------------------------------|----------|
| Conductor Size and Number of Wires | AWG26×8C |
| Rated Voltage                      | 30V      |
| Permissible Current                | 1A       |

| 2nd Arm Side                                   |           |        |         | Base side |        |           |  |
|--|-----------|--------|---------|-----------|--------|-----------|--|
| Connector                                      | Thickness | Symbol | Pin No. | Pin No.   | Symbol | Thickness | Connector                                      |
| Connector/SMP-08V-NC<br>Contact/SHF-001T-0.8BS | AWG26     | U      | 1       | 1         | U      | AWG26     | Connector/SMP-08V-NC<br>Contact/SHF-001T-0.8BS |
|  |           |        | 2       | 2         |        |           |  |
|  |           |        | 3       | 3         |        |           |  |
|  |           |        | 4       | 4         |        |           |  |
|  |           |        | 5       | 5         |        |           |  |
|  |           |        | 6       | 6         |        |           |  |
|  |           |        | 7       | 7         |        |           |  |
|  |           |        | 8       | 8         |        |           |  |



## (2) User Tubing

Connect an air tube that you have prepared to the quick joint.

|  |                      |
|--|----------------------|
| Dimensions (outer diameter • inner diameter) and Number of Tubes | φ4mm×φ2.5mm 2 pieces |
| Normal Service Pressure  | 0.8MPa               |
| Working Medium   | Air                  |

## 3.3.2 IXP-3/4N3515, 4515, 5520, 6520

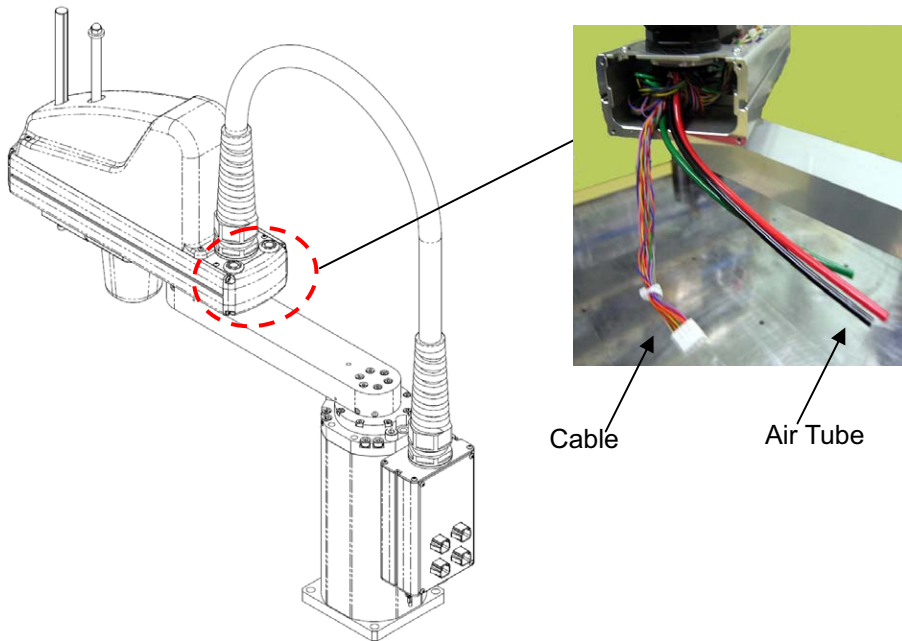
The unit is equipped with some wires and tubes free for you to use.

Make sure to use them within the specifications.

(Note) As the user cable for the gripper-equipped types 3N3510GL, 3N3510GM, 3N4510G, 3N4515GM, 3N5515GW, 3N5515GL, 3N6515GW and 3N6515GL is to be used for gripper wiring, it cannot be used as a user cable.

Connection to the gripper is to be made with using the relay cable CB-IXP-AT008-AS.

### ● Tool Side (in 2nd arm)



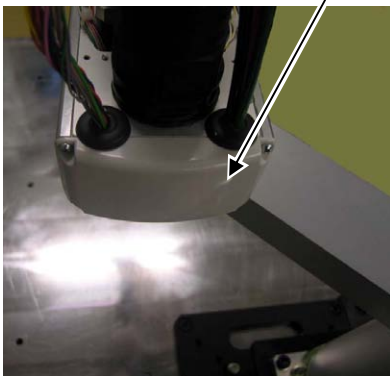
Take off the cover on the 2nd arm and take out the connection cables to an external cable and the air tube.

Connect them to the air tube and cables on the tool side, and take out from the cable ejecting grommet.

It is not a matter whether the positions of the air joint and the connector joints are inside or outside the 2nd arm. Attach the cover after the connection is made.

The following optional cable is prepared as the cable on the tool side.

Cable Ejecting Grommet



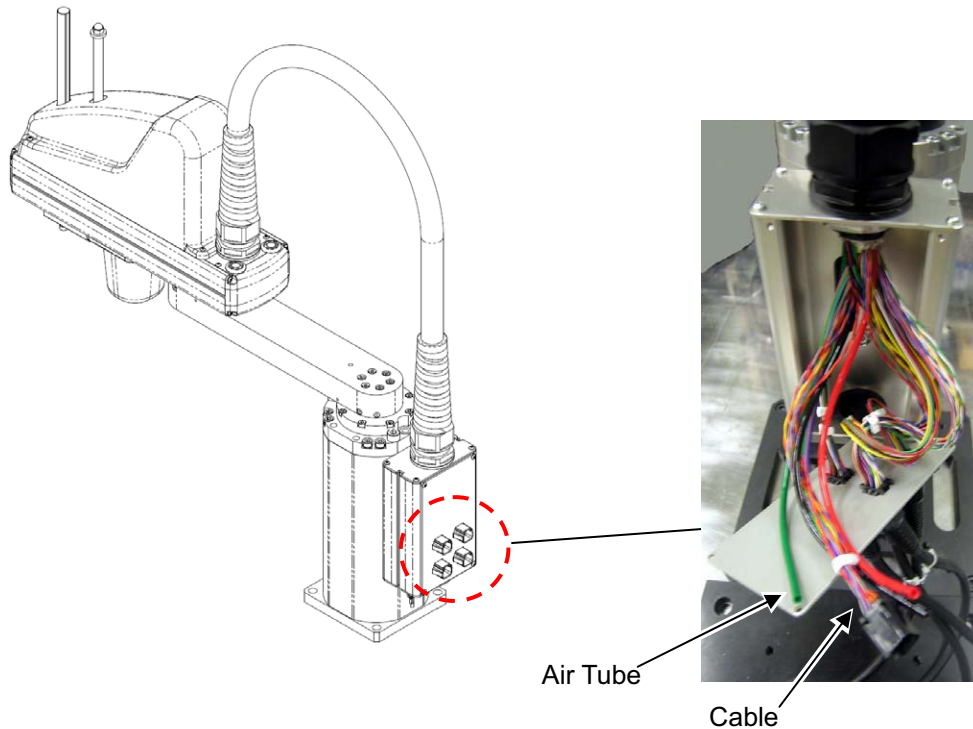
User Cable on Tool Side (Robot Cable)

Bare cut on user side

Model Code: CB-IXP-USR□□□-AS

□□□: 1m=010,  
2m=020,  
3m=030

- Host Side such as PLC (inside cable box)

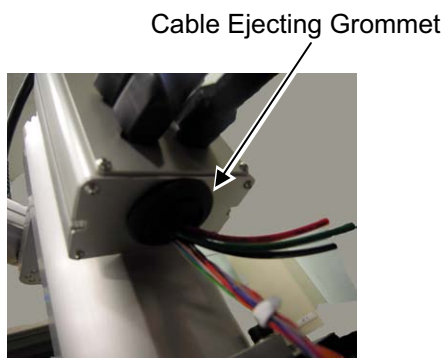


Take off the cover on the cable box and take out the connection cables to an external cable and the air tube.

Connect them to the air tube and cables on the host side such as PLC, and take out from the cable ejecting grommet.

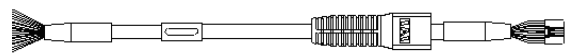
It is not a matter whether the positions of the air joint and the connector joints are inside or outside the cable box. Attach the cover after the connection is made.

The following optional cable is prepared as the cable on the host side such as PLC.



User Cable on Host Side such as PLC  
(Robot Cable)

Bare cut on  
host side such  
as PLC



Model Code: CB-IXP-USR□□□-CS

□□□: 3m = 030

5m = 050

10m = 100

15m = 150

20m = 200 (max.)

Order in requested length available

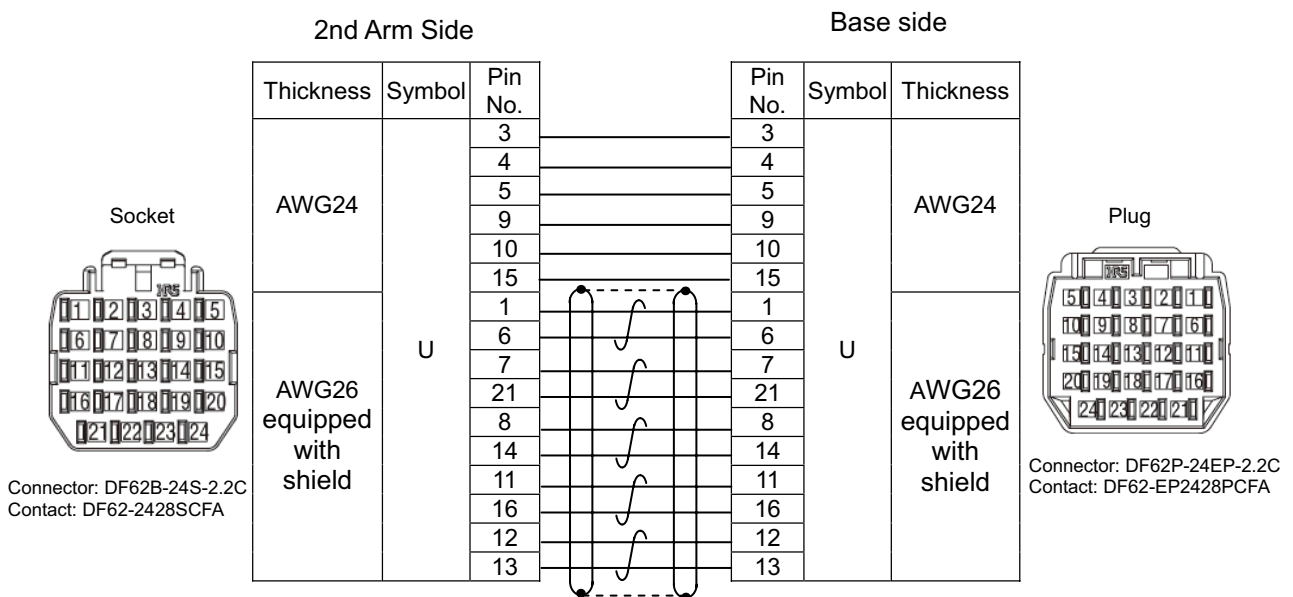
## (1) User Wiring

The following connector is adopted so IAI gripper which can be ordered in option can be directly connected.

It is available for connection of the drive or signal of a device other than the IAI gripper. It is necessary either to prepare a connector and a contact or to use a dedicated connection cable (option, one end with bare cut).

### Specifications

|                                    |   |
|------------------------------------|---|
| Rated Voltage                      | 30V                                       |
| Permissible Current                | AWG24: 2A, AWG26: 1A                      |
| Conductor Size and Number of Wires | AWG24x6C, AWG26x5P (equipped with shield) |



Wiring inside Unit between Receptacle on Base Side and Receptacle on 2nd Arm Side

## (2) User Tubing

Connect an air tube that you have prepared to the quick joint.

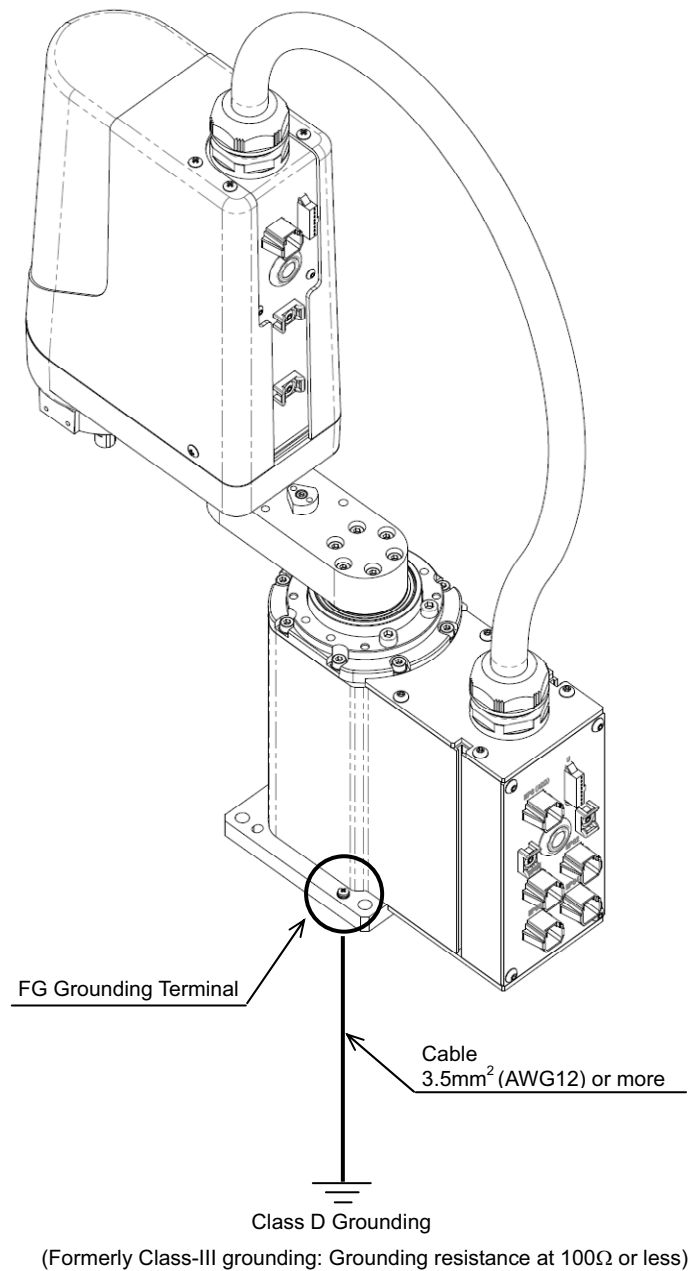
### Specifications

|  |                      |
|--|----------------------|
| Normal Service Pressure  | 0.8MPa               |
| Dimensions (outer diameter • inner diameter) and Number of Tubes | φ4mm×φ2.5mm 3 pieces |
| Working Medium   | Air                  |

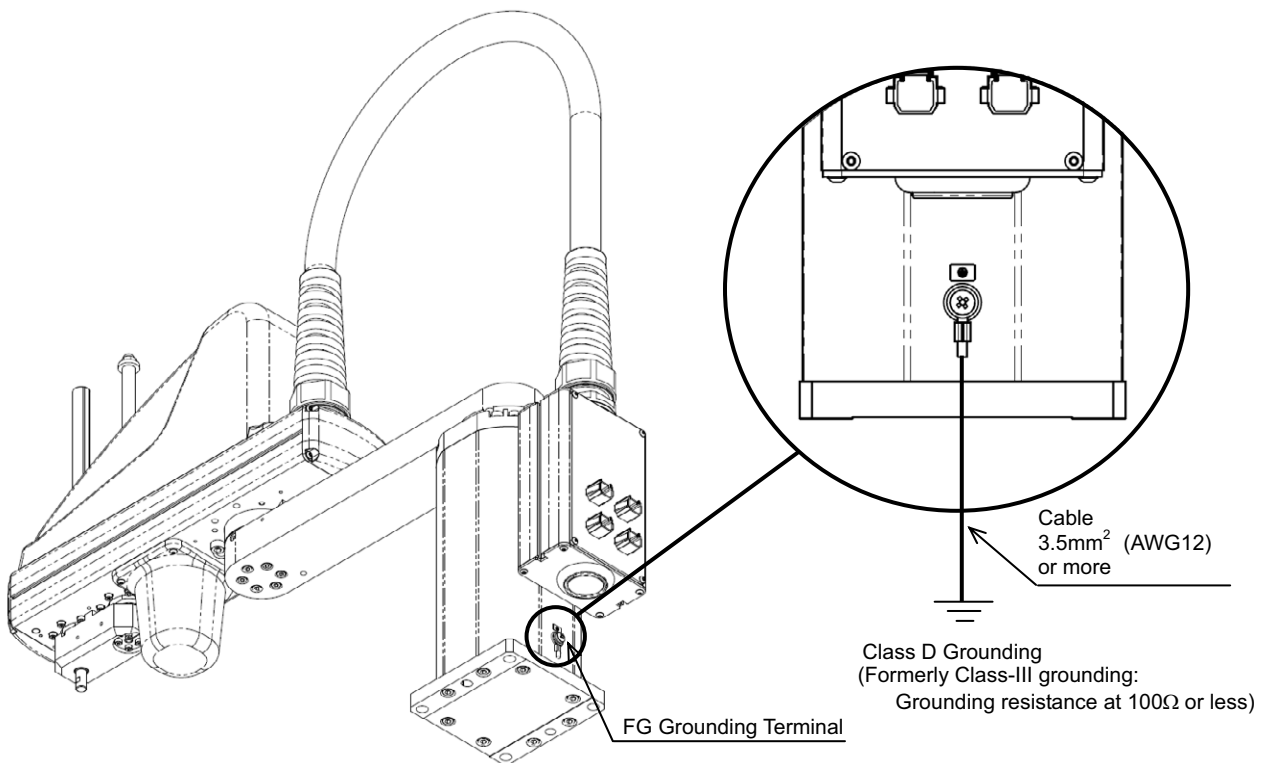
## 3.4 Grounding

On the robot body, use a grounding terminal shown in the figure for grounding.

[IXP-3/4N1808, 2508]



[IXP-3/4N3515, 4515, 5520, 6520]



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

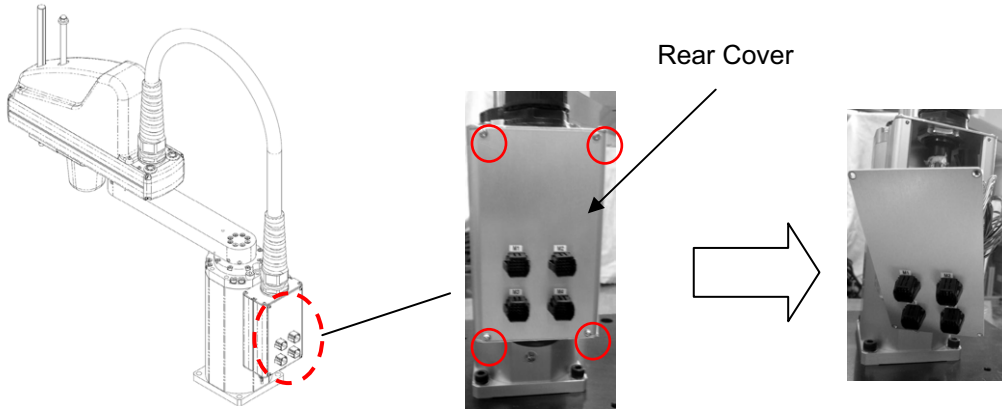
## 3.5 How to Change Motor • Encoder Cables of IXP-3/4N3515, 4515, 5520, 6520 to Bottom Ejection

By following the following steps, the Motor • Encoder Cables can be ejected from the bottom of the cable box.

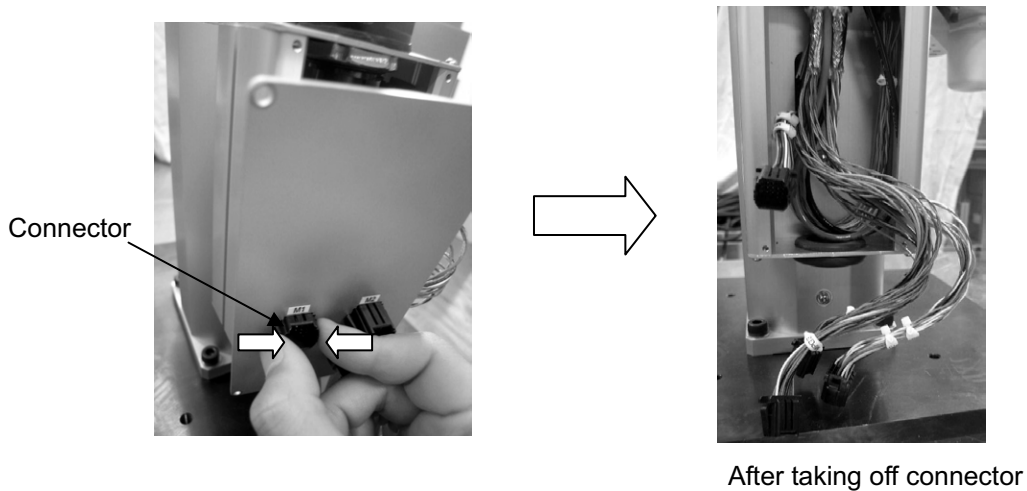
**⚠ Caution:** • Make sure to turn off the power to the controller before starting to work on. Working with the power being kept on may cause have an error operation, which may lead to a critical accident resulting in injury or death.

[Procedure]

- 1) Detach the four screws on the rear cover of the cable box with a 2mm-sized hex wrench.

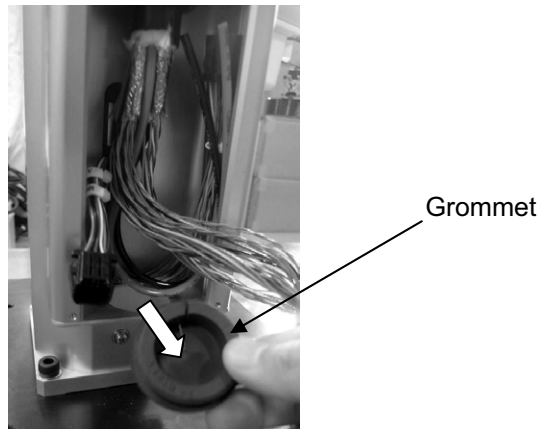


- 2) Pinch the connector to release the locking features and push the connector in so the connector can be taken off the back cover.



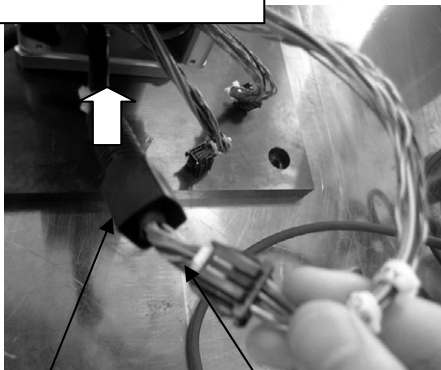


3) Take out the grommet at the bottom.

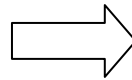


4) Put the Motor • Encoder Cables through from the bottom and join it to the connector.  
At this time, make sure to connect the cables with the same number as that labelled on the mark tube.  
After connection is made, put the cable cover over the connector.

Put Motor • Encoder Cables through hole on bottom



Connector Cover      Motor • Encoder Cable

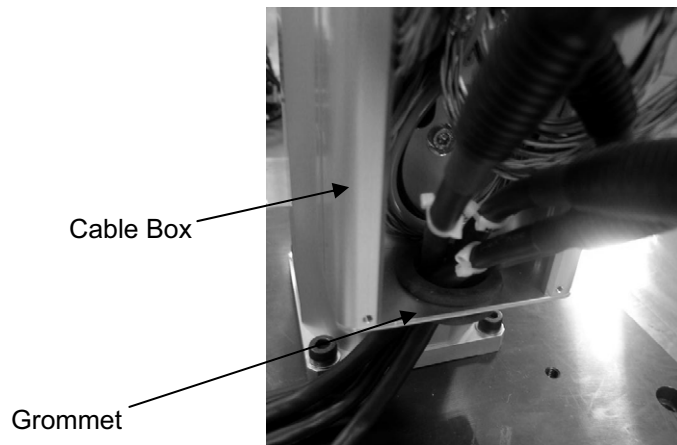


After connecting four cables

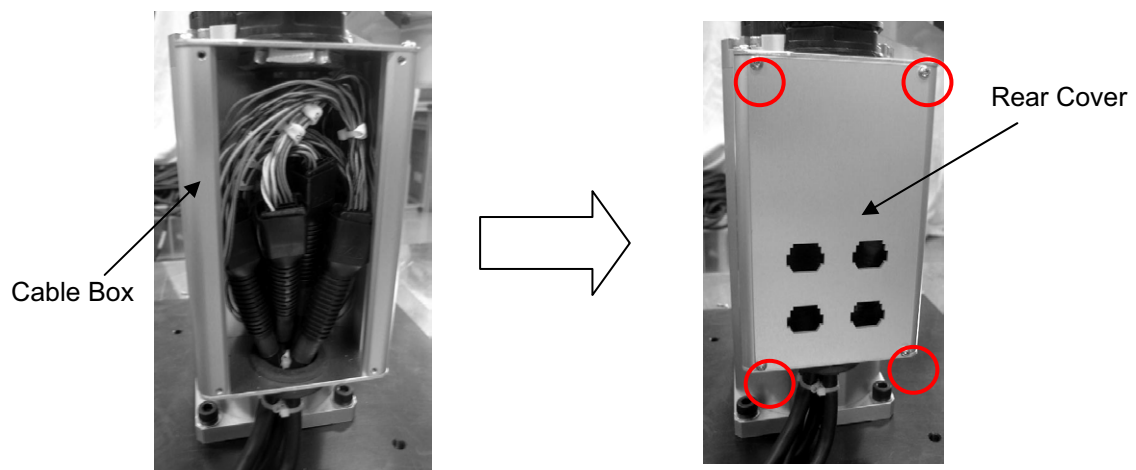
**⚠ Caution:**

- Check that there is no bend or break on the connector pins and also no damage on cables before joining the connectors. Also, after connecting, confirm that the connectors are joined properly.
- In case of connection in wrong order, it may cause operation failure, which may cause a critical accident resulting in injury or death. Pay special attention on the wiring connections.

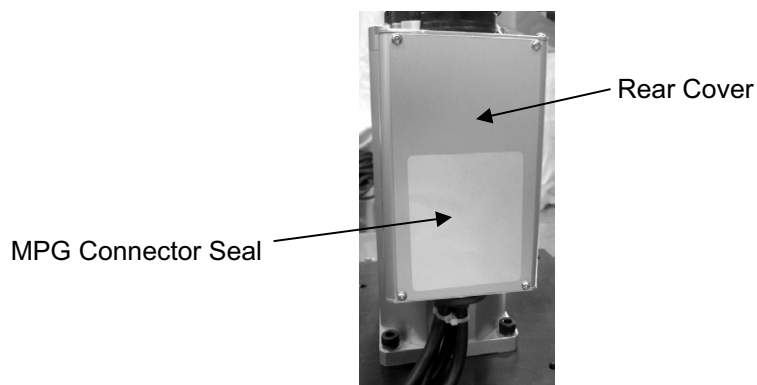
- Put the Motor • Encoder Cables through the grommet, and attach the grommet on the cable box.



- Store the cables in the cable box and attach the rear cover with four screws with using a 2mm-sized hex wrench.



- To cover up the holes, put the enclosed MPG Connector Seal after wiping off any oil or dirt on the rear cover.

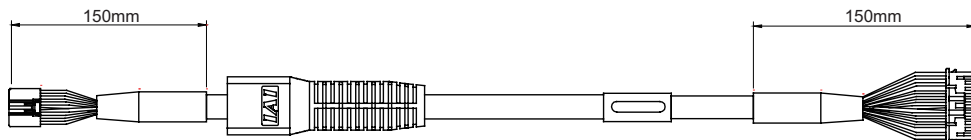


## 3.6 Caution for Wiring and Tubing

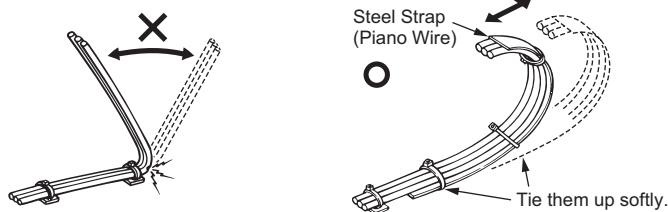


**Warning:** For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure,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

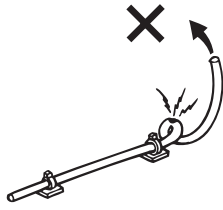
- Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or re-joint it.
  - Hold the dedicated cable to avoid mechanical force being applied to the terminals and connectors.
  - Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
  - In case a dedicated cable is to be used at a moving part, make sure to lay out the cable without applying any force to pull the connector or extreme bend on the cable. Do not attempt to use the cable with a bending radius below the allowable value.
  - Make certain that the connectors are plugged properly. Insufficient connection may cause an operation error, thus it is extremely risky.
  - Do not lay out the cables to where the machine runs over them.
  - Pay attention to the cable layout so it would not hit peripherals during an operation. In case it does, have an appropriate protection such as a cable track.
  - When a cable is used hanging on the ceiling, prevent an environment that the cable swings with acceleration or wind velocity.
  - Make sure there is not too much friction inside the cable storage equipment.
  - Do not apply radiated heat to power line or cables.
  - Do not apply radiated heat to power line or cables.
- Motor • Encoder Integrated Cables CB-CAN-MPA□□□□  
 Motor • Encoder Integrated Cables Robot Type CB-CAN-MPA□□□□-RB



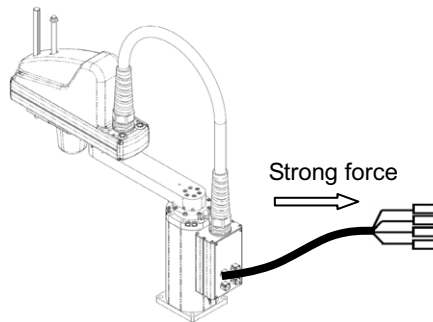
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



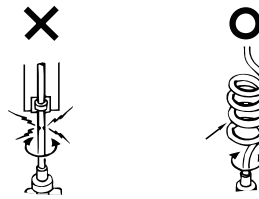
- Do not let the cable bend, kink or twist.



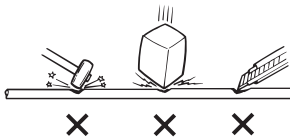
- Do not pull the cable with a strong force.



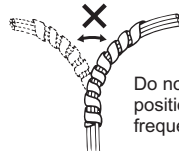
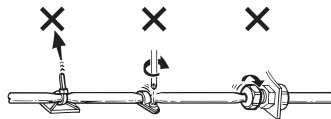
- Pay attention not to concentrate the twisting force to one point on a cable.



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

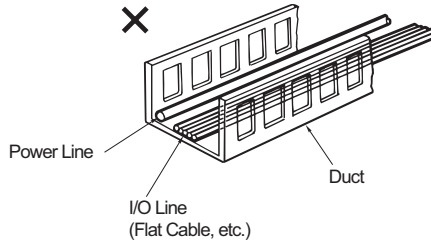


- When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.



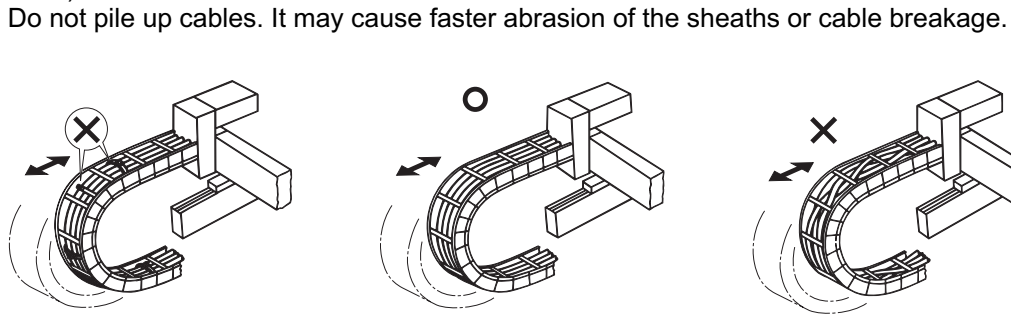
Do not use spiral tube in any position where cables are bent frequently.

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



Follow the instructions below when using a cable track.

- If there is an indication to the cable for the space factor in a cable track, refer to the wiring instruction given by the supplier when storing the cable in the cable track.
- Avoid the cables to get twined or twisted in the cable track, and also to have the cables move freely and do not tie them up. (Avoid tension being applied when the cables are bent.)

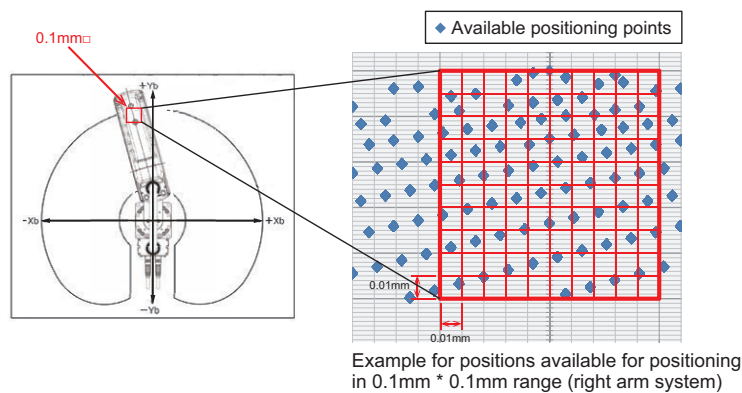


## 4. Operation

### 4.1 Available Positioning Points

Even though the position for positioning can be set in 0.001mm unit, the position actually can stop can have a dispersion of approximately 0.01mm to the specified position as shown in the figure below. This dispersion differs depending on the position for positioning and arm systems. At the position in the worst condition (outer edge of operation range), the pitch (at maximum) of the available positioning points are as shown in the table below.

(Note) When the servo is turned on after direct teaching is conducted while the servo is off, it could get misaligned by approximately MAX. 0.1mm unless otherwise the position that the direct teaching was conducted is a point available for positioning. To avoid having a misalignment, conduct teaching with JOG operation or inching operation.



|                                    |  |        | IXP-3N1808  | IXP-3N2508  | IXP-4N1805  | IXP-4N2508  |
|------------------------------------|--|--------|-------------|-------------|-------------|-------------|
| Pitch available positioning points | In Horizontal Face (J1 Axis + J2 Axis) | mm     | 0.081(MAX.) | 0.097(MAX.) | 0.081(MAX.) | 0.097(MAX.) |
|                                    | Vertical axis                          | mm     | 0.011       | 0.011       | 0.011       | 0.011       |
|                                    | Rotary axis                            | degree | -           | -           | 0.099       | 0.099       |

|                                    |  |        | IXP-3N3515  | IXP-3N4515  | IXP-4N3515  | IXP-4N4515  |
|------------------------------------|--|--------|-------------|-------------|-------------|-------------|
| Pitch available positioning points | In Horizontal Face (J1 Axis + J2 Axis) | mm     | 0.202(MAX.) | 0.179(MAX.) | 0.202(MAX.) | 0.179(MAX.) |
|                                    | Vertical axis                          | mm     | 0.009       | 0.009       | 0.009       | 0.009       |
|                                    | Rotary axis                            | degree | -           | -           | 0.113       | 0.113       |

|                                    |  |        | IXP-3N5520  | IXP-3N6520  | IXP-4N5520  | IXP-4N6520  |
|------------------------------------|--|--------|-------------|-------------|-------------|-------------|
| Pitch available positioning points | In Horizontal Face (J1 Axis + J2 Axis) | mm     | 0.200(MAX.) | 0.224(MAX.) | 0.200(MAX.) | 0.224(MAX.) |
|                                    | Vertical axis                          | mm     | 0.009       | 0.009       | 0.009       | 0.009       |
|                                    | Rotary axis                            | degree | -           | -           | 0.053       | 0.053       |

- ⚠ Caution:
- The pitch available positioning points on the horizontal face (J1 axis + J2 axis) is determined by the arm angle. As the arm extends, the pitch available positioning points gets bigger as shown in the figure above.
  - For the position teaching, conduct direct teach by the position movement in the PC software or the teaching pendant. [For how to perform direct teach, refer to XSEL PC Software Instruction Manual]
  - If input of the coordinate values that positioning is desired is made in the position table, and the robot is positioned at the indicated coordinate, there will be a difference occurred between the input coordinate and the point positioning was actually made. In such a case as when feeding operation by indicating the pitching distance is made, there is a case that desired operation cannot be obtained.
  - There will be a misalignment to the case of positioning to the same position on the right arm system and the left arm system.
  - If it is necessary to fine-tune the positioning point, have a fine-tuning function to the alignment tool on the work piece.

## 4.2 Retaining of Load on Vertical Axis

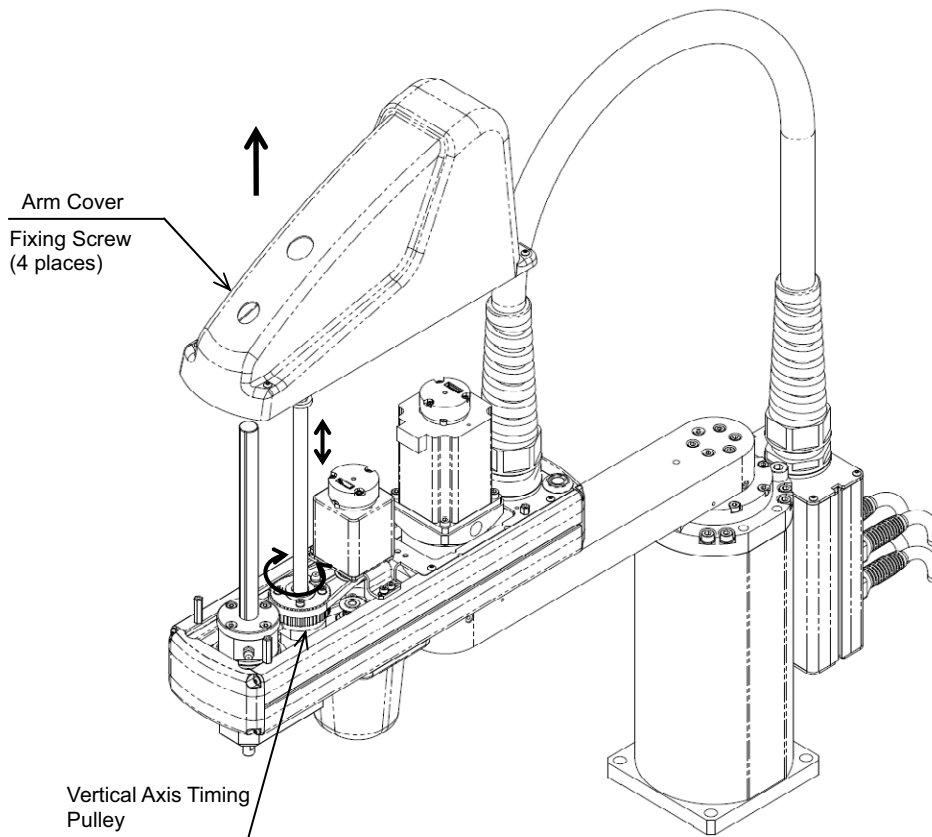
The vertical axis of IXP-3/4N1808, 2508 is equipped with a brake to retain a load.

The vertical axis of IXP-3/4N3515, 4515 is not equipped with a brake to retain a load. It holds a load with friction of the mechanical parts.

It is available to equip with a brake on the vertical axis for IXP-3/4N5520, 6520 in option. Select the Z-axis brake when the transported load is 4kg or more.

## 4.3 How to Move Vertical Axis Manually

To move the vertical axis of IXP-3/4N3515, 4515, 5520, 6520 manually with hand, remove the arm cover and slide the timing pulley for the vertical axis.



**⚠ Caution:** Do not attempt to move the vertical axis manually by hand. Excessive moment will be applied to the bearings on the J1 and J2 axes, which may cause to generate abnormal noise and vibration, malfunction or drop of the product life.



## 4.4 Movement while Servo-on


As the robot is equipped with a stepper motor, the position slightly moves and turns back during the servo is on due to the characteristics of the stepper motor.

Shown below is the maximum movement amount during the servo is on.

|                               |  |        | IXP-3N1808 | IXP-3N2508 | IXP-4N1808 | IXP-4N2508 |
|-------------------------------|--|--------|------------|------------|------------|------------|
| Max. Movement during Servo-on | In Horizontal Face (J1 Axis + J2 Axis) | mm     | 2          | 2.4        | 2          | 2.4        |
|                               | Vertical axis                          | mm     | 0.3        | 0.3        | 0.3        | 0.3        |
|                               | Rotary axis                            | degree | -          | -          | 2.4        | 2.4        |

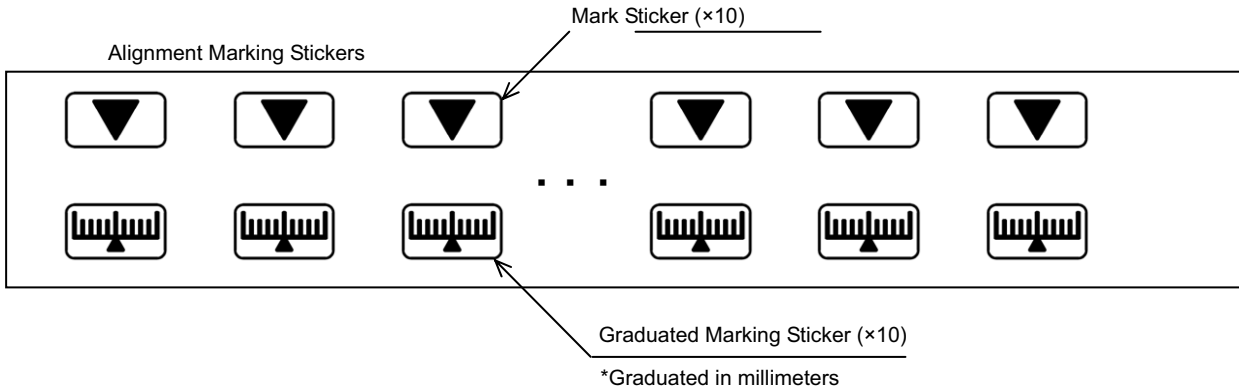
|                               |  |        | IXP-3N3515 | IXP-3N4515 | IXP-4N3515 | IXP-4N4515 |
|-------------------------------|--|--------|------------|------------|------------|------------|
| Max. Movement during Servo-on | In Horizontal Face (J1 Axis + J2 Axis) | mm     | 4.9        | 4.3        | 4.9        | 4.3        |
|                               | Vertical axis                          | mm     | 0.2        | 0.2        | 0.2        | 0.2        |
|                               | Rotary axis                            | degree | -          | -          | 2.7        | 2.7        |

|                               |  |        | IXP-3N5520 | IXP-3N6520 | IXP-4N5520 | IXP-4N6520 |
|-------------------------------|--|--------|------------|------------|------------|------------|
| Max. Movement during Servo-on | In Horizontal Face (J1 Axis + J2 Axis) | mm     | 5.2        | 5.5        | 5.2        | 5.5        |
|                               | Vertical axis                          | mm     | 0.2        | 0.2        | 0.2        | 0.2        |
|                               | Rotary axis                            | degree | -          | -          | 1.3        | 1.3        |

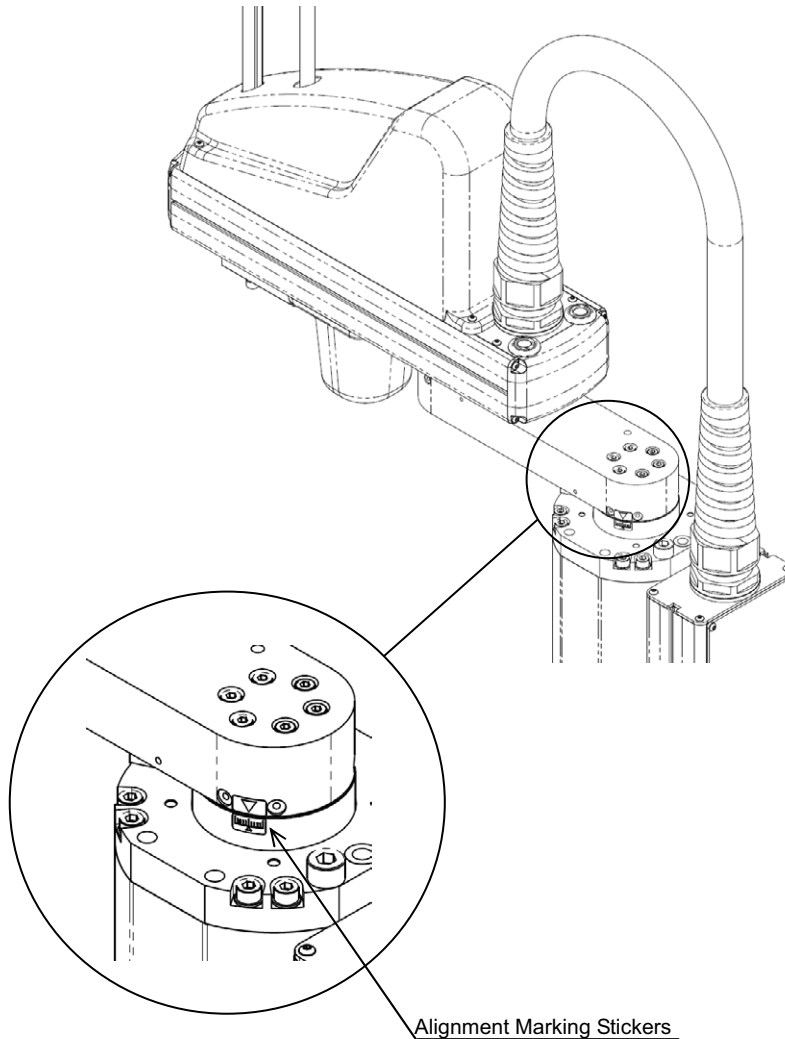
-  **Caution:**
- By considering the maximum movement amount during the servo is on, pay attention not to have interference with peripheral equipment.
  - Do not attempt to turn the servo on while interfered with mechanical stopper or peripheral equipment.

## 4.5 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.



⚠ Notice: Alignment marking stickers have adhesive on the back side. Wipe of any oil or dirt on the attaching surface before applying a sticker on.



## 5. Maintenance inspection

 **Warning:** 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

### 5.1 Inspection Items and Periods

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. Follow the contents stated in RCP4 Gripper Type Instruction Manual (ME3730) when conducting the maintenance inspection on the gripper.

#### [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                 | Correct the deformation or positional shift of the cage.<br>Confirm that the interlock mechanism is operating properly.        |
| Appearance of Robot         | Check the exterior for abnormality, flaws, dents, etc.<br>(If the robot has flaws or other abnormalities, please contact IAI.) |
| Operation of Robot          | Check for abnormal operation, vibration or noise.  |
| Cables                      | Check for damage and pinch of cables.<br>Check the cable mounting parts for looseness.   |
| Emergency-Stop Switch       | Confirm that the emergency-stop switch functions properly.   |

#### [2] Half a Year Maintenance Inspection

Have a maintenance and inspection for the following items once in half a year (every 6 months).

If the robot main body has flaws or other abnormalities, please contact IAI.

| Maintenance Inspection Area | Maintenance Inspection Details  |
|-----------------------------|---|
| Robot Main Body             | Check for any looseness of the attachment bolts on the robot body and play on cover related components.<br>(Tighten if any loosened bolt is found.) |
| Ball Screw, Ball Spline     | Supply grease to ball screw and ball splined.<br>(Applied Grease: AFG+70 Grease by THK)<br>[Refer to 5.2, "Grease Supply on the Vertical Axis"]     |
| Connectors                  | Check the connectors for looseness.   |

[3] Yearly Maintenance Inspection

Have a maintenance and inspection for the following items every year.

| Maintenance Inspection Area             | Maintenance Inspection Details   |
|---|--|
| Robot Main Body<br>Arm Attachment Bolts | Check for any looseness of the bolts on the arm.<br>(If any play is found on the arm attachment, tighten up the bolts.)<br>[Refer to 5.4, "Check for Looseness of Arm Attachment Bolts"] |

[4] 5 Years Maintenance Inspection

Have a maintenance and inspection for the following items once every 5 years.

After 5 years has passed, have a maintenance and inspection for the following items every year.

If the robot main body has flaws or other abnormalities, please contact IAI.

| Maintenance Inspection Area                                | Maintenance Inspection Details  |
|--|---|
| J1 Axis and J2 Axis<br>Speed Reducer<br>Bearings on Joints | Lost motion measurement<br>If the lost motion value exceeds the allowable range, it is considered the end of life for speed reducer or bearing. It is necessary to have the unit disassembled for such work as replacement of the speed reducer.<br>(Please contact IAI if any abnormality is found.)<br>(Note) The life of the speed reducer may vary depending on the duration of operation, speed or load, but it is approximately five to seven years.<br>[Refer to 5.5, "How to Measure Lost Motion".] |
| Vertical Axis and<br>Rotary Axis Belt                      | Visual inspection on the timing belt to check if there is any damage or remarkable abrasion on the teeth side surface<br>It is necessary to have the timing belt replaced if any abnormality is found.<br>(Please contact IAI if any abnormality is found.)<br>[Refer to 5.6, "How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis"]   |

## 5.2 Grease Supply on the Vertical Axis

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

### 5.2.1 Applicable Grease and Supply Period

| Grease to Apply |        | Supply Period     |
|-----------------|--------|-------------------|
| THK             | AFG+70 | Every half a year |

**Warning:** Do not attempt to apply fluorine grease. When mixed with lithium grease, not only decrease the grease characteristics, but also may damage the driving part.

### 5.2.2 Grease Supply

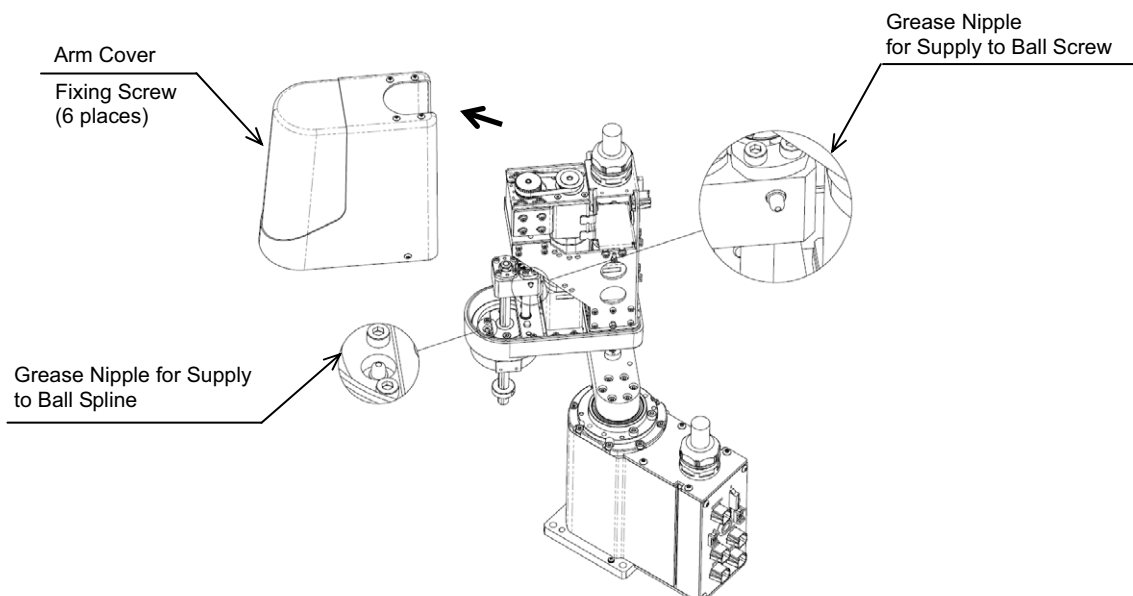
[1] IXP-3/4N1808, 2508

[Necessary item for grease supply] 2mm-sized hex wrench

[Procedure]

- 1) Detach the arm cover on the 2nd arm.
- 2) With a grease gun, supply grease on the grease nipple for supply to the ball screw. (approx. 5g)
- 3) Supply grease on the grease nipple for supply to the ball spline in the same manner. (approx. 0.1g)  
Bend the 2<sup>nd</sup> arm before supplying to the ball spline.  
Also, do not attempt to apply unnecessary load. It will apply excess moment to J1 and J2 Axes, and may cause abnormal noise and vibration, malfunction or drop of production life.
- 4) Wipe off the excessive grease, and put the covers back on.
- 5) Perform JOG operation to move up and down so the grease can be applied evenly to the balls inside the nut.

|                        |               |
|------------------------|---------------|
| Recommended Grease Gun | MG70 (by THK) |
|------------------------|---------------|



[2] IXP-3/4N3515, 4515, 5520, 6520

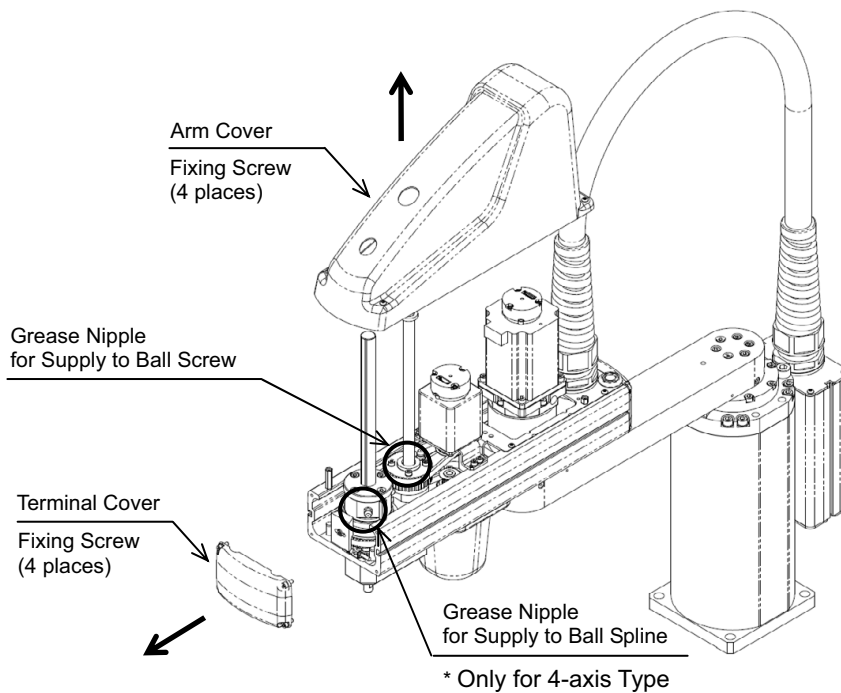
[Necessary item for grease supply] 2mm-sized hex wrench

[Procedure]

- 1) Detach the arm cover on the 2nd arm and the terminal cover on the 2nd arm tip.
- 2) With a grease gun, supply grease on the grease nipple for supply to the ball screw. (approx. 5cc)
- 3) Supply grease on the grease nipple for supply to the ball spline in the same manner. (approx. 5cc)
- 4) Wipe off the excessive grease, and put the covers back on.
- 5) Perform JOG operation to move up and down so the grease can be applied evenly to the balls inside the nut.

|                        |               |
|------------------------|---------------|
| Recommended Grease Gun | MG70 (by THK) |
|------------------------|---------------|

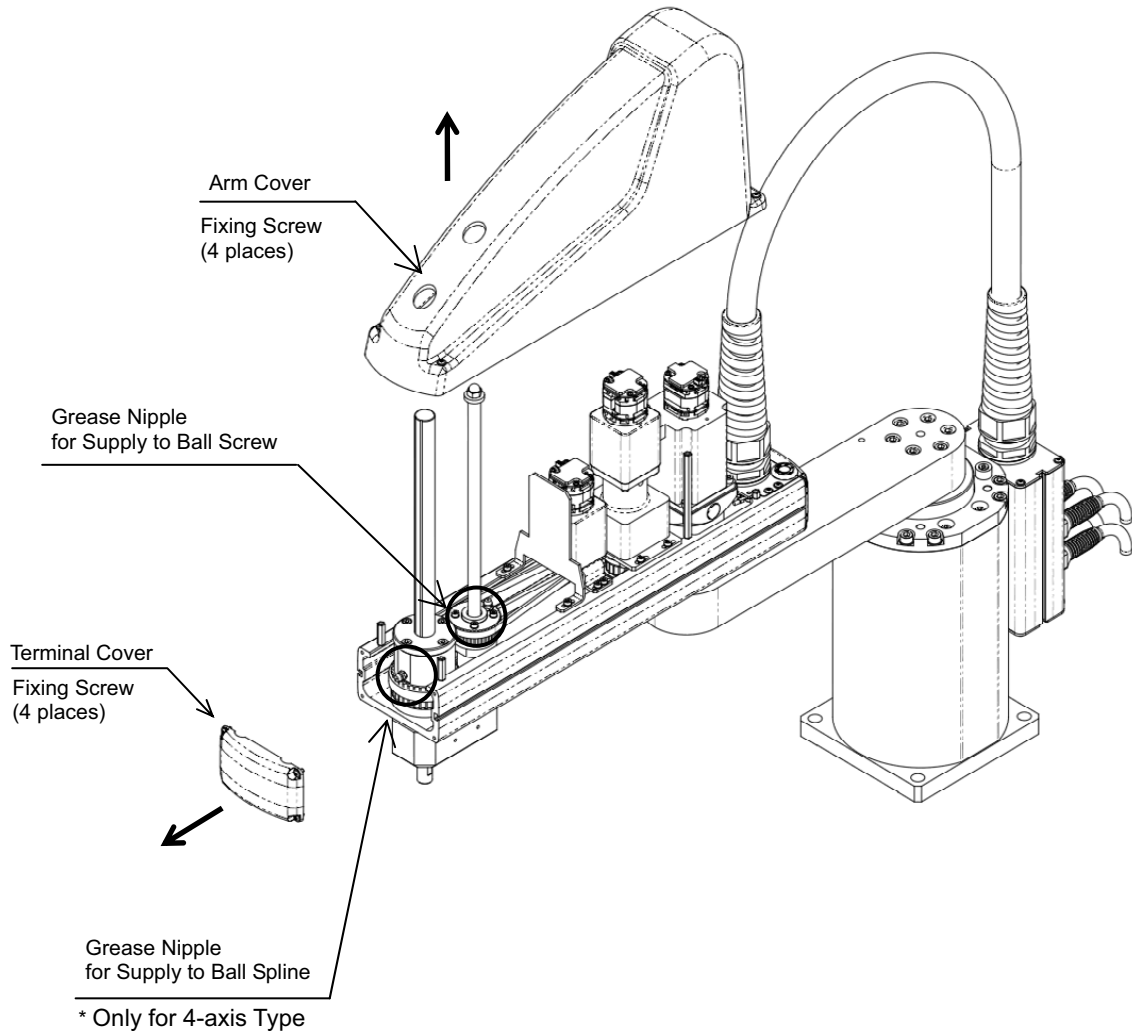
- IXP-3/4N3515, 4515



**⚠ Caution:**

- In case the grease got into your eye, 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.
- Do not attempt to move the vertical axis manually by hand. In case the vertical axis is moved by hand, excessive moment will be applied to the bearings on the J1 and J2 axes, which may cause to generate abnormal noise and vibration, malfunction or drop of the product life.

- IXP-3/4N5520, 6520



- ⚠ Caution:**
- In case the grease got into your eye, 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.
  - Do not attempt to move the vertical axis manually by hand. In case the vertical axis is moved by hand, excessive moment will be applied to the bearings on the J1 and J2 axes, which may cause to generate abnormal noise and vibration, malfunction or drop of the product life.

### 5.3 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 5.5 How to Measure Lost Motion]



## 5.4 Check for Looseness of Arm Attachment Screws

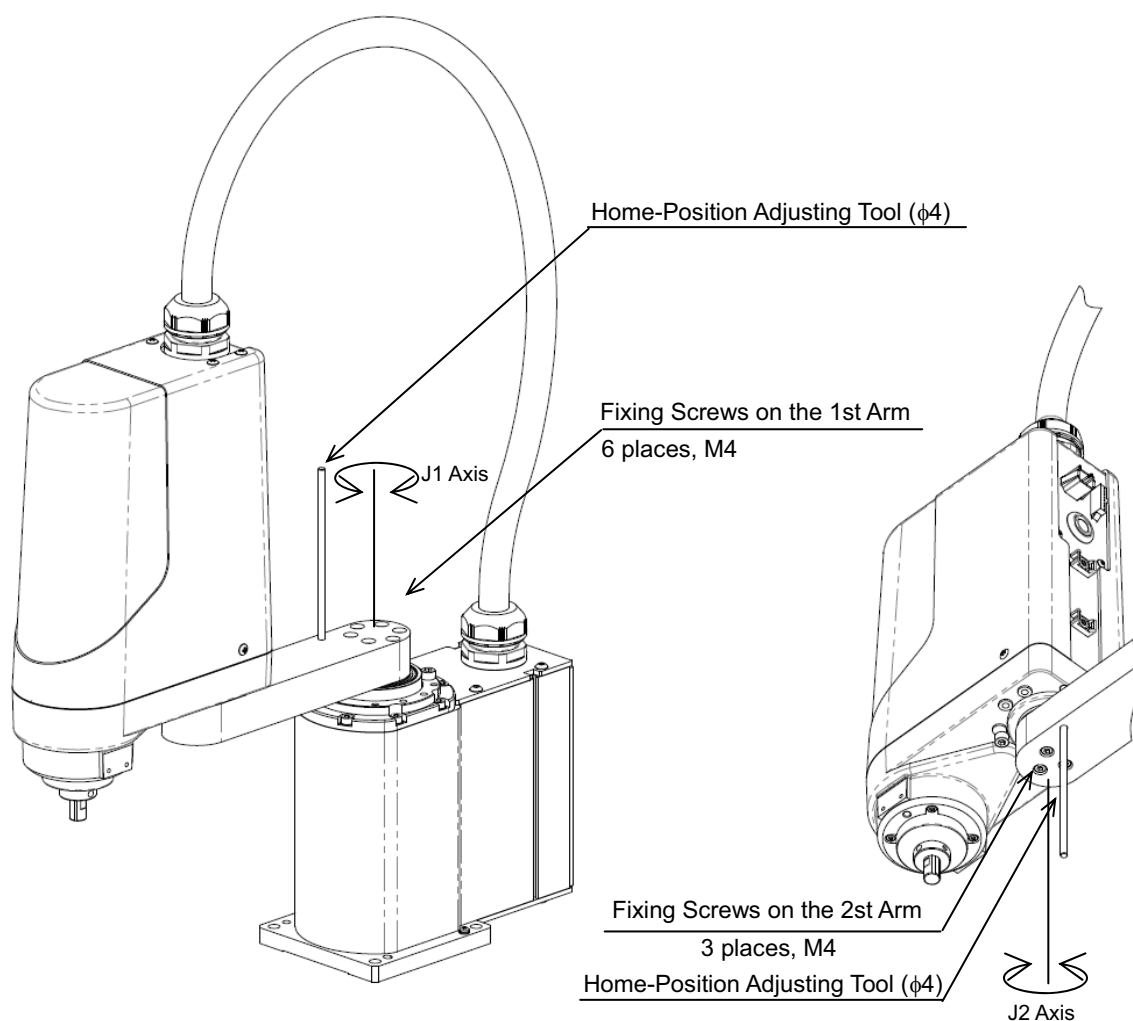
[1] IXP-3/4N1808, 2508

[Tools necessary to check arm attachment screws]

3mm-sized hex wrench, Home-Position Adjusting Tool ( $\phi 4$ ) (Accessorie)

[Procedure]

- 1) Set the J1 axis to the posture shown below, and insert the home-position adjustment tool ( $\phi 4$ ).
- 2) Check that the fixing screws on the 1st arm are not loosened by using a hex wrench. In looseness is found, tighten it up with the home-position adjustment tool ( $\phi 4$ ) kept inserted. (Tightening Torque: 359N $\cdot$ cm)
- 3) Set the J2 axis to the posture shown below, and insert the home-position adjustment tool ( $\phi 4$ ).
- 4) Check that the fixing screws on the 2st arm are not loosened by using a hex wrench. In looseness is found, tighten it up with the home-position adjustment tool ( $\phi 4$ ) kept inserted. (Tightening Torque: 359N $\cdot$ cm)

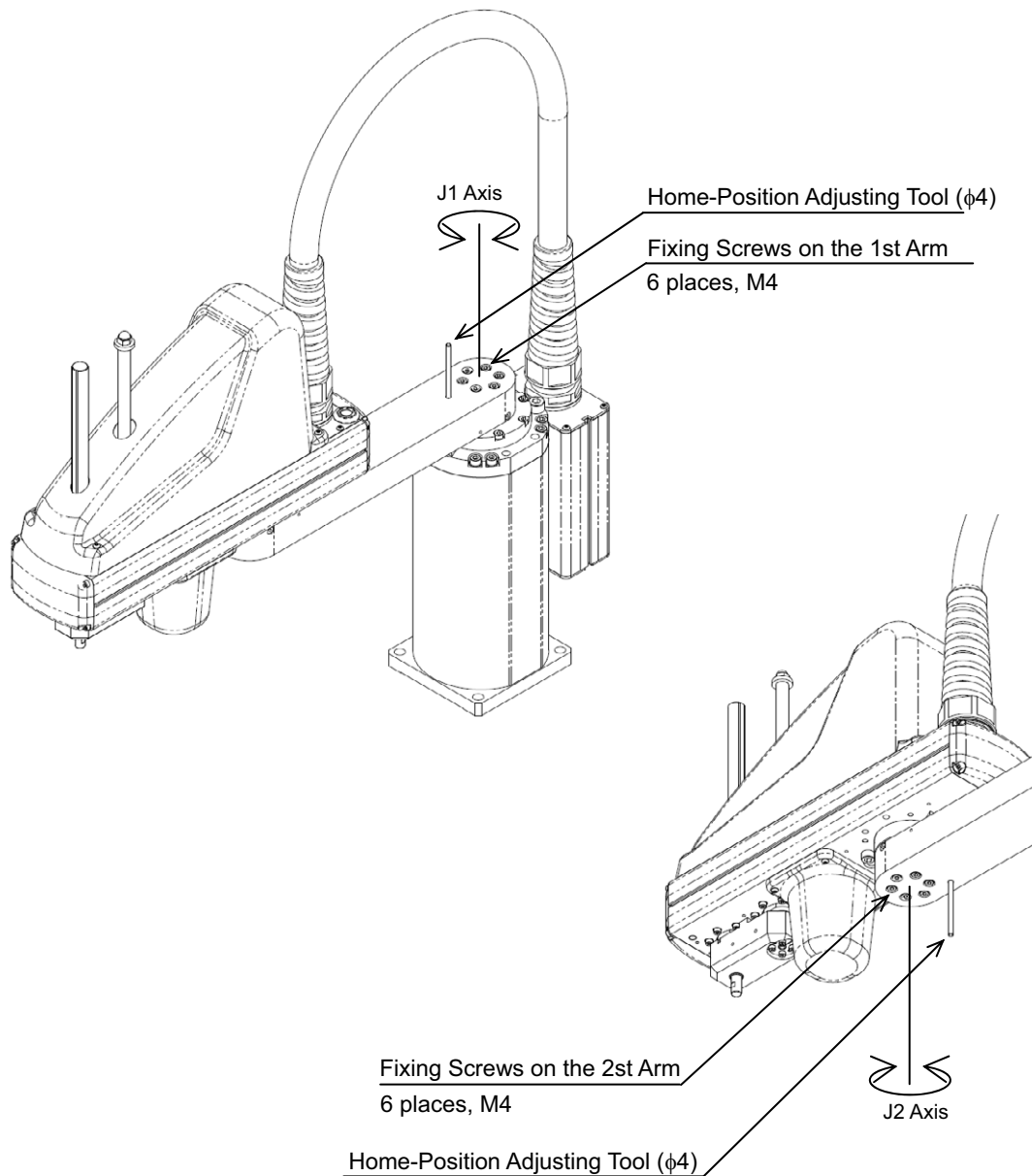


[2] IXP-3/4N3515, 4515

[Tools necessary to check arm attachment screws]  
3mm-sized hex wrench, Home-Position Adjusting Tool ( $\phi 4$ ) (Accessorie)

[Procedure]

- 1) Set the J1 axis to the posture shown below, and insert the home-position adjustment tool ( $\phi 4$ ).
- 2) Check that the fixing screws on the 1st arm are not loosened by using a hex wrench. In looseness is found, tighten it up with the home-position adjustment tool ( $\phi 4$ ) kept inserted. (Tightening Torque: 359N $\cdot$ cm)
- 3) Set the J2 axis to the posture shown below, and insert the home-position adjustment tool ( $\phi 4$ ).
- 4) Check that the fixing screws on the 2st arm are not loosened by using a hex wrench. In looseness is found, tighten it up with the home-position adjustment tool ( $\phi 4$ ) kept inserted. (Tightening Torque: 359N $\cdot$ cm)



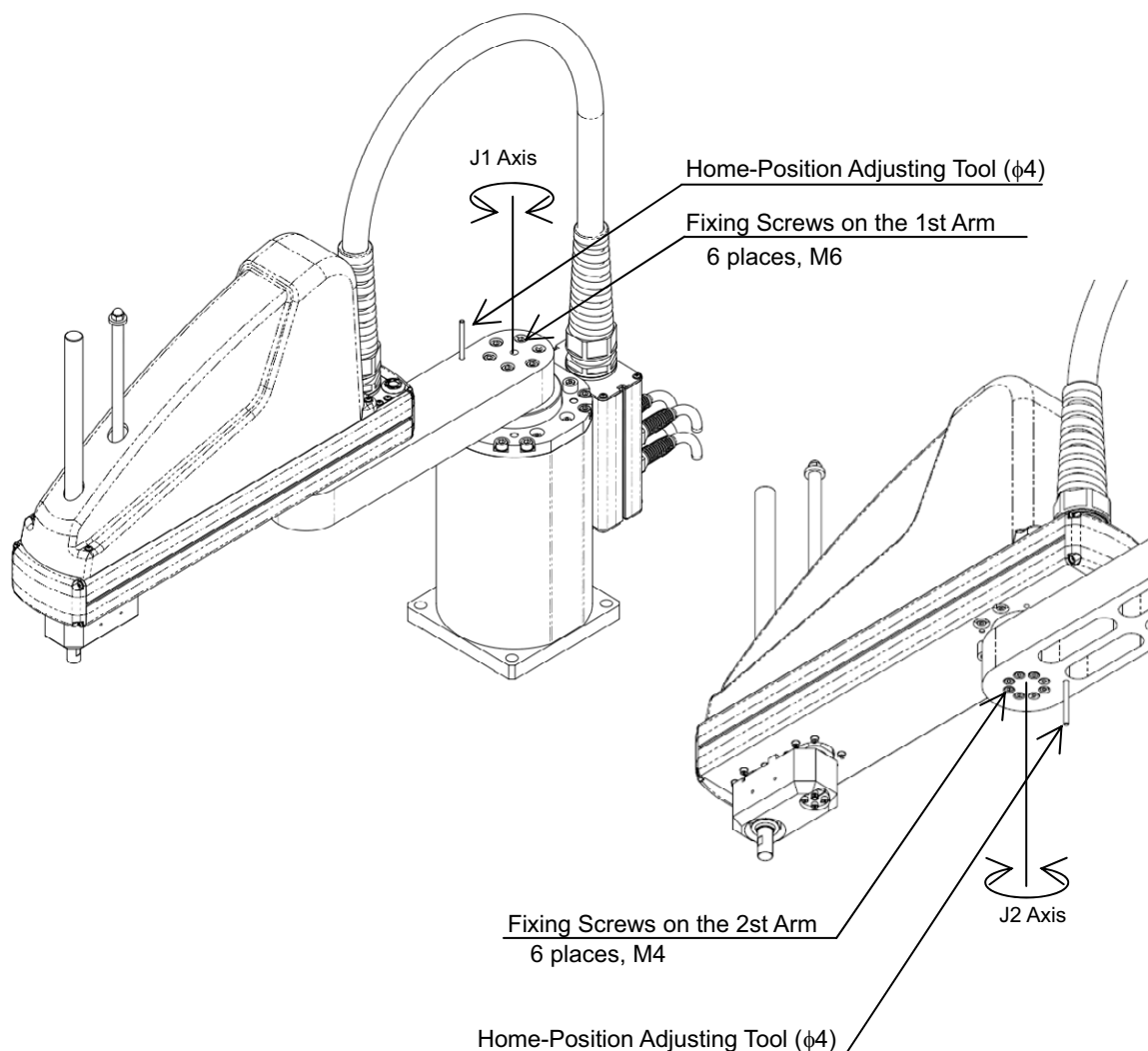
[3] IXP-3/4N5520, 6520

[Tools necessary to check arm attachment screws]

3mm-sized and 5mm-sized hex wrench, Home-Position Adjusting Tool ( $\phi 4$ ) (Accessorie)

[Procedure]

- 1) Set the J1 axis to the posture shown below, and insert the home-position adjustment tool ( $\phi 4$ ).
- 2) Check that the fixing screws on the 1st arm are not loosened by using a hex wrench. In looseness is found, tighten it up with the home-position adjustment tool ( $\phi 4$ ) kept inserted. (Tightening Torque: 1234N $\cdot$ cm)
- 3) Set the J2 axis to the posture shown below, and insert the home-position adjustment tool ( $\phi 4$ ).
- 4) Check that the fixing screws on the 2st arm are not loosened by using a hex wrench. In looseness is found, tighten it up with the home-position adjustment tool ( $\phi 4$ ) kept inserted. (Tightening Torque: 359N $\cdot$ cm)



## 5.5 How to Measure Lost Motion

[Tools necessary for lost motion measurement]

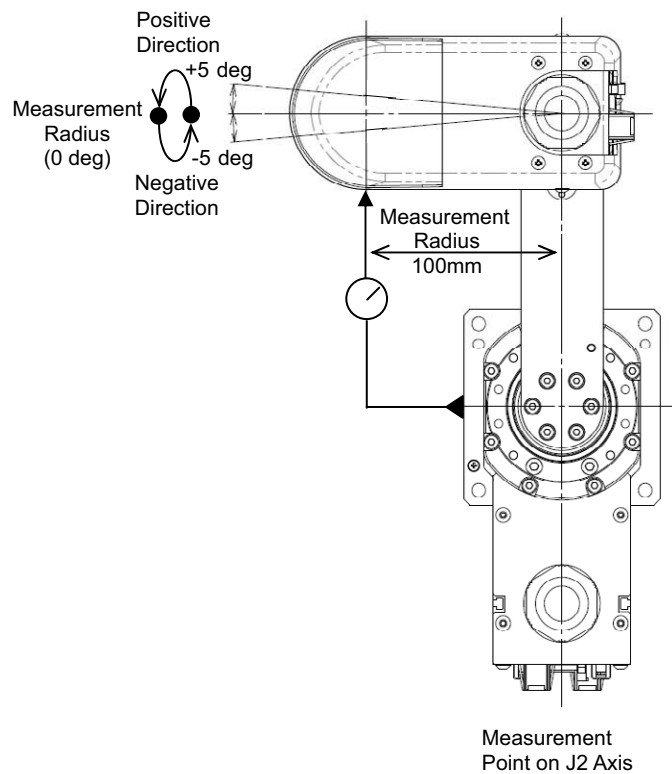
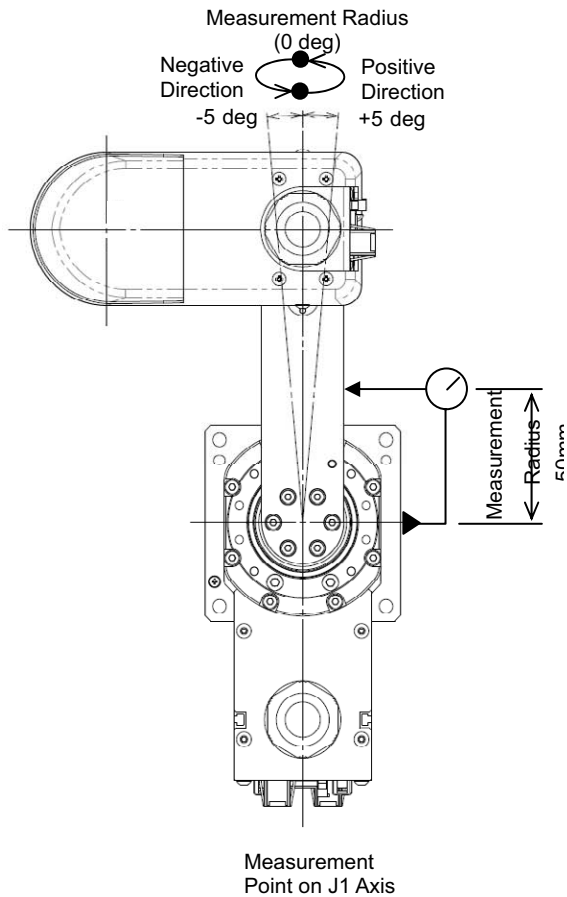
Digimatic Indicator (Measurement range 10mm or more, minimum display 0.001mm) or equivalent acceptable Magnet stand

[Procedure]

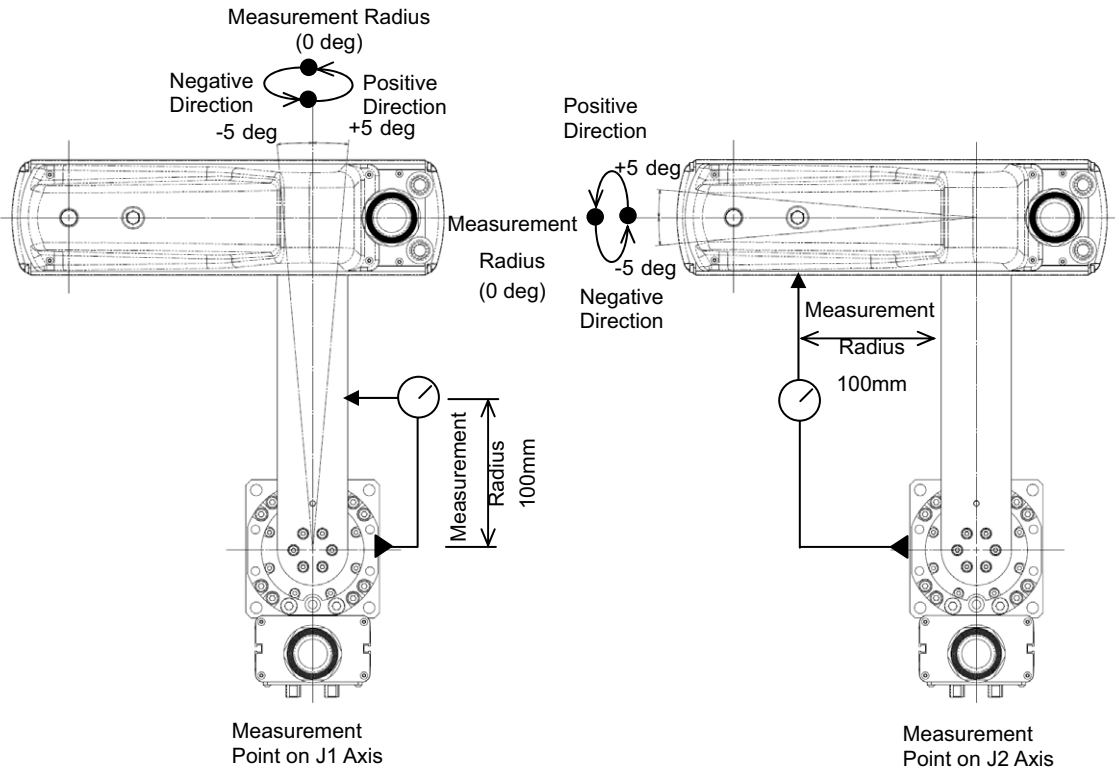
- 1) Create a position and a program to operate 1st Axis and 2nd Axis in  $\pm 5$ deg with PTP Operation.
- 2) Allocate the measurement device as shown in the figure below.

- Measurement Point: See figure below
- Operation Command: PTP Operation (MOVP Command)
- Operation Speed: 30%
- Acceleration/Deceleration : 30%

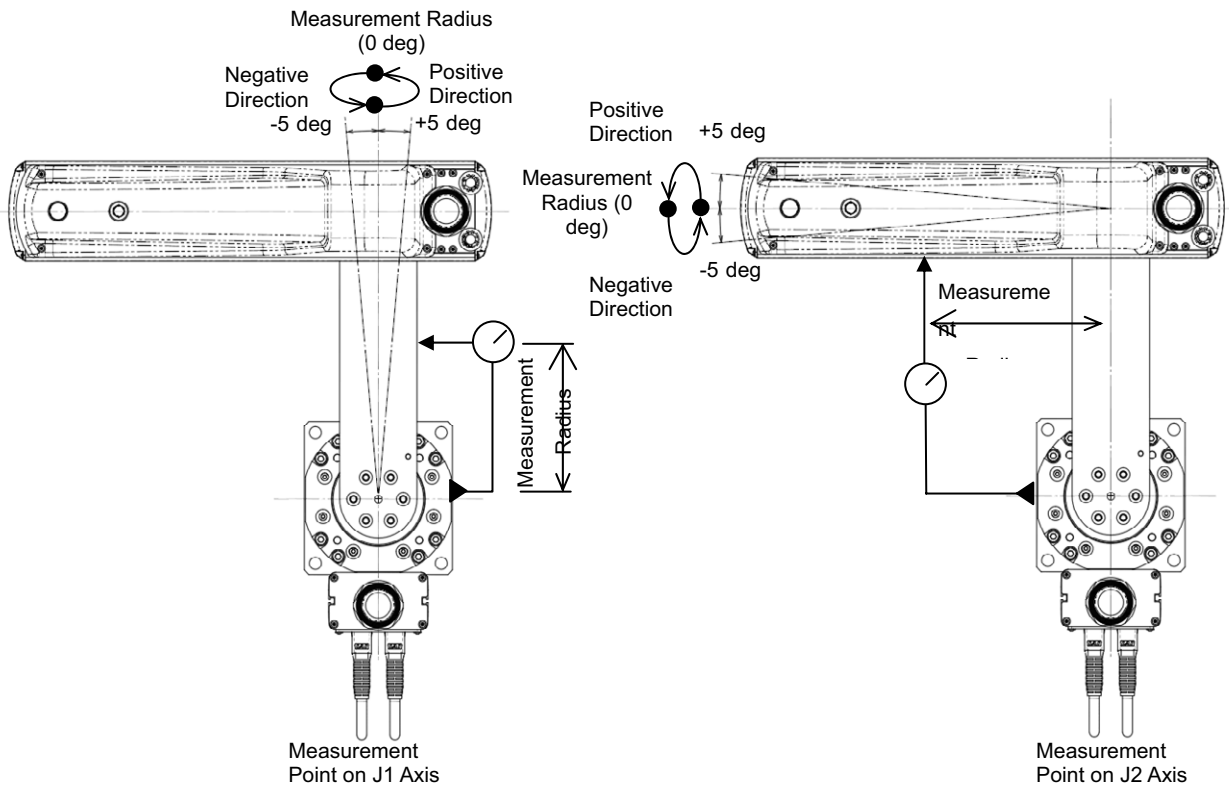
[IXP-3/4N1808, 2508]



[IXP-3/4N3515, 4515]



[IXP-3/4N5520, 6520]



- Move the axis from +5deg towards 0deg, the measurement point, in the positive direction, and measure the position.
- 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.
- 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.  
Repeat the measurements of b and c for seven times in each positive and negative direction. The difference of the average of the measurement results is determined as the lost motion.

### Example for Lost Motion Measurement

| Number of Times         | Positive Direction                       | Negative Direction |
|-------------------------|--|--------------------|
| 1                       | +0.003                                   | -0.003             |
| 2                       | -0.003                                   | +0.003             |
| 3                       | +0.003                                   | +0.005             |
| 4                       | -0.003                                   | -0.005             |
| 5                       | +0.003                                   | -0.005             |
| 6                       | +0.003                                   | -0.004             |
| 7                       | +0.003                                   | -0.006             |
| Average                 | +0.0013                                  | -0.0021            |
| Difference [mm]         | +0.0013-(-0.0021)  = 0.0034              |                    |
| Measurement Radius [mm] | 100                                      |                    |
| Lost Motion [arc min]   | [atan(0.0034/100)]*60 nearly equals 0.12 |                    |

### How to decide

It is normal as long as the figured out values are below the allowable values shown in the table below.

### Lost Motion Allowance

|                         | IX-3/4N1808, 2508 |         | IX-3/4N3515, 4515 |         |
|-------------------------|-------------------|---------|-------------------|---------|
|                         | J1 axis           | J2 axis | J1 axis           | J2 axis |
| Lost Motion [arc min.]  | 3                 | 5       | 3                 | 3       |
| Measurement Radius [mm] | 50                | 100     | 100               | 100     |

|                         | IX-3/4N5520, 6520 |         |
|-------------------------|-------------------|---------|
|                         | J1 axis           | J2 axis |
| Lost Motion [arc min.]  | 3                 | 3       |
| Measurement Radius [mm] | 150               | 150     |

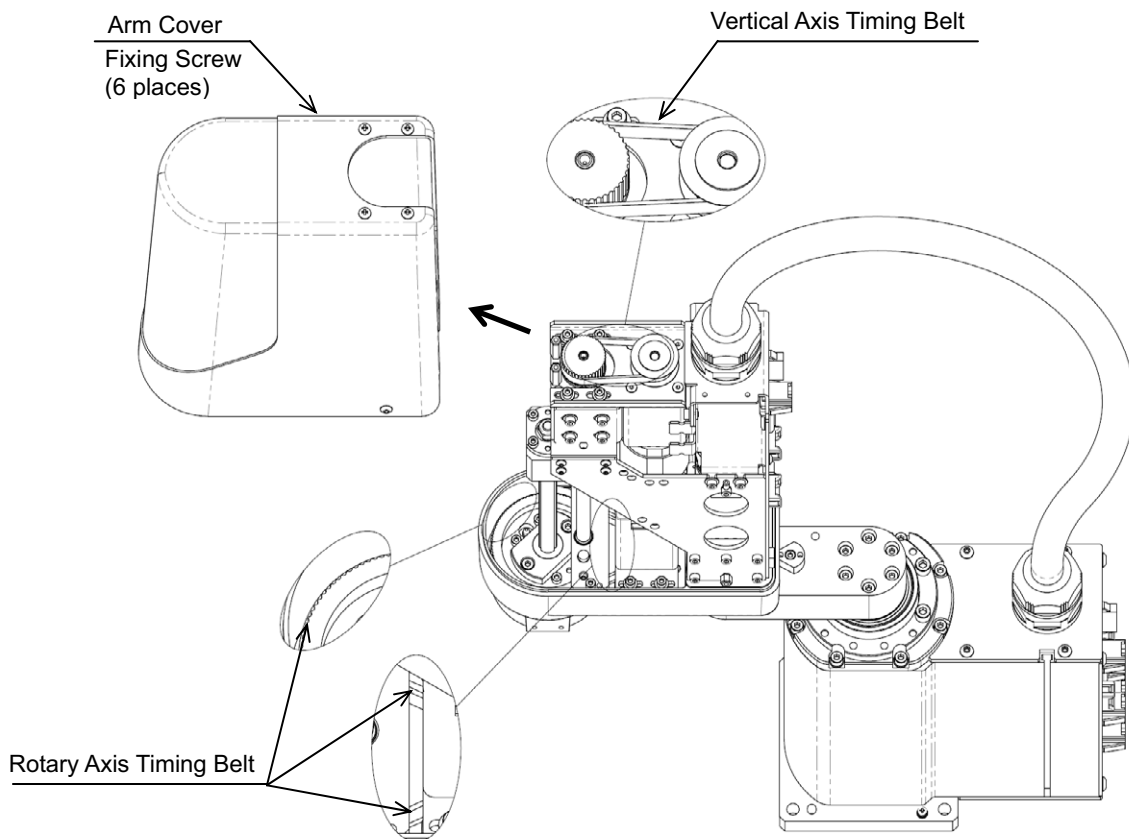
## 5.6 How to Inspect Visually on Timing Belt for Vertical Axis and Rotary Axis

[Necessary item for visual inspection]  
2mm-sized hex wrench set

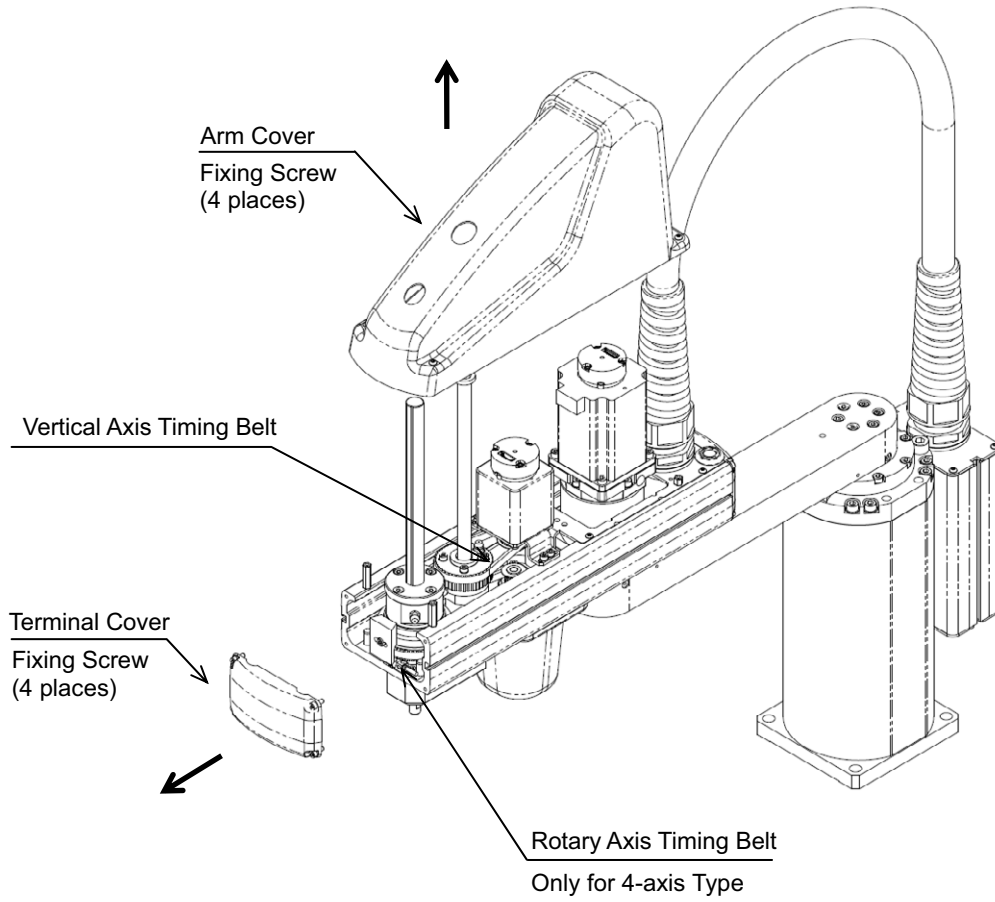
[Procedure]

- 1) Detach the arm cover on the 2nd arm and the terminal cover on the 2nd arm tip.
- 2) Check if there is any damage or remarkable abrasion on the teeth side surface.

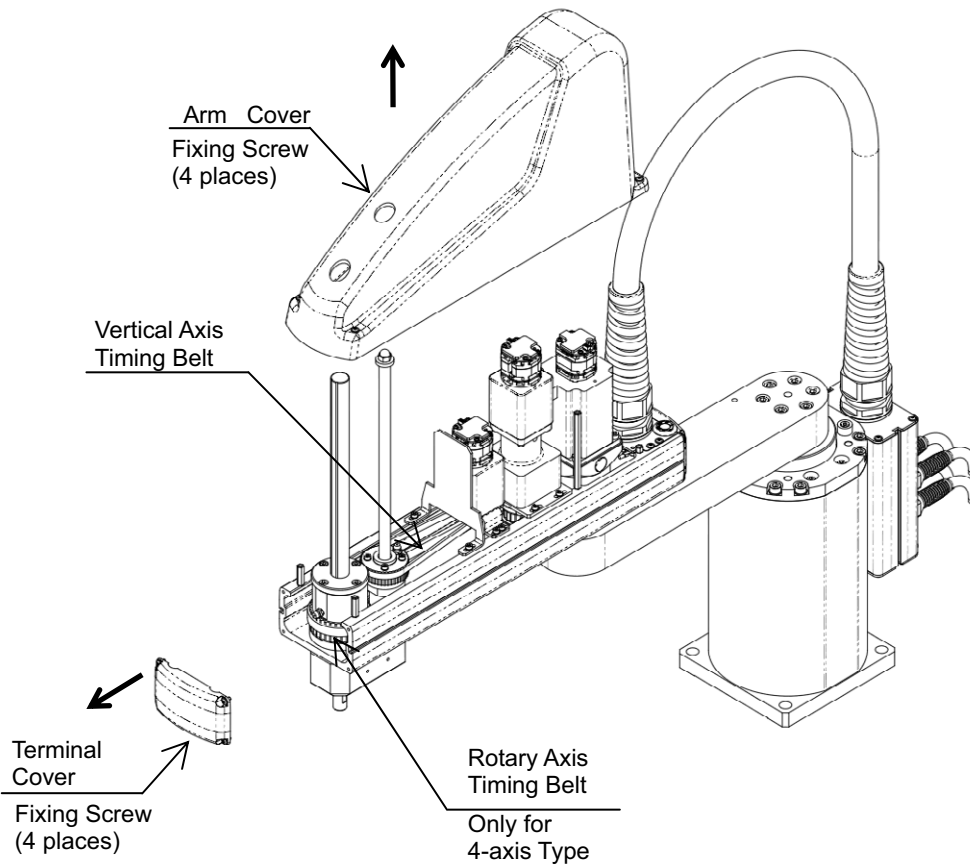
[IXP-3/4N1808, 2508]



[IXP-3/4N3515, 4515]



[IXP-3/4N5520, 6520]





## 5.7 Absolute Reset

### 5.7.1 List of Sections to Refer to for Absolute Reset

Shown in the table below is the sections that should be referred to for how to perform absolute reset on each axis.

Conduct the process of the appropriate robot model code.

| Robot Model Code | 3N1808/3N2508-WA<br>3N3515/3N4515-WA<br>3N5520/3N6520-WA<br>(3-axis/Absolute) | 4N1808/3N2508-WA<br>4N3515/4N4515-WA<br>4N5520/4N6520-WA<br>(4-axis/Absolute) |
|------------------|---|---|
| J1               | 5.7.2 Absolute Reset<br>Step 1) to 9)   | 5.7.2 Absolute Reset<br>Step 1) to 9)   |
| J2               | 5.7.2 Absolute Reset<br>Step 1) to 9)   | 5.7.2 Absolute Reset<br>Step 1) to 9)   |
| Z                | 5.7.2 Absolute Reset<br>Step 10)  | 5.7.2 Absolute Reset<br>Step 10)  |
| R                | -   | 5.7.2 Absolute Reset<br>Step 11) to 15)                                       |

Also, when absolute reset is required on the additional axis, refer to the instruction manual of the applicable model.

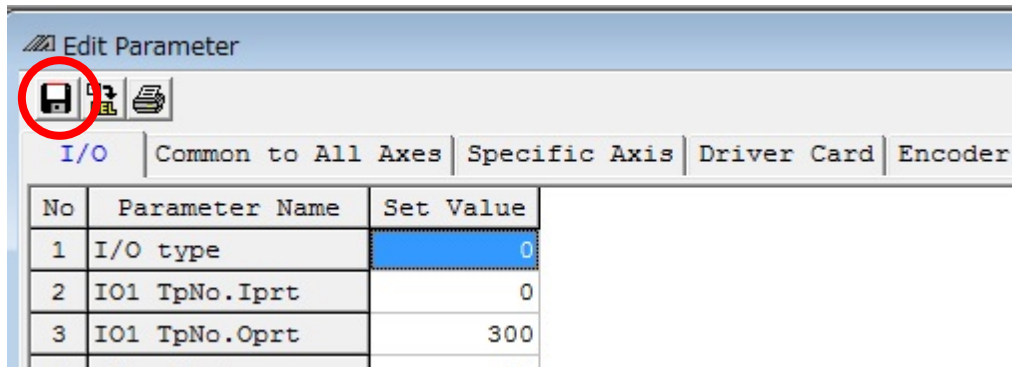
## 5.7.2 Absolute Reset

In absolute type (WA), make sure to conduct the absolute reset when the absolute data was lost or after the robot is dismantled to replace the motor and so on.

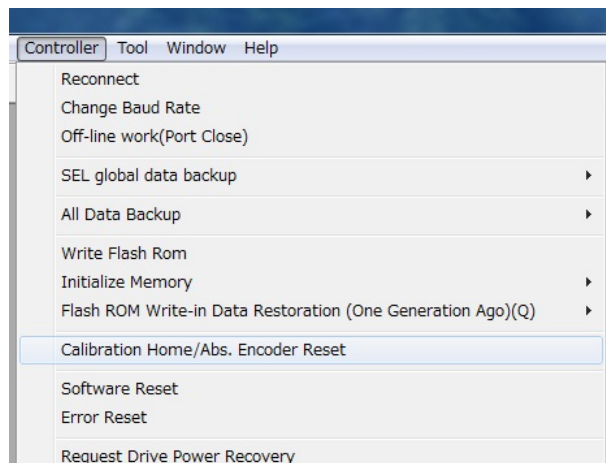
**⚠ Caution:**

- 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 absolute reset is not conducted after the motor is replaced and robot is dismantled.
- There may be a case that the indicated coordinates for positioning point cannot be achieved before and after the absolute reset is conducted.

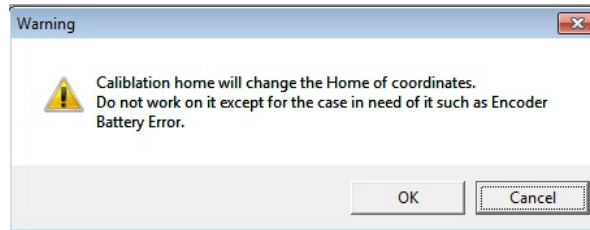
- 1) Make sure to have a backup of the parameters before conducting. Select [Parameter] → [Edit] from the menu in the PC software to show the parameter edit window. Press “Save As” button in the parameter edit window to save the parameters to file data.



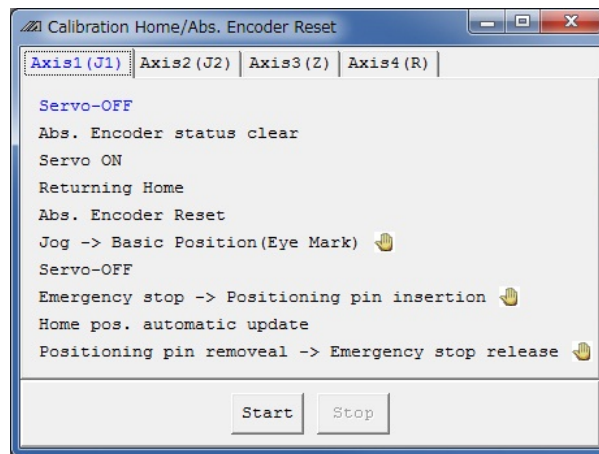
- 2) Select [Controller] → [Calibration Home/Abs. Encoder Reset] from the menu in the PC software.



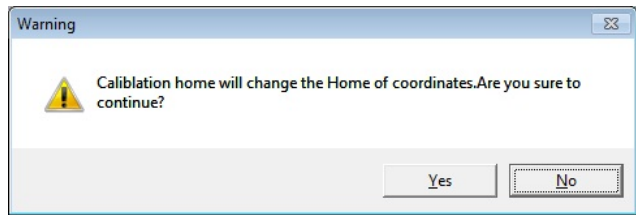
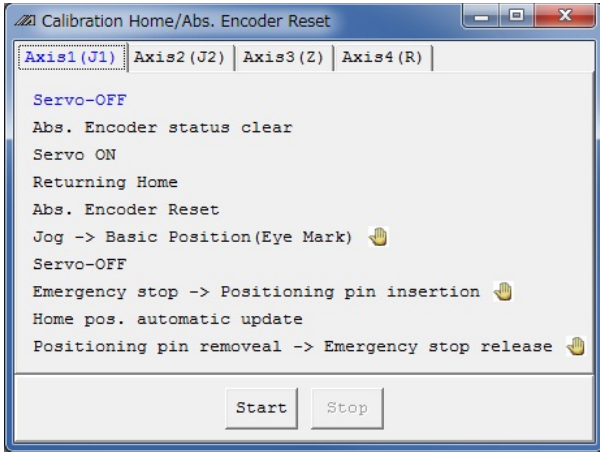
- 3) A warning window shows up. Check the content and click "OK".



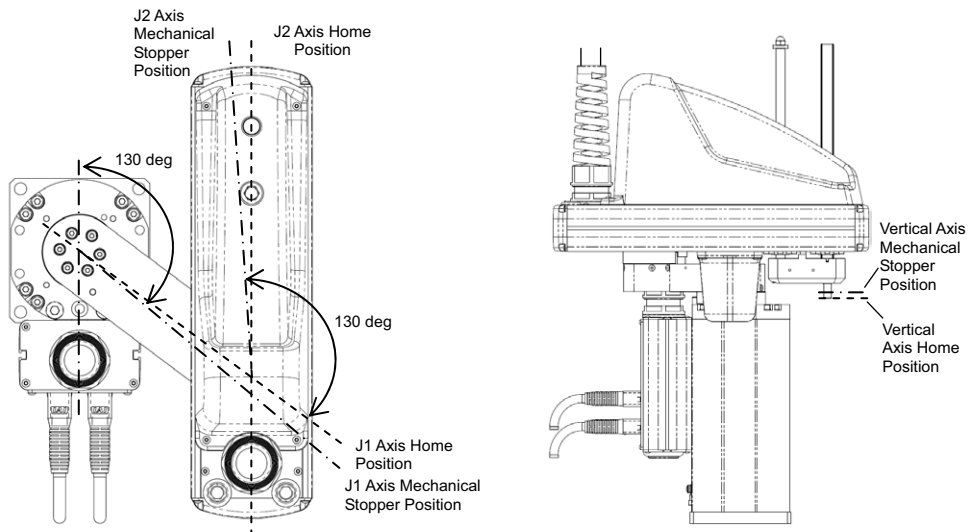
- 4) [Calibration Home/Abs. Encoder Reset] appears. Select the tab for the axis that requires the absolute reset.  
Conduct absolute reset to all the axes.



- Conduct absolute reset on [Axis 1 (J1)] or [Axis 2 (J2)].  
Click on "Start" button while the [Axis 1 (J1)] or [Axis 2 (J2)] tab is selected, and a warning window shows up. Release the emergency stop, check the content and click "Yes".  
Home-return operation starts on the axis subject to absolute reset.

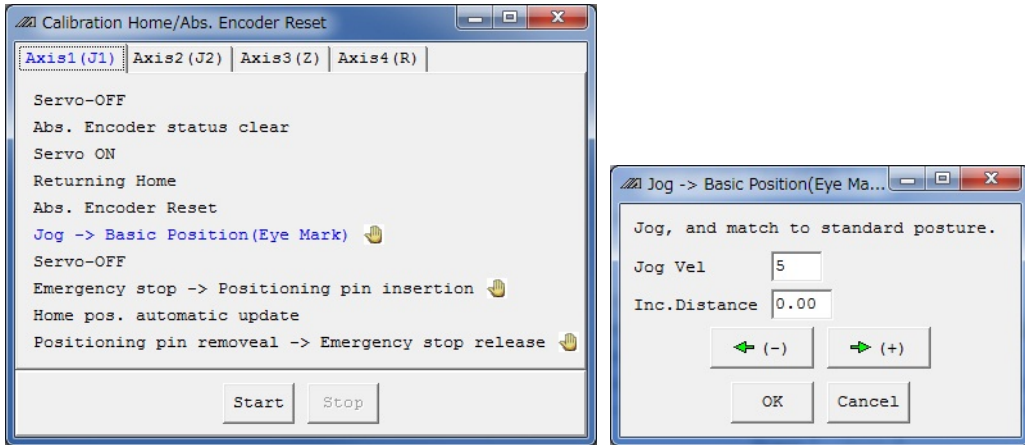


**Caution:** • Pay attention as the home-return operation starts as soon as clicking "Yes". The standard home position should be the posture below. Make sure to secure enough area for home-return posture and not to have interference to peripheral equipment.



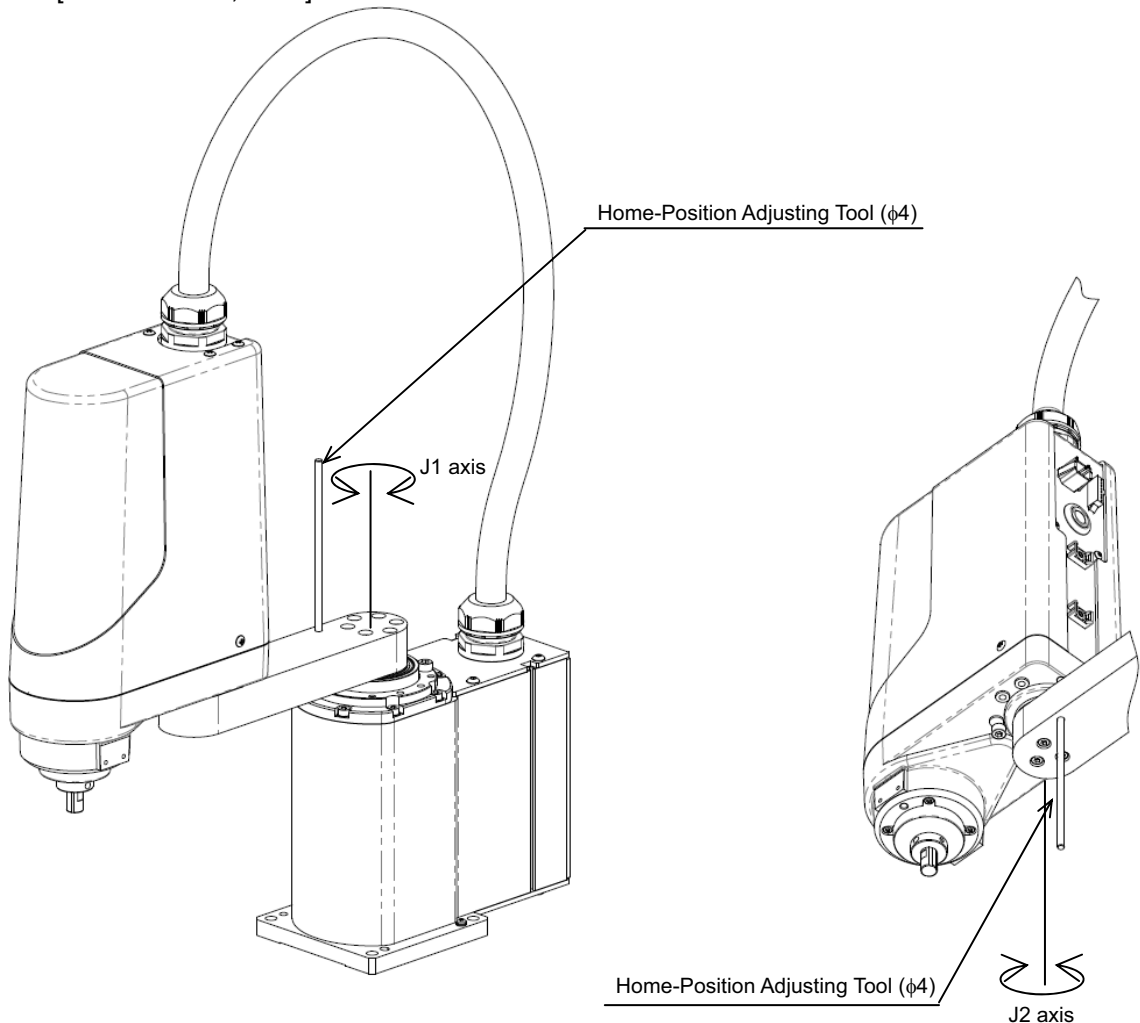
- The home-return operation is to be conducted with the turning limiting stopper when turning limitation is to be performed. [Refer to 1.2.2 Operation Range and Operation Limit]  
In this case, check that the home-return posture can be performed, and there is no interference to peripheral equipment.
- In case there is any interference to peripheral equipment during the home-return operation, the home-return operation completes at the position of interference, and the proper home position cannot be acquired. In such cases, it may cause malfunction of robot or peripheral equipment or critical operational error such as crash or expected operation cannot be made.

- 6) "Jog -> Basic position" window appears once the home-return operation is complete. Press "← (-)" and "→ (+)" buttons to move the arm to a place near the datum position. Refer to Step 7) for the datum position of the J1 axis and J2 axis. Also, change "JOG Vel" and "Inc Distance" if necessary. Click "OK" once the arm gets near the datum position. Click "OK" when moving the arm near the datum position manually by hand.

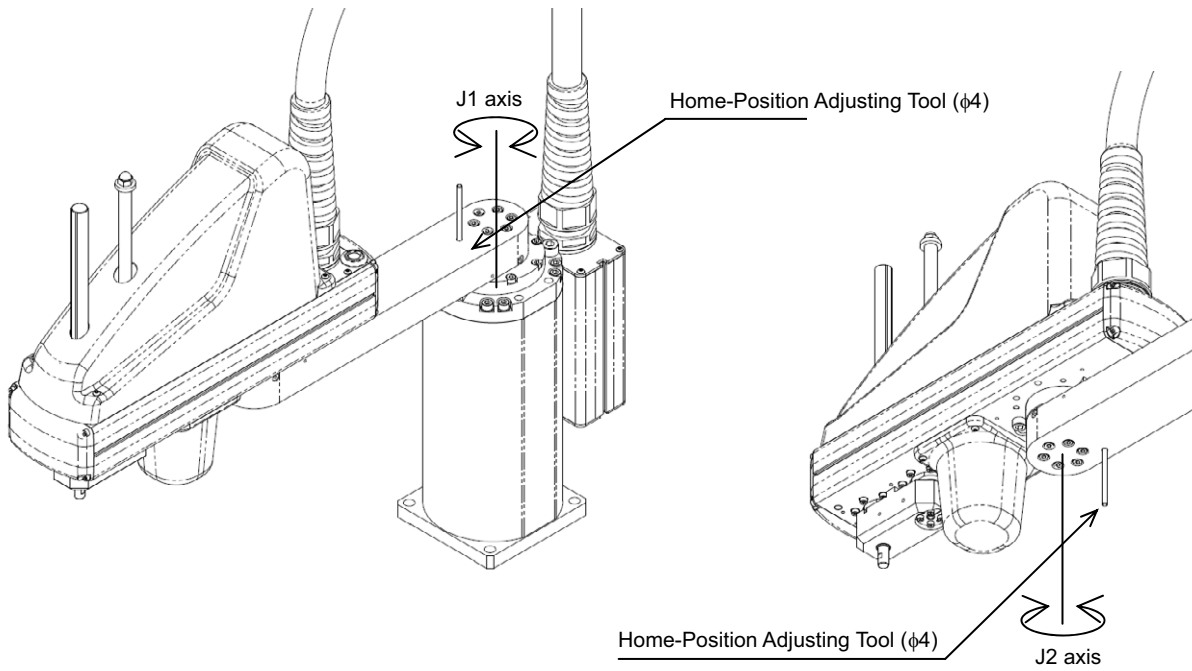


- 7) Have the emergency stop conducted, and insert the home-position adjustment tool ( $\phi 4$ ) at the datum position of J1 axis or J2 axis.

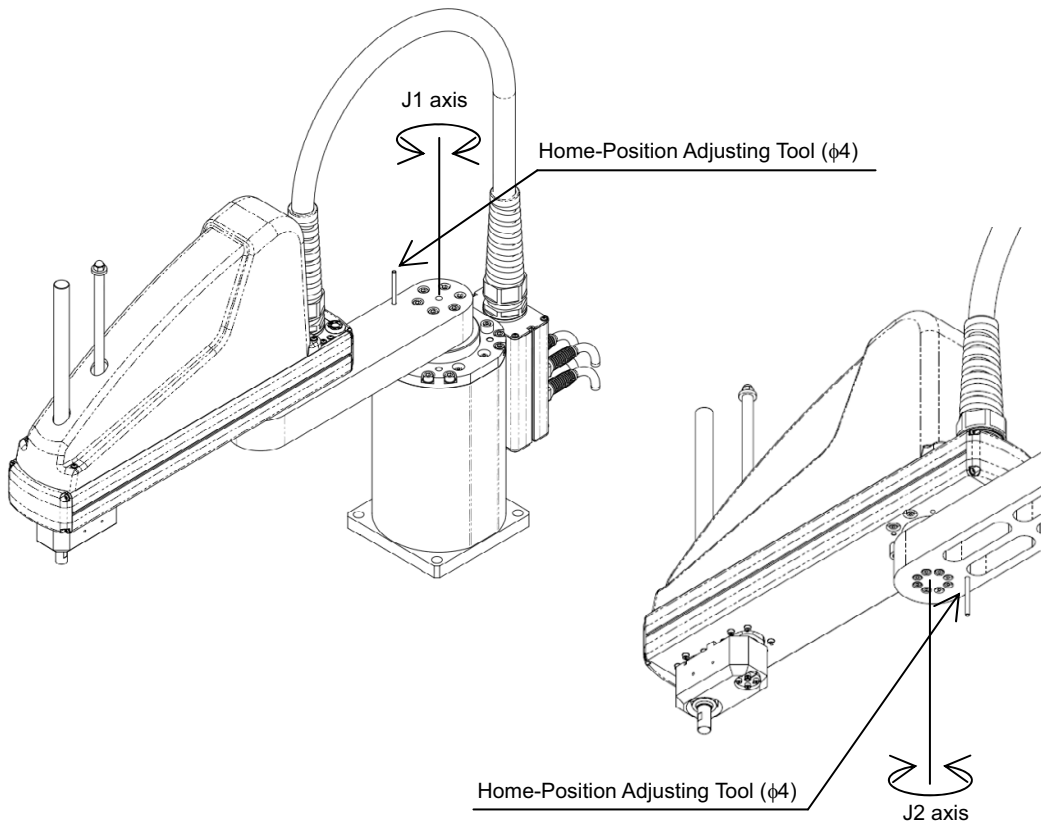
[IXP-3/4N1808, 2508]



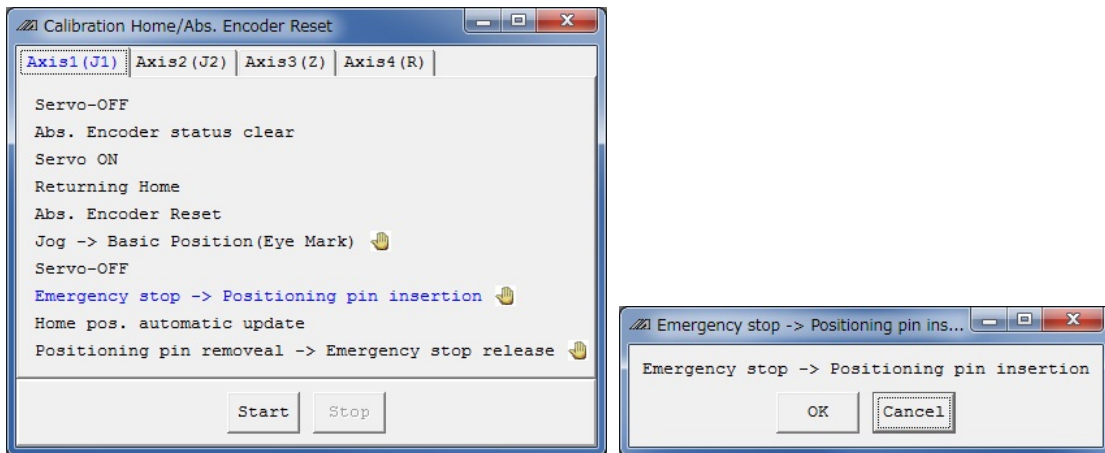
[IXP-3/4N3515, 4515]



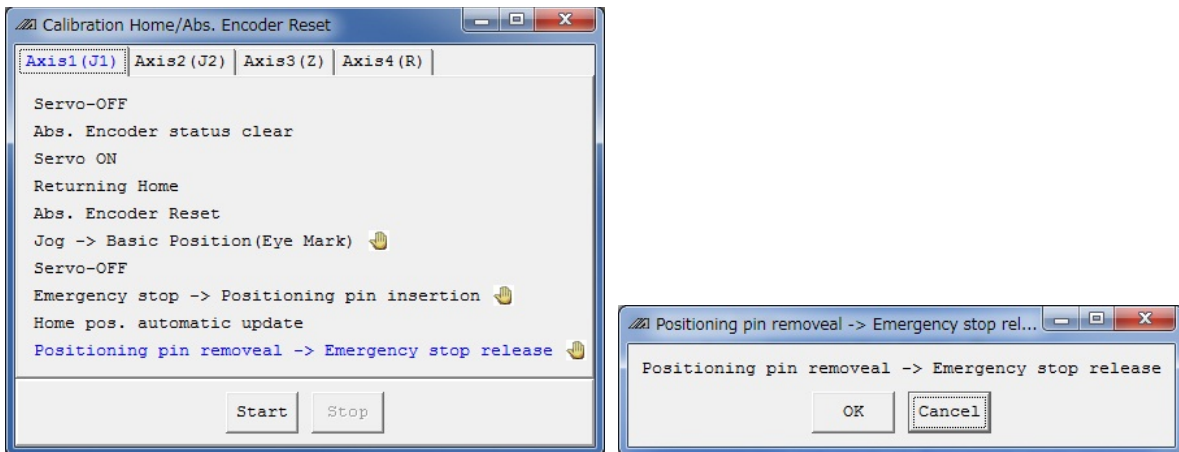
[IXP-3/4N5520, 6520]



- 8) With the home-position adjustment tool ( $\phi 4$ ) being inserted, click "OK" in "Emergency stop -> Positioning pin insertion" window.



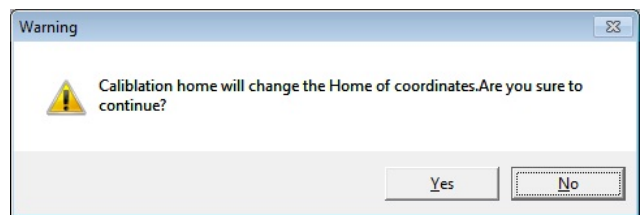
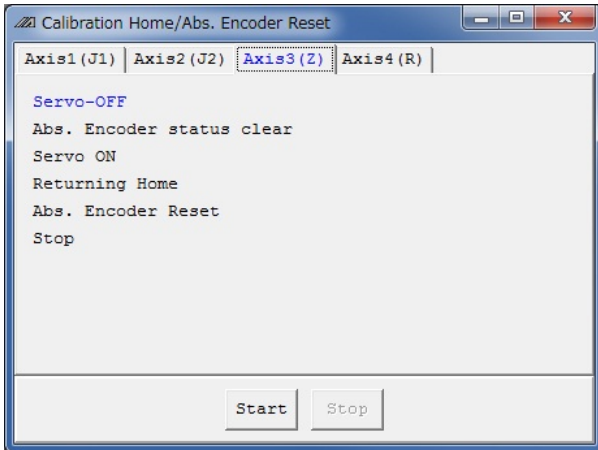
- 9) Remove the home-position adjustment tool ( $\phi 4$ ), and release the emergency stop. Click "OK" in "Positioning pin removal -> Emergency stop release" window.



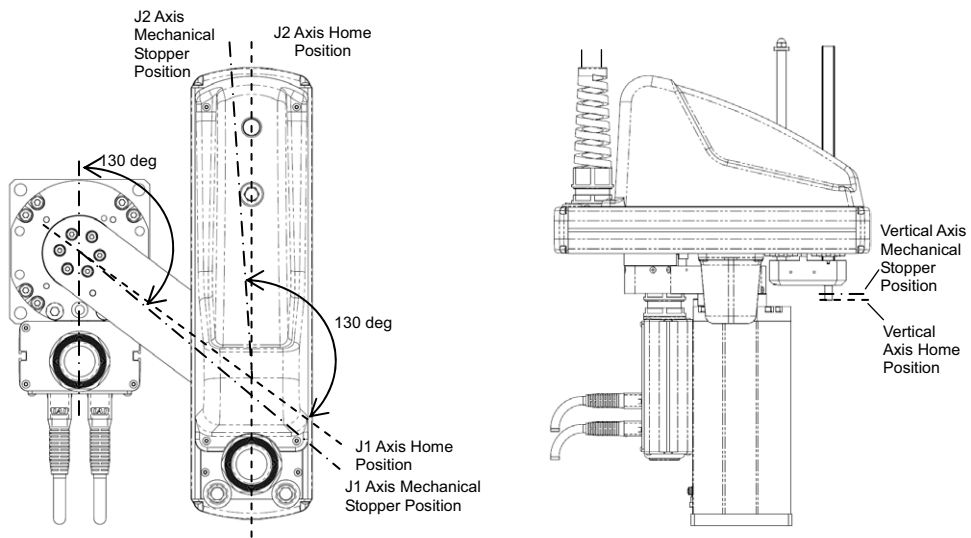
10) Conduct absolute reset on [Axis 3 (Z)].

Click on “Start” button while the [Axis 3 (Z)] tab is selected, and a warning window shows up. Release the emergency stop, check the content and click “Yes”. Home-return operation starts on the Z-axis.

Absolute reset completes after home return.



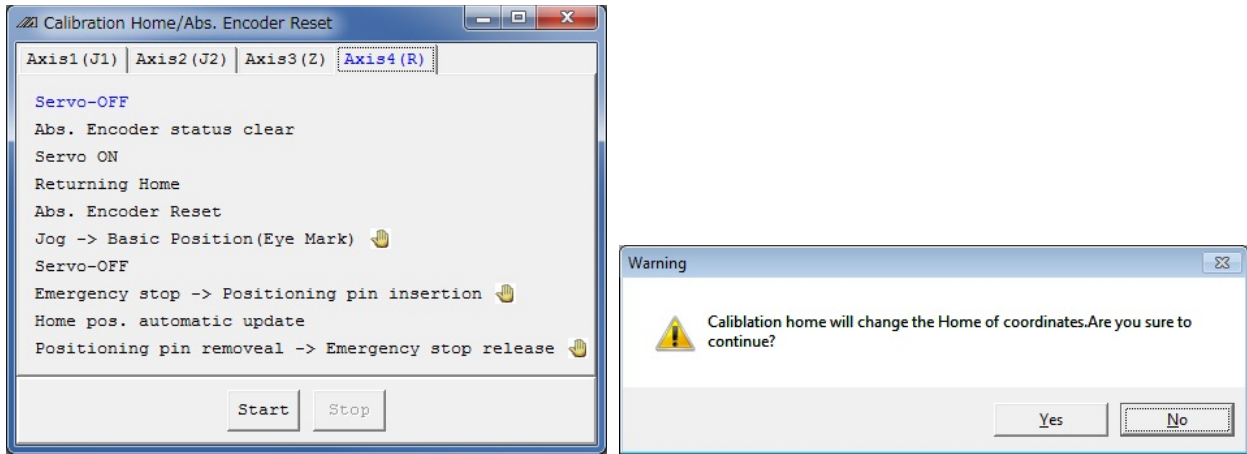
**Caution:** • Pay attention as the home-return operation starts as soon as clicking “Yes”. The standard home position should be the posture below. Make sure to secure enough area for home-return posture and not to have interference to peripheral equipment.



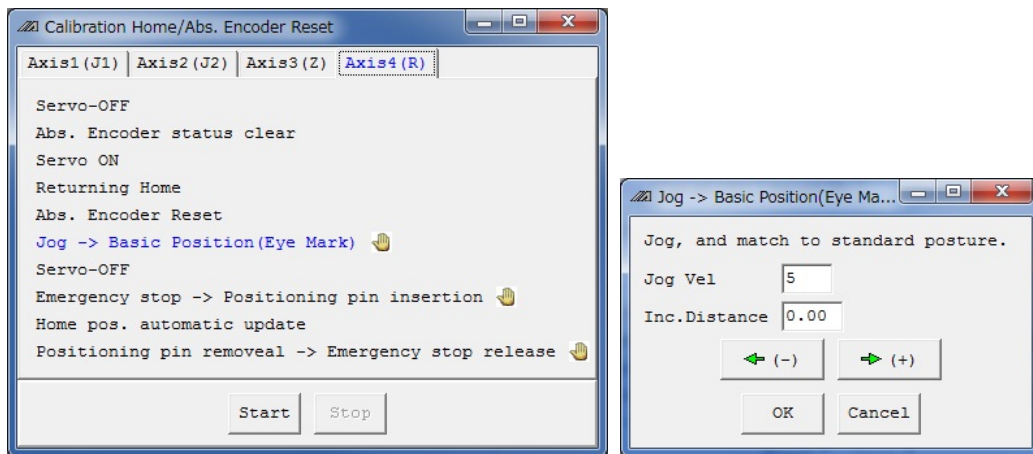
• In case there is any interference to peripheral equipment during the home-return operation, the home-return operation completes at the position of interference, and the proper home position cannot be acquired. In such cases, it may cause malfunction of robot or peripheral equipment or critical operational error such as crash or expected operation cannot be made.



- 11) Conduct absolute reset on [Axis 4 (R)].  
 Click on “Start” button while the [Axis 4 (R)] tab is selected, and a warning window shows up. Release the emergency stop, check the content and click “Yes”.  
 There is no movement on the R-axis by home return.



- 12) “JOG -> Basic Position” window appears. Press “← (-)” and “→ (+)” buttons to move the arm to a place near the datum position. Refer to Step 13) for the datum position of the J1 axis and J2 axis.  
 Also, change “JOG Vel” and “Inc Distance” if necessary. Click “OK” once the arm gets near the datum position.  
 Click “OK” when moving the arm new the datum position manually by hand.



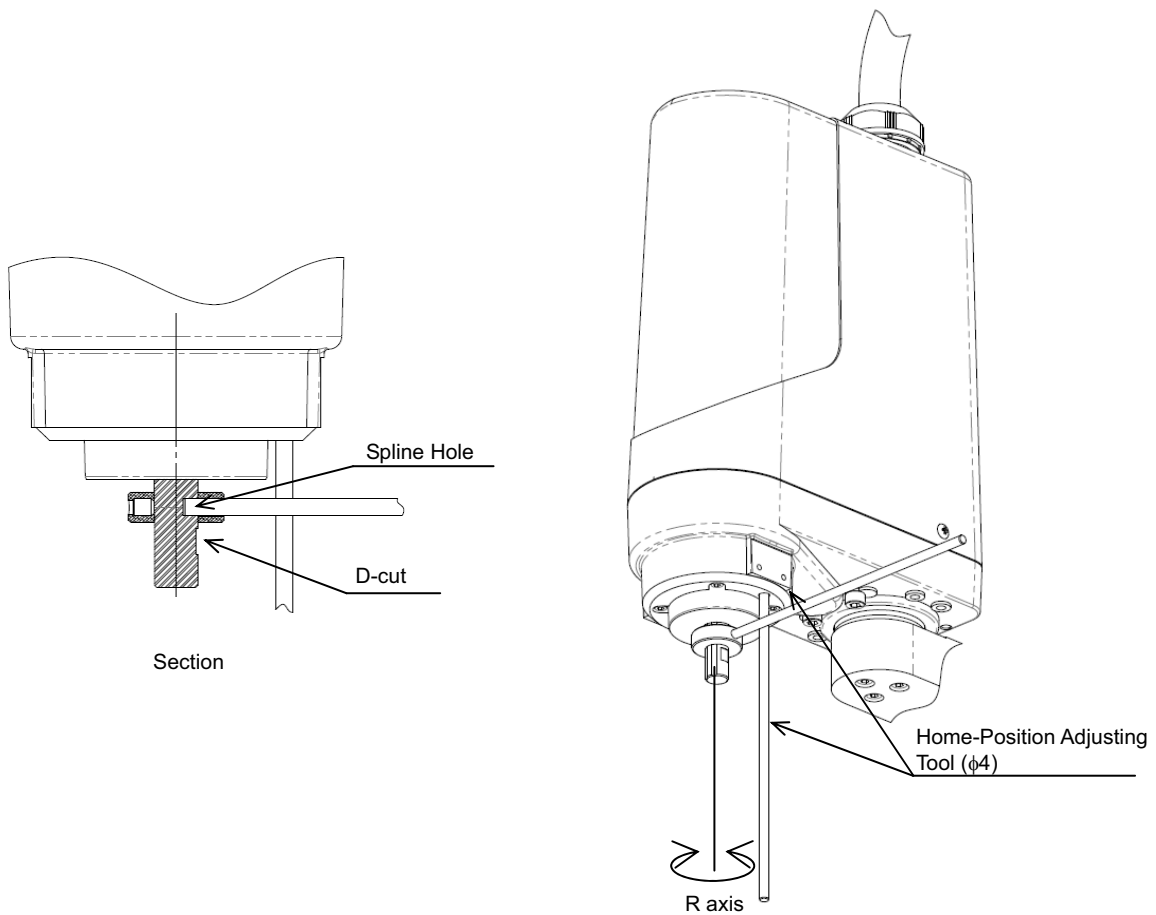
13) Have the emergency stop conducted, and insert the home-position adjustment tool ( $\phi 3$ ) at the datum position of R-axis.

As shown in the figure below align the position of either the D-cut surface on the R-axis tip or the D-cut surface on the hole for insertion of the home-position adjustment tool ( $\phi 3$ ).

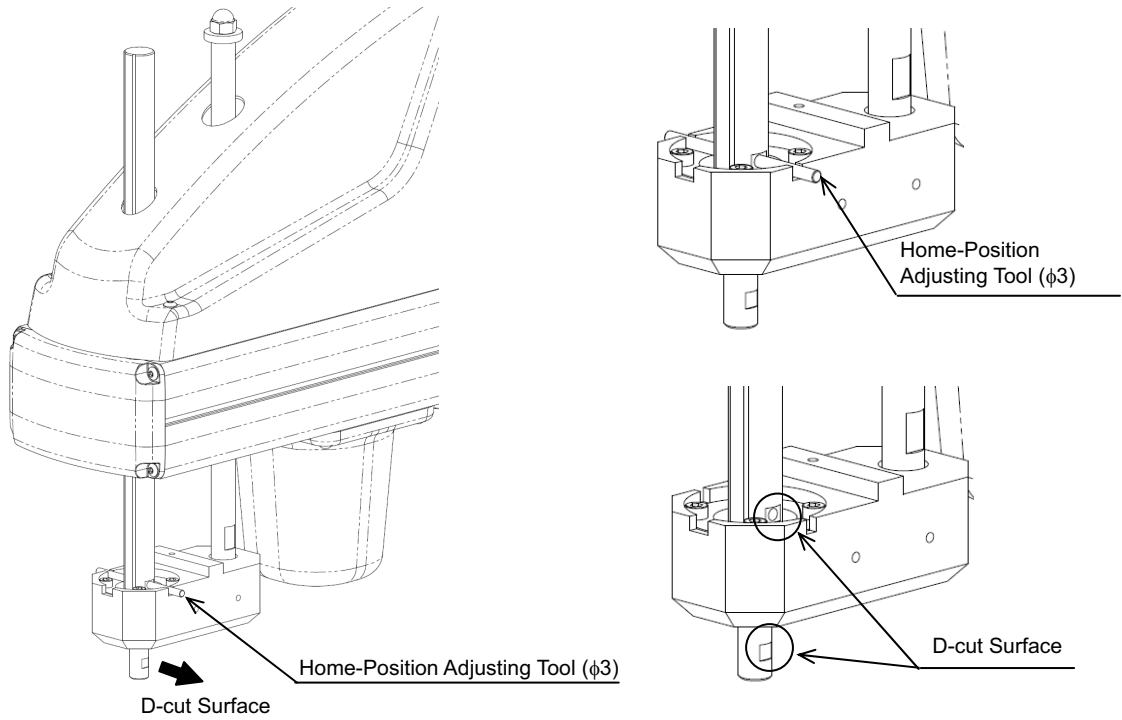
D-cut surface on the R-axis tip and the D-cut surface on the hole for insertion of the home-position adjustment tool ( $\phi 3$ ) face in the same direction.

**⚠ Caution:** The datum position of the R-axis is in the same position for every 360deg. Pay attention so the wires or pipes of tools get twisted.

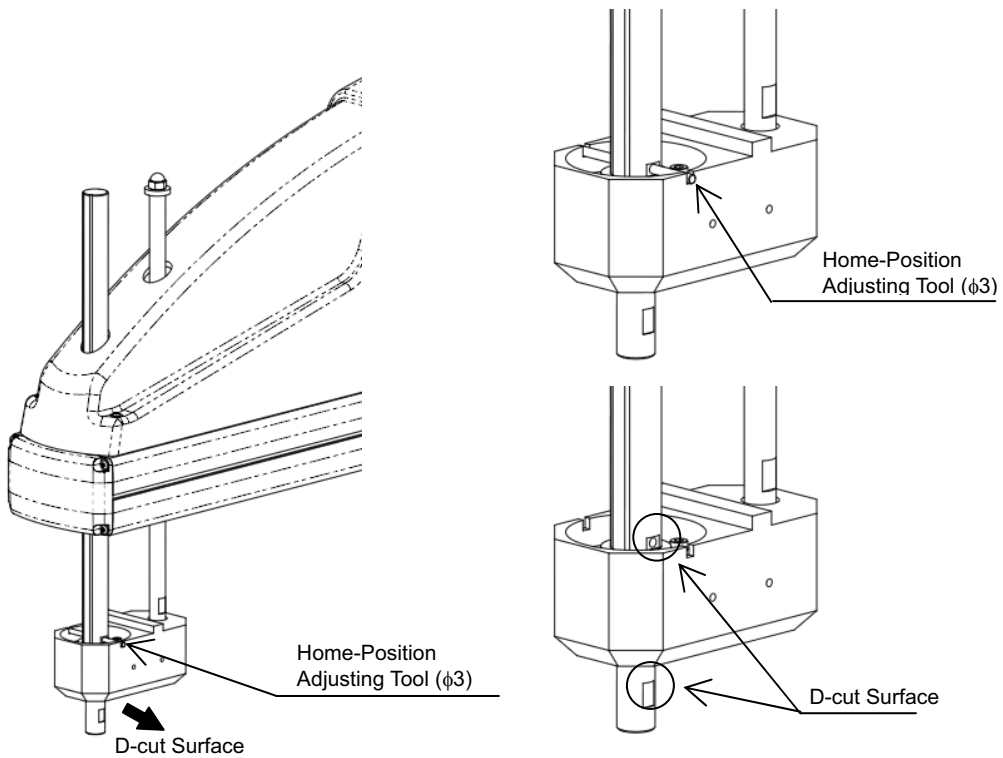
[IXP-3/4N1808, 2508]



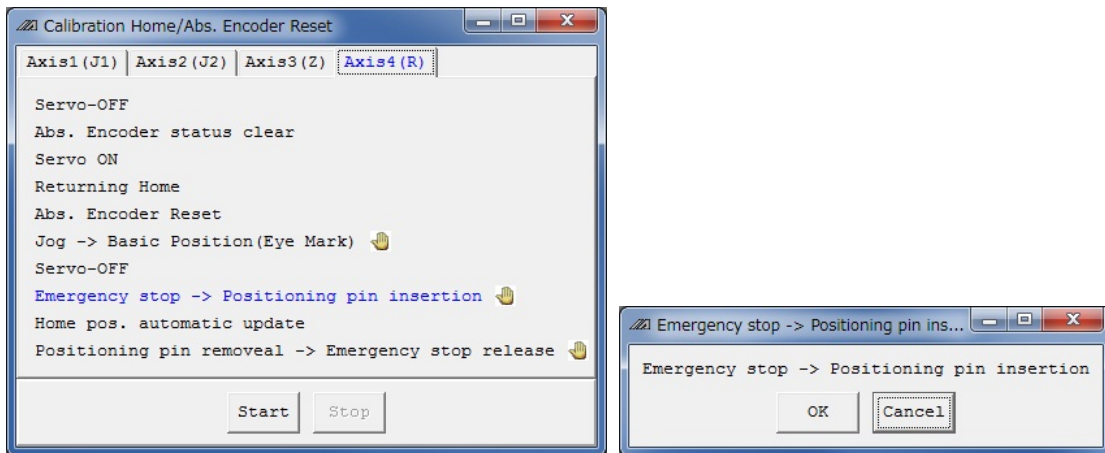
[IXP-3/4N3515, 4515]



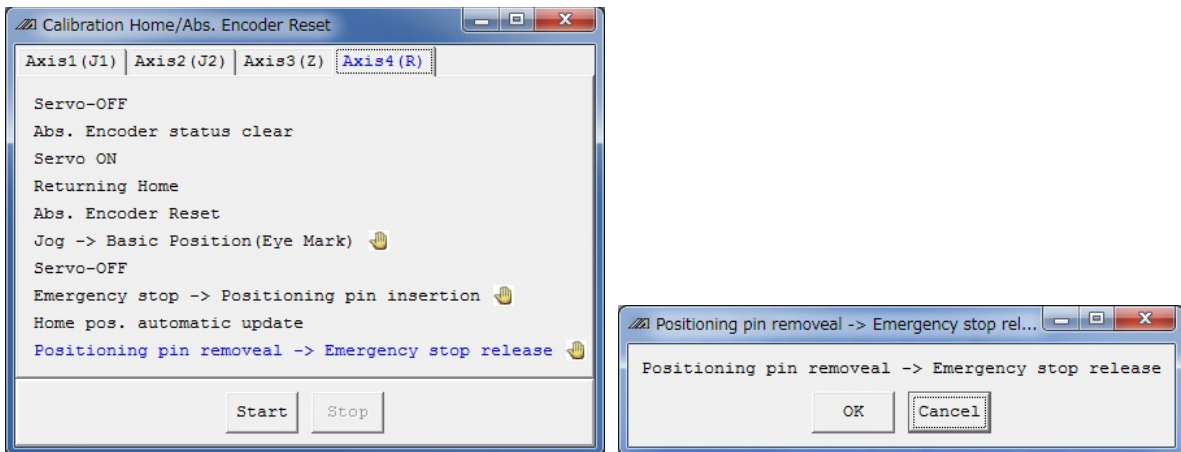
[IXP-3/4N5520, 6520]



- 14) With the home-position adjustment tool ( $\phi 3$ ) being inserted, click "OK" in "Emergency stop -> Positioning pin insertion" window.

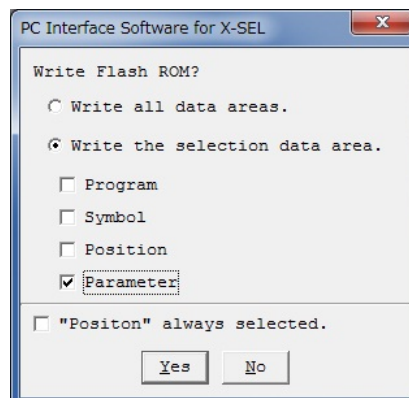


- 15) Remove the home-position adjustment tool ( $\phi 3$ ), and release the emergency stop. Click "OK" in "Positioning pin removal -> Emergency stop release" window.



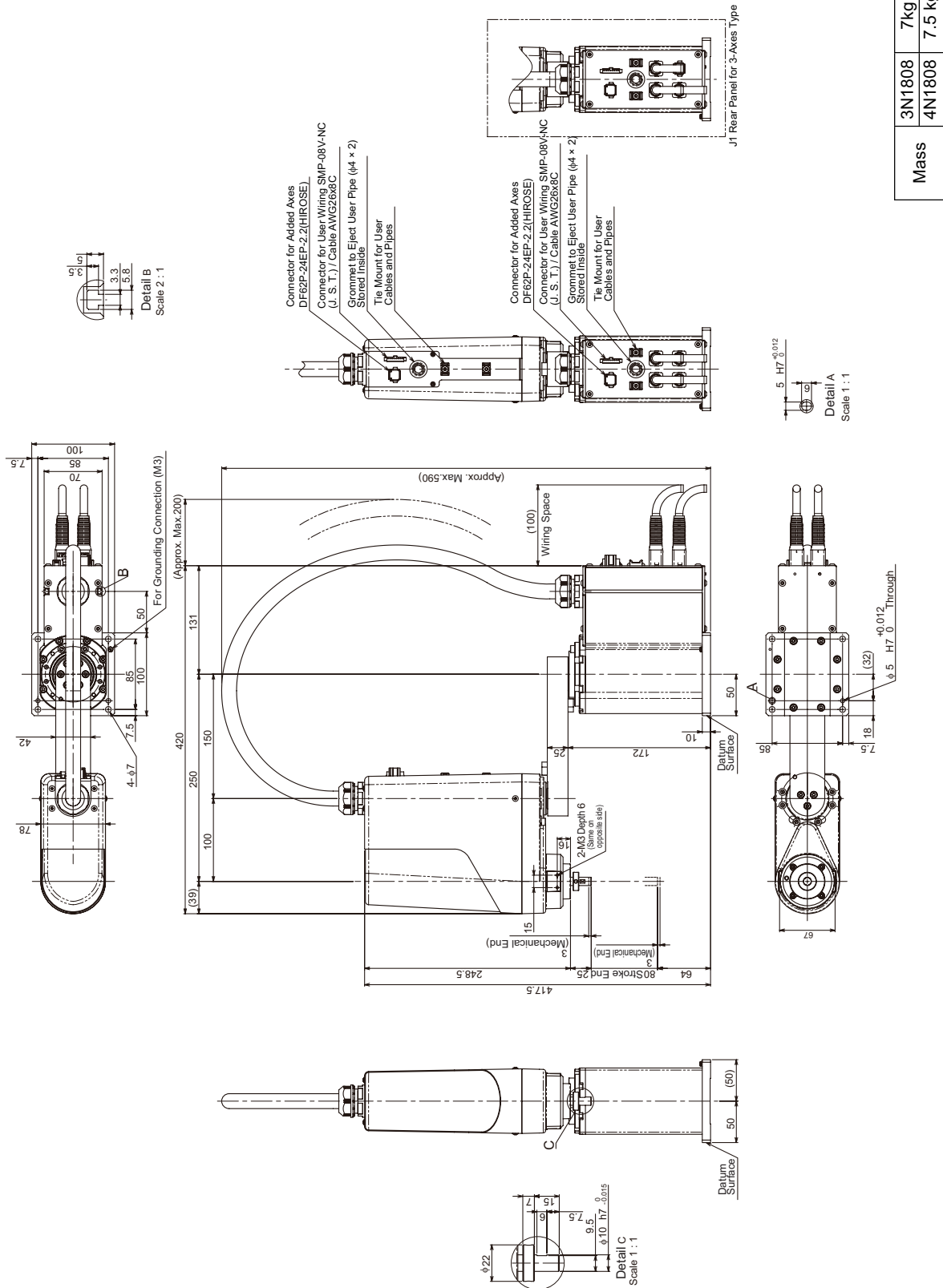
- 16) Once "Calibration Home/Abs. Encoder Reset" window is closed, the screen switches to "Write Flash ROM?" confirmation window. Put a check mark on "Parameter" and click "Yes", and then conduct the software reset.

Writing to the flash ROM can be conducted at once after the home-position adjustment and absolute reset are completed on each axis.



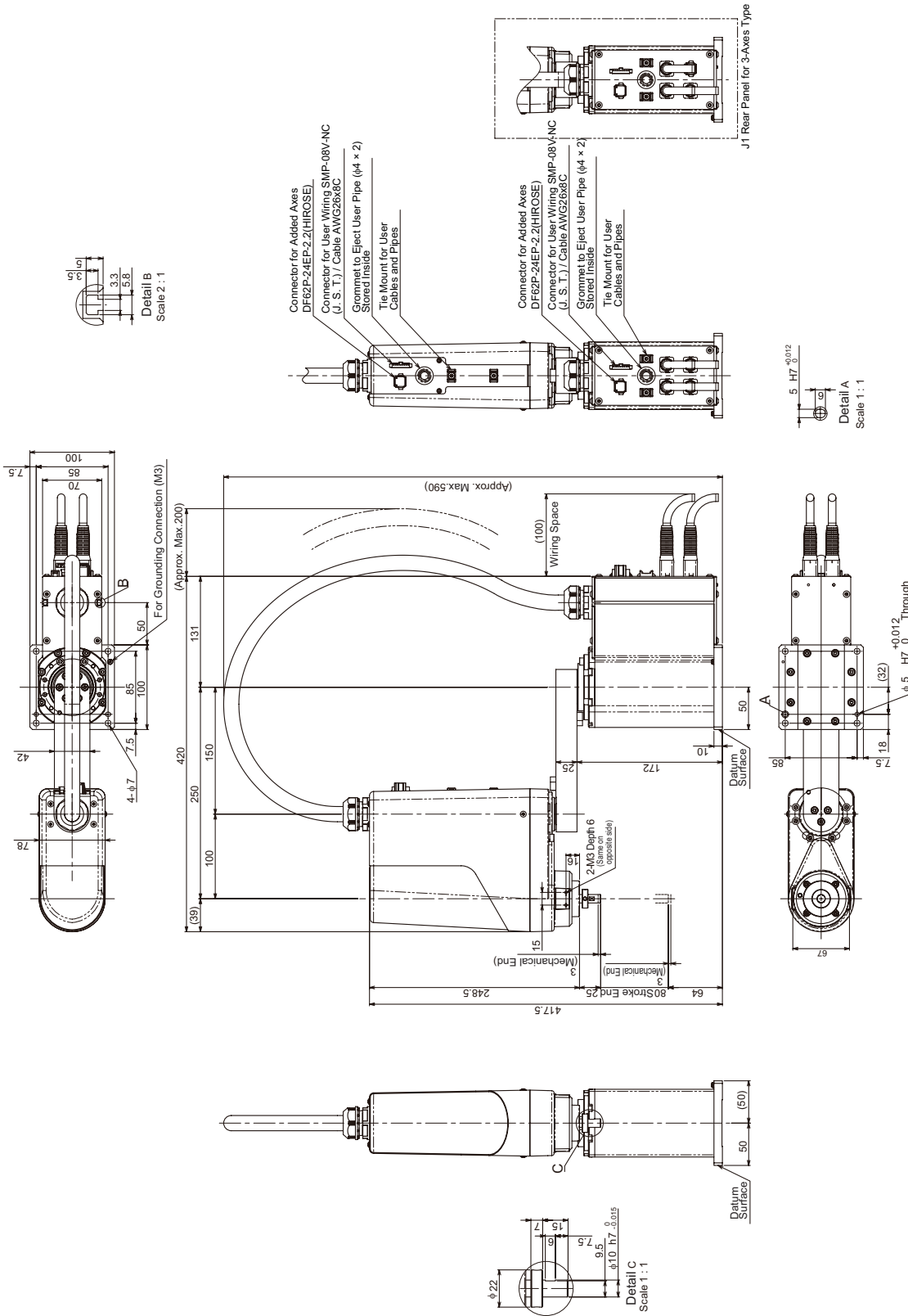
## 6. External Dimensions

### 6.1 IXP-3N1808, 4N1808

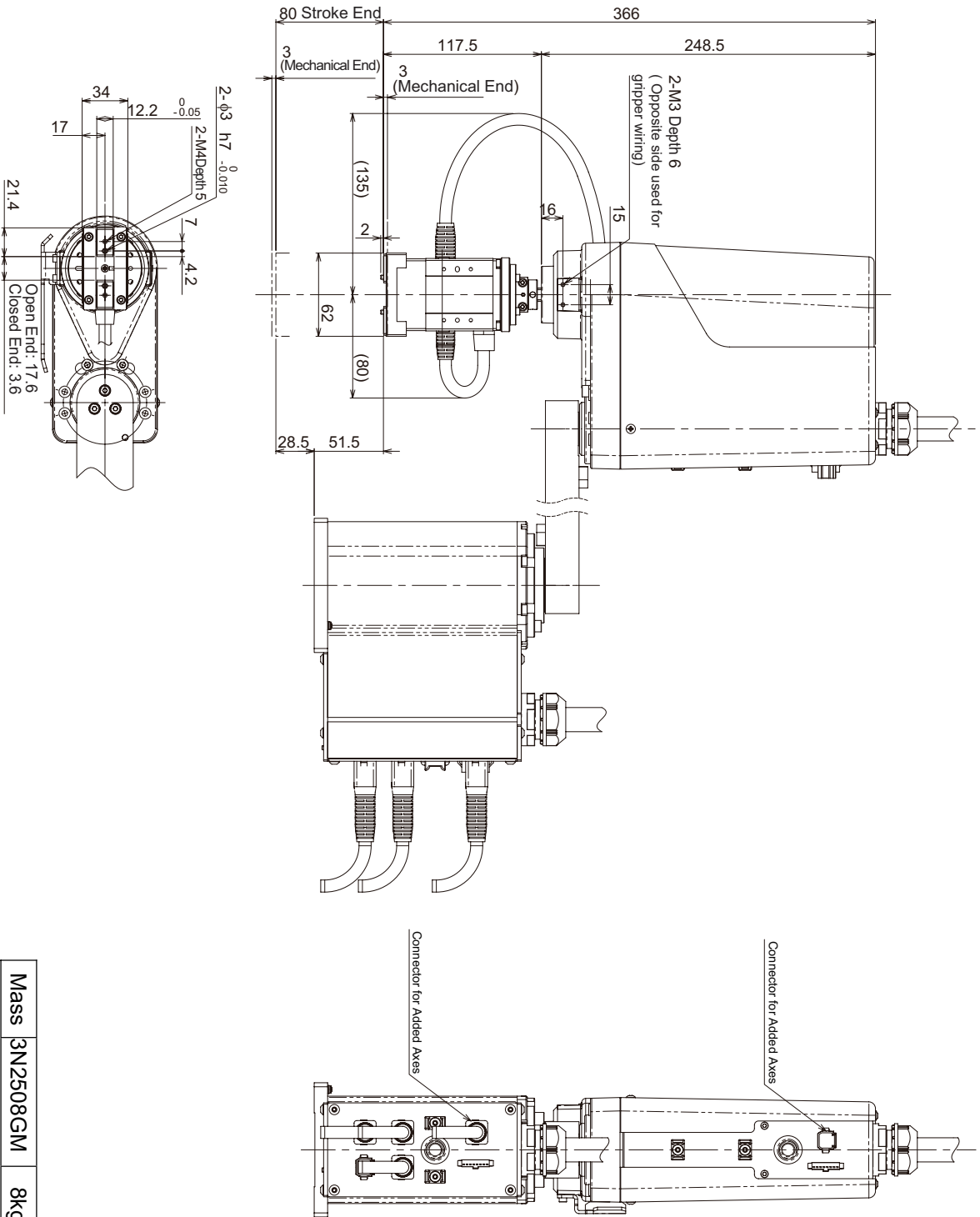


| Mass | 3N1808 | 4N1808 | 7kg | 7.5 kg |
|------|--------|--------|-----|--------|
|      |        |        |     |        |

## 6.2 IXP-3N2508, 4N2508



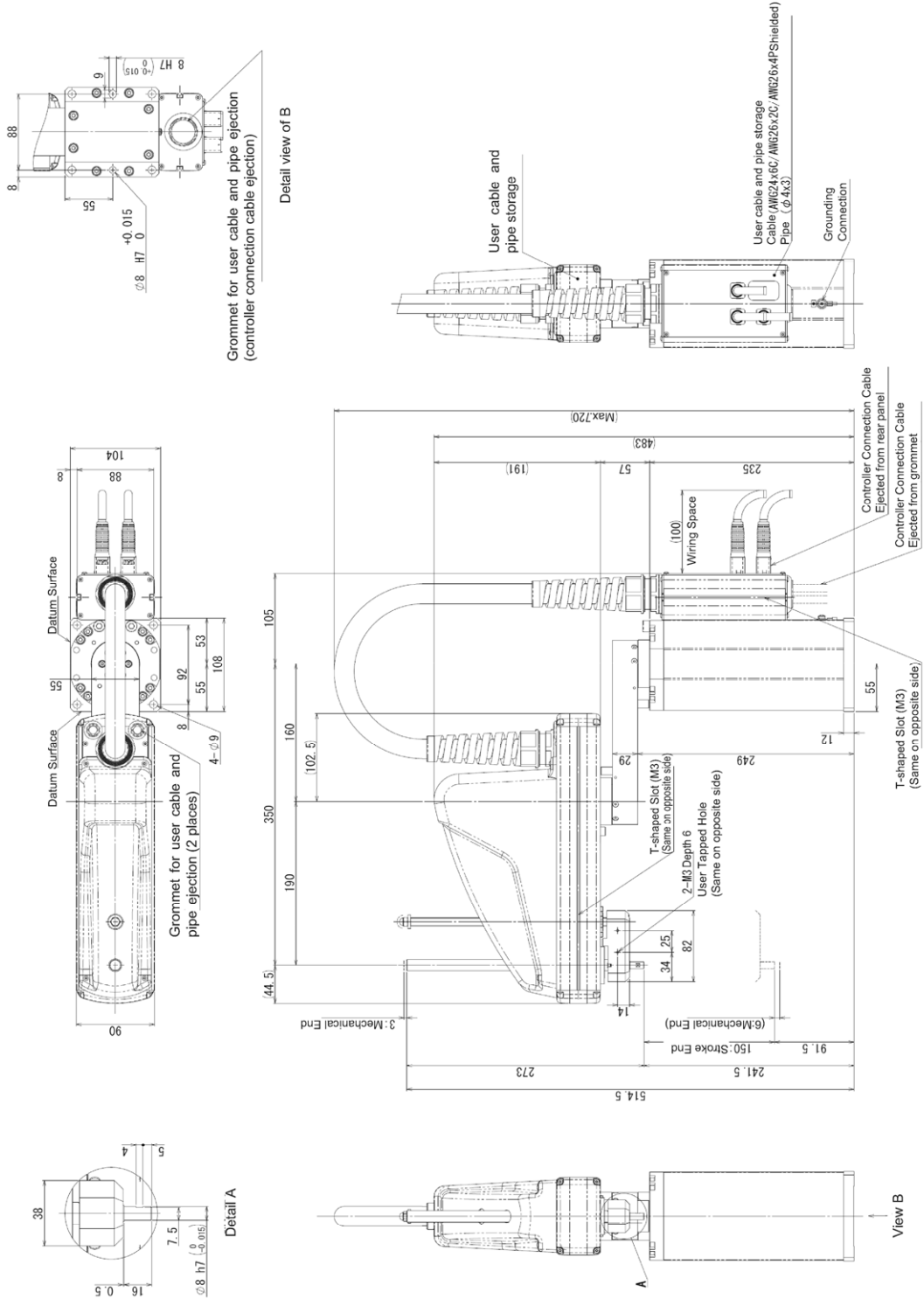
|      |        |       |
|------|--------|-------|
| Mass | 3N2508 | 7.5kg |
|      | 4N2508 | 8kg   |



6.3 IXP-3N2508GM

|      |          |     |
|------|----------|-----|
| Mass | 3N2508GM | 8kg |
|------|----------|-----|

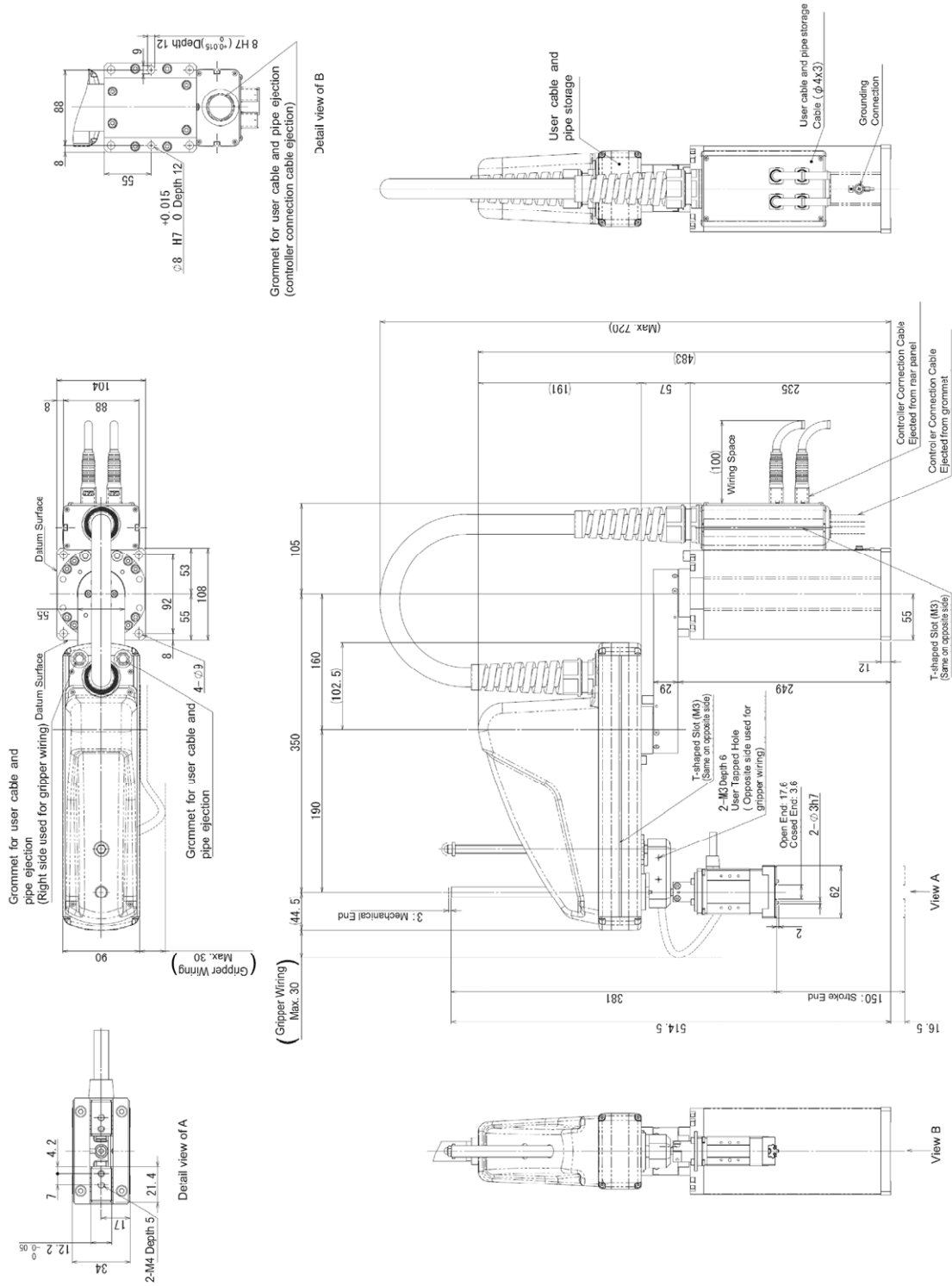
## 6.4 IXP-3N3515



Mass 12kg

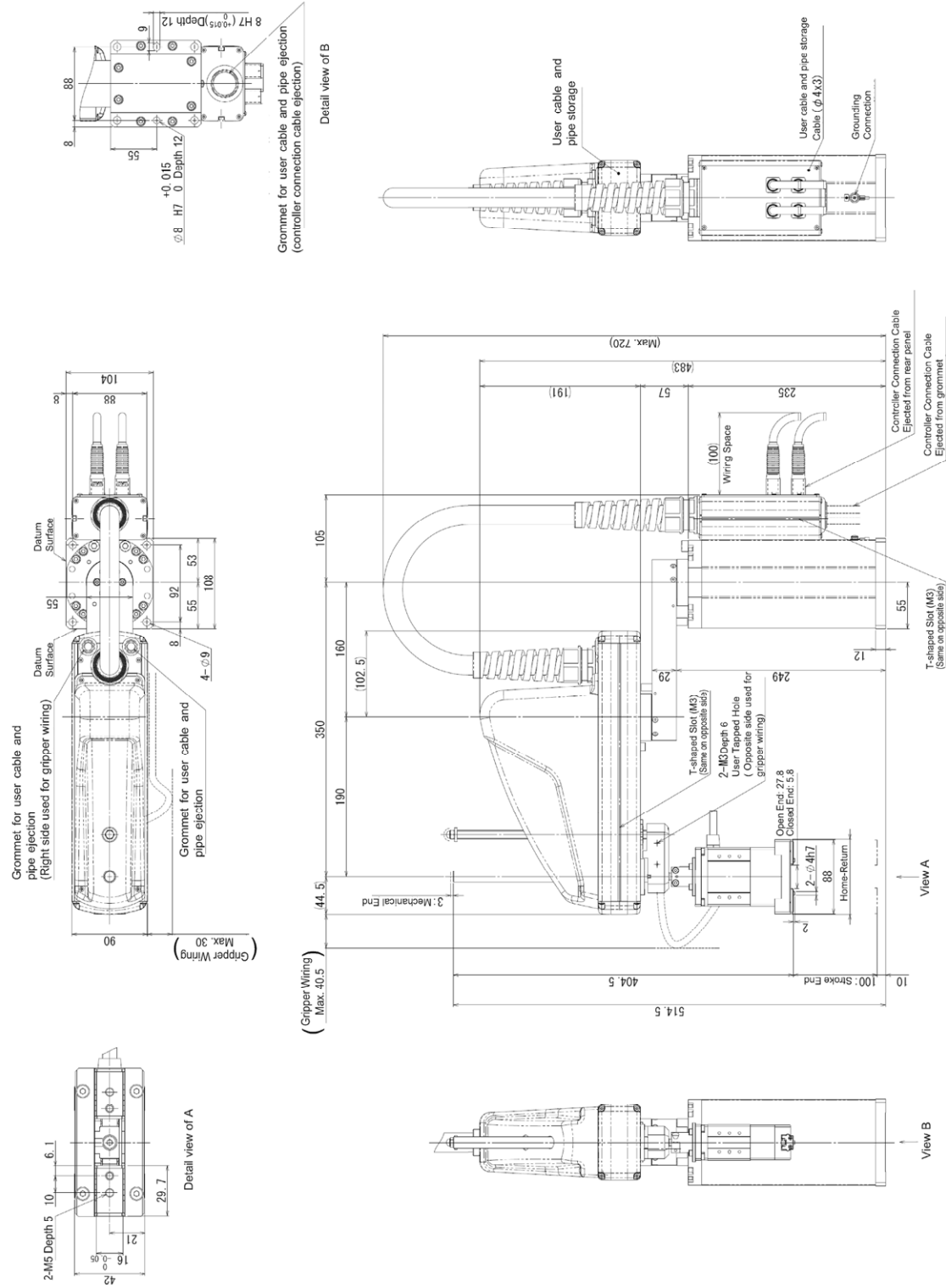


## 6.5 IXP-3N3515GM



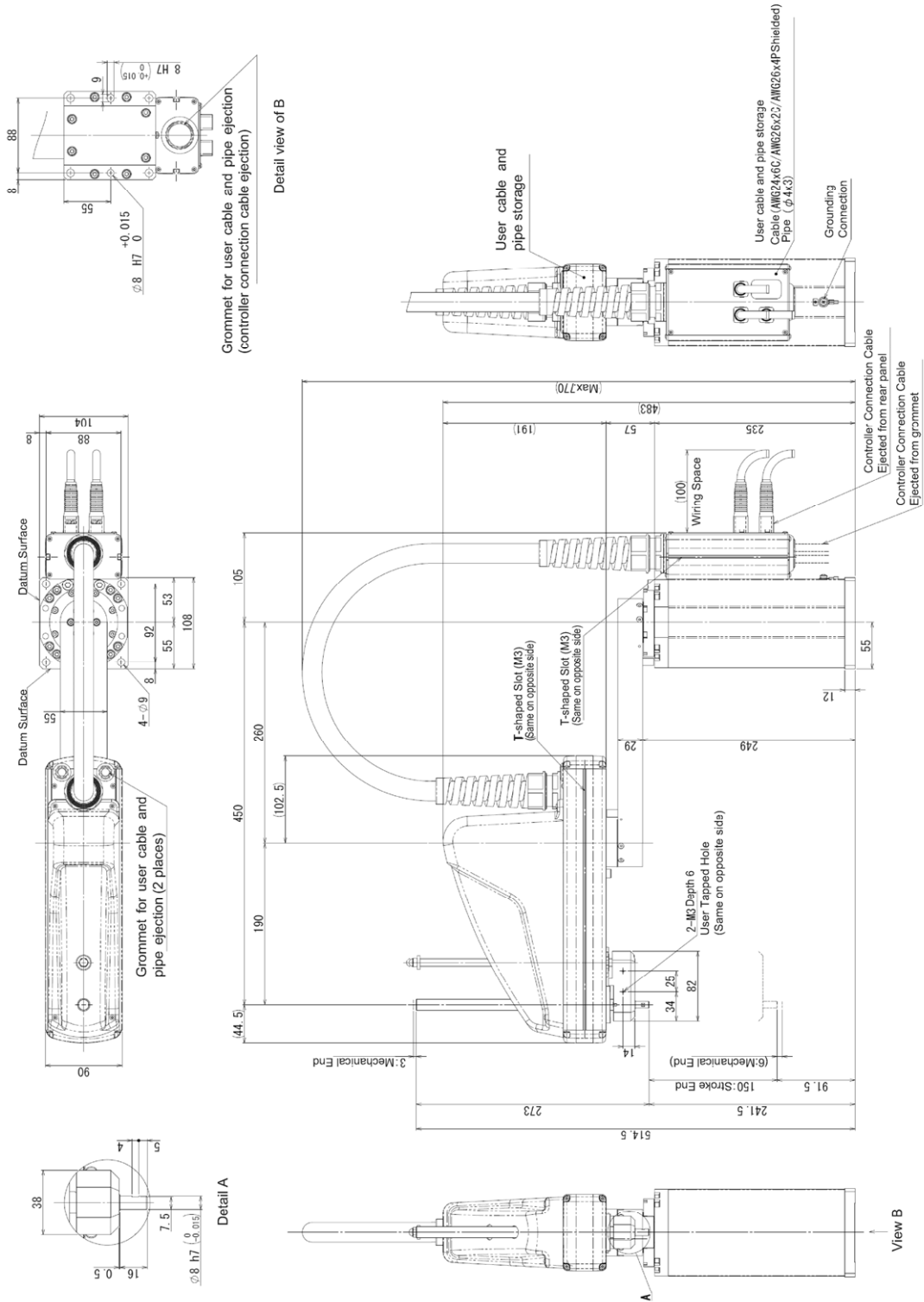
Mass 12.5kg

## 6.6 IXP-3N3510GL



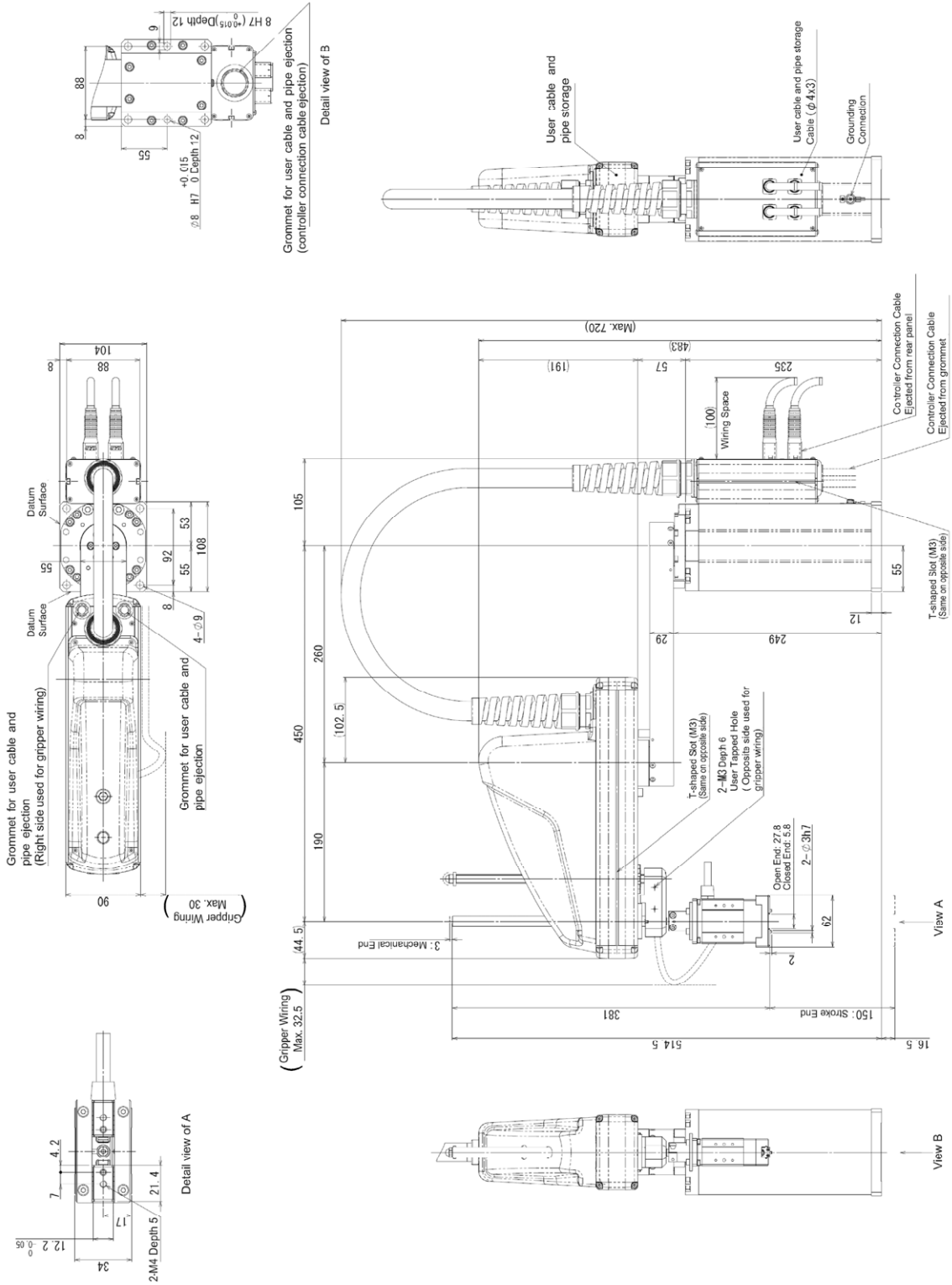
Mass 13kg

## 6.7 IXP-3N4515



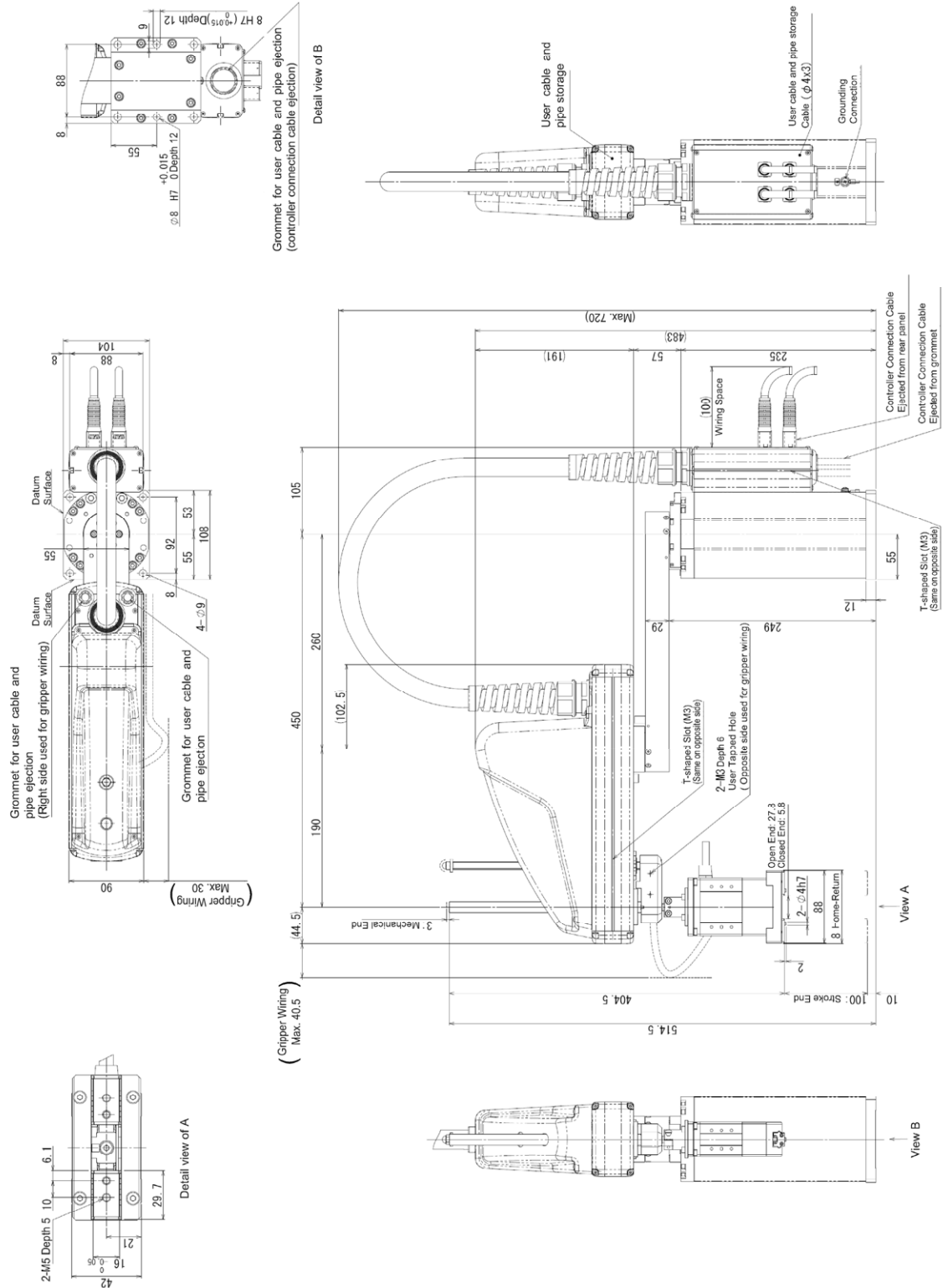
Mass 13kg

## 6.8 IXP-3N4515GM



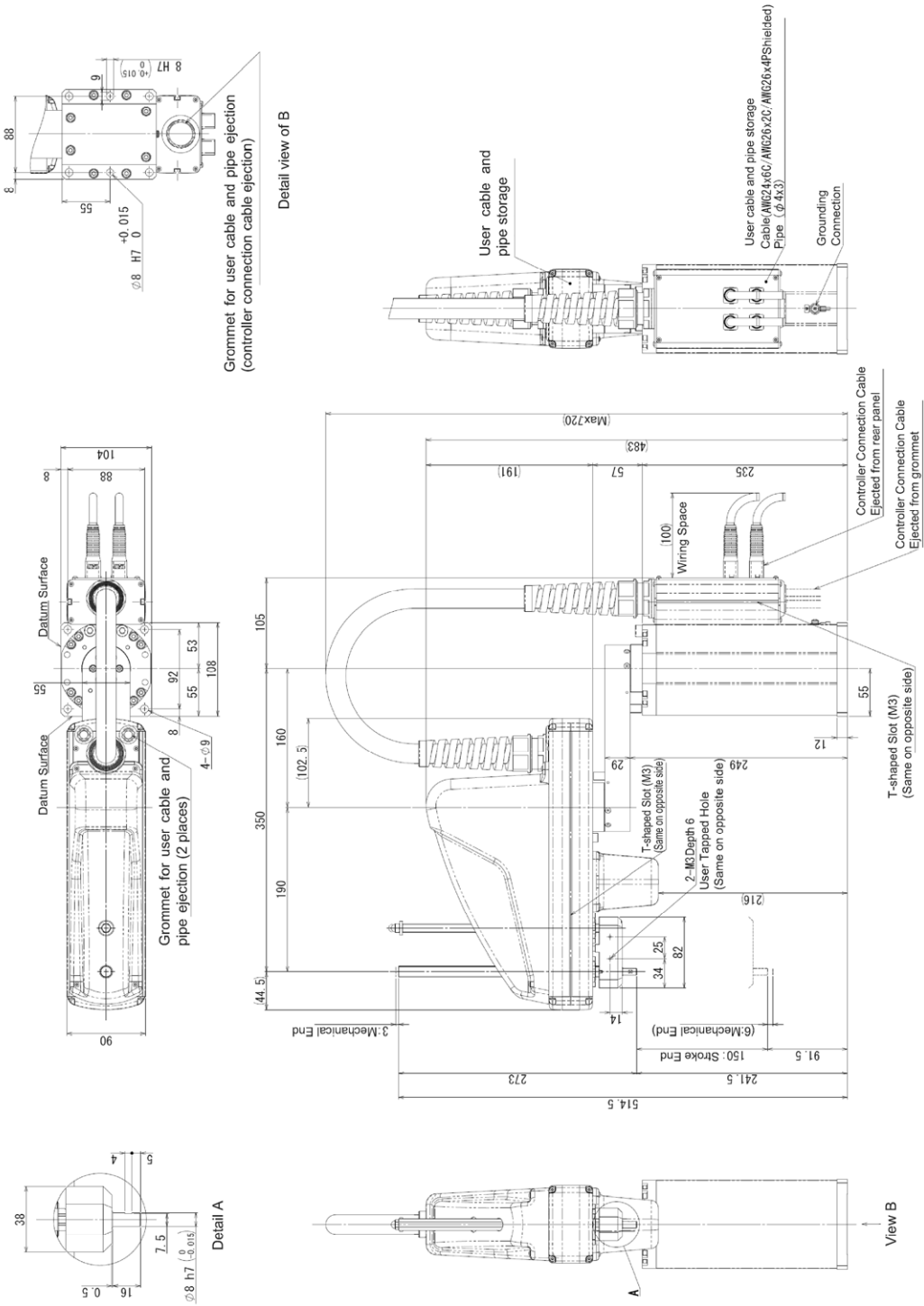
Mass 13.5kg

## 6.9 IXP-3N4510GL



Mass 14kg

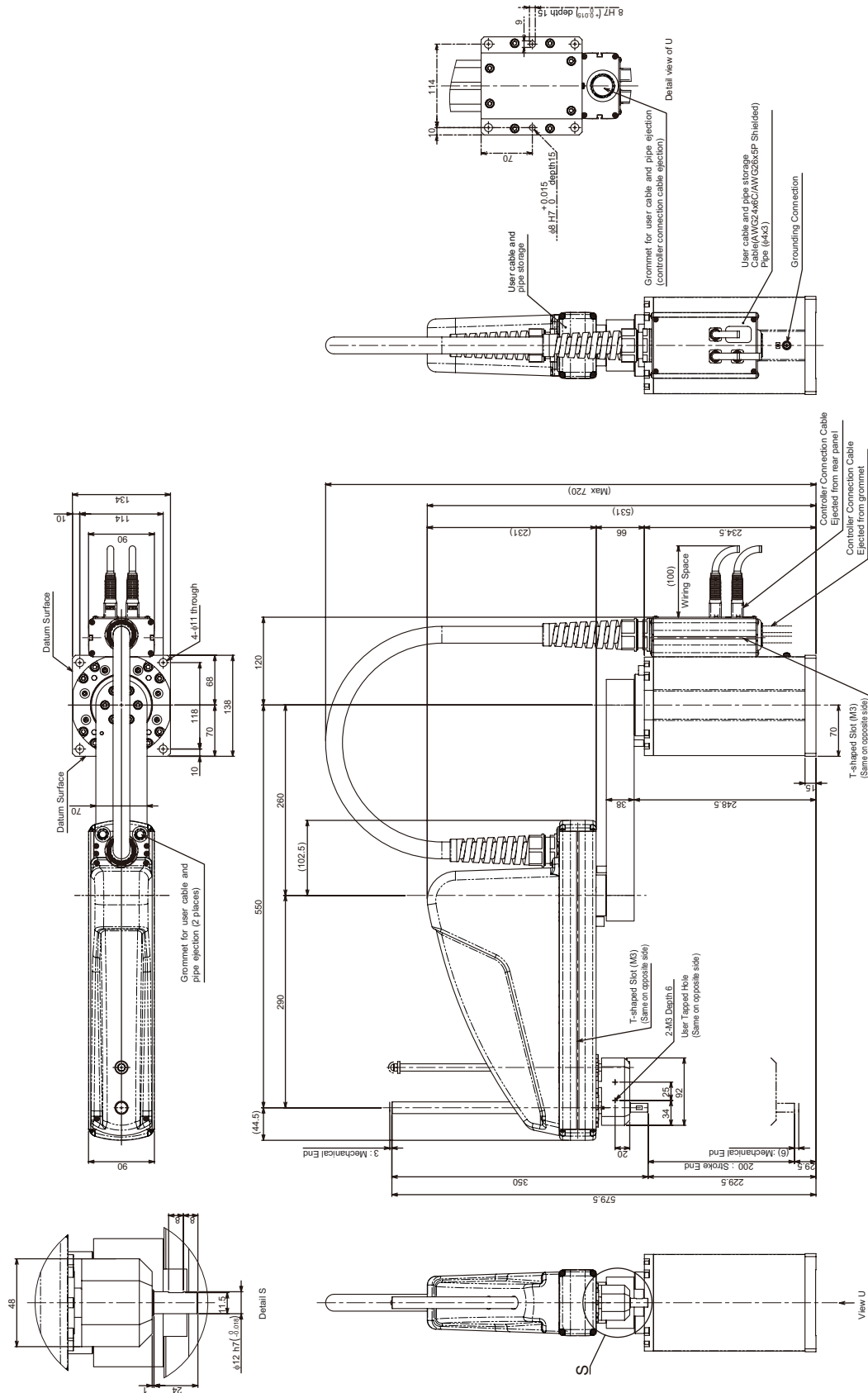
## 6.10 IXP-4N3515



Mass 13kg



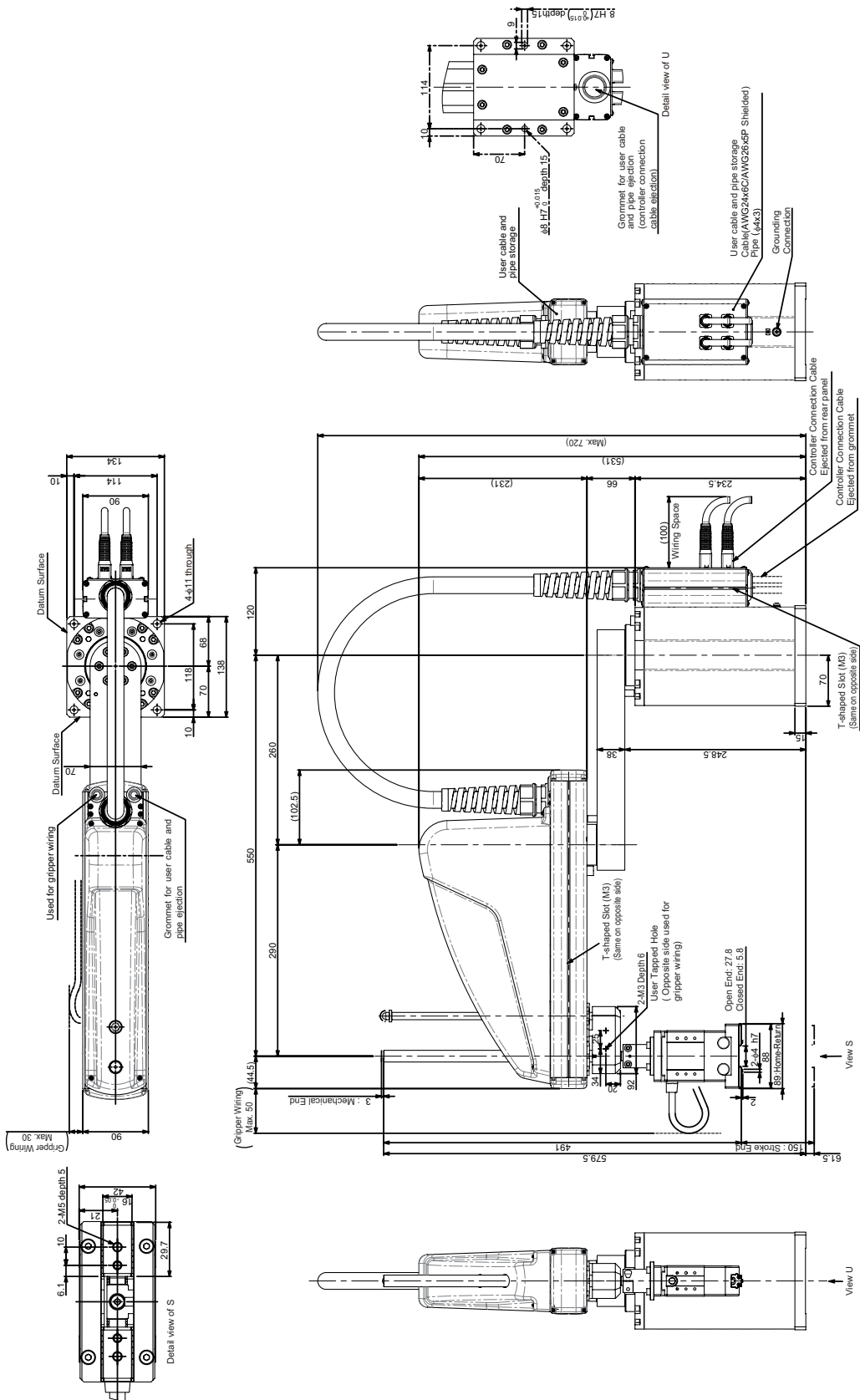
## 6.12 IXP-3N5520



Mass 20kg



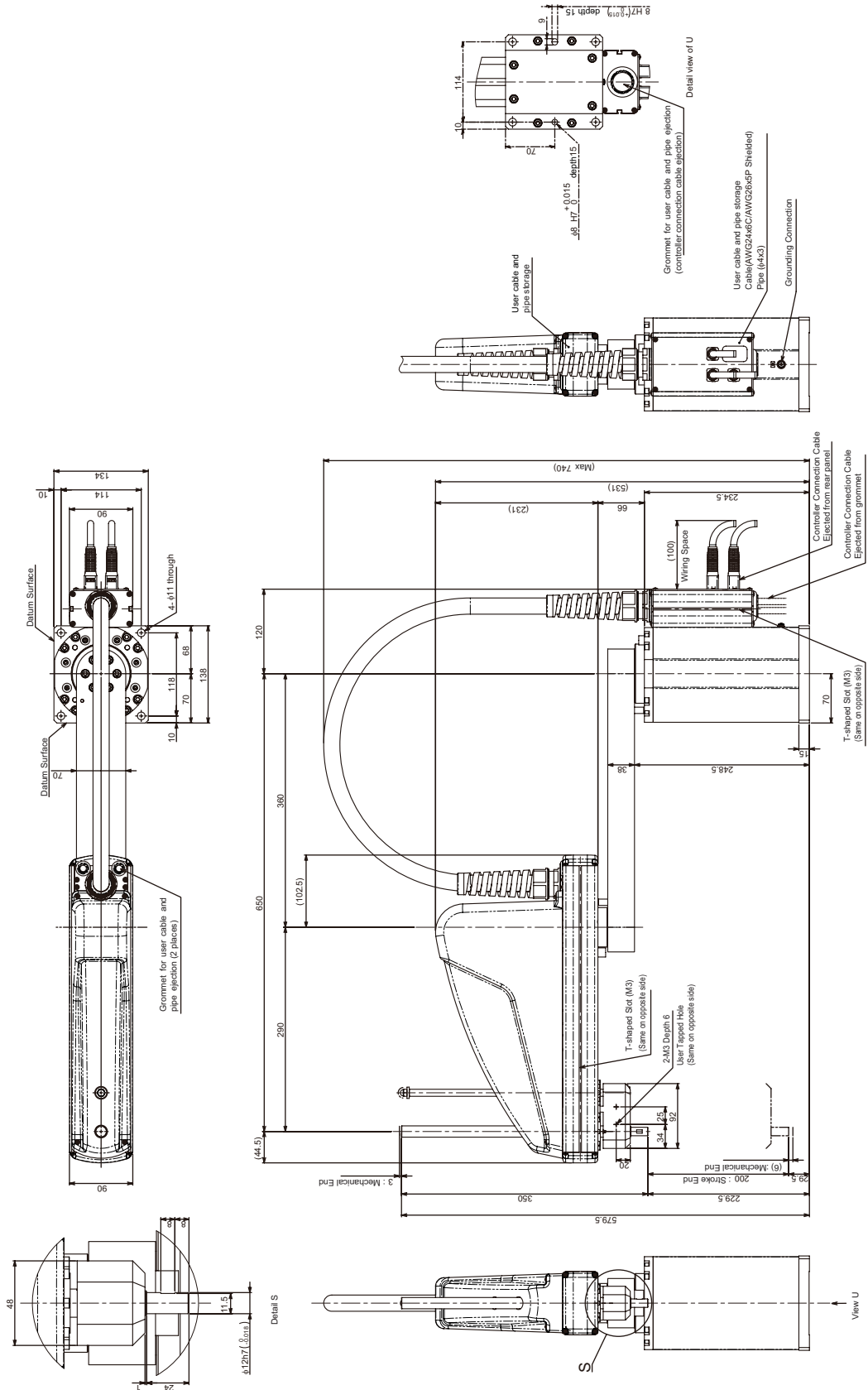
## 6.13 IXP-3N5515GL



Mass 21.3kg



## 6.15 IXP-3N6520



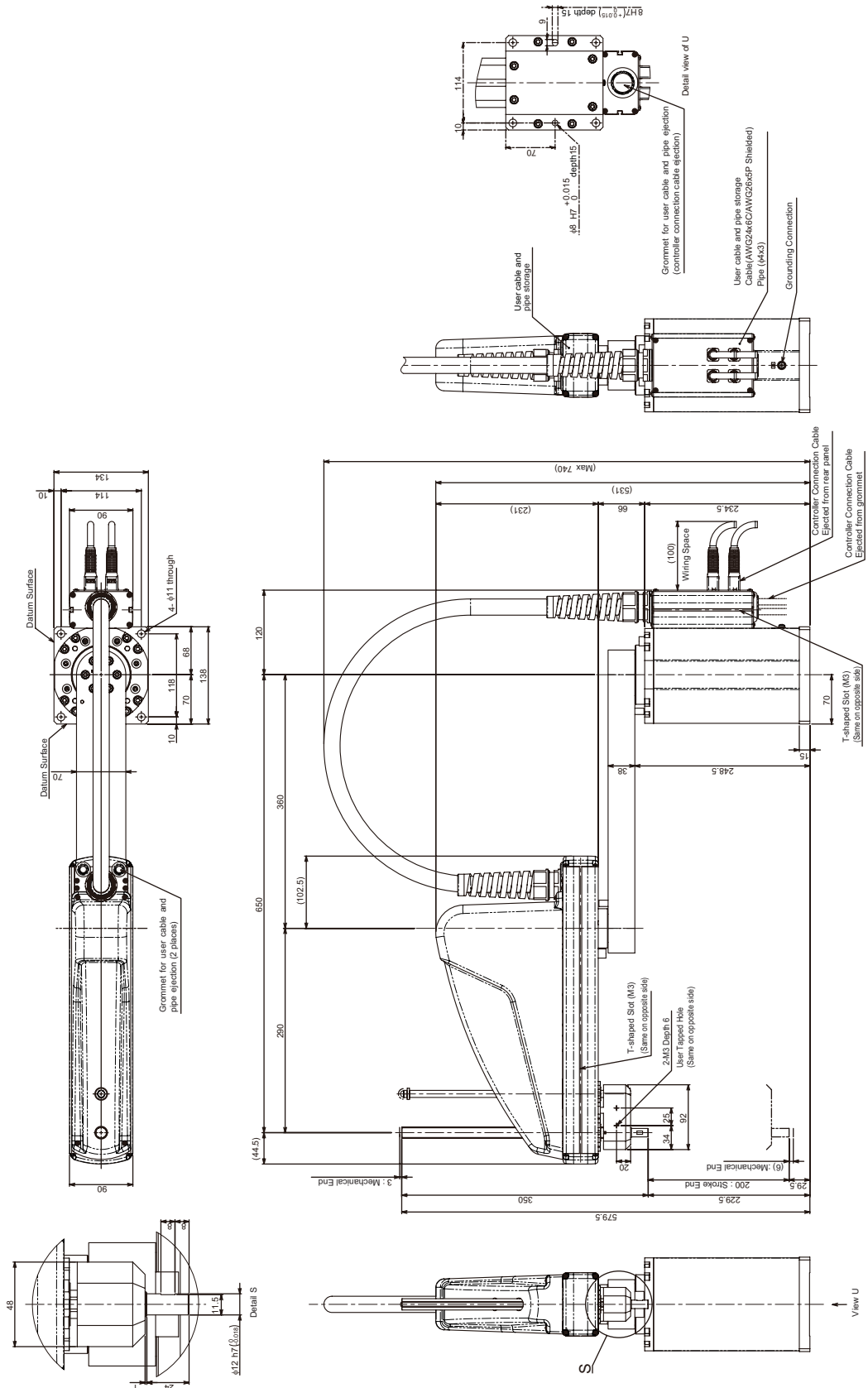
Mass 21kg







## 6.19 IXP-4N6520



Mass 22kg

## 7. Warranty

### 7.1 Warranty Period

One of the following periods, whichever is shorter:

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

### 7.2 Scope of the Warranty

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

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

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

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

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

### 7.3 Honoring the Warranty

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



## 7.4 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.

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

- (1) If our product is combined with another product or any system, device, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc. In such a case we will not be liable for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:

- [1] Medical equipment pertaining to maintenance or management of human life or health
- [2] A mechanism or mechanical equipment intended to move or transport people (such as a vehicle, railway facility or aviation facility)
- [3] Important safety parts of mechanical equipment (such as safety devices)
- [4] Equipment used to handle cultural assets, art or other irreplaceable items

- (3) Contact us at the earliest opportunity if our product is to be used in any condition or environment that differs from what is specified in the catalog or Instruction manual.

## 7.6 Other Items Excluded from Warranty

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

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

## 8. EC Declaration of Conformity

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



**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.

Power Con SCARA Type Robot  
(IXP 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: 2006/A2:2009, EN 61000-3-3: 2008
- RoHS Directive: 2011/65/EU  
EN 50581: 2012

Done at Shizuoka, Japan,

On 30. April, 2015

President Toru Ishida



**ORIGINAL**



## Change History

| Revision Date | Description of Revision  |
|---------------|--|
| 2014.06       | First edition  |
| 2014.07       | Second edition<br>Description added to explain “3.5 How to Change Motor • Encoder Cables to Bottom Ejection”   |
| 2014.09       | Edition 2B<br>Pg. 25 Note corrected  |
| 2015.01       | Third Edition<br>Pg. 15,17 Home-return accuracy for up-down axis in horizontal surface deleted<br>Pg. 23, 24 Caution added for WGHT Command setting for Gripper-equipped Type<br>Pg. 29 RCP4-GRS□□□ connection relay cable added for gripper attachment<br>Pg. 38 Offset amount added for Gripper-equipped Type<br>Pg. 39 Caution added for weight when using user T-shaped slot<br>Pg. 43 Caution added to warn to attach connector cover for connection cable<br>Pg. 45 Note added to state gripper to be connected with relay cable CB-IXP-AT008-AS |
| 2015.04       | Fourth Edition <ul style="list-style-type: none"> <li>• Contents changed for IAI industrial robot applicable models</li> <li>• Contents changed in caution notes related to safety for IAI products</li> <li>• Contents added for 3/4N1808, 2508, 5520 and 6520</li> <li>• Expression of “Weight” integrated to “Mass”</li> <li>• Declaration of Conformity to EC added</li> </ul>   |
| 2015.05       | Fifth Edition<br>Pg. 10 Deleted for (Note) with applicable for IXP-3/4 N5520, 6520 CE mark machinery directive<br>Pg. 156,157 Change made to EC declaratrion of conformity   |
| 2015.06       | Edition 5B<br>Pg. 17 “/Black” deleted from product name for No. 10 and 11 User Connector of the “Arm length 180/250” added for No. 16<br>Pg. 43, 46 Correction made Note 1 GRWSL : 2500g → 2000g<br>Pg. 51 Graph added for duty in continuous operation of Z-axis only for Z-axis equipped with brake (option model code: B)   |





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TEL (847) 908-1400 FAX (847) 908-1399  
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