IAI
Quality and Innovation

Horizontal Articulated Robot IXP Series PowerCon SCARA

Tabletop Specification, for Arm Length 180/250/350/450/550/650

First Step Guide Fourth Edition

Thank you for purchasing our product.
Make sure to read the Safety Guide and detailed Instruction Manual as well as this First Step Guide to ensure correct use.
This Instruction Manual is original.

Warning: Read the instruction manual carefully and follow the instruction manual when handling this equipment.
Please downloaded the user's manual from our website.
You can download it free of change. User registration is required for first time users.
URL:www.iai-robot.co.jp/data_dl/CAD_MANUAL/
Keep a printout of the introduction manual near the equipment in which this product is installed so that it can be checked at all times, or display it on your computer, tablet terminal, etc. so that you can check it immediately.
If you need a bound copy of the instruction manual, order it from the nearest sales office listed in the First Step Guide or at the end of the instruction manual. It will be provided for a fee.

- 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.

Product Check

This product is comprised of the following parts if it is of standard configuration.
If you find any fault in the contained model or any missing parts, contact us or our distributor.

1. Parts (The option is excluded.)

1.1 Standard Type

No.	Item	Model Number	Quantity: Arm length 180/250	Quantity: Arm length 350/450	Quantity: Arm length 550/650	Remarks
1	Robot	Refer to "How to Read the Model No." and "How to Read the Model"	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 (ϕ4)		2	1	1	
5	Home-Position Adjusting Tool (ϕ3)		-	1	1	Enclosed in Tip Rotation Axis Specification
6	Hex Socket Head Screw (M5×6/Black)		4	-	-	J1·J2 Revolution Limiting Stopper
7	Hex Socket Head Screw (M8×8/Black)		-	2	-	J1 Revolution Limiting Stopper
8	Hex Socket Head Screw (M6×6/Black)		--	2	-	J2 Revolution Limiting Stopper
9	J12 Stopper Pin		-	-	4	J1·J2 Turning Limiting Stopper
10	Hex Socket Head Screw (M4×15/Black)		-	-	2	J1 Turning Limiting for stopper fixed
11	Hex Socket Head Screw (M4×12/Black)		-	-	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 Pin contacts 20pcs
17	Safety Guide	M0194	1	1	1	

1.2 Cleanroom Type, Dust Proof/Splash Proof Type

No.	Item	Model Number	Quantity: Arm length 350/450 Cleanroom Type	Quantity: Arm length 350/450 Dust Proof / Splash Proof Type	Quantity: Arm length 550/650 Cleanroom Type	Quantity: Arm length 550/650 Dust Proof / Splash Proof Type	Remarks
1	Robot	Refer to "How to Read the Model Nameplate" and "How to Read the Model Number."	1 set	1 set	1 set	1 set	
2	Dedicated Controller		1 set	1 set	1 set	1 set	
Accessories							
3	Motor • Encoder Cables	CB-CAN-MPA□□□	3	-	3	-	For 3-axis Type
		CB-CAN-MPA□□□-RB	4	-	4	-	For 4-axis Type
4	Home-Position Adjusting Tool (ϕ4)		1	1	1	1	
5	Home-Position Adjusting Tool (For Rotation Axis)						Enclosed in with 4-axis specification
6	Positioning Mark Label		1 set	1 set	1 set	1 set	To check misalignment and positions
7	MPG Connector Seal		1	-	1	-	To cover up MPG connector opening
8	Prohibition of Entry into the Operation Area		2	2	2	2	
9	Marking Tube		1 set	-	1 set	-	Printed "MPG1 to 4 USER" 2 pieces each
10	Safety Guide	M0194	1	1	1	1	

2. How to Read the Model No.

MODEL	:	Model code
ARM LENGTH	:	Arm Length
PAYLOAD	:	Transportable Mass Rated and Maximum
WEIGHT	:	Mass
DATE	:	Date of Production
Manufacturer		
Address of Manufacturer		CE Mark

* CE Mark should be displayed on the standard type and cleanroom type.

3. How to Read the Model

3.1 Standard Type

IXP-4N5520-WA-P-P3-B-**

- Series Name: Power-con SCARA Robot
- <Type>
  - 3N1808: 3 Axis Type, Arm length 180mm / Vertical axis 80mm
  - 3N2508: 3 Axis Type, Arm length 250mm / Vertical axis 80mm
  - 3N2508GM: 3 Axis Type, Arm length 250mm / Vertical axis 80mm, RCP4-GRSML mounted on up-down axis end
  - 3N3515: 3 Axis Type, Arm length 350mm / Vertical axis 150mm
  - 3N3510GL: 3 Axis Type, Arm length 350mm / Vertical axis 100mm, RCP4-GRSLL mounted on up-down axis end
  - 3N3515GM: 3 Axis Type, Arm length 350mm / Vertical axis 150mm, RCP4-GRSML mounted on up-down axis end
  - 3N4515: 3 Axis Type, Arm length 450mm / Vertical axis 150mm
  - 3N4510GL: 3 Axis Type, Arm length 450mm / Vertical axis 100mm, RCP4-GRSLL mounted on up-down axis end
  - 3N4515GM: 3 Axis Type, Arm length 450mm / Vertical axis 150mm, RCP4-GRSML mounted on up-down axis end
  - 3N5520: 3 Axis Type, Arm length 550mm / Vertical axis 200mm
  - 3N5515GL: 3 Axis Type, Arm length 550mm/Vertical axis 150mm, RCP4-GRSLL mounted on up-down axis end
  - 3N5515GW: 3 Axis Type, Arm length 550mm/Vertical axis 150mm, RCP4-GRSWL mounted on up-down axis end
  - 3N6520: 3 Axis Type, Arm length 650mm / Vertical axis 200mm
  - 3N6515GL: 3 Axis Type, Arm length 650mm/Vertical axis 150mm, RCP4-GRSLL mounted on up-down axis end
  - 3N6515GW: 3 Axis Type, Arm length 650mm/Vertical axis 150mm, RCP4-GRSWL mounted on up-down axis end
  - 4N1808: 4 Axis Type, Arm length 180mm / Vertical axis 80mm
  - 4N2508: 4 Axis Type, Arm length 250mm / Vertical axis 80mm
  - 4N3515: 4 Axis Type, Arm length 350mm / Vertical axis 150mm
  - 4N4515: 4 Axis Type, Arm length 450mm / Vertical axis 150mm
  - 4N5520: 4 Axis Type, Arm length 550mm / Vertical axis 200mm
  - 4N6520: 4 Axis Type, Arm length 650mm / Vertical axis 200mm
- <Encoder Type>: WA: Battery-less absolute
- <Cable length>: N : None; P : 1m; S : 3m; M : 5m; X□□ : Length specification; R□□ : Robot cable
- <Applicable controller>: P3: MSEL-PCX, MSEL-PGX
- <Option>: B : Brake for Z Axis (3/4N5520, 3/4N6520)
- Identification for IAI use only (Note 1)

Note 1 Identification for IAI use only: This may be marked for the purpose of IAI. It is not an ID to describe the model code.

3.2 Cleanroom Type, Dust Proof/Splash Proof Type

IXP-4C5520-WA-P-P3-B-**

Series Name
Power-con SCARA Robot

<Type>
Cleanroom Type
- 3C3515 : 3 Axis Type, Arm length 350mm/Vertical axis 150mm
- 3C4515 : 3 Axis Type, Arm length 450mm/Vertical axis 150mm
- 3C5520 : 3 Axis Type, Arm length 550mm/Vertical axis 200mm
- 3C6520 : 3 Axis Type, Arm length 650mm/Vertical axis 200mm
- 4C3515 : 4 Axis Type, Arm length 350mm/Vertical axis 150mm
- 4C4515 : 4 Axis Type, Arm length 450mm/Vertical axis 150mm
- 4C5520 : 4 Axis Type, Arm length 550mm/Vertical axis 200mm
- 4C6520 : 4 Axis Type, Arm length 650mm/Vertical axis 200mm

Dust Proof/Splash Proof Type
- 3W3515 : 3 Axis Type, Arm length 350mm/Vertical axis 150mm
- 3W4515 : 3 Axis Type, Arm length 450mm/Vertical axis 150mm
- 3W5520 : 3 Axis Type, Arm length 550mm/Vertical axis 200mm
- 3W6520 : 3 Axis Type, Arm length 650mm/Vertical axis 200mm
- 4W3515 : 4 Axis Type, Arm length 350mm/Vertical axis 150mm
- 4W4515 : 4 Axis Type, Arm length 450mm/Vertical axis 150mm
- 4W5520 : 4 Axis Type, Arm length 550mm/Vertical axis 200mm
- 4W6520 : 4 Axis Type, Arm length 650mm/Vertical axis 200mm

Identification for IAI use only (Note 1)

<Option>
- B : Brake for Z Axis (3/4N5520, 3/4N6520 3/4W5520, 3/4W6520)
- VLL : Elbow Pipe Joint Left Ejection (Cleanroom Type)
- VLR : Elbow Pipe Joint Right Ejection (Cleanroom Type)

<Applicable controller>
- P3: MSEL-PCX, MSEL-PGX

<Cable length>
<Cleanroom Type>
- N : None
- P : 1m
- S : 3m
- M : 5m
- X□□ : Length specification
- R□□ : Robot cable

<Dust Proof/ Splash Proof Type >
- 3L : 3m
- 5L : 5m

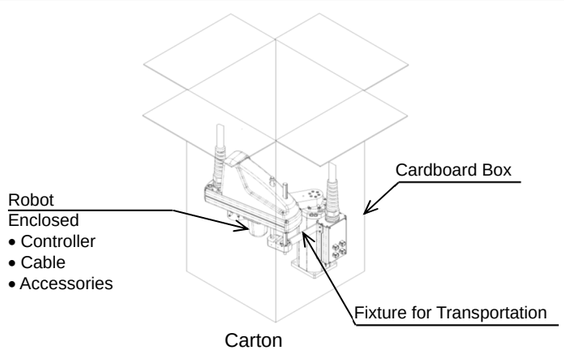
<Encoder Type>
- WA: Battery-less absolute

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.

Precautions in Handling

1. Handling of the Robot
Unless otherwise specified, the robot is delivered in the package was shown in the figure below. The transportation fixture is attached on the robot body.

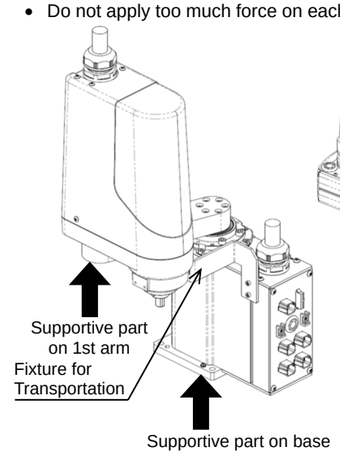
Notice:
- Detach the transportation fixture before starting operation.
- Keep the transportation fixture so it can be used when transporting or moving the robot.
- The robot taken out of the cardboard box cannot stand by itself. If it is necessary to put it down temporarily, put a cushioning underneath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



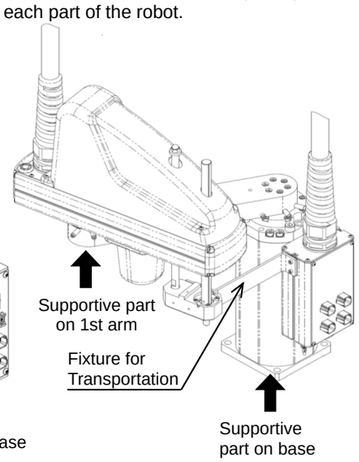
Carton

1.1 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.
- When setting down the package temporarily, keep it horizontal. 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.

1.2 Handling of 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.



Arm Length 180/250



Arm Length 350/450/550/650

2. Handling of the Robot Mounted on Mechanical Equipment (System)
The following are the cautions for when transporting SCARA Robot installed in the machinery equipment (system) in the whole system.
- Transportation must be carried out with the transportation fixture applied on the robot.
- 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.

Installation Environment, Storage 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)
(Dust proof/splash proof type possesses the protection structure of IP6X against dust particles.)
- Location where metal chips which could damage the bellows or seals can get generated
- Location where water, oil (includes oil mist and cutting fluid) or a chemical is splashed
(Dust proof/splash proof type possesses the protection structure of IPX5 against liquid.)
- 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

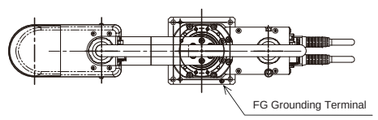
2. Storage • Preservation Environment
- The storage and preservation environment should comply with the same standards as those for the installation environment. In particular, when the machine is to be stored for a long time, pay close attention to environmental conditions so that no dew condensation 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.
- For storage and preservation temperature, the machine withstands temperatures up to 60°C for a short time, but in the case of the storage and preservation period of 1 month or more, control the temperature to 50°C or less.
- Storage and preservation should be performed in the horizontal condition. In the case it is stored in the packaged condition, follow the posture instruction if any displayed on the package.

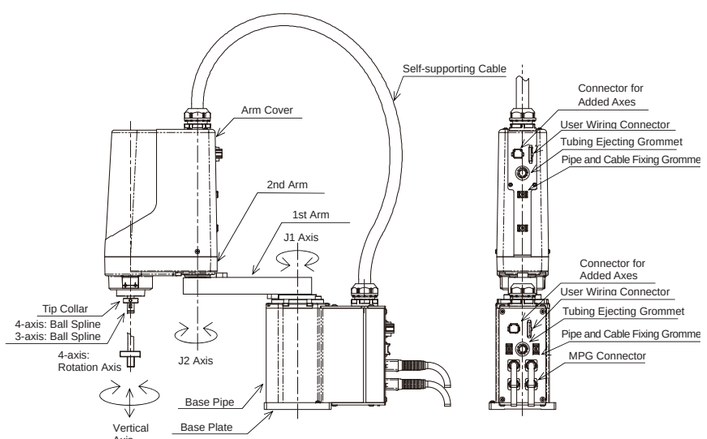
[For IP65]
IP : International Protection
IP6X : Solid particle protection
There should be no ingress of dust inside.
IPX5 : Liquid ingress protection
Water projected against enclosure from any direction shall have no harmful effects.
* With using pure water, project water from any direction for 1 minute in every 1m^2 of outer cover area and 3 minutes in total at least. The distance from the nozzle to the machine is 2.5 to 3m. Projection pressure at 30kPa and flow volume at 12.5L/min.

Caution :
- Do not attempt to use the robot in an environment more than Degree of Protection IP65 against liquid and dust.
If water and dust get inside the robot, there is a concern of drop in product life, operation accuracy and error operation.
- Make the cleanroom down-flow environment.
- Color of bellows may change in some environment of use, but note that it will not give influence to dust proof and drip proof performances.

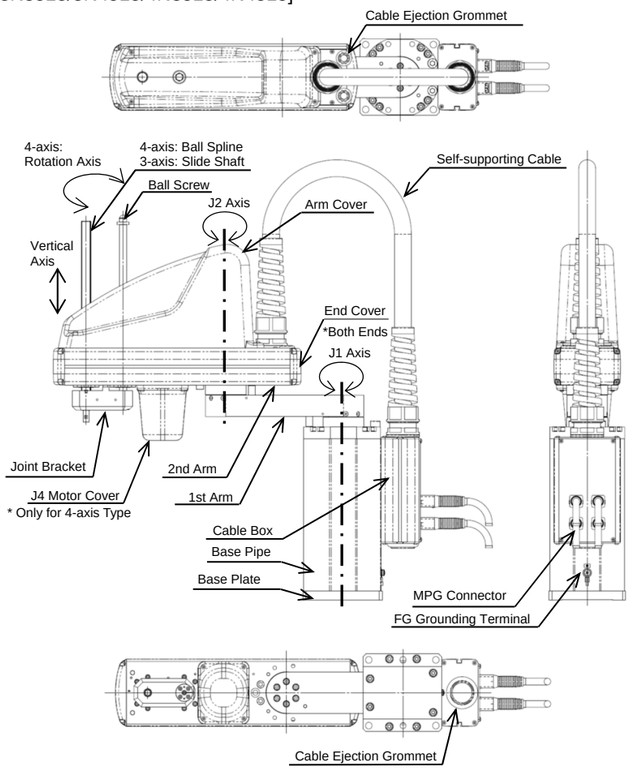
External Dimensions

1. Standard Type
[IXP-3N1808/3N2508/4N1808/4N2508]

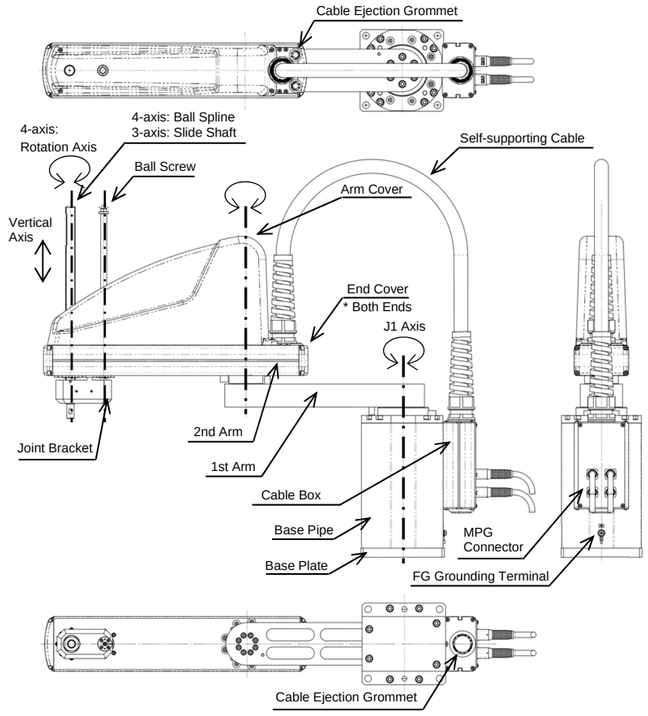




[IXP-3N3515/3N4515/4N3515/4N4515]

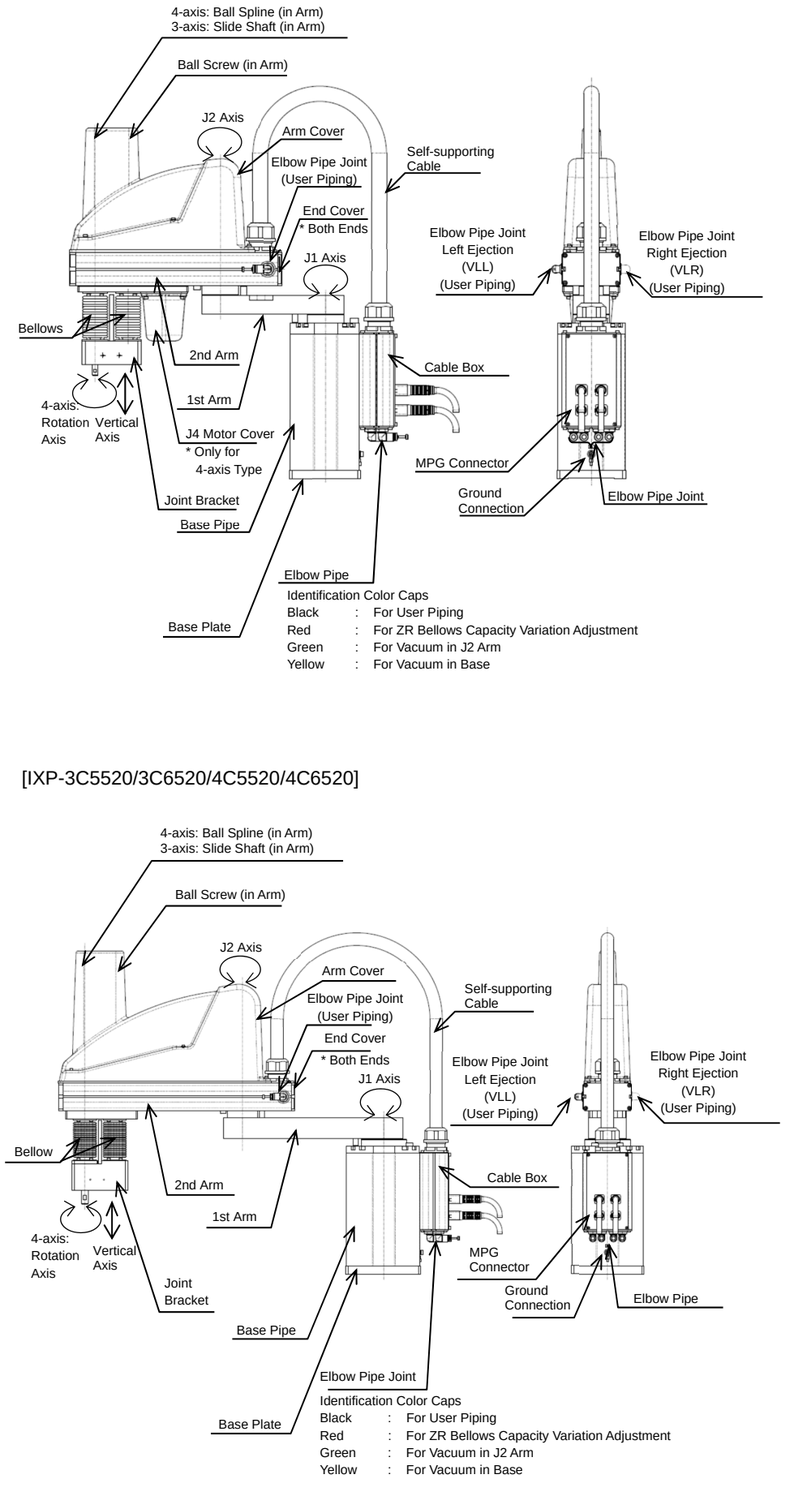


[IXP-3N5520/3N6520/4N5520/4N6520]



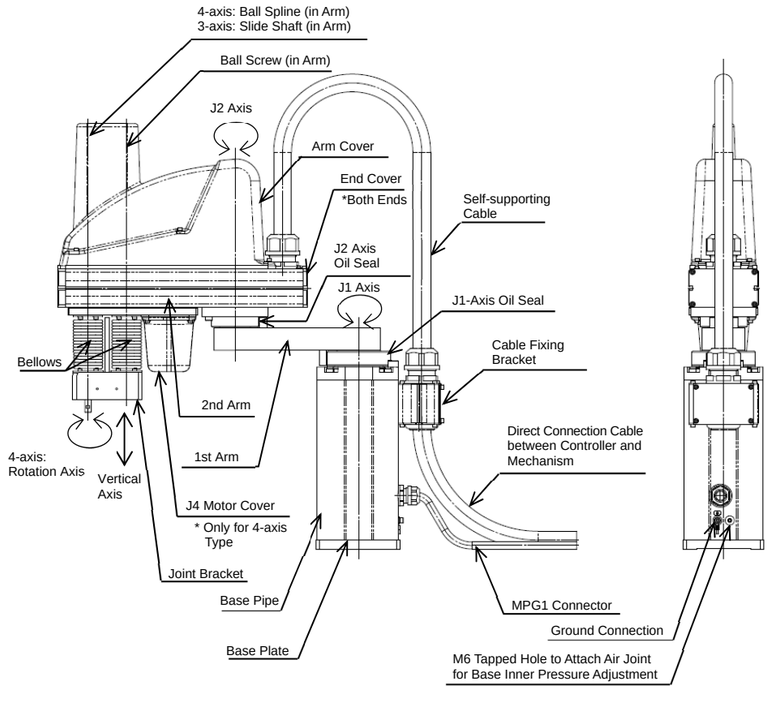
[Refer to the catalog or Instruction Manual for the detail of outline and attachments dimensions.]

2. Cleanroom Type
[IXP-3C3515/3C4515/4C3515/4C4515]

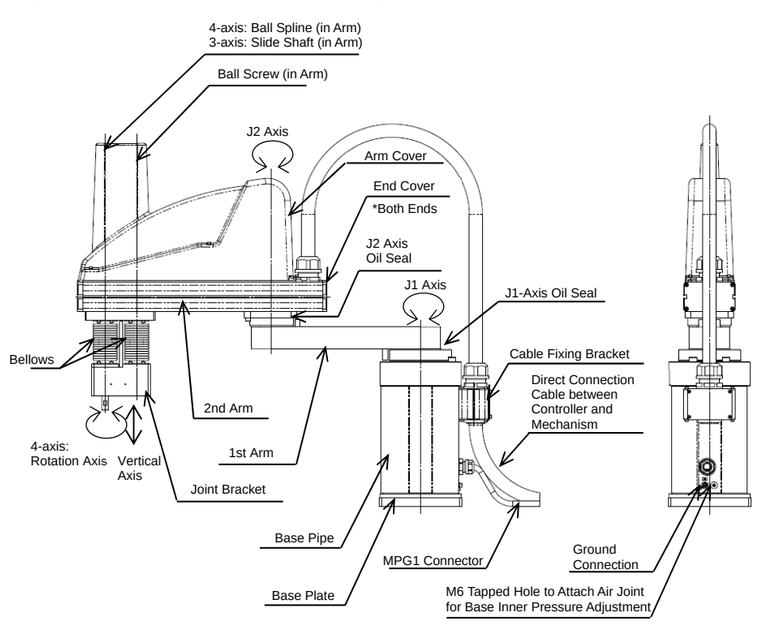


[IXP-3C5520/3C6520/4C5520/4C6520]

3. Dust Proof/Splash Proof Type
[IXP-3W3515/3W4515/4W3515/4W4515]



[IXP-3W5520/3W6520/4W5520/4W6520]



Installation

Installation of the robot is acceptable only in standard horizontal orientation.
Horizontally oriented wall mount or ceiling mount is not available.
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.

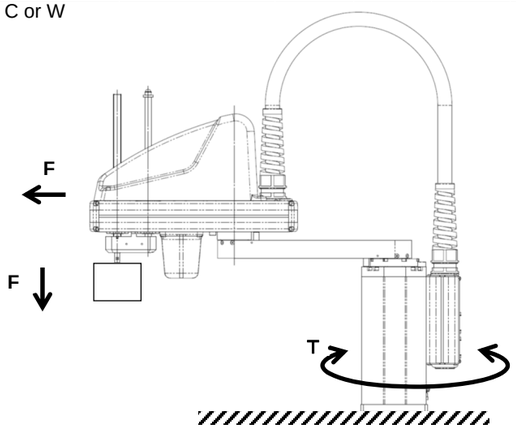
Model Number	Tapped Holes
IXP-3/4□1808, 2508	M6 with the effective length 12mm or more
IXP-3/4□3515, 4515	M8 with the effective length 16mm or more
IXP-3/4□5520, 6520	M10 with the effective length 20mm or more

   □ is N, C or W
   - 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 stableness 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
IXP-3/4□3515	63	6	83	8	32	3
IXP-3/4□4515	53	5	89	9	50	5
IXP-3/4□5520	73	7	137	14	66	7
IXP-3/4□6520	61	6	143	15	66	7

□is, C or W



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.

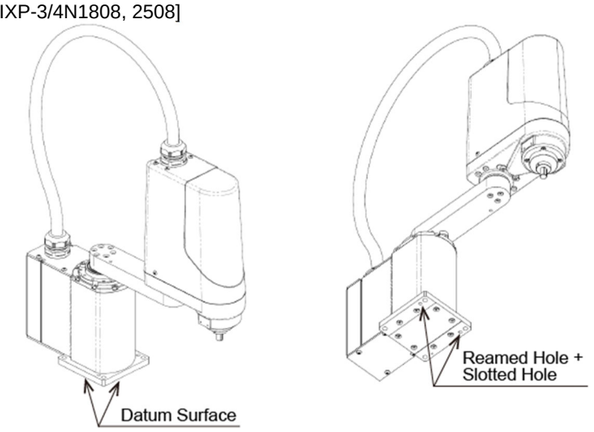
3. Installation of the Robot
   - The robot body has to be securely fastened with using hex socket cap screws and steel ring plain washers (4pcs each).

Model Number	Attachment Hole	Attachment Screw	Steel Ring Plain Washer	Tightening Torque
IXP-3/4N1808, 2508	ϕ7 through (Dimension from the seat to the installation surface is 10mm)	M6	6.5×13×1.0	12.3N•m
IXP-3/4□3515, 4515	ϕ9 through (Dimension from the seat to the installation surface is 12mm)	M8	8.5×16×1.2	30N•m
IXP-3/4□5520, 6520	ϕ10 through (Dimension from the seat to the installation surface is 15mm)	M10	10.5×18×1.6	59N•m

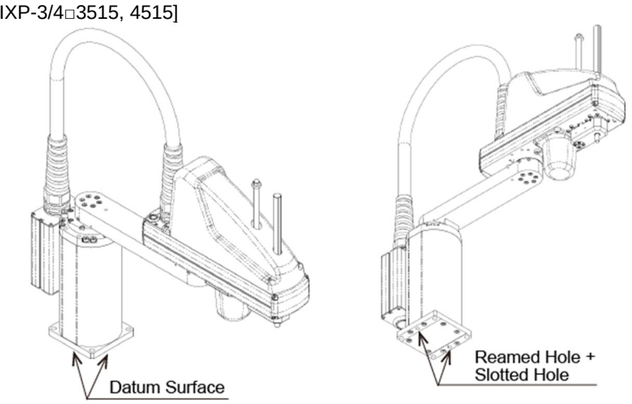
□ is N, C or W

- 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.

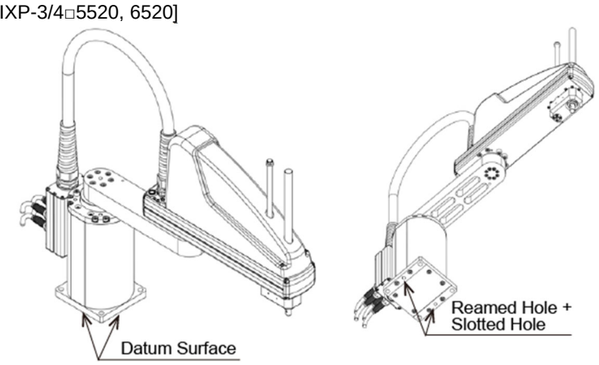
[IXP-3/4N1808, 2508]



[IXP-3/4□3515, 4515]



[IXP-3/4□5520, 6520]

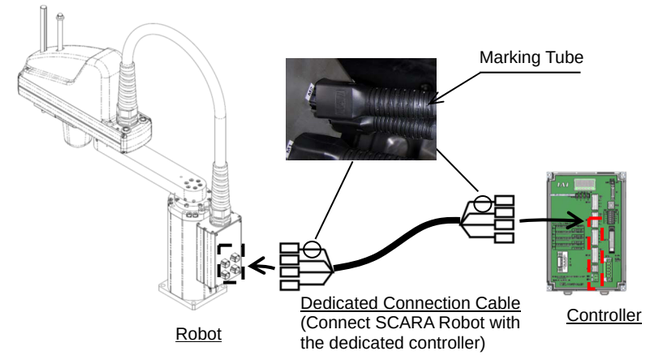


4. Equipping with Safety Protection Fence
   - Considering safety, it is recommended to have a safety protection fence to prevent possible danger.
     For Machinery Directive (2006/42/EC) in EU Directives, equip with safety protection fence.
     Use a system I/O connector at the entrance of the safety 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.

Wiring

As the connection cable for the controller and the robot, use the IAI-dedicated controller and dedicated connection cable.

[Connection of standard type and cleanroom type SCARA ROBOT to MSEL-PCX/PGX Controllers

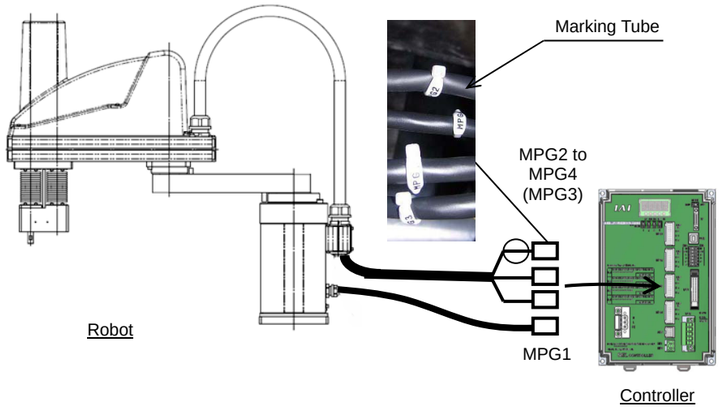


Robot cable
: 5m or less r=68mm or more (Movable Use)
: 5m or morer=73mm or more (Movable Use)
Standard cable
: 5m or less r=85mm or more (Fixed Use)
: 5m or morer=91mm or more (Fixed Use)

- Motor • Encoder Integrated Cables CB-CAN-MPA□□□
- Motor • Encoder Integrated Cables Robot Type CB-CAN-MPA□□□-RB

  □□□ indicates the cable length L
  Example. 030 = 3m

[Connection of dust proof/splash proof type SCARA ROBOT to MSEL-PCX/PGX Controllers



Dedicated Connection Cable
(Connect dust proof/splash proof type SCARA ROBOT
and dedicated controller)

MPG1 for cable (Thin cable) r=68mm or more (Movable Use)
MPG2 to MPG4 (MPG3) for cable (Thick cable) r=220mm or more (Movable Use)

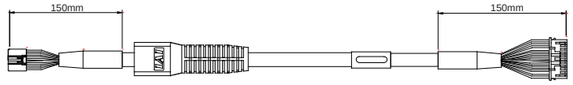
⚠ Warning

- Be sure to connect to the robot of the serial number specified 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. Rigidly fix the connectors with the screws equipped to them.
- 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.

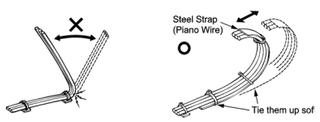
Refer to the instruction manuals for the controller and PC software for the procedures to connect the I/O cable, controller power cable, PC connection cable, etc.

[Prohibited Items in the Cable Processing]

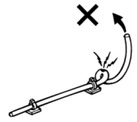
- Do not pull or bend forcibly the cable so as not to give any extra load or tension to the cable.
- Do not process the cable for extension or shortening by means of cutting out, combination or connecting with another cable.
- Do not apply radiated heat to power line or cables.
  Standard Cables CB-CAN-MPA□□□
  Robot Cables CB-CAN-MPA□□□-RB



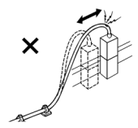
- Do not let the cable flex at a single point.



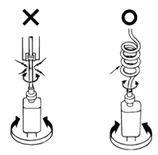
- Do not let the cable bend, kink or twist.



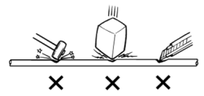
- Do not pull the cable with a strong force.



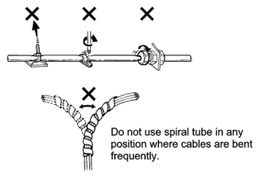
- Do not let the cable receive a turning force at a single point.



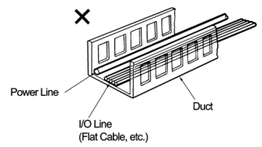
- Do not pinch, drop a heavy object onto or cut the cable.



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

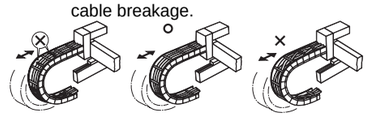


- Separate the I/O line, communication line and power line from each other. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable carrier.

- If there is an indication to the cable for the space factor in a cable carrier, refer to the wiring instruction given by the supplier when storing the cable in the cable carrier.
- Avoid the cables to get twined or twisted in the cable carrier, and also to have the cables move freely and do not tie them up. (Avoid tension being applied when the cables are bent.)
  Do not pile up cables. It may cause faster abrasion of the sheaths or cable breakage.



⚠ Caution :
- When the cable is connected or disconnected, make sure to turn off the power to the controller. When the cable is connected or disconnected with the controller power turned ON, it might cause a malfunction of the actuator and result in a serious injury or damage to the machinery.
- When the connector connection is not correct, it would be dangerous because of a malfunction of the actuator. Make sure to confirm that the connector is connected correctly.

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Manual No.: ME3741-4D