



IX

INTELLIGENT ACTUATOR

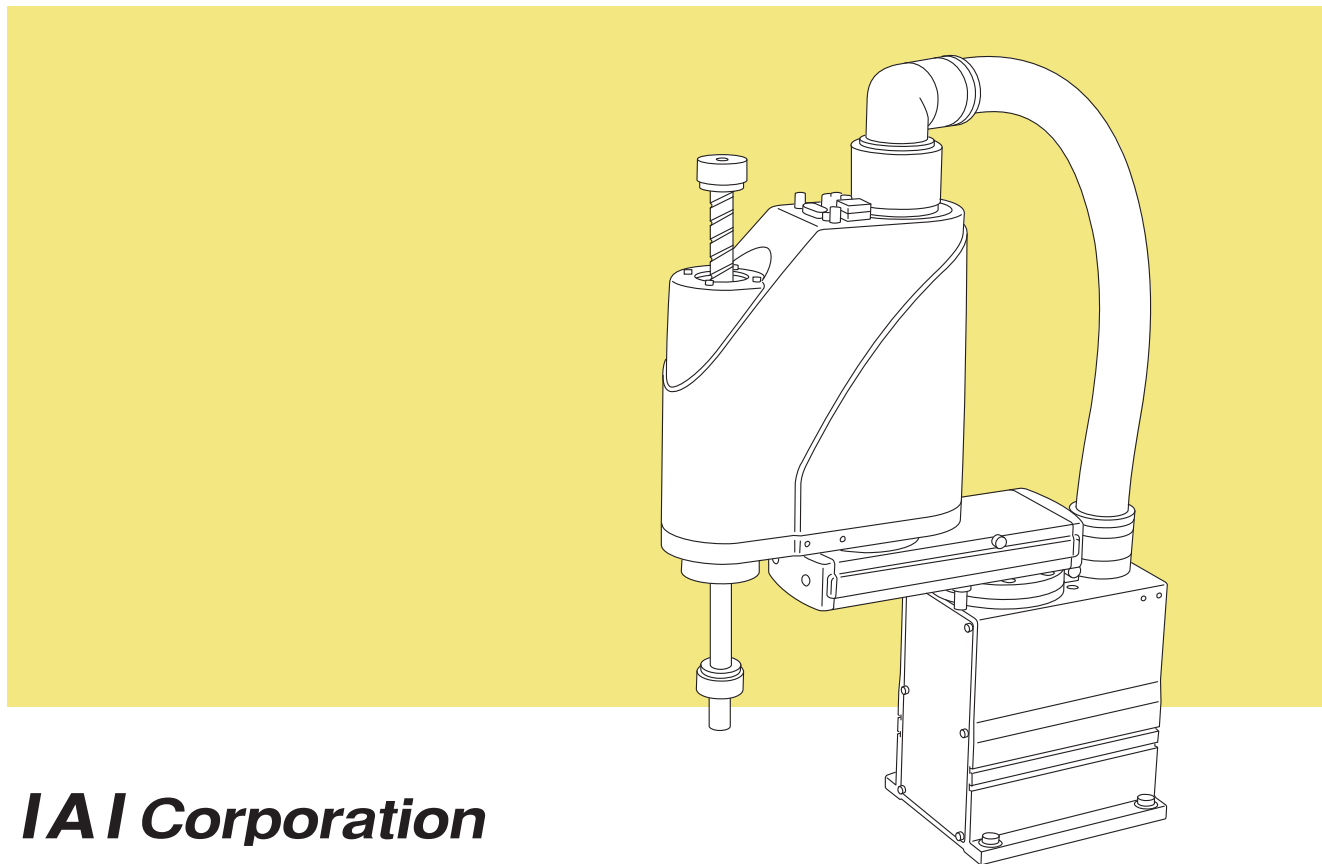
Horizontal Articulated Robot – IX Series

Tabletop Type, Arm Length 250/350
IX-NNN-2515H, IX-NNN-3515H

Dust-proof/Splash-proof Specification
IX-NNW2515H/IX-NNW3515H

Clean Room Specification
IX-NNC2515H/IX-NNC3515H

Operation Manual Ninth Edition



IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

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

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

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

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

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

[Important]

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



INTELLIGENT ACTUATOR

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Safety Guide

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

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	• 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. 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) • Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. • Do not use it in any of the following environments. 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact • For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

No.	Operation Description	Description
2	Transportation	• When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. • When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. • Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the operation manual for each model. • Do not step or sit on the package. • Do not put any heavy thing that can deform the package, on it. • When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. • When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit. • Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. • Do not get on the load that is hung on a crane. • Do not leave a load hung up with a crane. • Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	• The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. • Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	(1) Installation of Robot Main Body and Controller, etc. • Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. • Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. • When using the product in any of the places specified below, provide a sufficient shield. 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. (3) Grounding ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm² (AWG20 or equivalent) or more for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). ● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).

No.	Operation Description	Description
4	Installation and Start	(4) Safety Measures • When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. • Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. • Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. • Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. • When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. • Take the measure so that the work part is not dropped in power failure or emergency stop. • Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. • Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. • When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. • When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. • Place a sign "Under Operation" at the position easy to see. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.

No.	Operation Description	Description
6	Trial Operation	• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. • When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. • Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. • Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	• Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. • Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. • Make sure to operate automatic operation start from outside of the safety protection fence. • In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. • When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

No.	Operation Description	Description
8	Maintenance and Inspection	• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. • When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. • When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. • When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. • Place a sign "Under Operation" at the position easy to see. • For the grease for the guide or ball screw, use appropriate grease according to the Operation Manual for each model. • Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. • The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. • Pay attention not to lose the cover or untightened screws, and make sure to put the product back to the original condition after maintenance and inspection works. Use in incomplete condition may cause damage to the product or an injury. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.
9	Modification and Dismantle	• Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	• When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. • When removing the actuator for disposal, pay attention to drop of components when detaching screws. • Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	• Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device. • See Overseas Specifications Compliance Manual to check whether complies if necessary. • For the handling of actuators and controllers, follow the dedicated operation manual of each unit to ensure the safety.

Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the operation 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

Handling Precaution

1. Positioning Repeatability Does Not Change Even If the Positioning Band is Changed.

Positioning repeatability does not change even if the positioning band is changed.

If the positioning band is narrower than the default value, the positioning repeatability does not change, but the time it takes for the positioning complete signal to be output takes longer. The execution of next operation instruction (e.g., MOVP, MOVL) is delayed and, as a result, the tact time of the entire cycle may be delayed.

2. Make sure to attach the Horizontal Articulated Robot properly by following this operation manual.

Using the product with the Horizontal Articulated Robot not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.

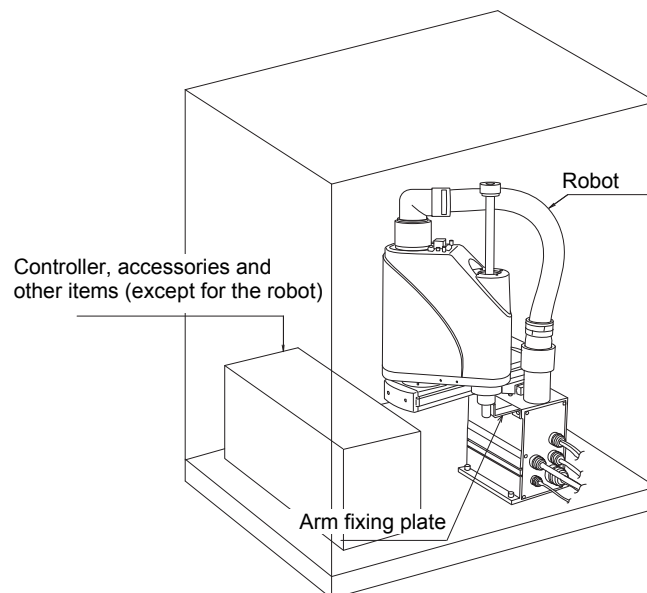
3. Handling of the Carton

Each robot is packed with a controller prior to shipment.

When transporting the carton containing the robot and controller, observe the following items and be careful not to drop the carton or apply impact due to forcible contact:

- If the carton is heavy, one operator should not attempt to carry it alone.
- Place the carton on a level surface if it is to be left there for a while.
- Do not climb upon the carton.
- Do not place on the carton any heavy object that may cause the carton to deform, or an article whose shape allows a work part to be concentrated at one point.

[Carton]





Warning



Caution

- The robot and controller are very heavy. When transporting the carton containing the robot and controller, handle it with extra care so as not to drop the carton or apply impact due to forcible contact, as it may cause injury or damage to the robot or controller.
- Serious injury may result if the carton is dropped onto a person during transportation.
- Never stand below the carton as it is hoisted.
- Use a carrier device with sufficient loading capacity.
- If a machine or method is used that requires specified skills, it must be operated/performed by a person having the proper qualifications.

4. Handling of Individual Components

The robot and controller are supplied as a set.

Your robot cannot be used with the controller supplied with another robot.

When handling multiple robots, confirm that the serial number on the robot is the same as the serial number on the controller and be careful not to lose their correct pairings with the controllers.

The robot will not stand on its own after being unloaded from the carton pallet.

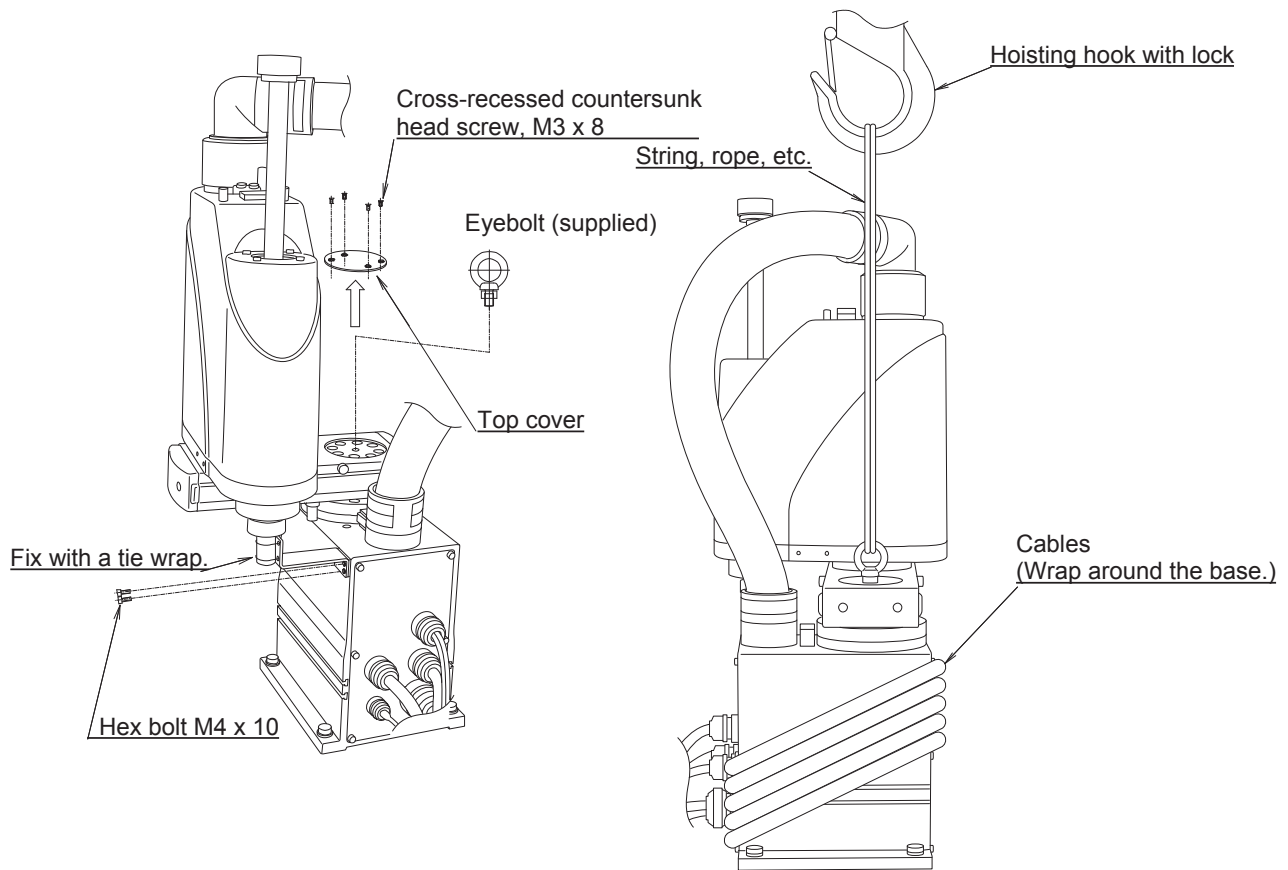
Hold it by hand, or place a cushioning material on the floor and place the robot on its side upon the cushion.

5. Transportation

When transporting the robot, affix the arms using the supplied arm fixing plate. Additionally, wrap the cables around the base and secure them with gummed tape or other means.

Use a dolly, forklift, crane, or other appropriate equipment for transportation. When transporting the robot, move it slowly so that it maintains its balance. Also, safeguard the robot against vibration or impact.

When a crane is used, install the supplied eyebolts on the robot for the pass-through of ropes. Install the eyebolts following removal of the top cover.



Danger



Warning

- If the arms and cables remain free, the arms may turn unexpectedly and pinch a hand, or a person may be tripped by the trailing cables.
- Do not attempt to carry the robot by hand, as it may injure the back. Additionally, an injury may result if the robot is dropped onto the feet.
- Serious injury may result if a person is caught under a fallen robot during transportation.
- Never stand below the robot as it is hoisted.
- Use a hoist and ropes that can comfortably support the weight of the robot.
- If a machine or method is used that requires specified skills, it must be operated/performed by a person having the proper qualifications.



International Standards Compliances

This actuator complies with the following overseas standard.

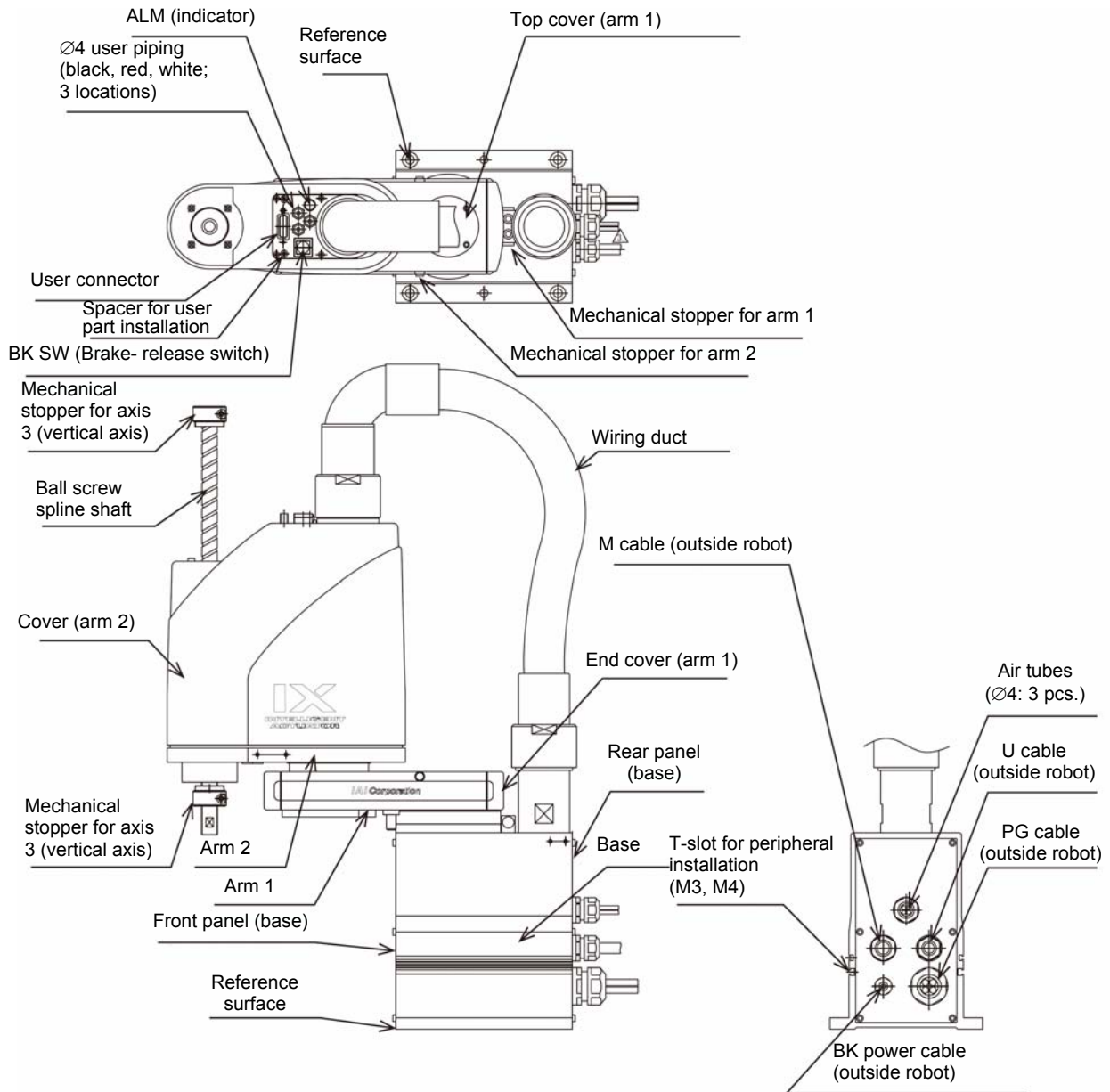
Refer to Overseas Standard Compliance Manual (ME0287) for more detailed information.

RoHS Directive	CE Marking
☐	☐

1. Name of Each Part

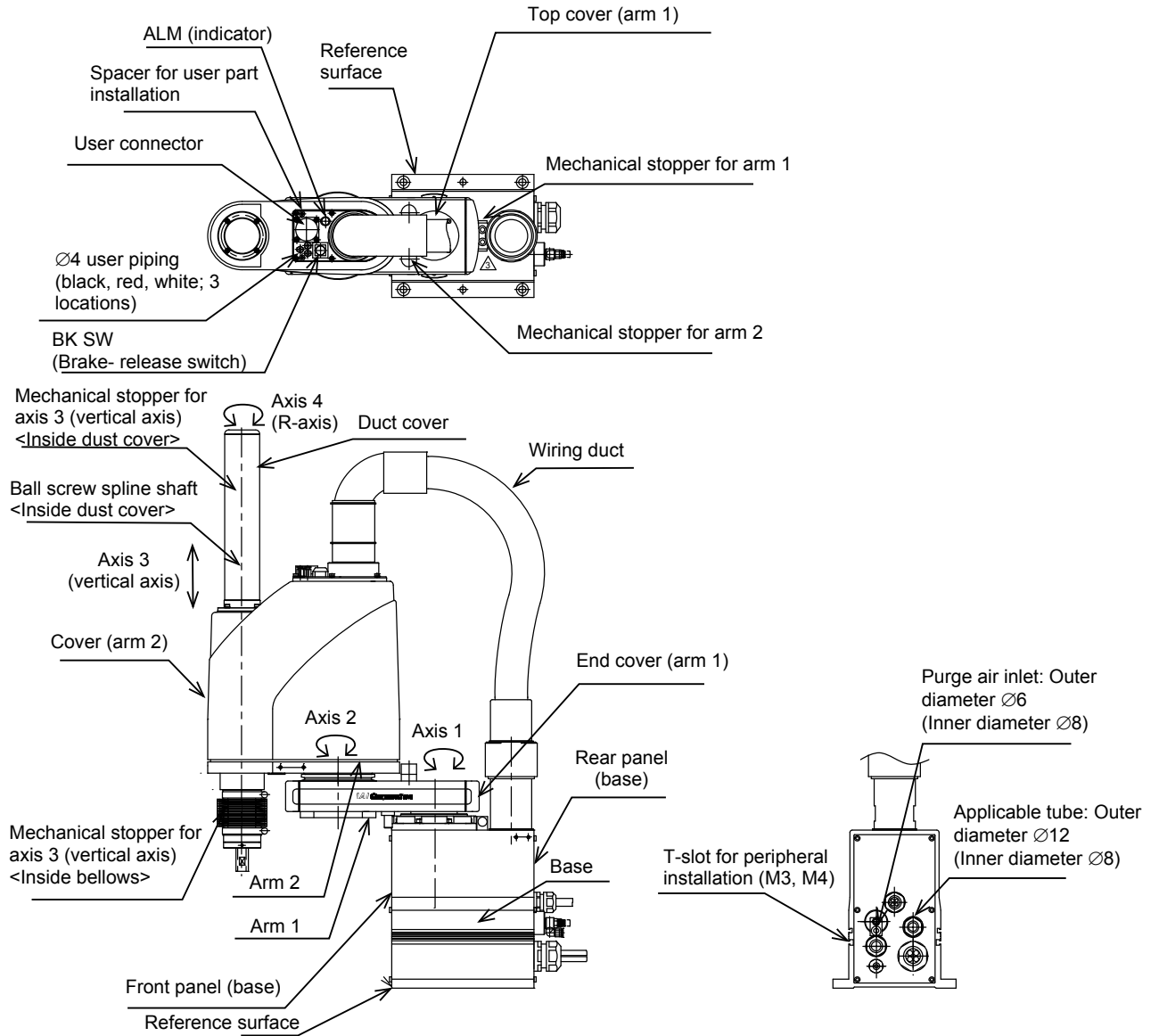
1.1 Robot

IX-NNN2515H/3515H

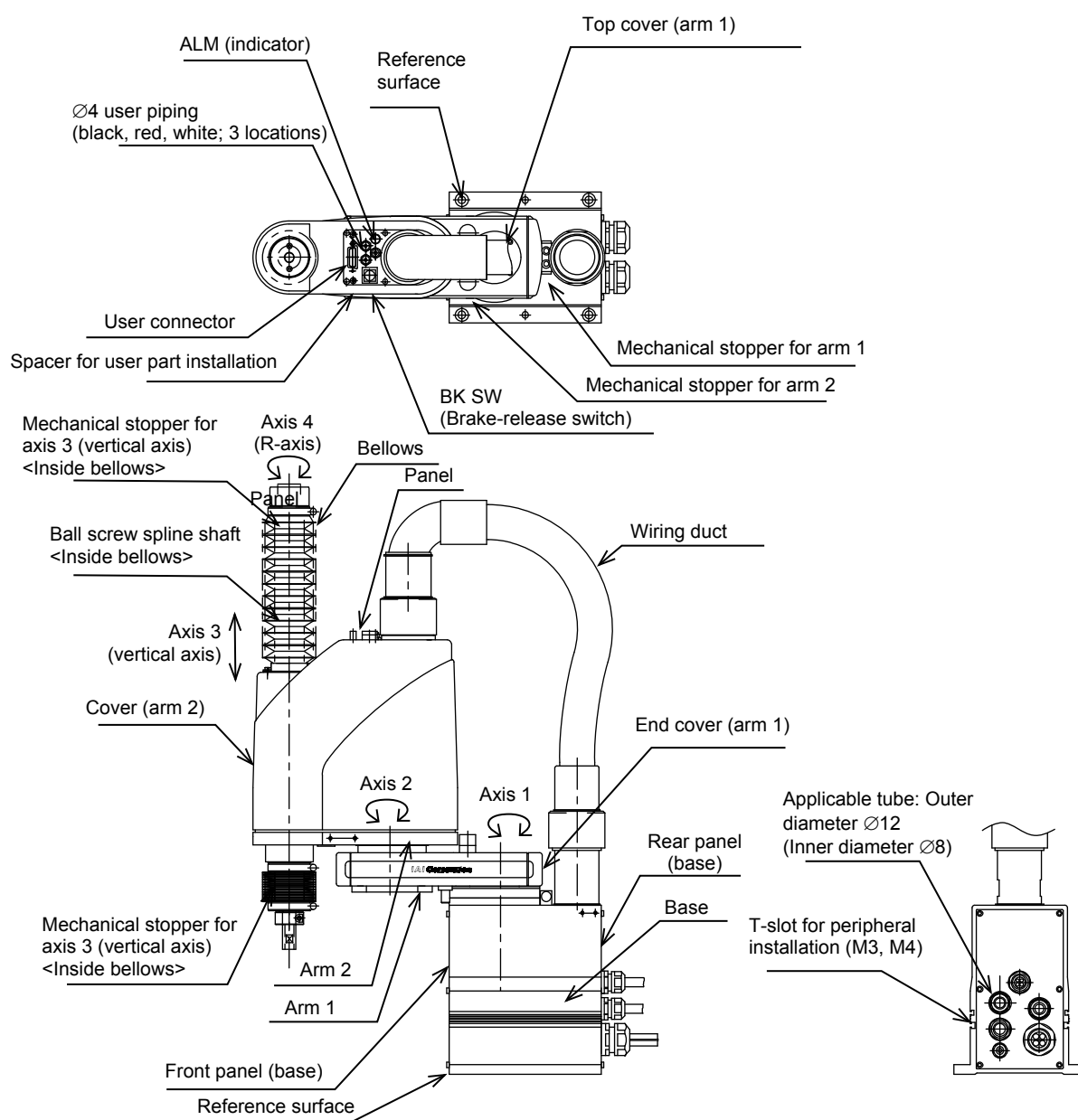


X-NNW2515H/3515H

1. Name of Each Part



IX-NNC2515H/3515H

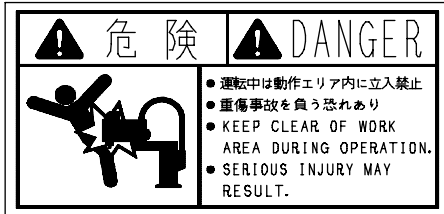


1.2 Labels

The following labels are attached on the robot and controller. Be sure to observe the instructions and cautions written on the labels to ensure the correct use of the robot/controller.

(1) Labels on the Robot

Prohibition of entry into
the operation area



Warning on handling of
the vertical axis



Warning against
electric shock



Robot serial number

MODEL	IX-NNN2515H-5L-T2	
SERIAL No.	XX350298	MADE IN JAPAN

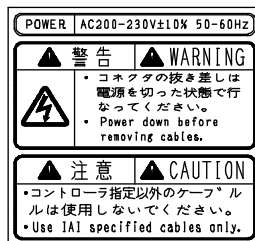
CE-certified robot
(Provided only for CE-certified models)

MODEL	: IX-NNN2515H-5L-T2
ARM LENGTH	: 250mm
PAYLOAD	: Rated 1Kg/Maximum 3Kg
WEIGHT	: 17Kg
MOTOR POWER	: Axis1 200W, Axis2 100W, Axis3 100W, Axis4 50W
DATE	: 22/10/2003
IAI Corporation	
645-1 SHIMIZU HIROSE SHIZUOKA-CITY, SHIZUOKA, 424-0102 JAPAN	

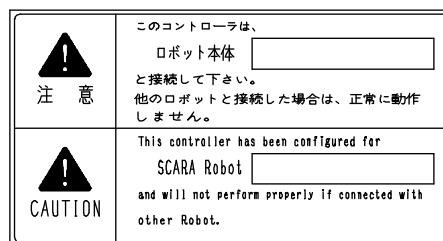


(2) Labels on the Controller

Caution/warning on
handling of the controller



Designation of the connected robot



Controller serial number
(Other than CE-certified models)

MODEL	XSEL-PX4-NNN2515H-N1-EEE-2-2	
SERIAL No.	XX150432	MADE IN JAPAN

Controller serial number
(CE-certified models)

IAI Corporation	
MODEL	XSEL-PX4-NNN2515H-N1-EEE-2-2
S/N	XX150432
INPUT	230V ~ 1021VA-3410VA MAX. IP20
MADE IN JAPAN	



Danger **Warning** **Caution**

- Failure to observe the cautionary information provided on the labels may result in serious injury or damage to the robot.

1.3 Label Positions

Label Positions on the Robot

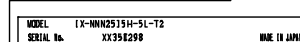
Warning on handling of the vertical axis



CE-certified robot
(Provided only for CE-certified models)



Robot serial number



View A

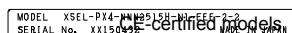
Warning against electric shock



Label Positions on the Controller

Controller serial number

Other than CE-certified models



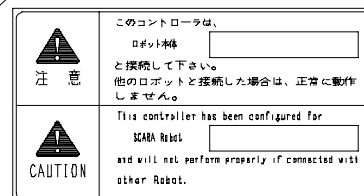
IAI Corporation

MODEL: XSEL-PX4-NNN2515H-N1-EEF-2-2
S/N: XX150432
INPUT: 230V ~ 1021VA-3410VA MAX.
IP20
MADE IN JAPAN

Caution/warning on handling of the controller

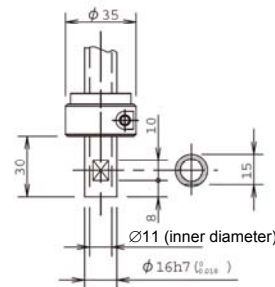
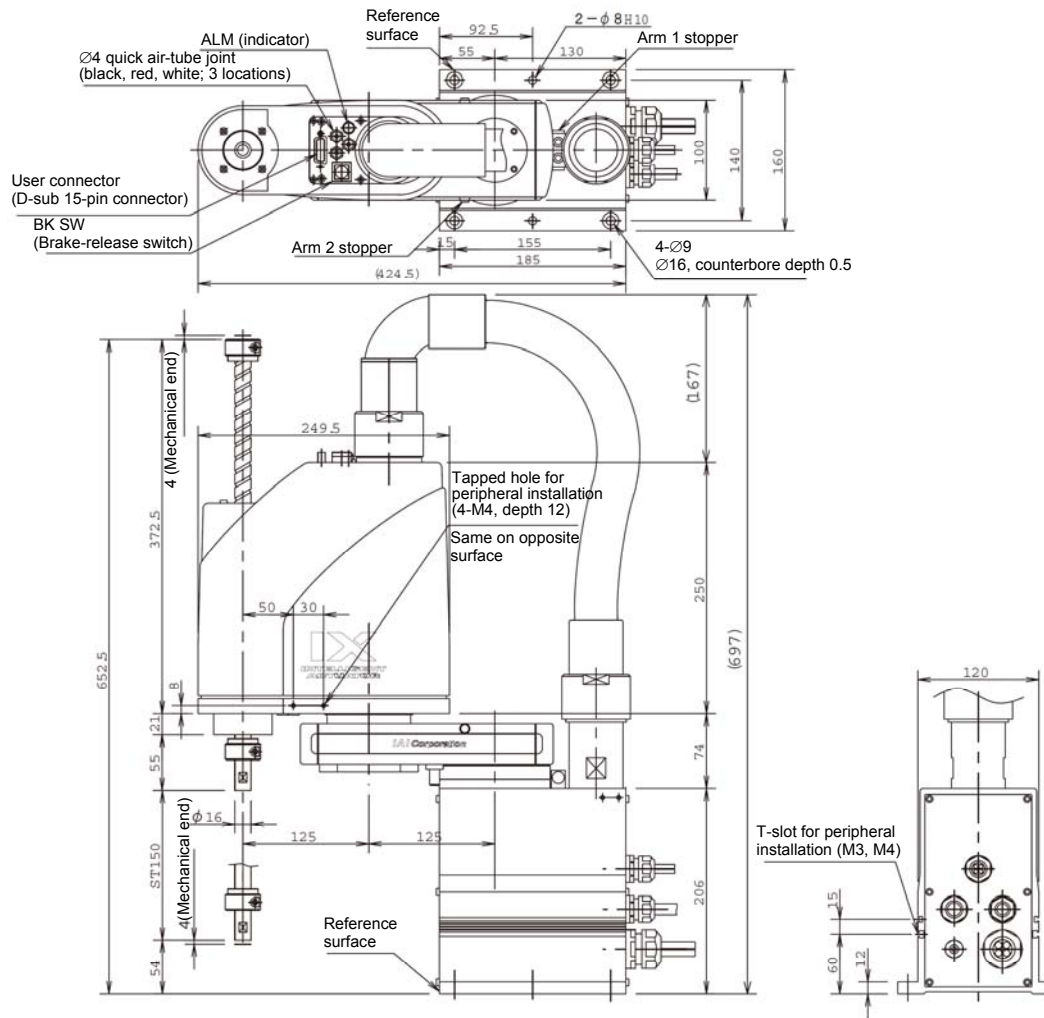


Designation of the connected robot



2. External Dimensions

IX-NNN2515H (Arm Length 250, Standard Specification)

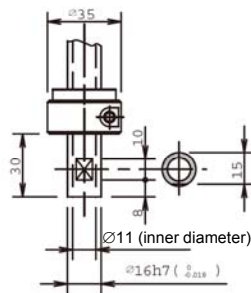
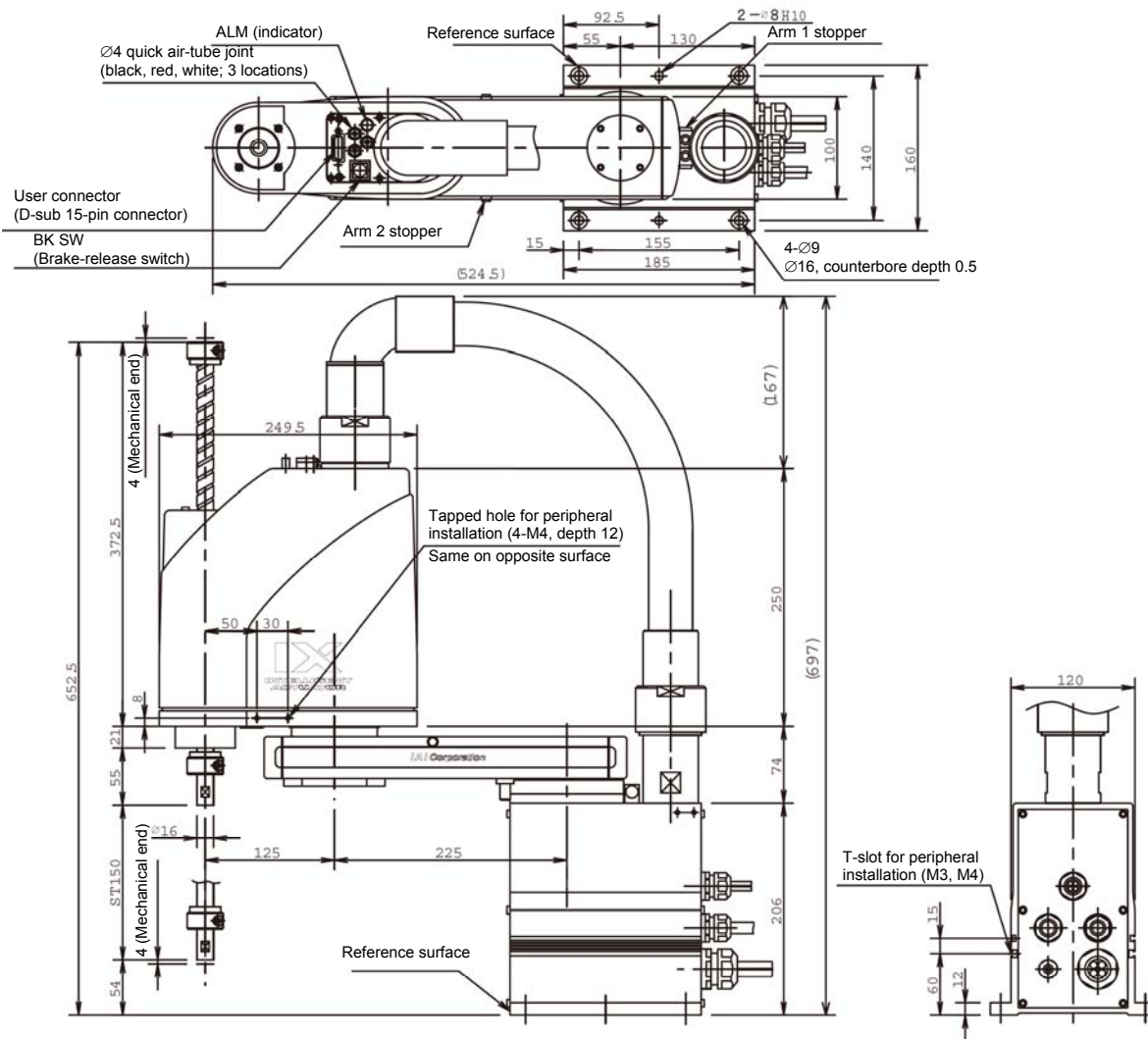


Detailed view of arm end

*1: External force applied to the spacers must not exceed 30 N in the axial direction or 2 N-m in the rotating direction (for each spacer).

*2: The LED operates only when the user provides a circuit that receives controller I/O output signal and supplies 24 VDC to the LED terminal in the user connector.

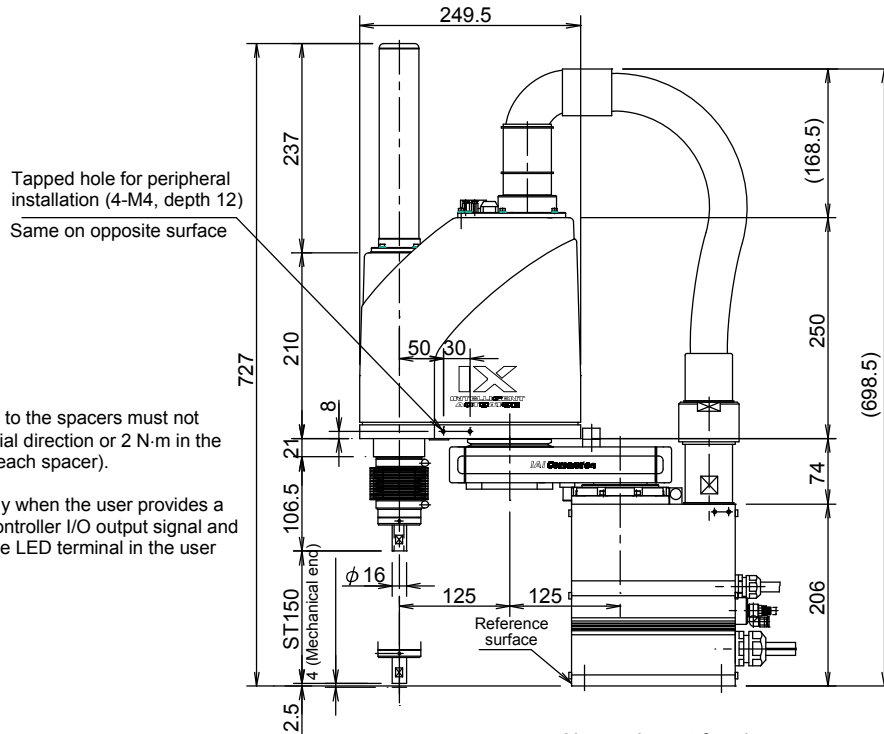
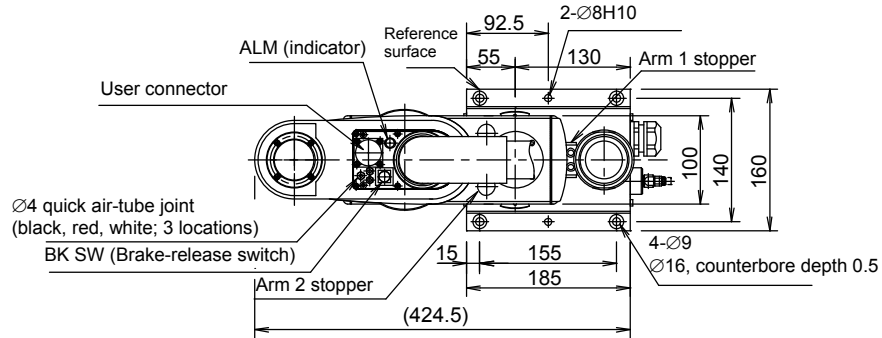
IX-NNN3515H (Arm Length 350, Standard Specification)



Detailed view of arm end

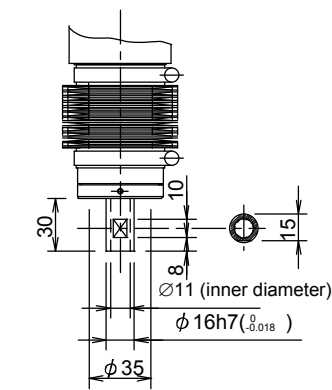
- *1: External force applied to the spacers must not exceed 30 N in the axial direction or 2 N-m in the rotating direction (for each spacer).
- *2: The LED operates only when the user provides a circuit that receives controller I/O output signal and supplies 24 VDC to the LED terminal in the user connector.

IX-NNW2515H (Arm Length 250, Dust-proof/Splash-proof Specification)

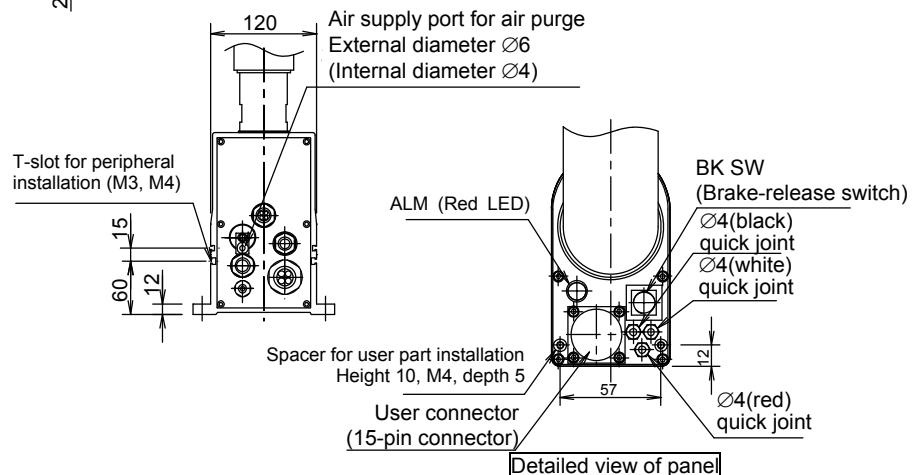


*1: External force applied to the spacers must not exceed 30 N in the axial direction or 2 N·m in the rotating direction (for each spacer).

*2: The LED operates only when the user provides a circuit that receives controller I/O output signal and supplies 24 VDC to the LED terminal in the user connector.

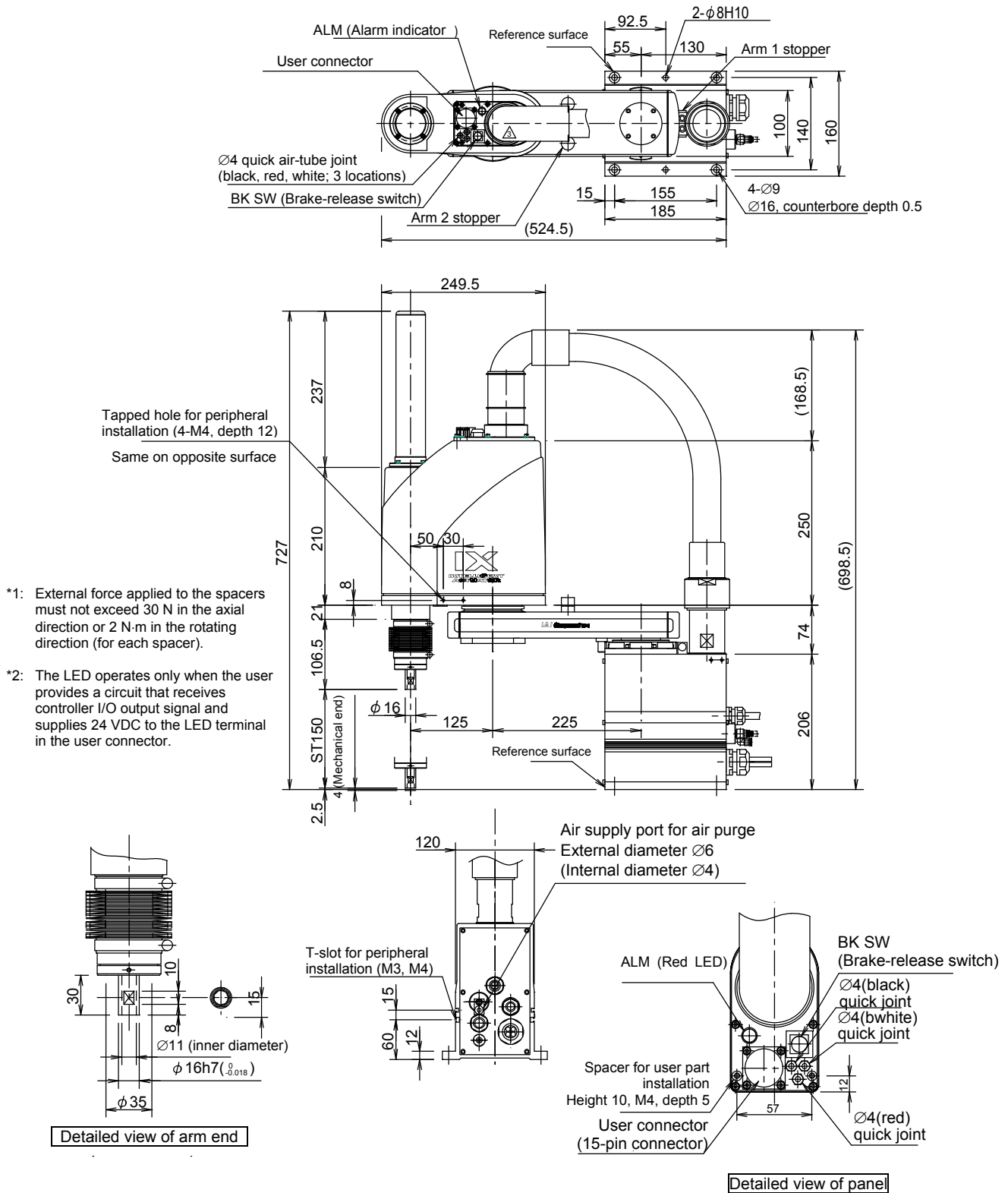


Detailed view of arm end

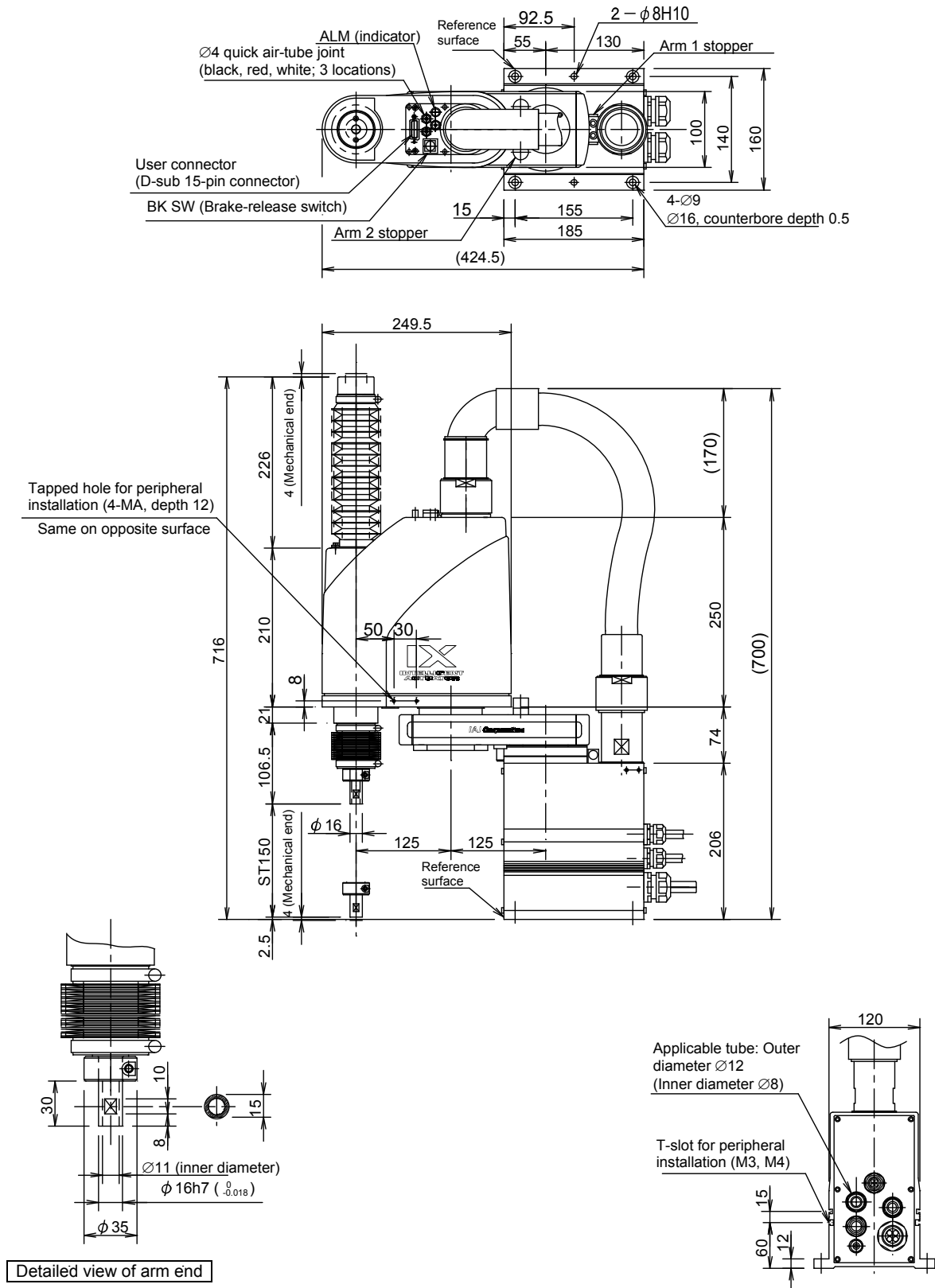


Detailed view of panel

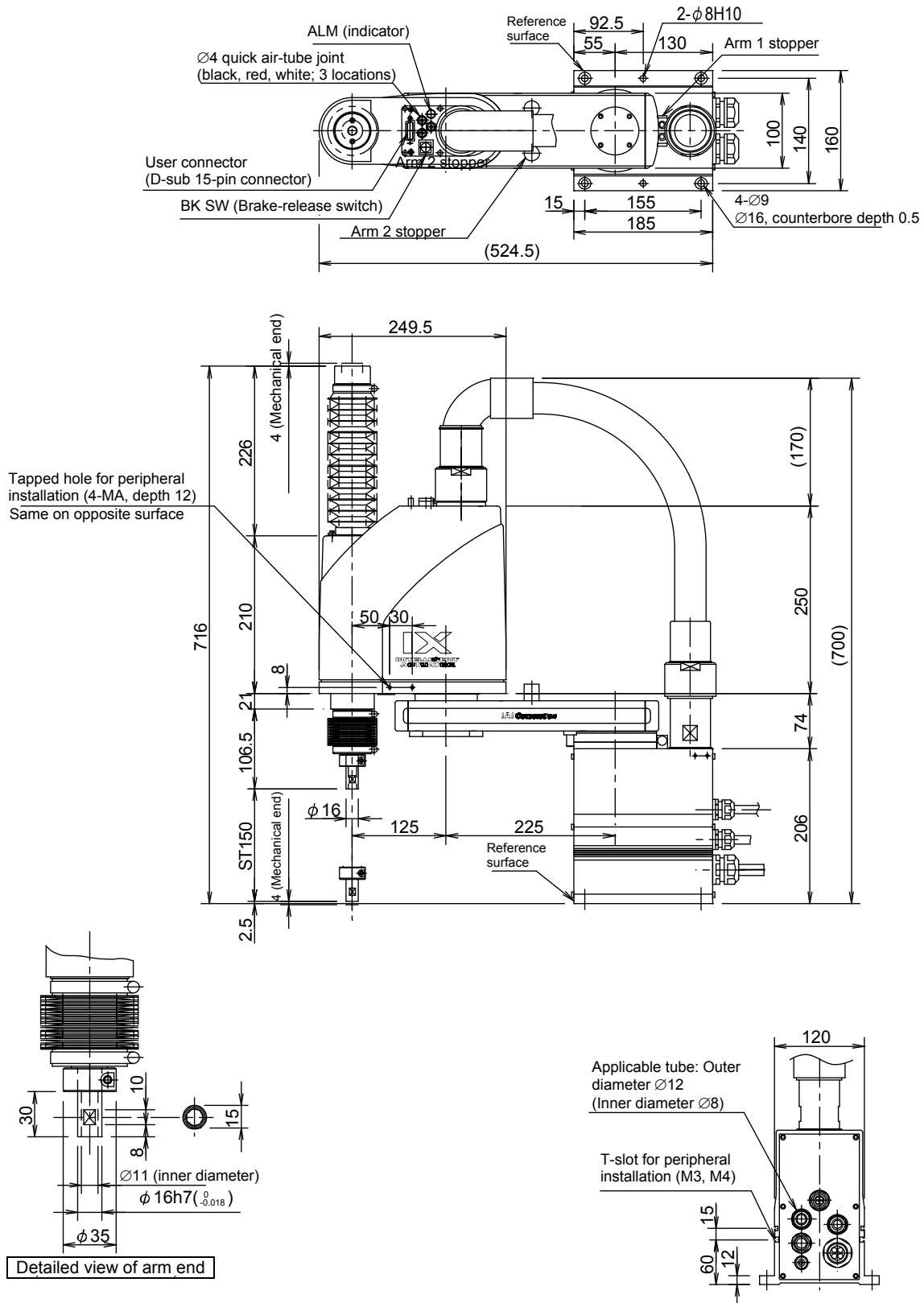
IX-NNW3515H (Arm Length 350, Dust-proof/Splash-proof Specification)



IX-NNC2515H (Arm Length 250, Clean Room Specification)

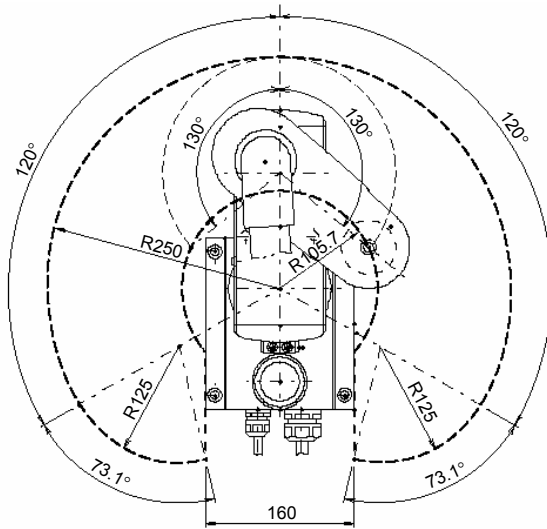


IX-NNC3515H (Arm Length 350, Clean Room Specification)



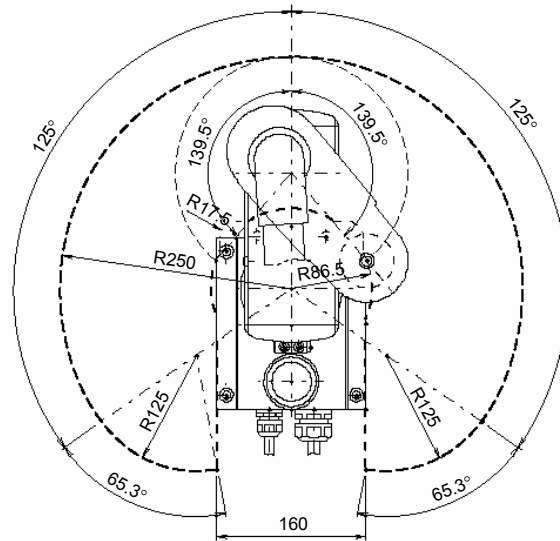
3. Robot Operation Area

IX-NNN2515H (Arm Length 250, Standard Specification)



Area of prohibited entry

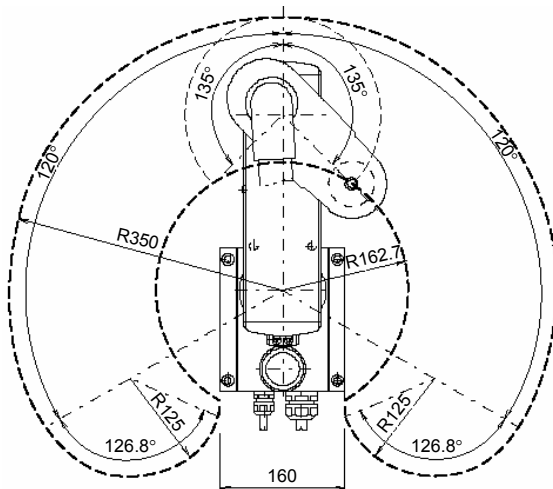
Movement range



Area of prohibited entry

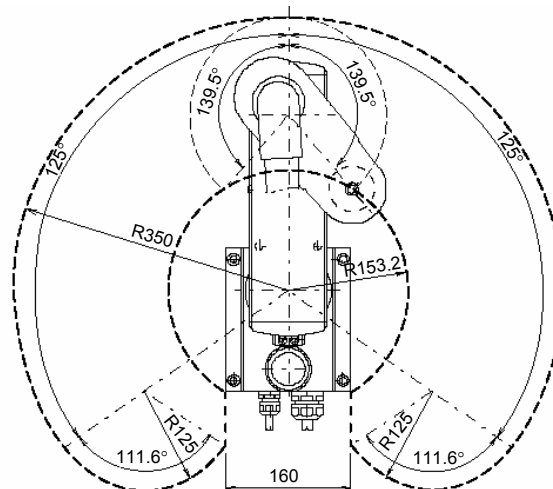
Mechanical stopper position

IX-NNN3515H (Arm Length 350, Standard Specification)



Area of prohibited entry

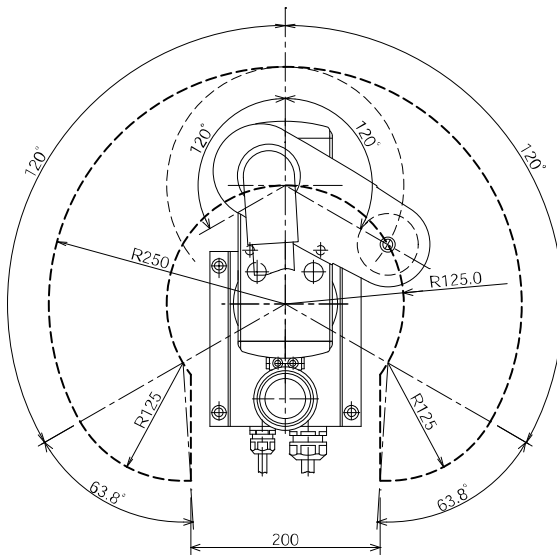
Movement range



Area of prohibited entry

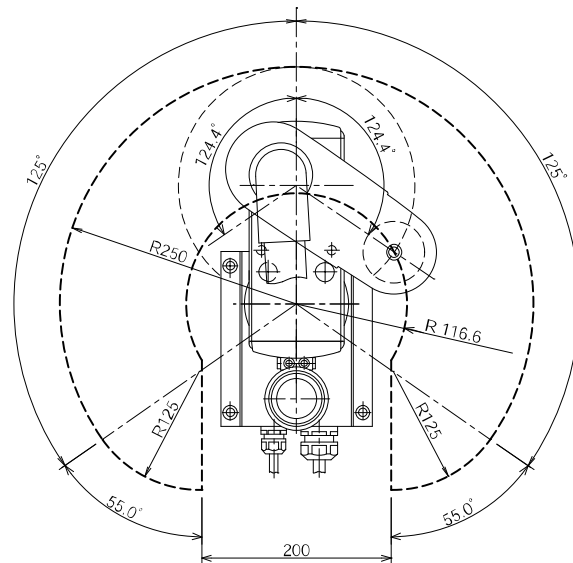
Mechanical stopper position

IX-NNW2515H (Arm Length 250, Dust-proof/Splash-proof Specification), IX-NNC2515H (Arm Length 250, Clean Room Specification)



Area of prohibited entry

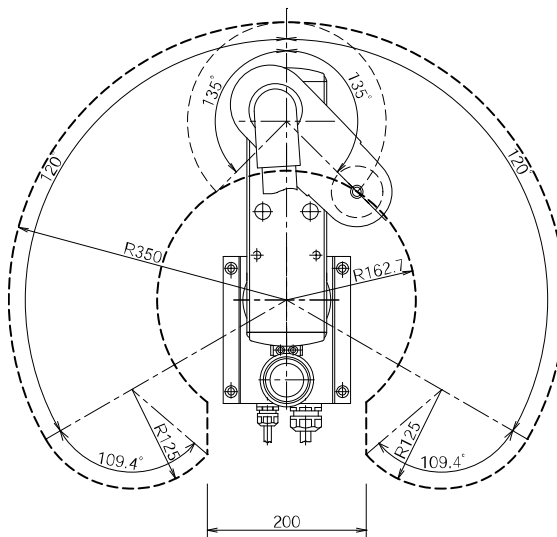
Movement range



Area of prohibited entry

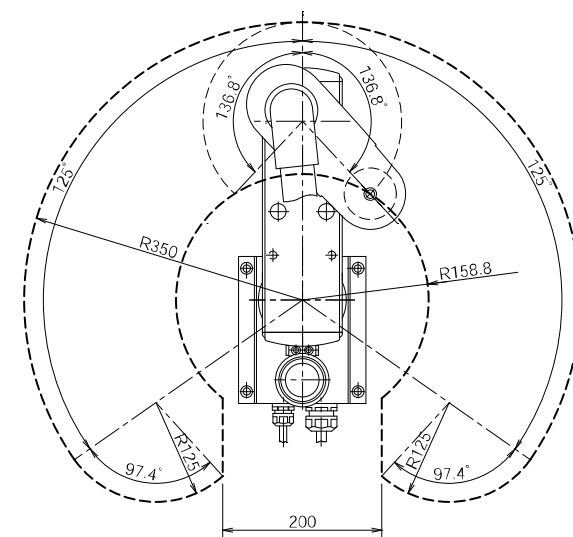
Mechanical stopper position

IX-NNW3515H (Arm Length 350, Dust-proof/Splash-proof Specification), IX-NNC3515H (Arm Length 350, Clean Room Specification)



Area of prohibited entry

Movement range



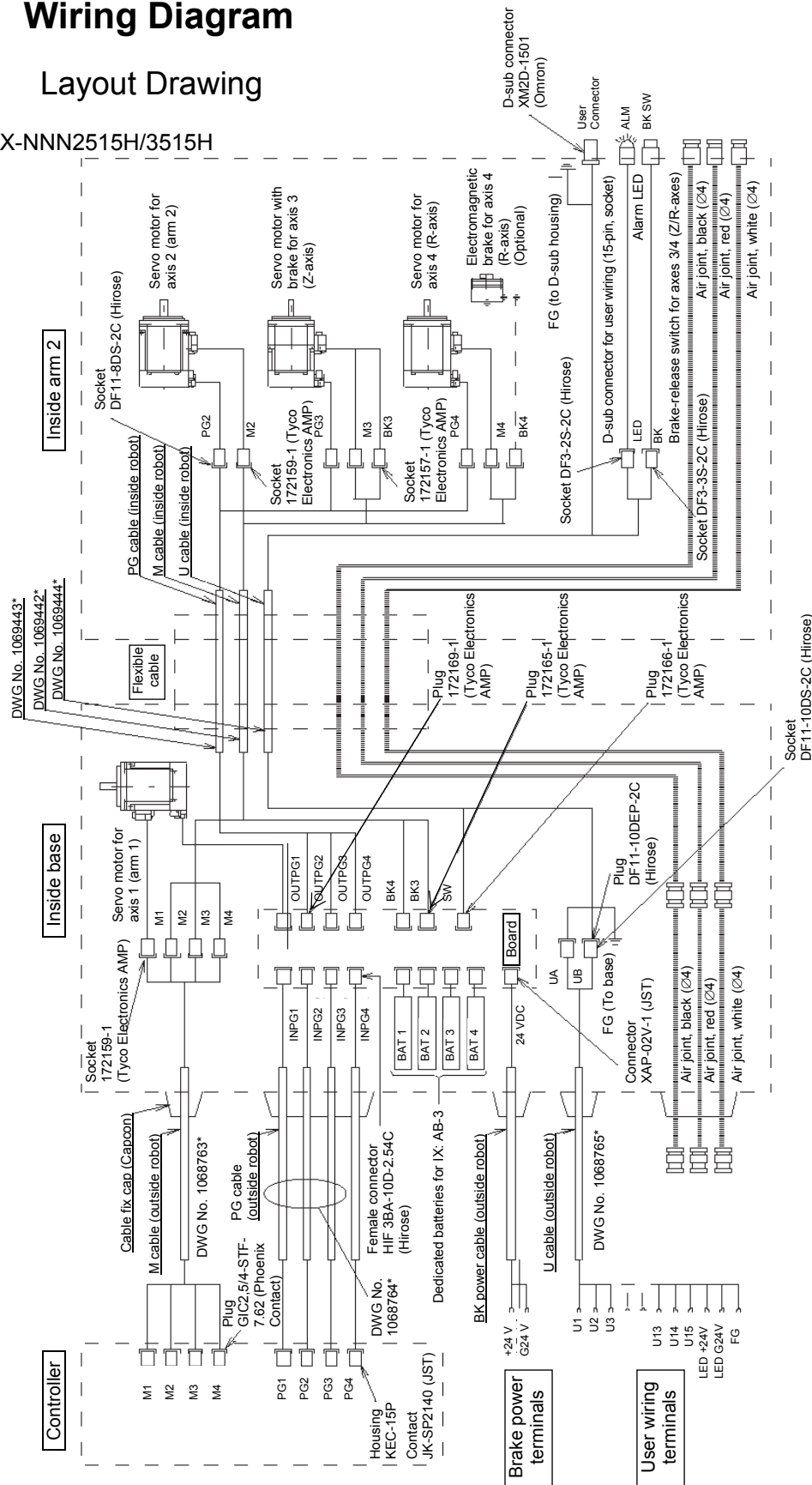
Area of prohibited entry

Mechanical stopper position

4. Wiring Diagram

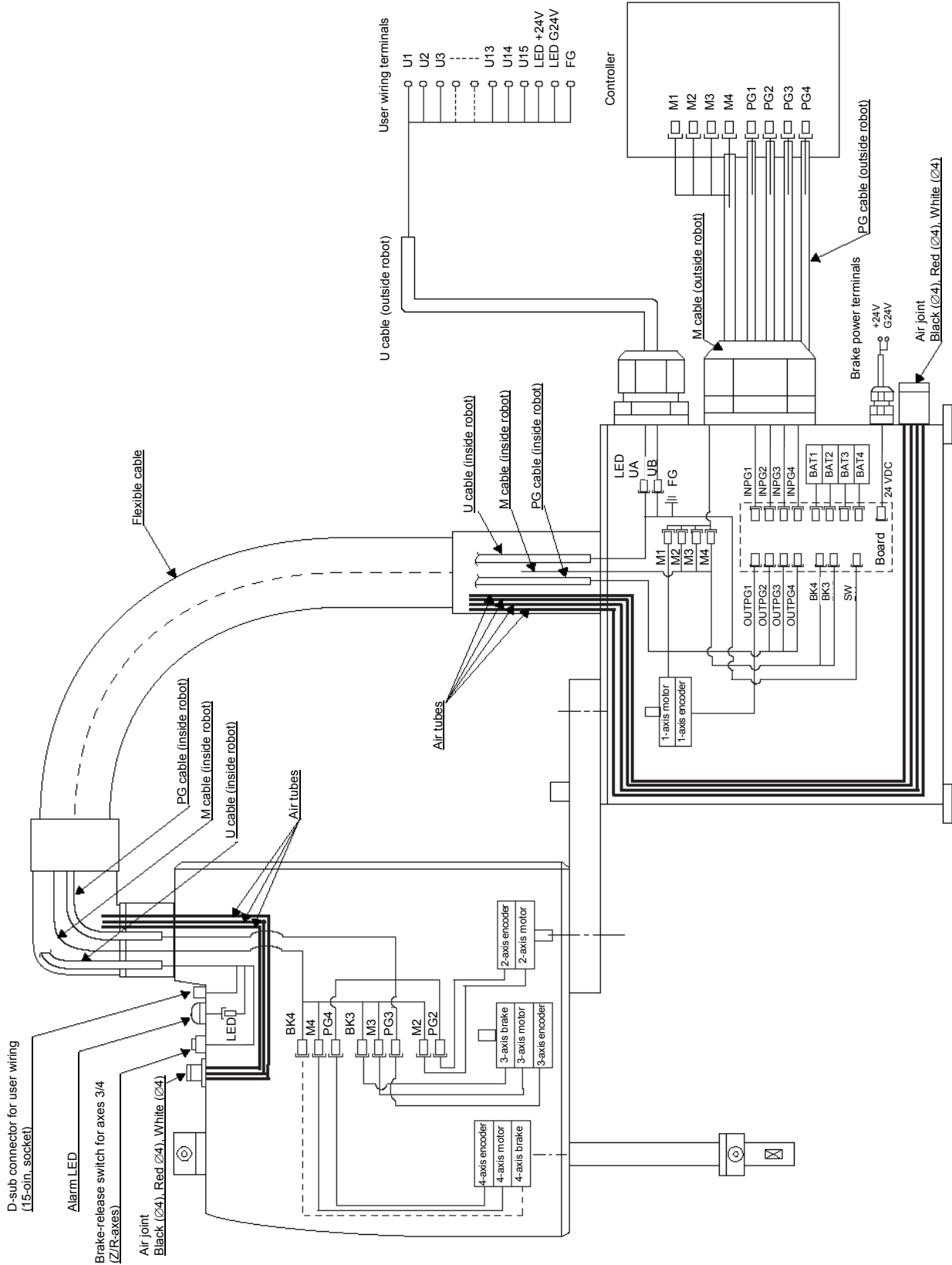
4.1 Layout Drawing

IX-NNN2515H/3515H



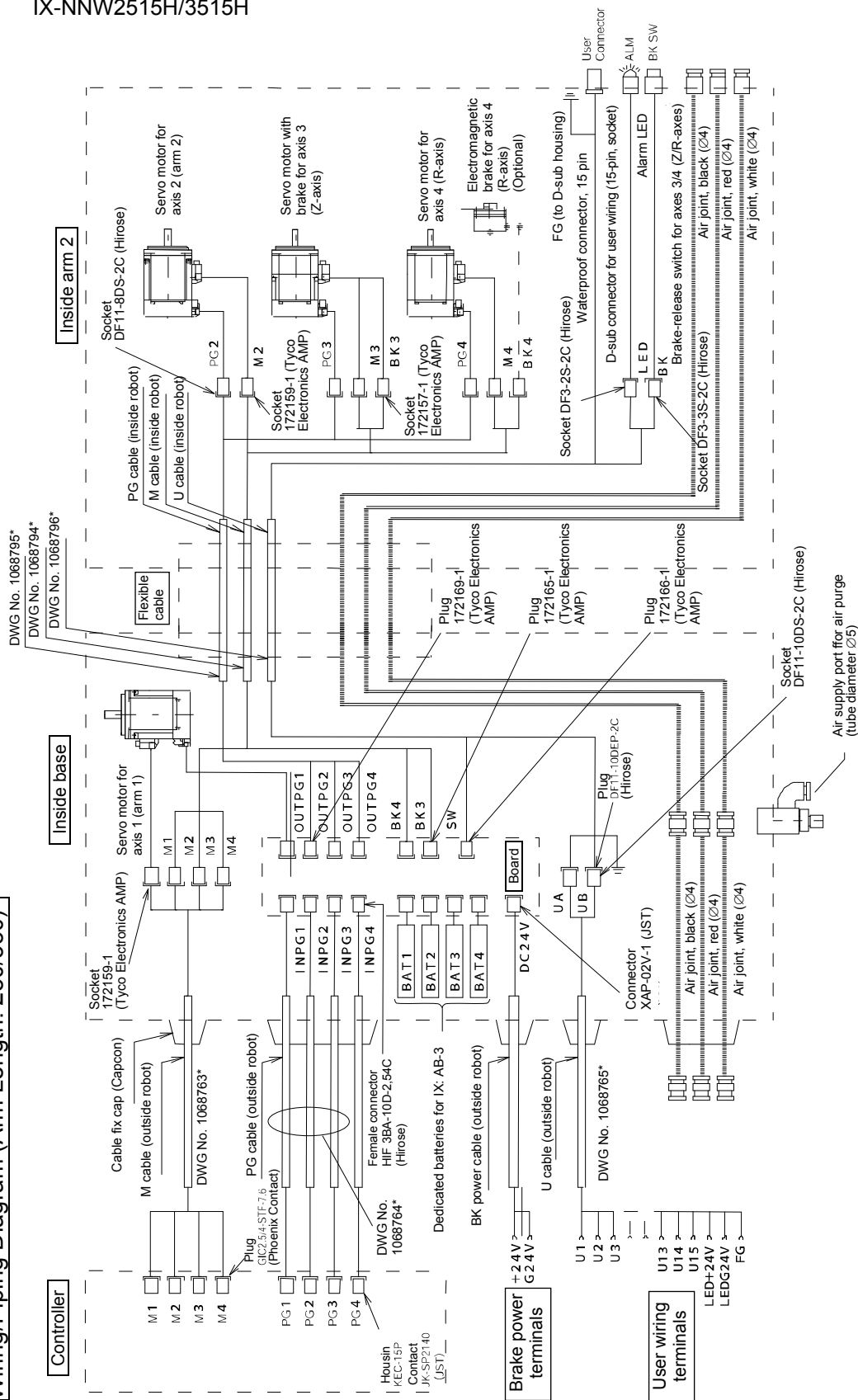
Notes

- (1) The actual layout of board connectors varies from this drawing.
- (2) Since the brake power circuit is provided on the primary side (high-voltage side), a dedicated 24 V power supply is required for this circuit. The 24 V power supply for I/O circuits used on the secondary side (low-voltage side) cannot be shared.
- (3) To operate the alarm LED, the user must provide a circuit that uses the controller I/O output signal.



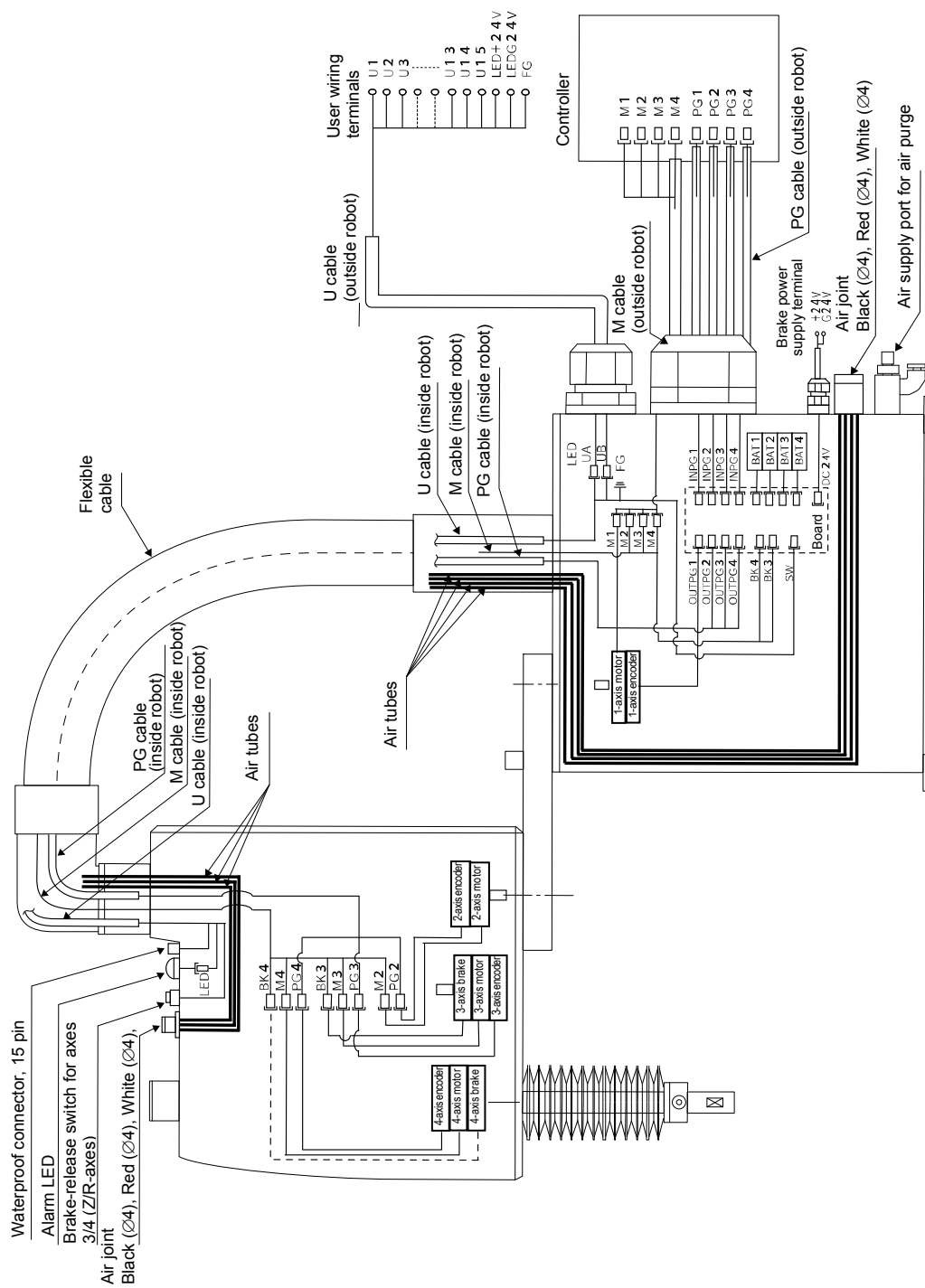
IX-NNW2515H/3515H

Wiring/Piping Diagram (Arm Length: 250/350)



Notes

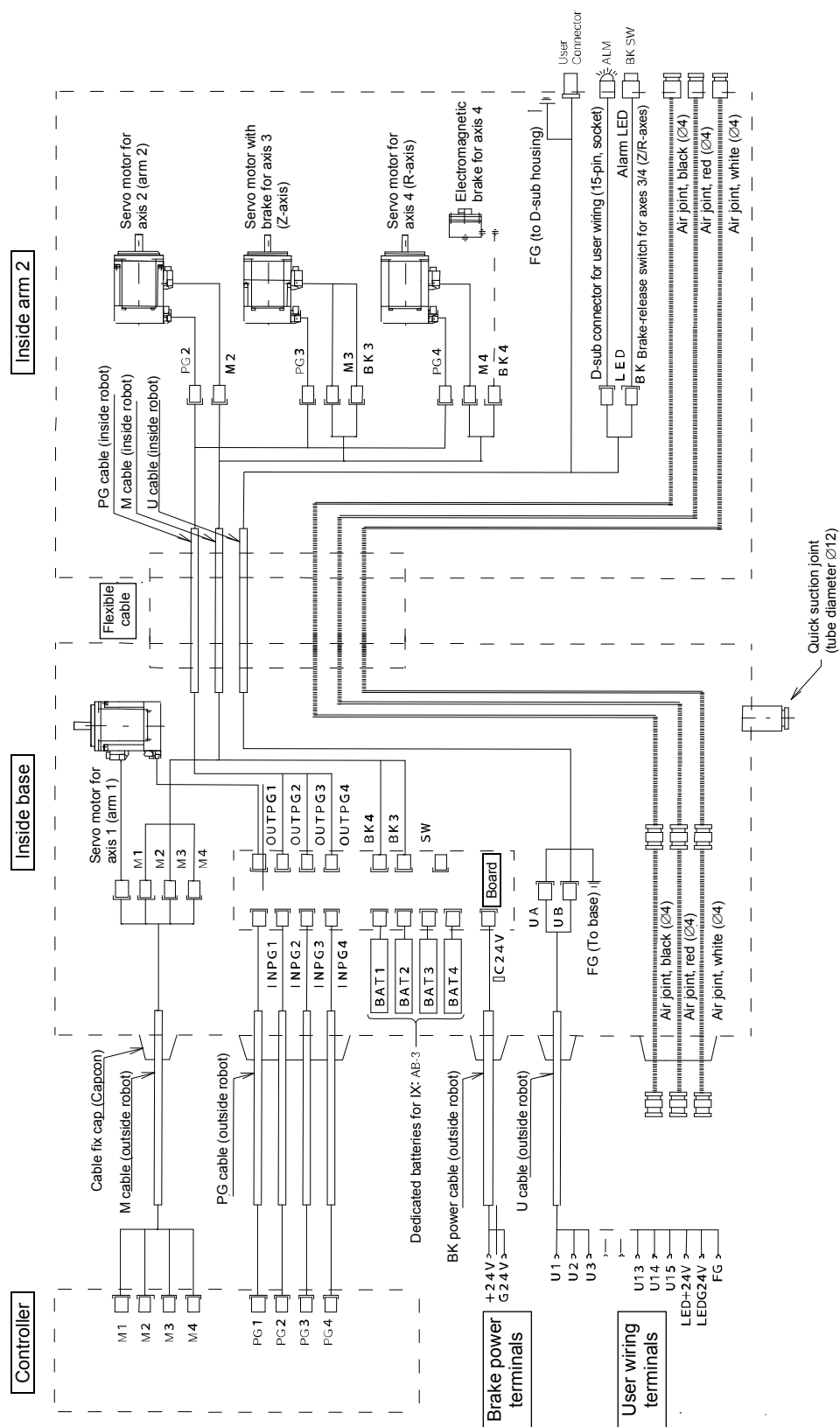
- The actual layout of board connectors varies from this drawing.
- Since the brake power circuit is provided on the primary side (high-voltage side), a dedicated 24 V power supply is required for this circuit.
- The 24 V power supply for I/O circuits used on the secondary side (low-voltage side) cannot be shared.
- To operate the alarm LED, the user must provide a circuit that uses the controller I/O output signal.
- The user connector is waterproof.
- FG is connected to pin 16 of the connector.



4. Wiring Diagram

4. Wiring Diagram

Wiring/Piping Diagram (Arm Length: 250/350)



- (1) The actual layout of board connectors varies from this drawing.
- (2) Since the brake power circuit is provided on the primary side (high-voltage side), a dedicated 24 V power supply is required for this circuit.
- (3) The 24 V power supply for I/O circuits used on the secondary side (low-voltage side) cannot be shared.

4.2 Machine Harness Wiring Table

IX-NNN2515H/3515H

(1) PG cables (inside robot)

DWG No. 1069443*

Base end

Arm end

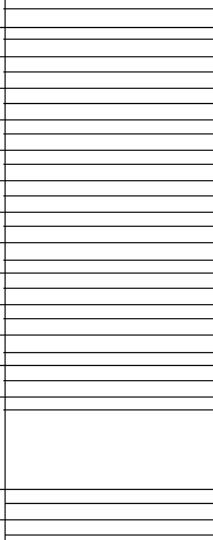
Tube symbol	Connector	Signal	Pin No.	Connection	Pin No	Signal	Connector	Tube symbol	ID No.	Cable
OUT PG2	Mini Universal MATE-N-LOK plug housing 172169-1 (by Tyco Electronics AMP)	BAT+	1		1	BAT+	Double-brazed crimp socket DF11-8DS-2C (by Hirose Electric)	PG2	Red	AWG22 (0.3 mm ²) shielded cable
		BAT-	2		2	BAT-			White	
		SD	3		3	SD			Red	
		-SD	4		4	-SD			White	
		Vcc	5		5	Vcc			Red	
		GND	6		6	GND			White	
		Shield	7		7	Shield			Green	
			8		8					
			9		9					
OUT PG3	Same as above	BAT+	1		1	BAT+	Same as above	PG3	Red	
		BAT-	2		2	BAT-			White	
		SD	3		3	SD			Red	
		-SD	4		4	-SD			White	
		Vcc	5		5	Vcc			Red	
		GND	6		6	GND			White	
		Shield	7		7	Shield			Green	
			8		8					
			9		9					
OUT PG4	Same as above	BAT+	1		1	BAT+	Same as above	PG4	Red	
		BAT-	2		2	BAT-			White	
		SD	3		3	SD			Red	
		-SD	4		4	-SD			White	
		Vcc	5		5	Vcc			Red	
		GND	6		6	GND			White	
		Shield	7		7	Shield			Green	
			8		8					
			9		9					

(2) M cables (inside robot)

DWG No. 1069442*

Base end

Arm end

Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
M2	Mini Universal MATE-N-LOK plug housing 172167-1 (by Tyco Electronics AMP)	U	1		1	U	Mini Universal MATE-N-LOK panel installation socket housing 172159-1 (by Tyco Electronics AMP)	U	1	Flexible cable 16 X AWG18
		V	2		2	V		V	2	
		W	3		3	W		W	3	
		C · G	4		4	C · G		C · G	4	
M3	Same as above	U	1		1	U	Same as above	U	5	
		V	2		2	V		V	6	
		W	3		3	W		W	7	
		C · G	4		4	C · G		C · G	8	
M4	Same as above	U	1		1	U	Same as above	U	9	
		V	2		2	V		V	10	
		W	3		3	W		W	11	
		C · G	4		4	C · G		C · G	12	
BK3	Mini Universal MATE-N-LOK plug housing 172165-1 (by Tyco Electronics AMP)	BK-	1		1	BK-	Mini Universal MATE-N-LOK panel installation socket housing 172157-1 (by Tyco Electronics AMP)	BK-	13	
		BK+	2		2	BK+		BK+	14	
BK4	Same as above	BK-	1		1	BK-	Same as above	BK-	15	
		BK+	2		2	BK+		BK+	16	

(3) UA and UB cables (outside robot)
Base end

DWG No. 1069444*
Arm end

Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
UA	Double-brazed relay plug DF11-10DEP-2C (by Hirose Electric)	U 1	1							

IX-NNW2515H/3515H

(1) PG cables (inside robot)

DWG No. 1068795*

Base end

Arm end

Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
OUT PG 2	Mini Universal MATE-N-LOK plug housing 172169-1 (by Tyco Electronics AMP)	BAT +	1		1	BAT +	Double-brazed crimp socket DF11-8DS-2C (by Hirose Electric)	PG 2	1R/sky blue	Flexible cable 10p x AWG26 Shielded cable
		BAT -	2		2	BAT -			1B/sky blue	
		SD	3		3	SD			1R/pink	
		-SD	4		4	-SD			1B/pink	
		Vcc	5		5	Vcc			1R/grass green	
		GND	6		6	GND			1B/grass green	
		Shield	7		7	Shield			Green	
			8		8					
			9		9					
OUT PG 3	Same as above	BAT +	1		1	BAT +	Same as above	PG 3	1R/orange	
		BAT -	2		2	BAT -			1B/orange	
		SD	3		3	SD			1R/gray	
		-SD	4		4	-SD			1B/gray	
		Vcc	5		5	Vcc			2R/sky blue	
		GND	6		6	GND			2B/sky blue	
		Shield	7		7	Shield			Green	
			8		8					
			9		9					
OUT PG 4	Same as above	BAT +	1		1	BAT +	Same as above	PG 4	2B/pink	
		BAT -	2		2	BAT -			2R/grass green	
		SD	3		3	SD			2B/grass green	
		-SD	4		4	-SD			2R/orange	
		Vcc	5		5	Vcc			2B/orange	
		GND	6		6	GND			Green	
		Shield	7		7	Shield				
			8		8					
			9		9					

(2) M cables (inside robot)

DWG No. 1068794*

Base end

Arm end

Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
M 2	Mini Universal MATE-N-LOK plug housing 172167-1 (by Tyco Electronics AMP)	U	1		1	U	Mini Universal MATE-N-LOK panel installation socket housing 172159-1 (by Tyco Electronics AMP)	U	1	Flexible cable 16 x AWG18
		V	2		2	V			2	
		W	3		3	W			3	
		C • G	4		4	C • G			4	
M 3	Same as above	U	1		1	U	Same as above	U	5	
		V	2		2	V			6	
		W	3		3	W			7	
		C • G	4		4	C • G			8	
M 4	Same as above	U	1		1	U	Same as above	U	9	
		V	2		2	V			10	
		W	3		3	W			11	
		C • G	4		4	C • G			12	
BK 3	Mini Universal MATE-N-LOK plug housing 172165-1 (by Tyco Electronics AMP)	BK -	1		1	BK -	Mini Universal MATE-N-LOK panel installation socket housing 172157-1 (by Tyco Electronics AMP)	BK -	13	
		BK +	2		2	BK +			14	
BK 4	Same as above	BK -	1		1	BK -	Same as above	BK -	15	
		BK +	2		2	BK +			16	

(3) UA and UB cables (outside robot)
Base end

DWG No. 1068796*
Arm end

Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
UA	Double brazed extension plug DF11-10DEP-2C (by Hirose Electric)	U 1	1		1	U 1	D-sub connector XM2D-1501 (by Omron)	—	1R/sky blue	Flexible cable 10p x AWG26 Shielded cable
		U 2	2		2	U 2			1B/sky blue	
		U 3	3		3	U 3			1R/pink	
		U 4	4		4	U 4			1B/pink	
		U 5	5		5	U 5			1R/grass green	
		U 6	6		6	U 6			1B/grass green	
		U 7	7		7	U 7			1R/orange	
		U 8	8		8	U 8			1B/orange	
		U 9	9		9	U 9			1R/gray	
		U 10	10		10	U 10			1B/gray	
UB		U 11	1		11	U 11	D-sub connector XM2D-1501 (by Omron)	—	2R/sky blue	
		U 12	2		12	U 12			2B/sky blue	
		U 13	3		13	U 13			2R/pink	
		U 14	4		14	U 14			2B/pink	
		U 15	5		15	U 15			2R/grass green	
		LED+24V	6			FG			Green	
		LEDG24V	7		1	LED+24V	Single-brazed crimp socket DF3-2S-2C (by Hirose Electric)	LED	2B/grass green	
		—	8		2	LEDG24V			2R/orange	
		—	9		1	BK 4	Single-brazed crimp socket DF3-3S-2C (by Hirose Electric)	BK	2B/orange	
		—	10		2	COM			2R/gray	
SW	Mini Universal MATE-N-LOK plug housing 172166-1 (by Tyco Electronics AMP)	BK 4	1		3	BK 3			2B/gray	
		COM	2							
		BK 3	3							
	Bare terminal (Y type) F0.3-4	FG	—							

4.3 Cable Wiring Table

IX-NNN2515H/3515H

(1) PG cables (outside robot)

DWG No. 1068764*

Robot end

Controller end

Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
INPG1 INPG2 INPG3 INPG4	Female crimp connector HIF3BA-10D-2.54C (by Hirose Electric)	BAT+	1		1	—	Housing KEC-15P (by JST)	PG1 PG2 PG3 PG4	—	4P× AWG26
		BAT—	2		2	—			—	
		SD	3		3	—			—	
		—SD	4		4	—			—	
		Vcc	5		5	—			—	
		GND	6		6	—			—	
		BK—	7		7	SD			Light gray 1 red	
		BK+	8		8	—SD			Light gray 1 black	
		FG	9		9	BAT+			Orange 1 red	
		—	10		10	BAT—			Orange 1 black	
					11	Vcc	Contact JK-SP2140 (by JST)		White 1 red	
					12	GND			White 1 black	
					13	BK—			Yellow 1 red	
					14	BK+			Yellow 1 black	
					15	—			—	
							Connector hood D13A (for 17HE-23150-C) (by DDK)			
							Hood			

(2) M cables (outside robot)

DWG No. 1068763*

Robot end

Controller end

Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
M 1	Mini Universal MATE-N-LOK panel installation socket housing 172159-1 (by Tyco Electronics AMP)	U	1		1	C • G	Reverse plug GIC2.5 4-STF-7.62 (by Phoenix Contact)	M 1	4	16× AWG18
		V	2		2	U			1	
		W	3		3	V			2	
		C • G	4		4	W			3	
M 2	Same as above	U	1		1	C • G	Same as above	M 2	8	
		V	2		2	U			5	
		W	3		3	V			6	
		C • G	4		4	W			7	
M 3	Same as above	U	1		1	C • G	Same as above	M 3	12	
		V	2		2	U			9	
		W	3		3	V			10	
		C • G	4		4	W			11	
M 4	Same as above	U	1		1	C • G	Same as above	M 4	16	
		V	2		2	U			13	
		W	3		3	V			14	
		C • G	4		4	W			15	

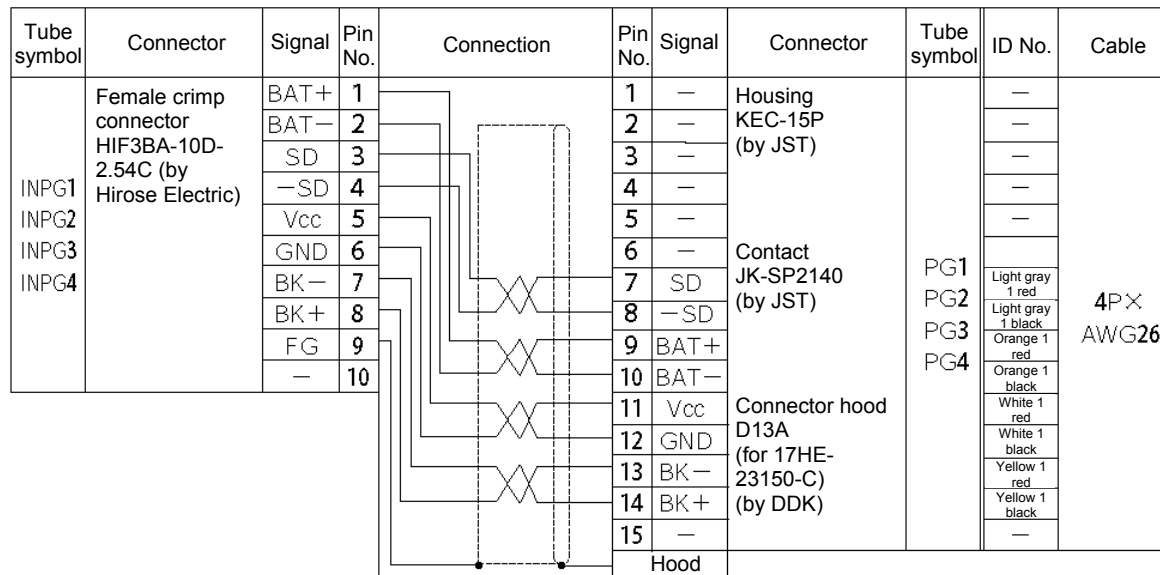
IX-NNW2515H/3515H

(1) PG cables (outside robot)

DWG No. 1068764*

Robot end

Controller end

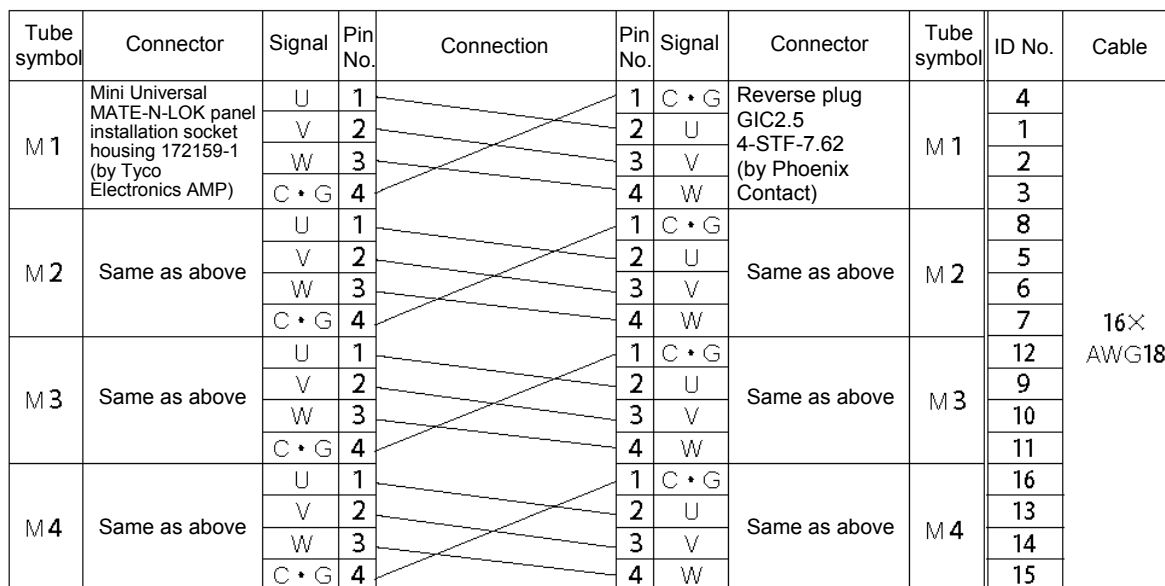


(2) M cables (outside robot)

DWG No. 1068763*

Robot end

Controller end



(3) UA and UB cables (outside robot)

DWG No. 1068765*

Robot end				Controller end						
Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
UA	Double-brazed crimp socket DF11-10DS-2C (by Hirose Electric)	U 1	1		1	U 1	Un-isolated terminal (Y type) F0.3-3	U 1	Orange 1 red	10P× AWG26
		U 2	2		2	U 2	Same as above	U 2	Orange 1 black	
		U 3	3		3	U 3	Same as above	U 3	Light gray 1 red	
		U 4	4		4	U 4	Same as above	U 4	Light gray 1 black	
		U 5	5		5	U 5	Same as above	U 5	White 1 red	
		U 6	6		6	U 6	Same as above	U 6	White 1 black	
		U 7	7		7	U 7	Same as above	U 7	Yellow 1 red	
		U 8	8		8	U 8	Same as above	U 8	Yellow 1 black	
		U 9	9		9	U 9	Same as above	U 9	Pink 1 red	
		U 10	10		10	U 10	Same as above	U 10	Pink 1 black	
UB	Same as above	U 11	1		11	U 11	Same as above	U 11	Orange 2 red	
		U 12	2		12	U 12	Same as above	U 12	Orange 2 black	
		U 13	3		13	U 13	Same as above	U 13	Light gray 2 red	
		U 14	4		14	U 14	Same as above	U 14	Light gray 2 black	
		U 15	5		15	U 15	Same as above	U 15	White 2 red	
		LED+24V	6		16	LED+24V	Same as above	LED+24V	White 2 black	
		LEDG24V	7		17	LEDG24V	Same as above	LEDG24V	Yellow 2 red	
		—	8		—	FG	Same as above	FG	Green	
		—	9							
		—	10							

(3) UA and UB cables (outside robot)

DWG No. 1068765*

Robot end					Controller end					
Tube symbol	Connector	Signal	Pin No.	Connection	Pin No.	Signal	Connector	Tube symbol	ID No.	Cable
UA	Double-brazed crimp socket DF11-10DS-2C (by Hirose Electric)	U 1	1		1	U 1	Un-isolated terminal (Y type) F0.3-3	U 1	Orange 1 red	10P× AWG26
		U 2	2		2	U 2	Same as above	U 2	Orange 1 black	
		U 3	3		3	U 3	Same as above	U 3	Light gray 1 red	
		U 4	4		4	U 4	Same as above	U 4	Light gray 1 black	
		U 5	5		5	U 5	Same as above	U 5	White 1 red	
		U 6	6		6	U 6	Same as above	U 6	White 1 black	
		U 7	7		7	U 7	Same as above	U 7	Yellow 1 red	
		U 8	8		8	U 8	Same as above	U 8	Yellow 1 black	
		U 9	9		9	U 9	Same as above	U 9	Pink 1 red	
		U 10	10		10	U 10	Same as above	U 10	Pink 1 black	
UB	Same as above	U 11	1		11	U 11	Same as above	U 11	Orange 2 red	
		U 12	2		12	U 12	Same as above	U 12	Orange 2 black	
		U 13	3		13	U 13	Same as above	U 13	Light gray 2 red	
		U 14	4		14	U 14	Same as above	U 14	Light gray 2 black	
		U 15	5		15	U 15	Same as above	U 15	White 2 red	
		LED+24V	6		16	LED+24V	Same as above	LED+24V	White 2 black	
		LEDG24V	7		17	LEDG24V	Same as above	LEDG24V	Yellow 2 red	
		—	8		—	FG	Same as above	FG	Green	
		—	9							
		—	10							

4.4 230 V Circuit Components

IX-NNN2515H/3515H, IX-NNC2515H/3515H, IX-NNW2515H/3515H

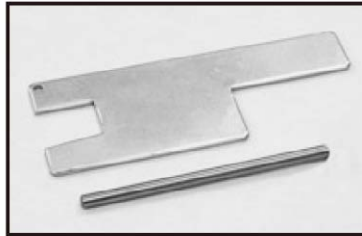
No.	Code name	Model number	Manufacturer	Remarks
1	Axis 1 servo motor	TS4607 N2027 E201	Tamagawa Seiki	AC servo motor, □ 60, 200 W, key groove, CE certified
2	Axis 2 servo motor	TS4606 N2044 E201		AC servo motor, □ 60, 100 W, key groove, CE certified
3	Axis 3 servo motor w/ brake	TS4606 N7044 E201		AC servo motor, □ 60, 100 W, w/ brake, round shaft, CE certified
4	Axis 4 servo motor	TS4602 N2044 E201		AC servo motor, □ 40, 50 W, key groove, CE certified
5	M cable (inside robot)		IAI	Wire: 300 V, 105°C (rated), AWG18 (0.84 mm ²), flexible cable, UL VW-1, c-UL FT-1
6	M cable (outside robot)		IAI	Wire: 300 V, 80°C (rated), AWG18 (0.89 mm ²), oil-resistant cable, UL VW-1, c-UL FT-1

5. Option

5.1 Absolute Reset Jig

This jig is used to perform an absolute reset in the event that absolute data in the encoder was lost.

Model number	Remarks
JG-2	For arm length 250/350

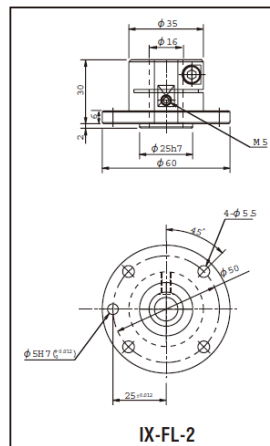


JG-2

5.2 Flange

This flange is used to install a load at the end of the Z-axis arm.

Model number	Remarks
IX-FL-2	For arm length 250/350



5.3 Absolute Data Backup Battery

This battery is used to retain absolute data in the encoder. (Set the battery inside the cover of the SCARA robot.)

Model number	Remarks
AB-3	For arm length 250 ~ 800

* Four batteries are needed for each robot (all SCARA robot models). Since AB-3 batteries are packed individually, specify the required number in your order.



AB-3

5.4 Cable Joint Type (Model: JY)

Motor cable, encoder cable, user cable and brake cable can be disconnected.

The cables to connect with the actuator cable out of the body for approx. 30cm are 5.4.1 to 5.4.4 below.

(Note) The joint cables for dust/splash proof type are the same ones as the standard.

The connectors are not water-proof.

Protect the connectors so then would not be exposed to ingress of liquid such as water or dust.

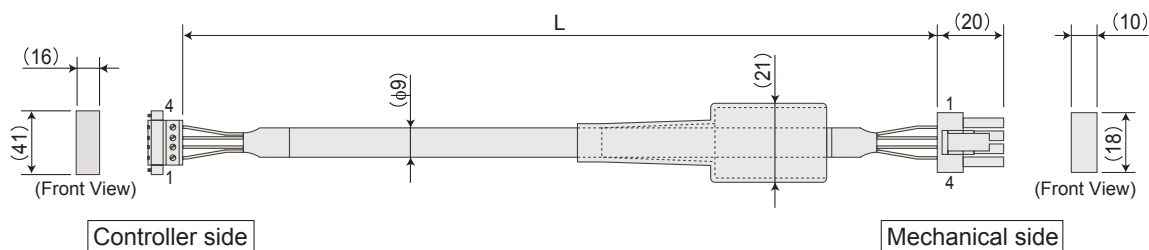
5.4.1 Motor Cable

Connect between the four motor cables out of body for approx. 30cm and the controller with the four motor cables.

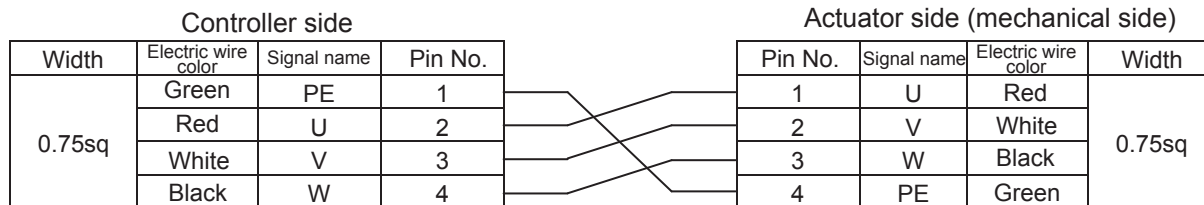
Model: CB-X-MA050 or CB-X-MA100

Length L: 5m in case cable length in model code is 5L

10m in case cable length in model code is 10L



Conection Diagram



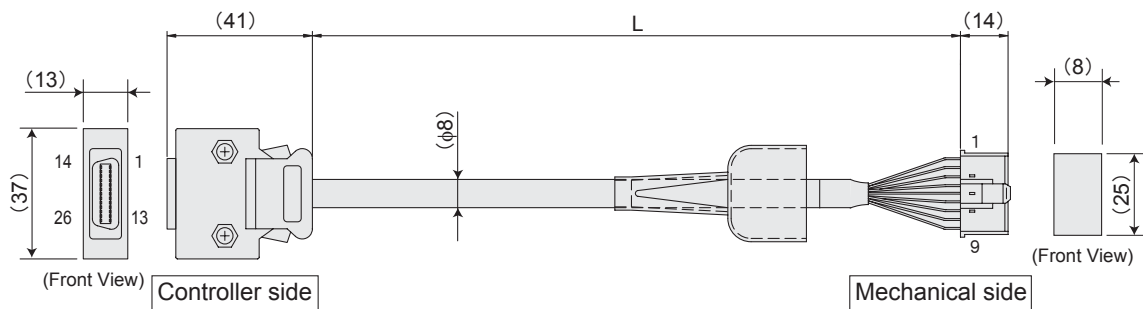
5.4.2 Encoder Cable

Connect between the four motor cables out of body for approx. 30cm and the controller with the four motor cables.

Model: CB-X1-PA050 or CB-X1-PA100

Length L: 5m in case cable length in model code is 5L

10m in case cable length in model code is 10L



Conection Diagram

Controller side

Width	Electric wire color	Signal name	Pin No.
AWG26	—	—	10
AWG26	—	—	11
AWG26	—	E24V	12
AWG26	—	0V	26
AWG26	—	LS	25
AWG26	—	CLEEP	24
AWG26	—	OT	23
AWG26	—	RSV	9
AWG26	—	—	18
AWG26	—	—	19
AWG26	—	A+	1
AWG26	—	A-	2
AWG26	—	B+	3
AWG26	—	B-	4
AWG26	—	Z+	5
AWG26	—	Z-	6
AWG26	Orange	SRD+	7
AWG26	Green	SRD-	8
AWG26	Purple	BAT+	14
AWG26	Gray	BAT-	15
AWG26	Red	Vcc	16
AWG26	Black	GND	17
AWG26	Blue	BKR-	20
AWG26	Yellow	BKR+	21
AWG26	—	—	22

Clamping connection to shield or hood

Actuator side (mechanical side)

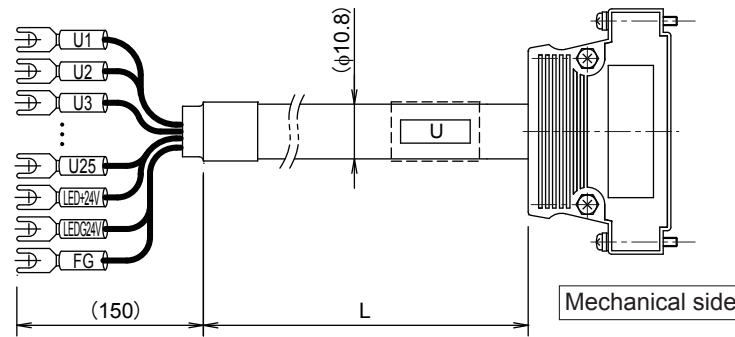
Pin No.	Signal name	Electric wire color	Width
1	BAT+	Black	AWG26
2	BAT-	Yellow	AWG26
3	SD	Blue	AWG26
4	SD	Orange	AWG26
5	Vcc	Green	AWG26
6	GND	Brown	AWG26
7	FG	Drain	AWG26
8	BK-	Gray	AWG26
9	BK+	Red	AWG26

5.4.3 User Cable

Model: CB-IX-USR050-CS2 or CB-IX-USR100-CS2

Length L: 5m in case cable length in model code is 5L

10m in case cable length in model code is 10L



Conection Diagram

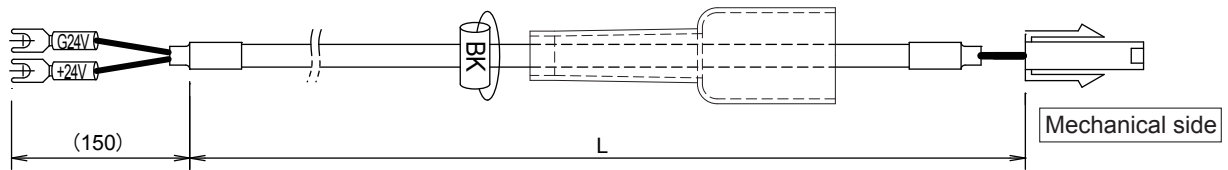
				Actuator side (mechanical side)				
Width	Electric wire color	Signal name	Pin No.		Pin No.	Signal name	Electric wire color	Width
AWG26	1B/Sky Blue	U1	1		1	U1	1B/Sky Blue	AWG26
AWG26	1R/Sky Blue	U2	2		2	U2	1R/Sky Blue	AWG26
AWG26	1B/Pink	U3	3		3	U3	1B/Pink	AWG26
AWG26	1R/Pink	U4	4		4	U4	1R/Pink	AWG26
AWG26	1B/Light Green	U5	5		5	U5	1B/Light Green	AWG26
AWG26	1R/Light Green	U6	6		6	U6	1R/Light Green	AWG26
AWG26	1B/Orange	U7	7		7	U7	1B/Orange	AWG26
AWG26	1R/Orange	U8	8		8	U8	1R/Orange	AWG26
AWG26	1B/Gray	U9	9		9	U9	1B/Gray	AWG26
AWG26	1R/Gray	U10	10		10	U10	1R/Gray	AWG26
AWG26	2B/Sky Blue	U11	11		11	U11	2B/Sky Blue	AWG26
AWG26	2R/Sky Blue	U12	12		12	U12	2R/Sky Blue	AWG26
AWG26	2B/Pink	U13	13		13	U13	2B/Pink	AWG26
AWG26	2R/Pink	U14	14		14	U14	2R/Pink	AWG26
AWG26	2B/Light Green	U15	15		15	U15	2B/Light Green	AWG26
AWG26	2R/Light Green	U16	16		16	U16	2R/Light Green	AWG26
AWG26	2B/Orange	U17	17		17	U17	2B/Orange	AWG26
AWG26	2R/Orange	U18	18		18	U18	2R/Orange	AWG26
AWG26	2B/Gray	U19	19		19	U19	2B/Gray	AWG26
AWG26	2R/Gray	U20	20		20	U20	2R/Gray	AWG26
AWG26	3B/Sky Blue	U21	21		21	U21	3B/Sky Blue	AWG26
AWG26	3R/Sky Blue	U22	22		22	U22	3R/Sky Blue	AWG26
AWG26	3B/Pink	U23	23		23	U23	3B/Pink	AWG26
AWG26	3R/Pink	U24	24		24	U24	3R/Pink	AWG26
AWG26	3B/Light Green	U25	25		25	U25	3B/Light Green	AWG26
AWG26	3R/Light Green	LED+24V	36		36	LED+24V	3R/Light Green	AWG26
AWG26	3B/Orange	LEDG24V	37		37	LEDG24V	3B/Orange	AWG26
FG	Green	FG	—	Clamping connection to braid or hood				

5.4.4 Brake Cable

Model: CB-IX-BK050-CS2 or CB-IX-BK100-CS2

Length L: 5m in case cable length in model code is 5L

10m in case cable length in model code is 10L



Conection Diagram

Width	Electric wire color	Signal name	Pin No.
AWG24	Sky Blue	G24V	1
AWG24	Pink	+24V	2

Actuator side (mechanical side)

Pin No.	Signal name	Electric wire color	Width
1	G24V	Sky Blue	AWG24
2	+24V	Pink	AWG24

6. Checking after Unpacking

After unpacking the carton, check the condition of the product and items included in the carton.

6.1 Items Included in the Carton

IX-NNN2515H/3515H

No.	Item	Model number	Remarks
1	Robot	Refer to "How to Read Model Nameplate" and "How to Read Model Number."	
2	Controller		
Accessories			
3	Eyebolt		
4	D-sub connector (XMA3 Plug, Solder Cup Terminal)	XM3A-1521 (Omron)	
5	Hood set (for D-sub connector) (XM2S Hood)	XM2S-1511 (Omron)	
6	Caution label		
7	Positioning label		
8	PIO flat cable	CB-X-PIO□□□	□□□ indicates the cable length
9	First step-by-step guide		
10	Operation manual (CD/DVD)		
11	Safety guide		

IX-NNW2515H/3515H

No.	Item	Model number	Remarks
1	Robot	Refer to "How to Read Model Nameplate" and "How to Read Model Number."	
2	Controller		
Accessories			
3	Eyebolt		
4	Water-proof connector		
5	Hood set (for water-proof connector)	NJW-2416-PM15 (Nanaboshi Electric Mfg.)	
6	Caution label		
7	Positioning label		
8	PIO flat cable	CB-X-PIO□□□	□□□ indicates the cable length
9	First step-by-step guide		
10	Operation manual (CD/DVD)		
11	Safety guide		

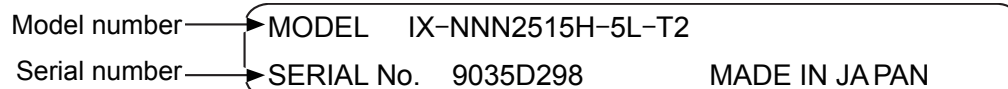
IX-NNC2515H/3515H

No.	Item	Model number	Remarks
1	Robot	Refer to "How to Read Model Nameplate" and "How to Read Model Number."	
2	Controller		
Accessories			
3	Eyebolt		
4	D-sub connector (XMA3 Plug, Solder Cup Terminal)	XM3A-1521 (Omron)	
5	Hood set (for D-sub connector) (XM2S Hood)	XM2S-1511 (Omron)	
6	Caution label		
7	Positioning label		
8	PIO flat cable	CB-X-PIO□□□	□□□ indicates the cable length
9	First step-by-step guide		
10	Operation manual (CD/DVD)		
11	Safety guide		

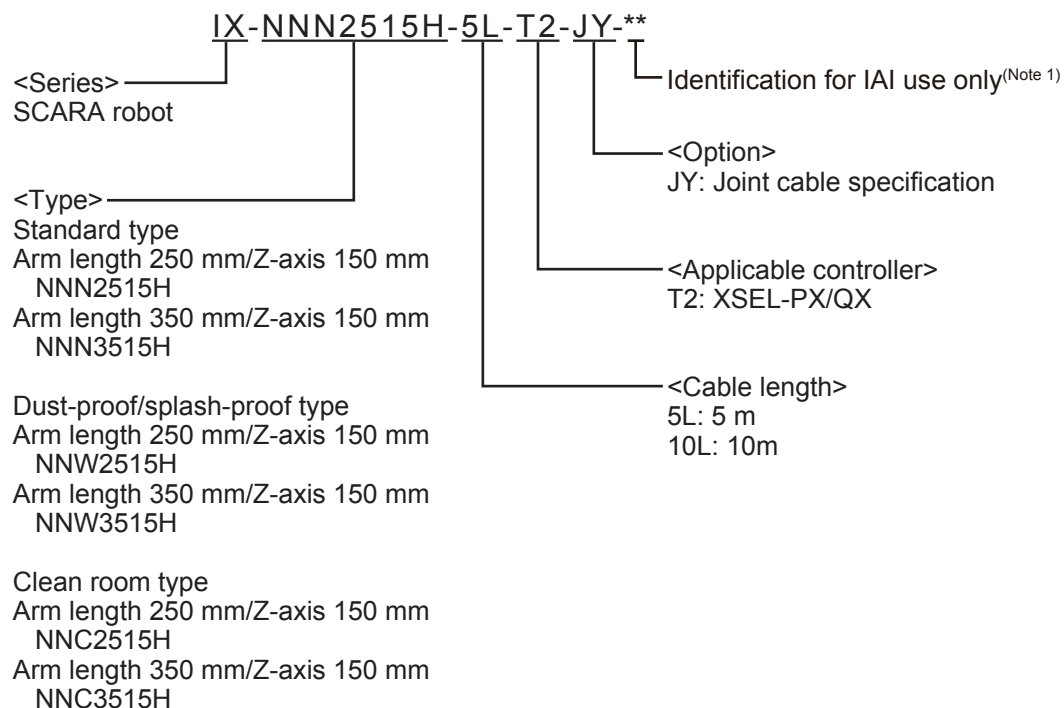
6.2 Operation Manuals Relating to This Product

No.	Item	Control No.
1	Operation Manual for XSEL-PX/QX Controller	ME0152
2	Operation Manual for XSEL-R/S/RX/SX/RXD/SXD Controller	ME0313
3	Operation Manual for XSEL Controller P/Q/PX/QX – RC Gateway Function	ME0188
4	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
5	Operation Manual for Teaching Pendant SEL-T/TD/TG	ME0183
6	Operation Manual for Teaching Pendant IA-T-X/XD	ME0160
7	Operation Manual for DeviceNet	ME0124
8	Operation Manual for CC-Link	ME0123
9	Operation Manual for PROFIBUS	ME0153
10	Operation Manual for X-SEL Ethernet	ME0140
11	Operation Manual for Multi-point I/O Board	ME0138
12	Operation Manual for Dedicated Terminal Block for Multi-point I/O Board	ME0139
13	Operation Manual for IA Net	ME0307

6.3 How to Read Model Nameplate



6.4 How to Read Model Number



Note 1 This may be displayed for the manufacturing reason.
(This is not to indicate the manufacturing model code.)

7. Specifications

7.1 IX-NNN2515H/3515H

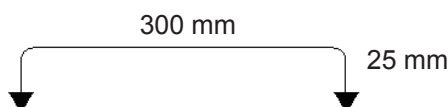
IX-NNN2515H (Arm Length 250, Standard Specification)

Item			Specifications
Type			IX-NNN2515H-□□L-T1
Degree of freedom			Four degrees of freedom
Overall arm length	mm		250
Arm 1 length			125
Arm 2 length			125
Drive method	Axis 1 (arm 1)		AC servo motor + Speed reducer
	Axis 2 (arm 2)		AC servo motor + Speed reducer
	Axis 3 (vertical axis)		AC servo motor with brake + Belt + Ball-screw spline
	Axis 4 (rotational axis)		AC servo motor + Belt + Reduction gear + Spline
Motor capacity	Axis 1 (arm 1)	W	200
	Axis 2 (arm 2)		100
	Axis 3 (vertical axis)		100
	Axis 4 (rotational axis)		50
Movement range	Axis 1 (arm 1)	degree	±120
	Axis 2 (arm 2)	degree	±130
	Axis 3 (vertical axis) (*1)	mm	150
	Axis 4 (rotational axis)	degree	±360
Maximum operating speed (*2)	Axis 1 + Axis 2 (maximum composite speed)	mm/sec	3191
	Axis 3 (vertical axis)		1316
	Axis 4 (rotational axis)	degree/sec	1600
Positioning repeatability precision (*3)	Axis 1 + Axis 2	mm	±0.010
	Axis 3 (vertical axis)		±0.010
	Axis 4 (rotational axis)	degree	±0.005
Standard cycle time (*4)		sec	0.40/2 kg
Loading capacity	Rated	kg	1
	Maximum		3
Push-in thrust of axis 3 (vertical axis)	Dynamic (*5)	N (kgf)	110.6 (11.2) Push torque limit value: 70%
	Static (*6)		21.0 (2.1) Push torque limit value: 20%
Permissible load on axis 4	Permissible moment of inertia (*7)	kg•m ²	0.015
	Permissible torque	N•m (kgf•cm)	1.9 (19.5)
Permissible tool diameter (*8)		mm	80
Home detection			Absolute
User wiring			D-sub 15-pin connector with 15-core AWG26 shielded cable (socket)
Alarm indicator (*9)			One small, red LED indicator (rated voltage: 24 V)

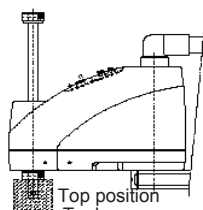
Item			Specifications
User piping			Three air tubes (outer diameter: $\phi 4$, inner diameter: $\phi 2.5$) (normal service pressure: 0.8 MPa)
Operating environment	Surrounding air temperature/humidity		Temperature: 0 to 40°C, humidity: 20 to 85%RH or less (non-condensing)
	Altitude	m	1,000 or less
Noise		dB	71
Robot weight		kg	17.1
Brake power source for main unit		W	DC24V110% 20W
Controller	Power supply		230 V 50/60 Hz 5 A
	Allowable supply voltage fluctuation	%	± 10
	Overvoltage category (IEC60664-1)		Category III
	Pollution degree (IEC60664-1)		Pollution degree 3

- *1: To move the robot horizontally at high speed, perform teaching so that the vertical axis stays as close to the top position as possible. (Fig. 1)
To operate the robot with its vertical axis at the bottom position, the speed and acceleration must be reduced as appropriate. (Fig. 2)
- *2: Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- *3: Positioning precision when the robot is operated repeatedly to one specified position from the same starting position at the same speed and acceleration/deceleration using the same arm (at a constant surrounding air temperature of 20°C). Take note that this is not the absolute positioning precision. Also note that the positioning repeatability may deviate from the specified value if the arm is changed, positioning is performed to one specified position from multiple positions, or any of the operating conditions such as operating speed and acceleration/deceleration setting is changed.
- *4: Measured when the robot is operated at the maximum speed, carrying a load of 2 kg.
This cycle time assumes a reciprocating operation involving a vertical travel of 25 mm and horizontal travel of 300 mm. (Rough positioning)

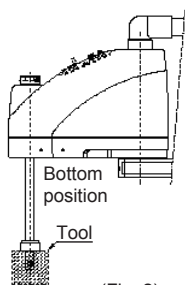
Note: Continuous operation at the maximum speed is not feasible.



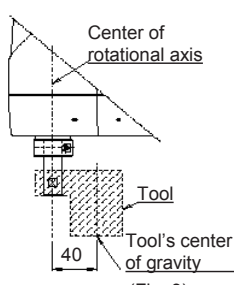
- *5: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 70%.
- *6: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 20%. Although this parameter can be set to a desired value from 15 to 70%, push force will not stabilize if the set value is outside the range of 20 to 70%.
- *7: The permissible moment of inertia converted to a value at the rotational center of axis 4. The offset from the rotational center of axis 4 to the tool's center of gravity is assumed to be 40 mm or less. (Fig. 3)
If the tool's center of gravity is further away from the rotational center of axis 4, the speed and acceleration must be reduced as appropriate.
- *8: If the tool exceeds the permissible diameter, it will contact the robot inside the robot's range of movement. (Fig. 4)
- *9: To enable the alarm LED indicator, the user must provide a circuit that supplies 24 VDC to the LED terminal in the user connector in response to the controller I/O output signal, etc.



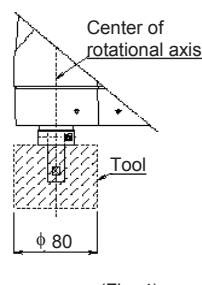
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

Reference design standards: Annex I to Machine Directives, EN292-1, EN292-2, EN1050, EN60204-1, EN775

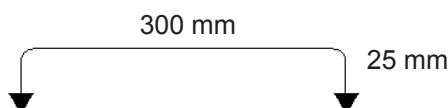
IX-NNN3515H (Arm Length 350, Standard Specification)

Item			Specifications
Type			IX-NNN3515H-□□L-T1
Degree of freedom			Four degrees of freedom
Overall arm length	mm		350
Arm 1 length			225
Arm 2 length			125
Drive method	Axis 1 (arm 1)		AC servo motor + Speed reducer
	Axis 2 (arm 2)		AC servo motor + Speed reducer
	Axis 3 (vertical axis)		AC servo motor with brake + Belt + Ball-screw spline
	Axis 4 (rotational axis)		AC servo motor + Belt + Reduction gear + Spline
Motor capacity	Axis 1 (arm 1)	W	200
	Axis 2 (arm 2)		100
	Axis 3 (vertical axis)		100
	Axis 4 (rotational axis)		50
Movement range	Axis 1 (arm 1)	degree	±120
	Axis 2 (arm 2)	degree	±135
	Axis 3 (vertical axis) (*1)	mm	150
	Axis 4 (rotational axis)	degree	±360
Maximum operating speed (*2)	Axis 1 + Axis 2 (maximum composite speed)	mm/sec	4042
	Axis 3 (vertical axis)	mm/sec	1318
	Axis 4 (rotational axis)	degree/sec	1600
Positioning repeatability precision (*3)	Axis 1 + Axis 2	mm	±0.010
	Axis 3 (vertical axis)		±0.010
	Axis 4 (rotational axis)	degree	±0.005
Standard cycle time (*4)		sec	0.42/2 kg
Loading capacity	Rated	kg	1
	Maximum		3
Push-in thrust of axis 3 (vertical axis)	Dynamic (*5)	N (kgf)	110.6 (11.2) Push torque limit value: 70%
	Static (*6)		21.0 (2.1) Push torque limit value: 20%
Permissible load on axis 4	Permissible moment of inertia (*7)	kg•m ²	0.015
	Permissible torque	N•m (kgf•cm)	1.9 (19.5)
Permissible tool diameter (*8)		mm	80
Home detection			Absolute
User wiring			D-sub 15-pin connector with 15-core AWG26 shielded cable (socket)
Alarm indicator (*9)			One small, red LED indicator (rated voltage: 24 V)
User piping			Three air tubes (outer diameter: φ 4, inner diameter: φ 2.5) (normal service pressure: 0.8 MPa)

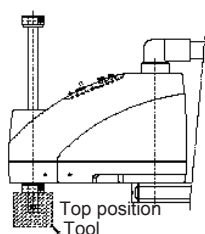
Item		Specifications	
Operating environment	Surrounding air temperature/humidity	Temperature: 0 to 40°C, humidity: 20 to 85%RH or less (non-condensing)	
	Altitude	m	1,000 or less
Noise		dB	71
Robot weight		kg	18.2
Brake power source for main unit		W	DC24V110% 20W
Controller	Power supply		230 V 50/60 Hz 5 A
	Allowable supply voltage fluctuation	%	±10
	Overvoltage category (IEC60664-1)		Category III
	Pollution degree (IEC60664-1)		Pollution degree 3

- *1: To move the robot horizontally at high speed, perform teaching so that the vertical axis stays as close to the top position as possible. (Fig. 1)
To operate the robot with its vertical axis at the bottom position, the speed and acceleration must be reduced as appropriate. (Fig. 2)
- *2: Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- *3: Positioning precision when the robot is operated repeatedly to one specified position from the same starting position at the same speed and acceleration/deceleration using the same arm (at a constant surrounding air temperature of 20°C). Take note that this is not the absolute positioning precision. Also note that the positioning repeatability may deviate from the specified value if the arm is changed, positioning is performed to one specified position from multiple positions, or any of the operating conditions such as operating speed and acceleration/deceleration setting is changed.
- *4: Measured when the robot is operated at the maximum speed, carrying a load of 2 kg.
This cycle time assumes a reciprocating operation involving a vertical travel of 25 mm and horizontal travel of 300 mm. (Rough positioning)

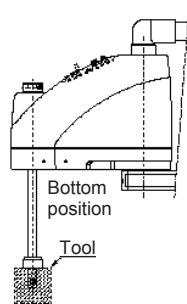
Note: Continuous operation at the maximum speed is not feasible.



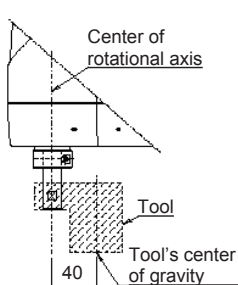
- *5: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 70%.
- *6: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 20%. Although this parameter can be set to a desired value from 15 to 70%, push force will not stabilize if the set value is outside the range of 20 to 70%.
- *7: The permissible moment of inertia converted to a value at the rotational center of axis 4. The offset from the rotational center of axis 4 to the tool's center of gravity is assumed to be 40 mm or less. (Fig. 3)
If the tool's center of gravity is further away from the rotational center of axis 4, the speed and acceleration must be reduced as appropriate.
- *8: If the tool exceeds the permissible diameter, it will contact the robot inside the robot's range of movement. (Fig. 4)
- *9: To enable the alarm LED indicator, the user must provide a circuit that supplies 24 VDC to the LED terminal in the user connector in response to the controller I/O output signal, etc.



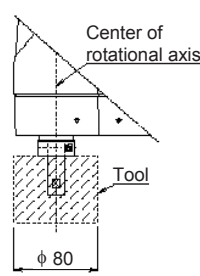
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

Reference design standards: Annex I to Machine Directives, EN292-1, EN292-2, EN1050, EN60204-1, EN775

7.2 IX-NNW2515H/3515H

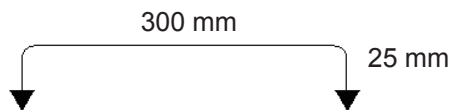
IX-NNW2515H (Arm Length 250, Dust-proof/Splash-proof Specification)

Item			Specifications
Type			IX-NNW2515H-□□L-T1
Dust-proof/splash proof performance (*12)			IP65 or equivalent
Degree of freedom			Four degrees of freedom
Overall arm length		mm	250
Arm 1 length			125
Arm 2 length			125
Drive method	Axis 1 (arm 1)		AC servo motor + Speed reducer
	Axis 2 (arm 2)		AC servo motor + Speed reducer
	Axis 3 (vertical axis)		AC servo motor with brake + Belt + Ball-screw spline
	Axis 4 (rotational axis)		AC servo motor + Belt + Reduction gear + Spline
Motor capacity	Axis 1 (arm 1)	W	200
	Axis 2 (arm 2)		100
	Axis 3 (vertical axis)		100
	Axis 4 (rotational axis)		50
Movement range	Axis 1 (arm 1)	degree	±120
	Axis 2 (arm 2)		±120
	Axis 3 (vertical axis) (*1)	mm	150
	Axis 4 (rotational axis)	degree	±360
Maximum operating speed (*2)	Axis 1 + Axis 2 (maximum composite speed)	mm/sec	3191
	Axis 3 (vertical axis)		1316
	Axis 4 (rotational axis)	degree/sec	1600
Positioning repeatability precision (*3)	Axis 1 + Axis 2	mm	±0.010
	Axis 3 (vertical axis)		±0.010
	Axis 4 (rotational axis)	degree	±0.005
Standard cycle time (*4)		sec	0.45
Loading capacity	Rated	kg	1
	Maximum		3
Push-in thrust of axis 3 (vertical axis)	Dynamic (*5)	N (kgf)	110.6 (11.2) Push torque limit value: 70%
	Static (*6)		21.0 (2.1) Push torque limit value: 20%
Permissible load on axis 4	Permissible moment of inertia (*7)	kg•m ²	0.015
	Permissible torque	N•m (kgf•cm)	1.9 (19.5)
Permissible tool diameter (*8)		mm	80
Home detection			Absolute
User wiring (*9)			D-sub 15-pin connector with 15-core AWG26 shielded cable (socket)
Alarm indicator (*10)			One small, red LED indicator (rated voltage: 24 V)
Air purge pipe joint			Applicable tube: Outer diameter φ 6 (inner diameter φ 4)

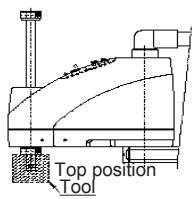
Item			Specifications
User piping			Three air tubes (outer diameter: $\phi 4$, inner diameter: $\phi 2.5$) (normal service pressure: 0.8 MPa)
Operating environment	Surrounding air temperature/humidity		Temperature: 0 to 40°C, humidity: 20 to 85%RH or less (non-condensing)
	Altitude	m	1,000 or less
Noise		dB	71
Robot weight		kg	21
Brake power source for main unit		W	DC24V110% 20W
Air purge pressure (Note 11)			Pressure before expansion of bellows within a range of 0.05 to 0.6 MPa
Protection degree			IP65 or equivalent
Controller	Power supply		230 V 50/60 Hz 5 A
	Allowable supply voltage fluctuation	%	± 10
	Overvoltage category (IEC60664-1)		Category III
	Pollution degree (IEC60664-1)		Pollution degree 3

- *1: To move the robot horizontally at high speed, perform teaching so that the vertical axis stays as close to the top position as possible. (Fig. 1)
To operate the robot with its vertical axis at the bottom position, the speed and acceleration must be reduced as appropriate. (Fig. 2)
- *2: Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- *3: Positioning precision when the robot is operated repeatedly to one specified position from the same starting position at the same speed and acceleration/deceleration using the same arm (at a constant surrounding air temperature of 20°C). Take note that this is not the absolute positioning precision.
Also note that the positioning repeatability may deviate from the specified value if the arm is changed, positioning is performed to one specified position from multiple positions, or any of the operating conditions such as operating speed and acceleration/deceleration setting is changed.
- *4: Measured when the robot is operated at the maximum speed, carrying a load of 2 kg.
This cycle time assumes a reciprocating operation involving a vertical travel of 25 mm and horizontal travel of 300 mm. (Rough positioning)

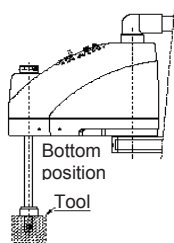
Note: Continuous operation at the maximum speed is not feasible.



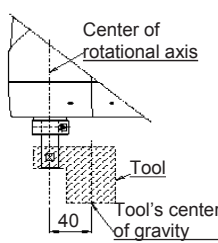
- *5: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 70%.
- *6: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 20%.
Although this parameter can be set to a desired value from 15 to 70%, push force will not stabilize if the set value is outside the range of 20 to 70%.
- *7: The permissible moment of inertia converted to a value at the rotational center of axis 4. The offset from the rotational center of axis 4 to the tool's center of gravity is assumed to be 40 mm or less. (Fig. 3)
If the tool's center of gravity is further away from the rotational center of axis 4, the speed and acceleration must be reduced as appropriate.
- *8: If the tool exceeds the permissible diameter, it will contact the robot inside the robot's range of movement. (Fig. 4)
- *9: To enable the alarm LED indicator, the user must provide a circuit that supplies 24 VDC to the LED terminal in the user connector in response to the controller I/O output signal, etc.
- *10: To enable the alarm LED indicator, the user must provide a circuit that supplies 24 VDC to the LED terminal in the user connector in response to the controller I/O output signal, etc.
- *11: As a guide, the recommended air purge pressure is 0.3 MPa or more (maximum pressure: 0.6 MPa or less). Raise the pressure to a range of 0.3 to 0.6 MPa until the bellows start to inflate, and use the speed controller to adjust the flow rate.
For the purge fluid, use clean, dry air free from compressor oil or other contaminant, and make sure the air filtration level is 10 μm or less.
- *12: The dust-proof/splash-proof specification has a dust-proof/splash-proof structure whose protection degree conforms to IP65.
The structure is not explosion-proof.
- *13: The controller structure is not dust-proof or splash-proof.



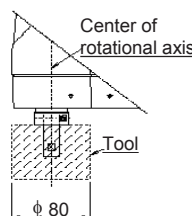
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

Reference design standards: Annex I to Machine Directives, EN292-1, EN292-2, EN1050, EN60204-1, EN775

IX-NNW3515H (Arm Length 350, Standard Specification)

Item			Specifications
Type			IX-NNW3515H-□□L-T1
Dust-proof/splash proof performance (*12)			IP65 or equivalent
Degree of freedom			Four degrees of freedom
Overall arm length	mm		350
Arm 1 length			225
Arm 2 length			125
Drive method	Axis 1 (arm 1)		AC servo motor + Speed reducer
	Axis 2 (arm 2)		AC servo motor + Speed reducer
	Axis 3 (vertical axis)		AC servo motor with brake + Belt + Ball-screw spline
	Axis 4 (rotational axis)		AC servo motor + Belt + Reduction gear + Spline
Motor capacity	Axis 1 (arm 1)	W	200
	Axis 2 (arm 2)		100
	Axis 3 (vertical axis)		100
	Axis 4 (rotational axis)		50
Movement range	Axis 1 (arm 1)	degree	±120
	Axis 2 (arm 2)	degree	±135
	Axis 3 (vertical axis) (*1)	mm	150
	Axis 4 (rotational axis)	degree	±360
Maximum operating speed (*2)	Axis 1 + Axis 2 (maximum composite speed)	mm/sec	4042
	Axis 3 (vertical axis)		1316
	Axis 4 (rotational axis)	degree/sec	1600
Positioning repeatability precision (*3)	Axis 1 + Axis 2	mm	±0.010
	Axis 3 (vertical axis)		±0.010
	Axis 4 (rotational axis)	degree	±0.005
Standard cycle time (*4)		sec	0.47
Loading capacity	Rated	kg	1
	Maximum		3
Push-in thrust of axis 3 (vertical axis)	Dynamic (*5)	N (kgf)	110.6 (11.2) Push torque limit value: 70%
	Static (*6)		21.0 (2.1) Push torque limit value: 20%
Permissible load on axis 4	Permissible moment of inertia (*7)	kg•m ²	0.015
	Permissible torque	N•m (kgf•cm)	1.9 (19.5)
Permissible tool diameter (*8)		mm	80
Home detection			Absolute
User wiring (*9)			D-sub 15-pin connector with 15-core AWG26 shielded cable (socket)
Alarm indicator (*10)			One small, red LED indicator (rated voltage: 24 V)
Air purge pipe joint			Applicable tube: Outer diameter φ 6 (inner diameter φ 4)
User piping			Three air tubes (outer diameter: φ 4, inner diameter: φ 2.5) (normal service pressure: 0.8 MPa)

Item			Specifications
Operating environment	Surrounding air temperature/humidity		Temperature: 0 to 40°C, humidity: 20 to 85%RH or less (non-condensing)
	Altitude	m	1,000 or less
Noise		dB	71
Robot weight		kg	21
Brake power source for main unit		W	DC24V/10% 20W
Air purge pressure (*11)			Pressure before expansion of bellows within a range of 0.05 to 0.6 MPa
Controller (*13)	Power supply		230 V 50/60 Hz 5 A
	Allowable supply voltage fluctuation	%	±10
	Overvoltage category (IEC60664-1)		Category III
	Pollution degree (IEC60664-1)		Pollution degree 3

*1 To move the robot horizontally at high speed, perform teaching so that the vertical axis stays as close to the top position as possible. (Fig. 1)
To operate the robot with its vertical axis at the bottom position, the speed and acceleration must be reduced as appropriate. (Fig. 2)

*2: Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.

*3: Positioning precision when the robot is operated repeatedly to one specified position from the same starting position at the same speed and acceleration/deceleration using the same arm (at a constant surrounding air temperature of 20°C). Take note that this is not the absolute positioning precision.
Also note that the positioning repeatability may deviate from the specified value if the arm is changed, positioning is performed to one specified position from multiple positions, or any of the operating conditions such as operating speed and acceleration/deceleration setting is changed.

*4 Measured when the robot is operated at the maximum speed, carrying a load of 2 kg.
This cycle time assumes a reciprocating operation involving a vertical travel of 25 mm and horizontal travel of 300 mm. (Rough positioning)

Note: Continuous operation at the maximum speed is not feasible.

300 mm

25 mm

*5: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 70%.

*6: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 20%.

*6: Although this parameter can be set to a desired value from 15 to 70%, push force will not stabilize if the set value is outside the range of 20 to 70%.

*7 The permissible moment of inertia converted to a value at the rotational center of axis 4. The offset from the rotational center of axis 4 to the tool's center of gravity is assumed to be 40 mm or less. (Fig. 3)
If the tool's center of gravity is further away from the rotational center of axis 4, the speed and acceleration must be reduced as appropriate.

*8 If the tool exceeds the permissible diameter, it will contact the robot inside the robot's range of movement. (Fig. 4)

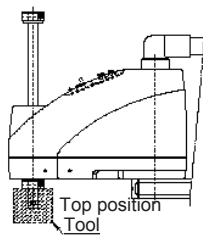
*9 Connector pins 1 to 15 can be used. Pin 16 is connected to the shield wire and cannot be used for a signal wire.

*10 To enable the alarm LED indicator, the user must provide a circuit that supplies 24 VDC to the LED terminal in the user connector in response to the controller I/O output signal, etc.

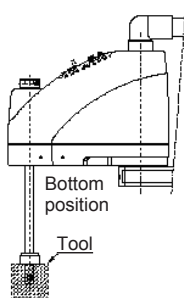
*11 As a guide, the recommended air purge pressure is 0.3 MPa or more (maximum pressure: 0.6 MPa or less). Raise the pressure to a range of 0.3 to 0.6 MPa until the bellows start to inflate, and use the speed controller to adjust the flow rate. For the purge fluid, use clean, dry air free from compressor oil or other contaminant, and make sure the air filtration level is 10 μm or less.

*12 The dust-proof/splash-proof specification has a dust-proof/splash-proof structure whose protection degree conforms to IP65. The structure is not explosion-proof.

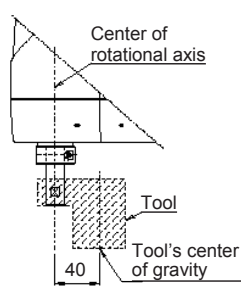
*13 The controller structure is not dust-proof or splash-proof.



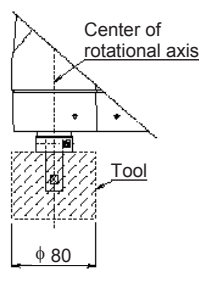
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

Reference design standards: Annex I to Machine Directives, EN292-1, EN292-2, EN1050, EN60204-1, EN775

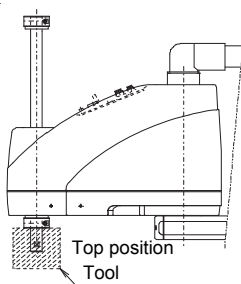
7.3 IX-NNC2515H/3515H

IX-NNC2515H (Arm Length 250, Cleanroom Specification)

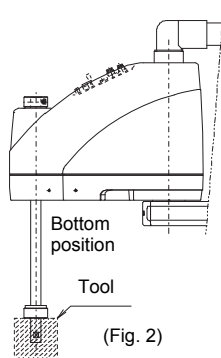
Item			Specifications
Type			IX-NNC2515H-□□L-T1
Degree of freedom			Four degrees of freedom
Overall arm length	mm		250
Arm 1 length			125
Arm 2 length			125
Drive method	Axis 1 (arm 1)		AC servo motor + Speed reducer
	Axis 2 (arm 2)		AC servo motor + Speed reducer
	Axis 3 (vertical axis)		AC servo motor with brake + Belt + Ball-screw spline
	Axis 4 (rotational axis)		AC servo motor + Belt + Reduction gear + Spline
Motor capacity	Axis 1 (arm 1)	W	200
	Axis 2 (arm 2)		100
	Axis 3 (vertical axis)		100
	Axis 4 (rotational axis)		50
Movement range	Axis 1 (arm 1)	degree	±120
	Axis 2 (arm 2)		±120
	Axis 3 (vertical axis) (*1)	mm	150
	Axis 4 (rotational axis)	degree	±360
Maximum operating speed (*2)	Axis 1 + Axis 2 (maximum composite speed)	mm/sec	3191
	Axis 3 (vertical axis)		1316
	Axis 4 (rotational axis)	degree/sec	1600
Positioning repeatability precision (*3)	Axis 1 + Axis 2	mm	±0.010
	Axis 3 (vertical axis)		±0.010
	Axis 4 (rotational axis)	degree	±0.005
Standard cycle time (*4)		sec	0.44
Loading capacity	Rated	kg	1
	Maximum		3
Push-in thrust of axis 3 (vertical axis)	Dynamic (*5)	N (kgf)	110.6 (11.2) Push torque limit value: 70%
	Static (*6)		21.0 (2.1) Push torque limit value: 20%
Permissible load on axis 4	Permissible moment of inertia (*7)	kg•m ²	0.015
	Permissible torque	N•m (kgf•cm)	1.9 (19.5)
Permissible tool diameter (*8)		mm	40
Home detection			Absolute
User wiring			D-sub 15-pin connector with 15-core AWG26 shielded cable (socket)
Alarm indicator (*9)			One small, red LED indicator (rated voltage: 24 V)
Suction pipe joint			Applicable tube: Outer diameter φ 12 (inner diameter φ 8)

Item			Specifications
User piping			Three air tubes (outer diameter: $\phi 4$, inner diameter: $\phi 2.5$) (normal service pressure: 0.8 MPa)
Operating environment	Surrounding air temperature/humidity		Temperature: 0 to 40°C, humidity: 20 to 85%RH or less (non-condensing)
	Altitude	m	1,000 or less
Noise		dB	71
Robot weight		kg	19
Brake power source for main unit		W	DC24V110% 20W
Cleanliness class			Class 10 (Base: 0.1 μm , when suctioned)
Suction flow rate (Note 10)			60 NI/min
Controller	Power supply		230 V 50/60 Hz 5 A
	Allowable supply voltage fluctuation	%	± 10
	Overvoltage category (IEC60664-1)		Category III
	Pollution degree (IEC60664-1)		Pollution degree 3

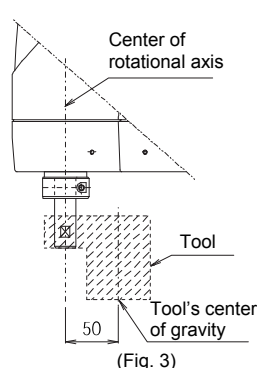
- *1 To move the robot horizontally at high speed, perform teaching so that the vertical axis stays as close to the top position as possible.
To operate the robot with its vertical axis at the bottom position, the speed and acceleration must be reduced as appropriate.
- *2: Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- *3: Positioning precision when the robot is operated repeatedly to one specified position from the same starting position at the same speed and acceleration/deceleration using the same arm (at a constant surrounding air temperature of 20°C). Take note that this is not the absolute positioning precision.
Also note that the positioning repeatability may deviate from the specified value if the arm is changed, positioning is performed to one specified position from multiple positions, or any of the operating conditions such as operating speed and acceleration/deceleration setting is changed.
- *4 Measured when the robot is operated at the maximum speed, carrying a load of 2 kg.
- *5: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 70%.
- *6: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 20%.
Although this parameter can be set to a desired value from 15 to 70%, push force will not stabilize if the set value is outside the range of 20 to 70%.
- *7 The permissible moment of inertia converted to a value at the rotational center of axis 4. The offset from the rotational center of axis 4 to the tool's center of gravity is assumed to be 40 mm or less.
If the tool's center of gravity is further away from the rotational center of axis 4, the speed and acceleration must be reduced as appropriate.
- *8 If the tool exceeds the permissible diameter, it will contact the robot inside the robot's range of movement. (Fig. 4)
- *9 To enable the alarm LED indicator, the user must provide a circuit that supplies 24 VDC to the LED terminal in the user connector in response to the controller I/O output signal, etc.
- *10 Use this value as a rough guide on suction flow rate.



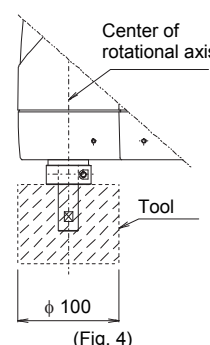
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

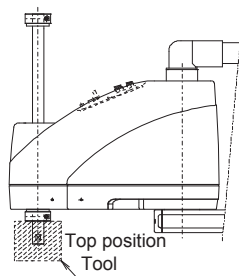
Reference design standards: Annex I to Machine Directives, EN292-1, EN292-2, EN1050, EN60204-1, EN775

IX-NNC3515H (Arm Length 350, Clean Room Specification)

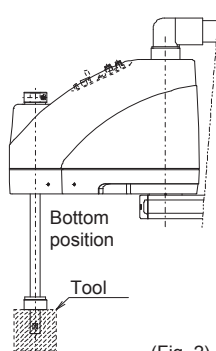
Item			Specifications
Type			IX-NNW3515H-□□L-T1
Degree of freedom			Four degrees of freedom
Overall arm length	mm		350
Arm 1 length			225
Arm 2 length			125
Drive method	Axis 1 (arm 1)		AC servo motor + Speed reducer
	Axis 2 (arm 2)		AC servo motor + Speed reducer
	Axis 3 (vertical axis)		AC servo motor with brake + Belt + Ball-screw spline
	Axis 4 (rotational axis)		AC servo motor + Belt + Reduction gear + Spline
Motor capacity	Axis 1 (arm 1)	W	200
	Axis 2 (arm 2)		100
	Axis 3 (vertical axis)		100
	Axis 4 (rotational axis)		50
Movement range	Axis 1 (arm 1)	degree	±120
	Axis 2 (arm 2)	degree	±135
	Axis 3 (vertical axis) (*1)	mm	150
	Axis 4 (rotational axis)	degree	±360
Maximum operating speed (*2)	Axis 1 + Axis 2 (maximum composite speed)	mm/sec	4042
	Axis 3 (vertical axis)	mm/sec	1316
	Axis 4 (rotational axis)	degree/sec	1600
Positioning repeatability precision (*3)	Axis 1 + Axis 2	mm	±0.010
	Axis 3 (vertical axis)	mm	±0.010
	Axis 4 (rotational axis)	degree	±0.005
Standard cycle time (*4)		sec	0.46
Loading capacity	Rated	kg	1
	Maximum		3
Push-in thrust of axis 3 (vertical axis)	Dynamic (*5)	N (kgf)	110.6 (11.2) Push torque limit value: 70%
	Static (*6)		21.0 (2.1) Push torque limit value: 20%
Permissible load on axis 4	Permissible moment of inertia (*7)	kg·m ²	0.015
	Permissible torque	N·m (kgf·cm)	1.9 (19.5)
Permissible tool diameter (*8)		mm	40
Home detection			Absolute
User wiring			D-sub 15-pin connector with 15-core AWG26 shielded cable (socket)
Alarm indicator (*9)			One small, red LED indicator (rated voltage: 24 V)
Suction pipe joint			Applicable tube: Outer diameter φ 12 (inner diameter φ 8)

Item			Specifications
User piping			Three air tubes (outer diameter: ϕ 4, inner diameter: ϕ 2.5) (normal service pressure: 0.8 MPa)
Operating environment	Surrounding air temperature/humidity		Temperature: 0 to 40°C, humidity: 20 to 85%RH or less (non-condensing)
	Altitude	m	1,000 or less
Noise		dB	71
Robot weight		kg	20
Brake power source for main unit		W	DC24V10% 20W
Cleanliness class			Class 10 (Base: 0.1 μ m, when suctioned)
Suction flow rate (Note 10)		NI/min	60 NI/min
Controller	Power supply		230 V 50/60 Hz 5 A
	Allowable supply voltage fluctuation	%	$\pm$ 10
	Overvoltage category (IEC60664-1)		Category III
	Pollution degree (IEC60664-1)		Pollution degree 3

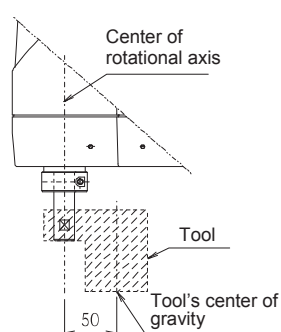
- *1 To move the robot horizontally at high speed, perform teaching so that the vertical axis stays as close to the top position as possible.
To operate the robot with its vertical axis at the bottom position, the speed and acceleration must be reduced as appropriate.
- *2: Assuming PTP instruction operation. The maximum composite speed is not the maximum speed of CP operation.
- *3: Positioning precision when the robot is operated repeatedly to one specified position from the same starting position at the same speed and acceleration/deceleration using the same arm (at a constant surrounding air temperature of 20°C). Take note that this is not the absolute positioning precision.
Also note that the positioning repeatability may deviate from the specified value if the arm is changed, positioning is performed to one specified position from multiple positions, or any of the operating conditions such as operating speed and acceleration/deceleration setting is changed.
- *4 Measured when the robot is operated at the maximum speed, carrying a load of 2 kg.
- *5: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 70%.
- *6: Push force when driver card parameter No. 38, "Push torque limit during positioning" is set to 20%.
Although this parameter can be set to a desired value from 15 to 70%, push force will not stabilize if the set value is outside the range of 20 to 70%.
- *7 The permissible moment of inertia converted to a value at the rotational center of axis 4. The offset from the rotational center of axis 4 to the tool's center of gravity is assumed to be 40 mm or less.
If the tool's center of gravity is further away from the rotational center of axis 4, the speed and acceleration must be reduced as appropriate.
- *8 If the tool exceeds the permissible diameter, it will contact the robot inside the robot's range of movement. (Fig. 4)
- *9 To enable the alarm LED indicator, the user must provide a circuit that supplies 24 VDC to the LED terminal in the user connector in response to the controller I/O output signal, etc.
- *10 Use this value as a rough guide on suction flow rate.



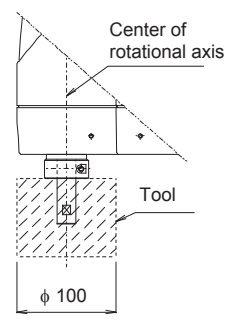
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

Reference design standards: Annex I to Machine Directives, EN292-1, EN292-2, EN1050, EN60204-1, EN775

8. Installation Environment and Storage Environment

8.1 Installation Environment

8.1.1 IX-NNN2515H/3515H, IX-NNC2515H/3515H

Install the robot in an environment that satisfies the following conditions:

- Away from direct sunlight
- Not subject to radiated heat from a high-capacity energy source such as a heat-treating furnace
- Surrounding air temperature: 0°C to 40°C
- Humidity: 85% or less (non-condensing)
- Not exposed to corrosive or flammable gases
- Not subject to impact or vibration
- Not exposed to a significant amount of electromagnetic waves, ultraviolet rays or radiation
- Sufficient space is available to ensure safety in teaching and maintenance/inspection operations

Generally, the robot must be installed where the operator need not wear protective gear in order to work.

8.1.2 IX-NNW2515H/3515H

The dust-proof/splash-proof specification has a structure confirming to IEC standard with regard to water and powder dust and protection degree of IP65 or equivalent.

Install the robot in an environment that satisfies the following conditions:

Please note that the dust-proof/splash-proof specification does not provide an explosion-proof structure.

- Away from direct sunlight
- Not subject to radiated heat from a high-capacity energy source such as a heat-treating furnace
- Surrounding air temperature: 0°C to 40°C
- Humidity: 85% or less (non-condensing)
- Not exposed to corrosive or flammable gases
- Not subject to impact or vibration
- Not exposed to a significant amount of electromagnetic waves, ultraviolet rays or radiation
- Sufficient space is available to ensure safety in teaching and maintenance/inspection operations

Dust-proof/splash-proof items

- Will not become immersed in liquid.
- Free from fine shavings generated by grinding, etc.
- Free from cutting oil.
- Free from mist of cutting fluid, grinding fluid or other liquids containing sulfur.

About IP65

IP: International Protection rating. IP is a symbol of protection characteristics.

6: Degree of protection against intrusion of solid matter

- Powder dust will not enter.

5: Degree of protection against intrusion of water

- No harmful damage will be sustained when hit by water jet directly from any direction. Spray fresh water from all directions for 1 minute per 1 m² of surface area of the cover, for a total duration of at least 3 minutes. The distance from the nozzle to the machine shall be adjusted to a range of 2.5 to 3 m, injection pressure to 30 kPa, and flow rate to 12.5 L/min.



Danger



Warning

- Do not use the robot in an environment exceeding the protection degrees against water/powder dust specified for the robot. Doing so may cause water or powder dust to enter, resulting in shorter robot life, lower operation precision or malfunction.
- Supply air of the specified pressure from the air supply port for air purge provided on the side face of the base. If air is not supplied, dust-proof/splash-proof performance will drop.
- Supplied air shall be clean, dry air free from compressor oil, etc., while the filtration level of the air filter shall be 10 µm or less and atmospheric dew point shall be -20°C or below.
- The robot controller is not dust-proof or splash-proof.
- Please contact IAI regarding the robot's splash-proof performance against liquids other than water.
- The bellows may change color depending on the use environment, but discoloration does not affect the robot's dust-proof/splash-proof performance.

8.2 Installation Platform

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.

- The surface on which the robot is fixed must have a thickness of 25 mm or more.
The levelness of the robot installation surface must be at least ± 0.05 mm.
- Machine tapped holes of the size shown in the table below in the mounting surface of the platform.

Model number	Tapping size	Remarks
IX-NNN2515H/3515H IX-NNW2515H/3515H IX-NNC2515H/3515H	M8	M8: The effective thread shall be 10 mm or more (for steel, or 20 mm or more for aluminum).

- The platform must have sufficient rigidity to withstand not only the weight of the robot but also the dynamic moment of inertia that is generated when the robot is operated at maximum speed.
- Secure the platform to the floor or other rigid structure in a manner that prevents any movement due to operation of the robot.
- The installation platform must allow the robot to be mounted on a level surface.

8.3 Storage/preservation Environment

The storage/preservation environment conforms to the installation environment. If the robot is to be stored for a prolonged period of time, be sure the robot will not be exposed to dew condensation.

Unless otherwise specified, desiccant is not placed in the carton when shipped. If the robot is to be kept in an environment subject to condensation, provide preventive measures from over the carton or directly to the robot after unpacking.

The maximum storage/preservation temperature is 60°C for a short storage/preservation period. If the robot is to be stored for more than a month, the temperature should not exceed 50°C.



Danger



Warning

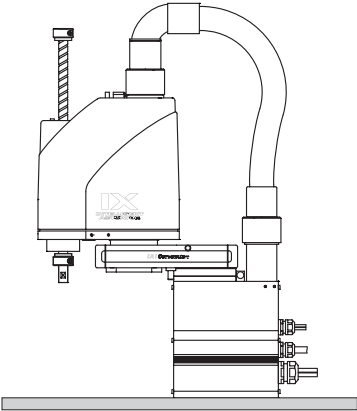
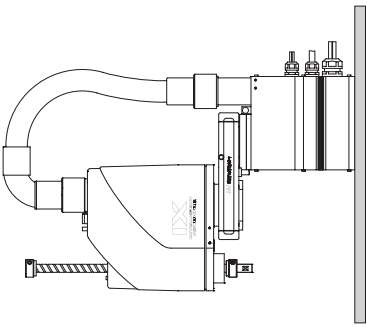
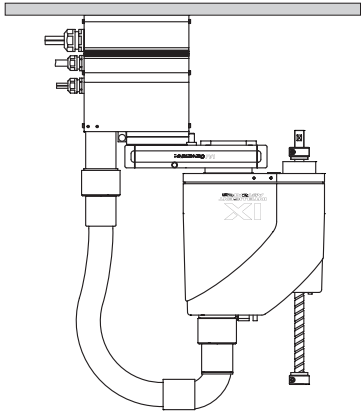
- Failure to provide a proper environment for installation and storage/preservation may shorten the service life of the robot, reduce its operation precision, or cause a malfunction or failure.
- Never use the robot in a flammable atmosphere. The robot may explode or ignite.

9. How to Install

Shown below is how to install SCARA Robot.

9.1 Installation Posture

○ : Available × : Not available

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



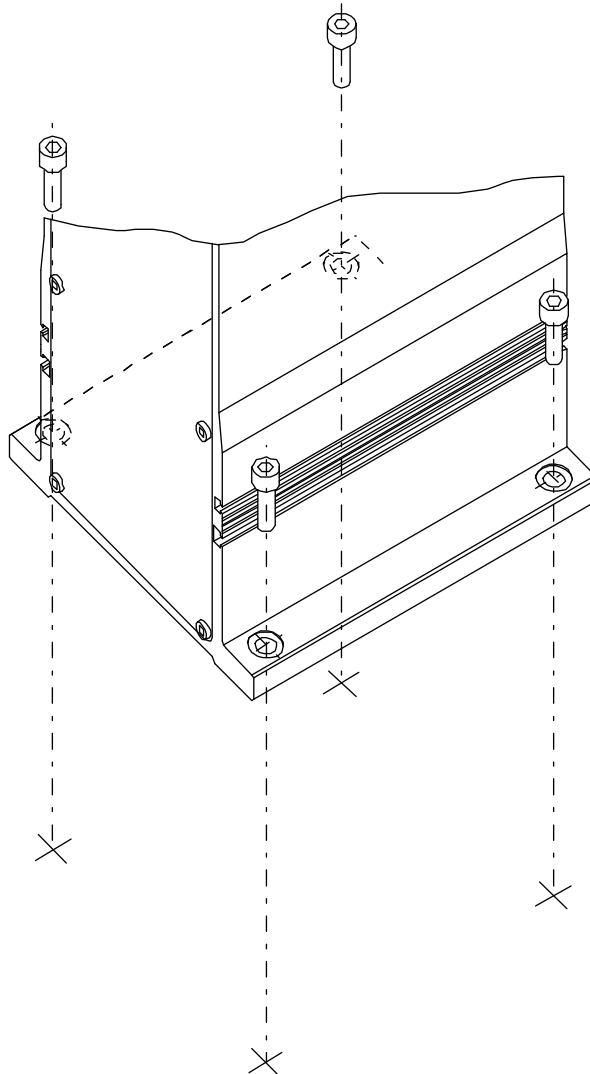
9.2 Installing the Robot

Install the robot horizontally.

Use four M3 or M4 hexagonal socket head bolts and washers to securely affix the robot.

Model number	Bolt size	Tightening torque
IX-NNN2515H/3515H IX-NNW2515H/3515H IX-NNC2515H/3515H	M8 washer	3.2 N-m

For the hexagonal socket head bolts, use high-strength bolts of ISO10.9 or higher.



Warning



Caution

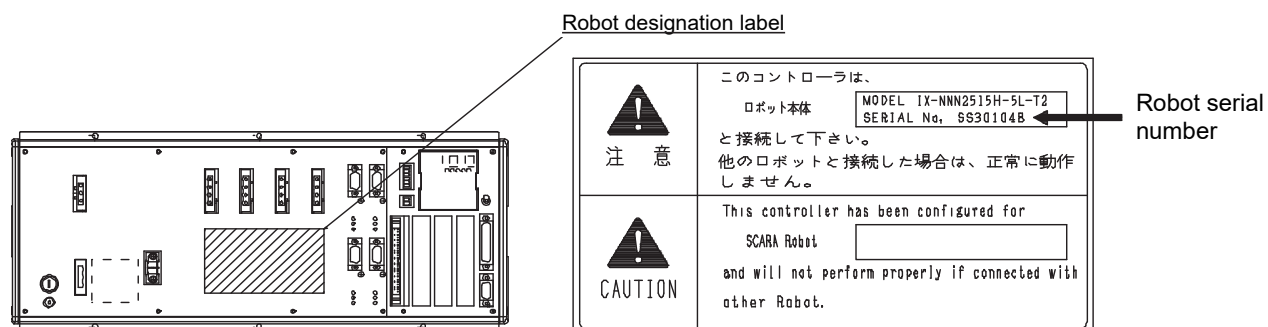
- Be sure to use washers. If not, the bearing surface may cave in.
- Tighten the hexagonal socket head bolts securely to the correct torque. If not, precision may drop and in the worst case the robot may topple and cause an accident.

10. Connecting the Controller

The controller connection cables are attached on the robot (standard cable: 3 m).

Pay attention to the following items when connecting the controller:

- Connect to the robot of the serial number specified on the robot designation label provided on the front panel of the controller.



- Connect the cables securely after confirming that they are free from damage or bent connector pins.
- 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.
- Please prepare the dedicated 24V DC power source for the brake power circuit of Horizontal Articulated Robot since it is on the primary (high pressure) side.

Do not attempt to share the secondary circuit power sources such as I/O power source.

The brake power to be supplied to Horizontal Articulated Robot should be 24V DC $\pm 10\%$ and the voltage source capacity 20W.

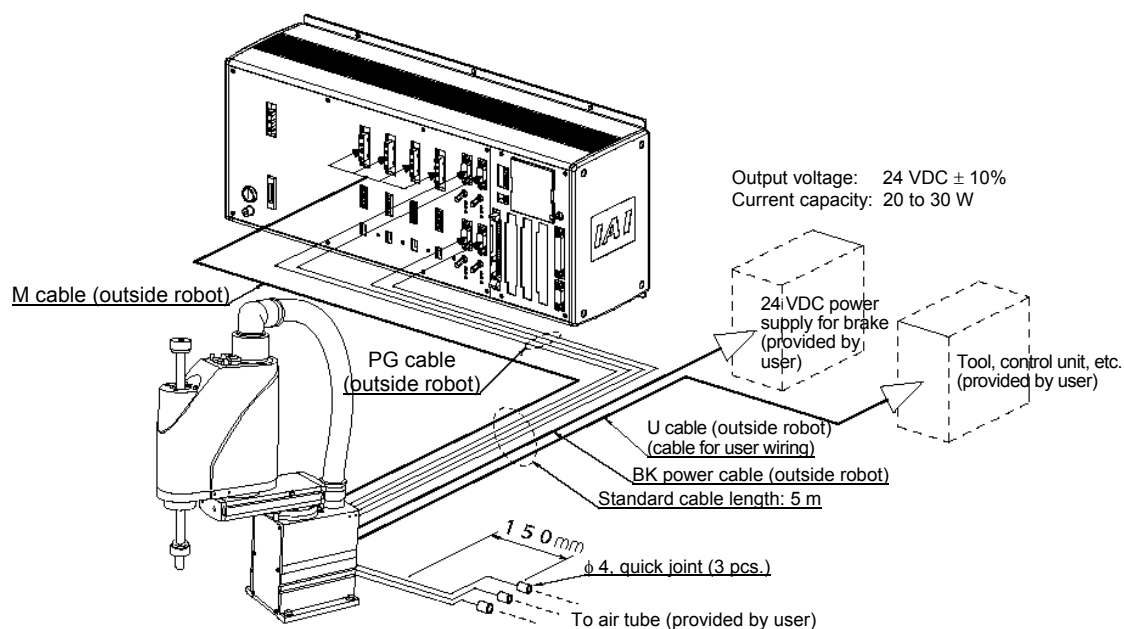
The brake power to be supplied to the controller should be 24V DC $\pm 10\%$ and the voltage source capacity 7W.

(Note) It is necessary to increase the voltage source capacity of the brake power source if brake actuators are to be connected to the 5th and 6th axes of the controller. [Refer to the section of the voltage source capacity and heat generation in the controller operation manual.]

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

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.
- Before connecting or disconnecting a cable, always turn off the power to the controller. Connecting/disconnecting a cable with the power supplied to the controller may cause the robot to malfunction, resulting in a serious accident.
- Installing the connectors into the wrong sockets may cause the robot to malfunction. Be sure to check the designation on the cable with that on the controller panel before plugging in any connector.
- If the connectors are not inserted securely, the robot may malfunction and generate the risk of danger. Be sure to affix each connector with the supplied screws.

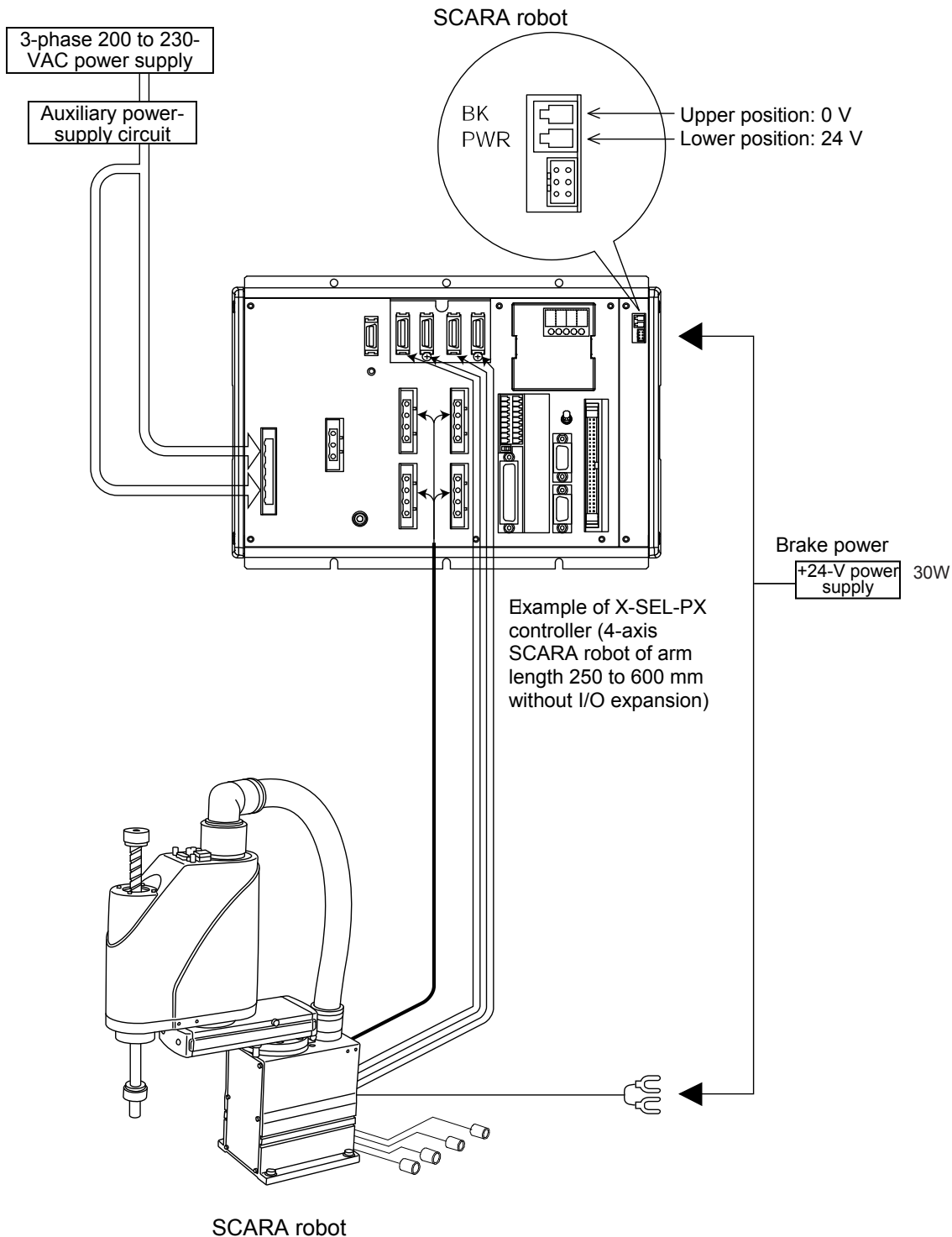


Warning

- Before connecting or disconnecting a cable, always turn off the power to the controller. Connecting/disconnecting a cable with the power supplied to the controller may cause the robot to malfunction, resulting in a serious accident.
- Installing the connectors into the wrong sockets may cause the robot to malfunction. Be sure to check the designation on the cable with that on the controller panel before plugging in any connector.
- If the connectors are not inserted securely, the robot may malfunction and generate the risk of danger. Be sure to affix each connector with the supplied screws.

If you are using an X-SEL-PX/QX controller, you must supply the brake power to the controller in addition to wiring the brake power cable from the SCARA robot.

Supply the brake power (+24 V) to the controller as shown in the figure.





11. Checking after Installation

Once the robot has been installed, check the following items:

- Visually check the robot, controller and cables for dents and other abnormalities.
- Confirm that the cables are connected properly and that the connectors are inserted securely.



Warning

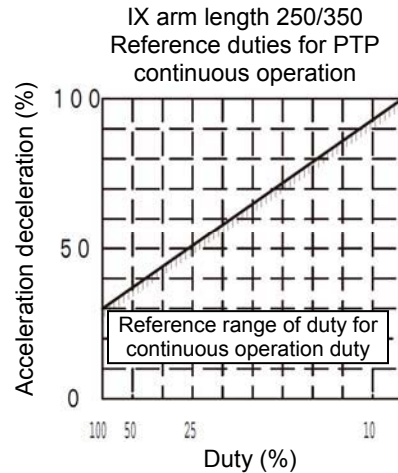
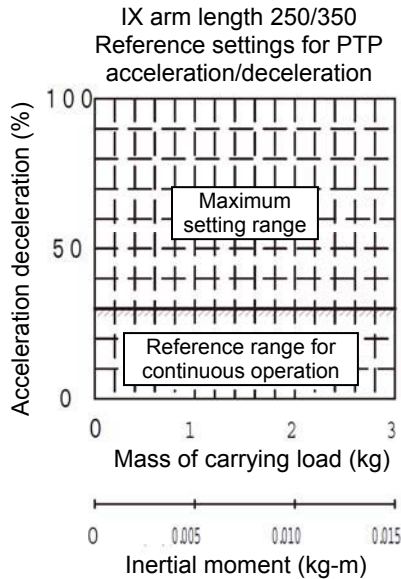
- Failure to perform these checks may result in a malfunctioning robot or a damaged controller or robot.

12. Precautions for Use

12.1 Setting the Acceleration/Deceleration

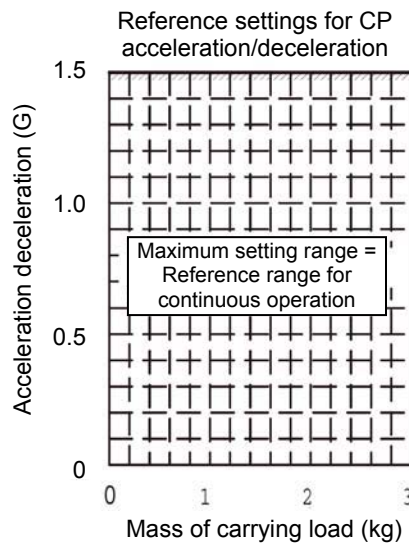
Set the acceleration/deceleration using the graphs below as a reference.

- (1) PTP operation (Set using the SEL language commands ACCS and DCLS.)



$$\text{Duty (\%)} = \frac{\text{Continuous operation}}{\text{Continuous operation} + \text{Stopping time}} \times 100$$

- (2) CP operation (Set using the SEL Language commands ACC and DCL.)



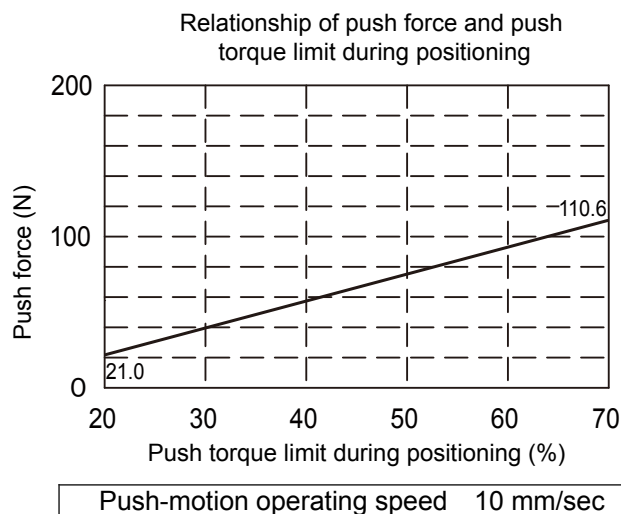
Maximum speed of CP operation at arm length 250	600 mm/sec
Maximum speed of CP operation at arm length 350	700 mm/sec

Caution

- When PTP operation is performed with the acceleration/deceleration set to 100%, the optimal acceleration/deceleration function adjusts the maximum acceleration/acceleration at which the robot can accelerate/decelerate carrying the load weight set by the WGHT command, to 100%.
Be sure to set the mass and inertial moment using the WGHT command.
Never set in the WGHT command a value smaller than the load mass installed on the vertical axis.
If such smaller value is set, the robot accelerates/decelerates at the maximum acceleration/deceleration permitted for the applicable load weight or even higher, and consequently the SCARA robot may stop by generating an error or break down.
- Start from the appropriate reference setting for acceleration/deceleration during continuous operation, and then gradually raise the value for the purpose of adjustment.
- Operate the SCARA robot by maintaining an acceleration/deceleration appropriate for the applicable mass and inertial moment. If not, the life of the driving part may be shortened or damage or vibration may result.
- If an overload error (error code: D0A) occurs, lower the acceleration/deceleration setting or provide an appropriate stopping time based on the reference duty for continuous operation.
$$\text{Duty (\%)} = (\text{Continuous operation} / (\text{Continuous operation} + \text{Stopping time})) / 100$$
- To move arm 1 or 2 of the SCARA robot horizontally at high speed, keep the vertical axis near the top position. If such high-speed operation is performed with the vertical axis lowered, the vertical axis may vibrate.
- Be sure to keep the inertial moment and carrying load at the allowable values or less.
- The carrying load represents the inertial moment and mass at the center of rotation of axis 4. If the acceleration/deceleration is raised when the inertial moment far exceeds the allowable value, control is disabled in the rotating direction.
- Depending on the position of the vertical axis, the vertical axis may generate vibration when the inertial moment of the load is high. If vibration occurs, lower the acceleration/deceleration.

12.2 Push Force of the Vertical Axis

Set the push force of the vertical axis by referring to the graph below.



Caution

- Use the PUSH command to perform push-motion operation involving the vertical axis. If push-motion operation is performed without using the PUSH command, the life of the driving part may be shortened or damage or vibration may result.
- Push force can be changed by driver card parameter No. 38, "Torque limit during positioning."
- When performing push-motion operation, keep the speed to 10 mm/sec or below.
If the speed exceeds 10 mm/sec, provide a shock-reducing mechanism to keep the vertical axis from receiving shock.
- The graph of push force and push torque limit during positioning shows characteristics when no load is installed on the vertical axis. In downward push-motion operation, the applicable push force increases by the load mass.
In upward push-motion operation with the inverse specification, the applicable push force decreases by the load mass.
- Push force is controlled by servo motor current. No control is implemented based on feedback of push force.
- Push force is subject to a variation of approx. $\pm 5\%$.

12.3 Tools

The tool mounting part must have sufficient strength and rigidity, along with adequate fastening power to prevent positional shift.

It is recommended that a tool be installed over a split ring, span ring or other appropriate part. A sample configuration of tool installation is given below.

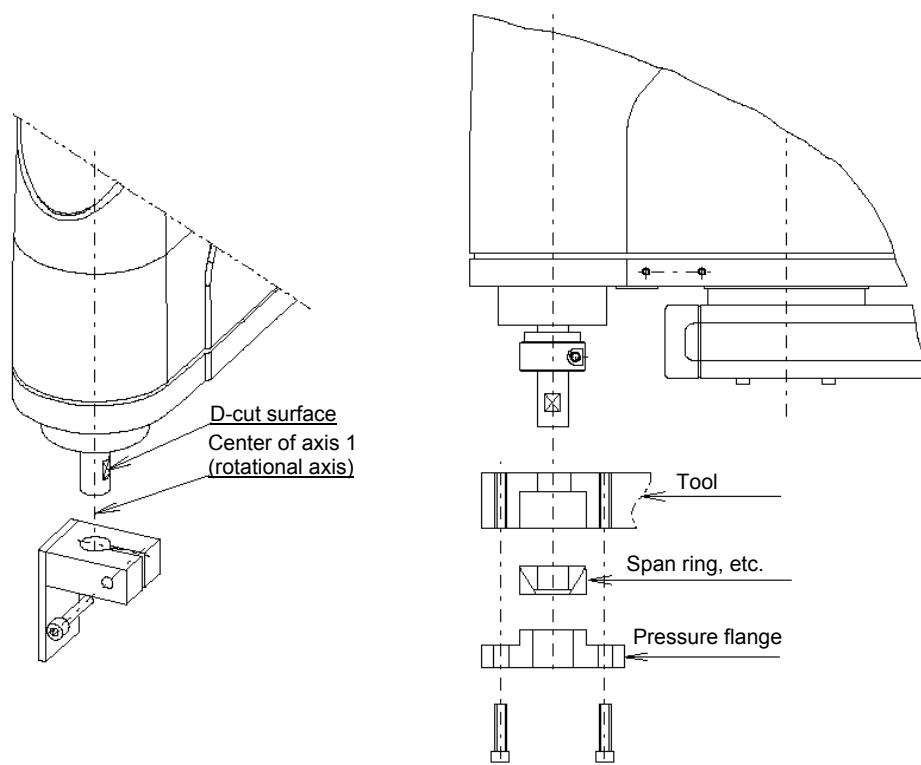
Set the tool diameter to 100 mm or less. If the tool diameter exceeds 100 mm, the tool will interfere with the robot within the robot's operation area. If the tool diameter exceeds 100 mm or the tool interferes with peripheral equipment, decrease the soft limits to reduce the operation area.

Also keep the inertial moment of the tool and work part at 0.015 kgmm² or less.

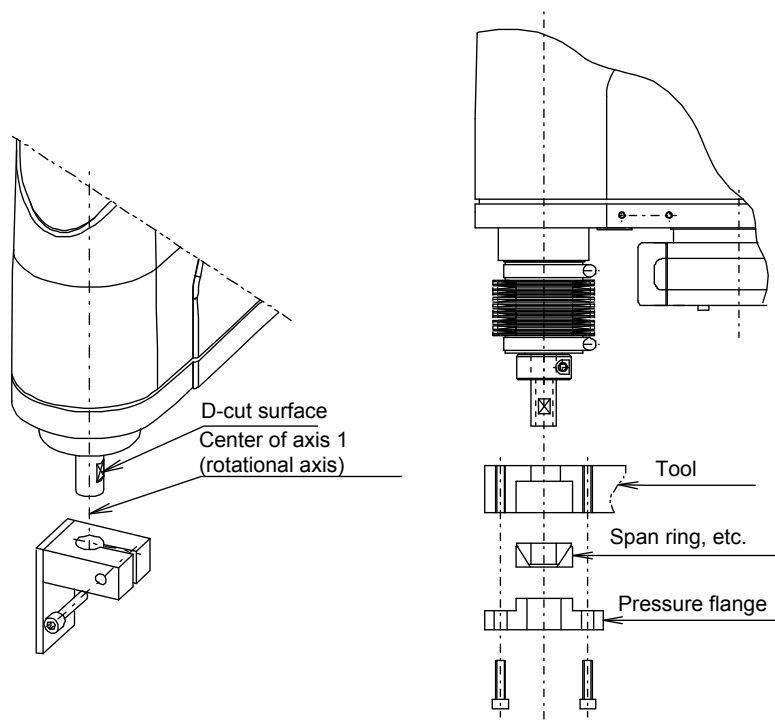
Use the D-cut surface at the end of axis 4 (rotational axis) to adjust the position (direction) of axis 4. To set the rotating direction using the D-cut surface and setscrews, be sure to use setscrews with resin or brass pad or set pieces made of soft material.

(Avoid attachment of the tool at the D-cut surface via thread fastening. Doing so may damage the D-cut positioning surface.)

IX-NNN-2515H/3515H



IX-NNW2515H/3515H, IX-NNC2515H/3515H



Warning



Caution

- Turn off the power to the controller and robot before installing a tool.
- If the tool mounting part does not have sufficient strength, it may break while the robot is operating and cause the tool to detach and fly off.
- If the tool diameter exceeds 80 mm, the tool will contact the robot within the robot's operation area. Set the soft limit smaller and narrow the operation area.
- Avoid attachment of the tool at the D-cut surface via thread fastening. Doing so may damage the D-cut positioning surface.

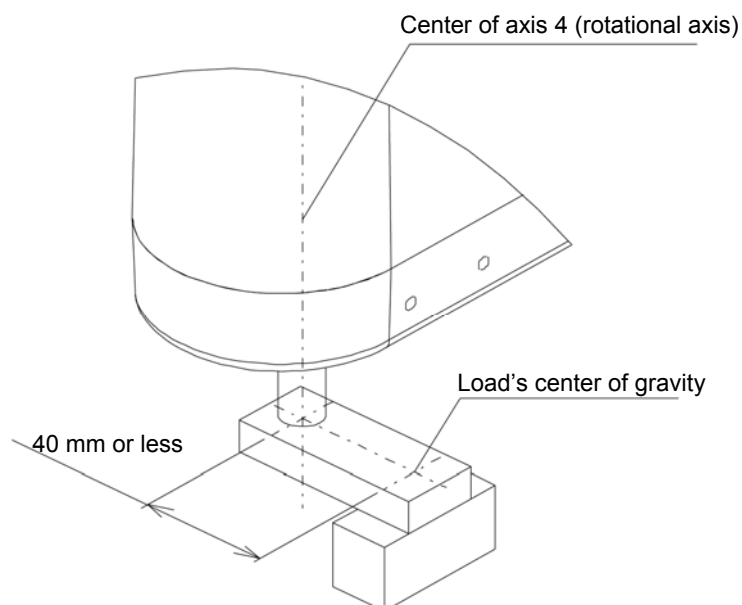
12.4 Transferring Load

Model number	Rated transferring mass	Maximum transferring mass
IX-NNN2515H/3515H IX-NNW2515H/3515H IX-NNC2515H/3515H	1 kg	3 kg

Load's permissible moment of inertia

Model number	Allowable inertial moment	Remarks
IX-NNN2515H/3515H IX-NNW2515H/3515H IX-NNC2515H/3515H	0.015 kg-m ²	Both rated and maximum

Load offset (from the center of axis 4 (rotational axis))
40 mm or less



Caution

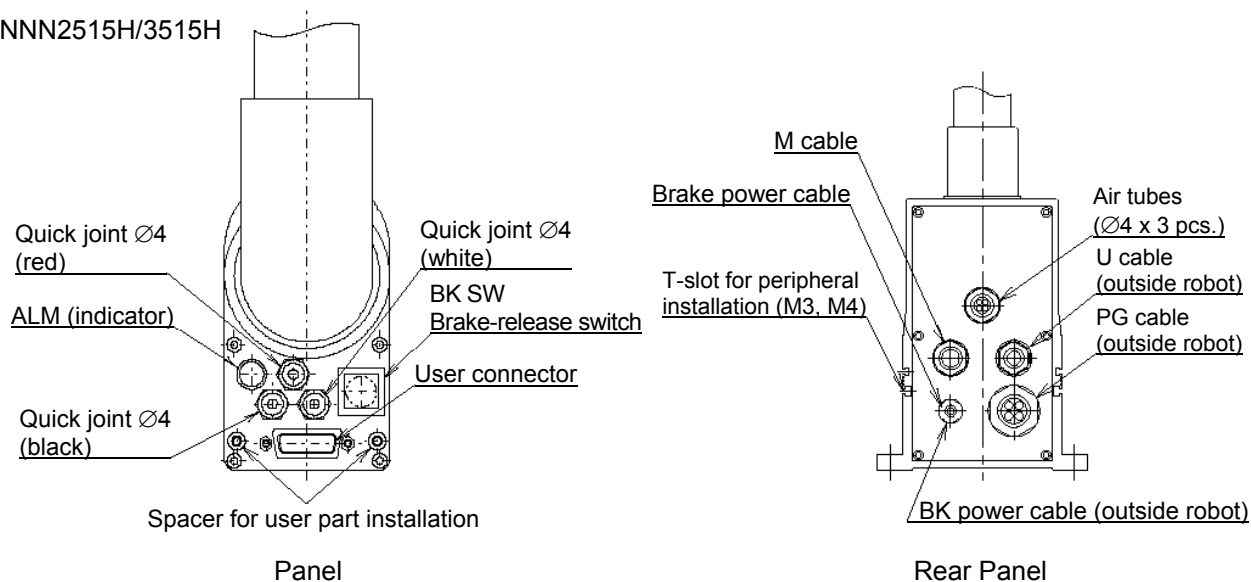
- Set appropriate acceleration/deceleration according to the mass of the end and moment of inertia. Failure to do so may cause the drive part to wear prematurely or may result in damage or vibration.
- If vibration occurs, lower the acceleration/deceleration as appropriate.
- If the load gets offset, the robot becomes more likely to cause vibration. Design the tools so that the load's center of gravity aligns with the center of axis 4.
- Do not move the robot horizontally with axis 3 (vertical axis) extended. It may cause the vertical axis to bend and disable the axis. To move the robot horizontally with axis 3 extended, adjust the speed and acceleration/deceleration as appropriate.

12.5 User Wiring and Piping

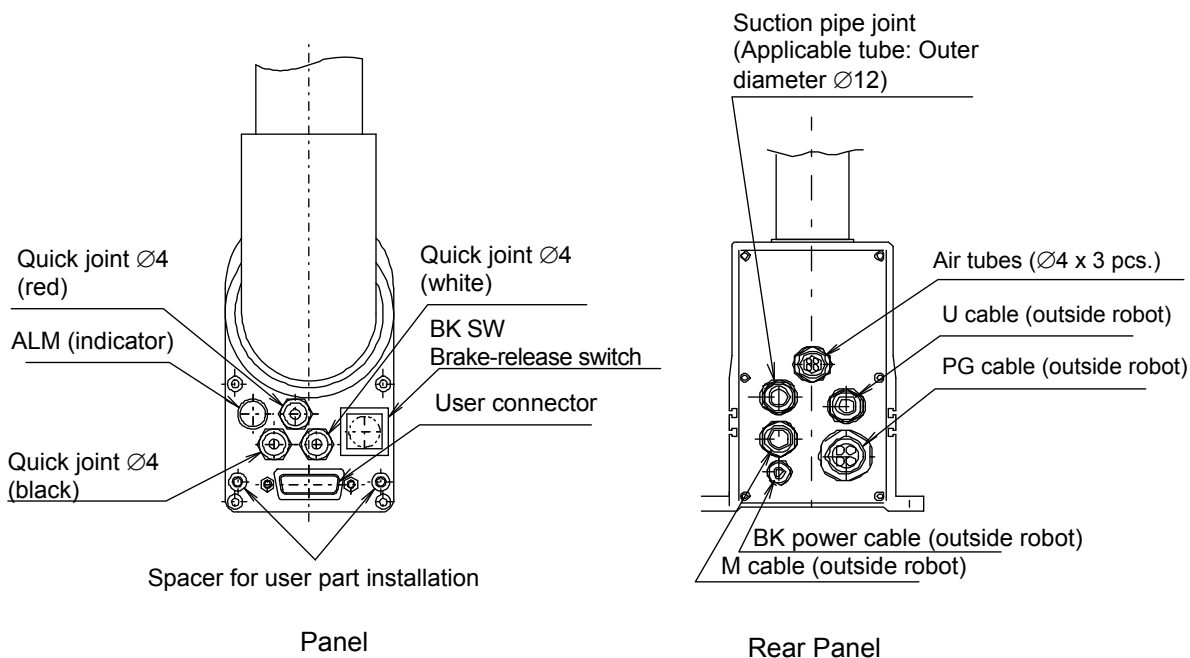
The robot comes with standard cables and tubes that the user can use in a desired wiring/piping configuration.

12.5.1 IX-NNN2515H/3515H, IX-NNC2515H/3515H

IX-NNN2515H/3515H



IX-NNC2515H/3515H



User connector specifications

Rated voltage	30 V
Permissible current	1.1 A
Conductor size and number of wires	AWG 26 (0.15 mm ²), 15 wires
Other	Twisted-pair cable (1 to 24), shielded

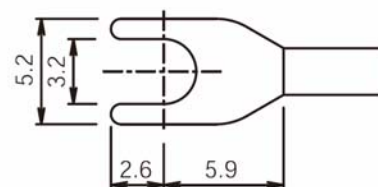
Piping specifications

Normal service pressure	0.8 MPa
Dimensions (outer diameter x inner diameter) and number of tubes	Ø4 mm x Ø2.5 mm, 3 pieces
Working medium	Air

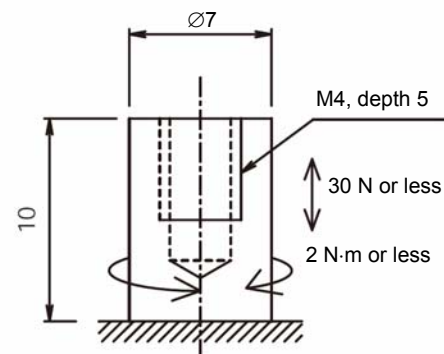
ALM (indicator) specifications

Rated voltage	24 VDC
Rated current	12 mA
Illumination color	Red LED

Shape of Y-terminal



Spacer for user part installation



External force applied to the spacers must not exceed 30 N in the axial direction or 2 N·m in the rotating direction (for each spacer).

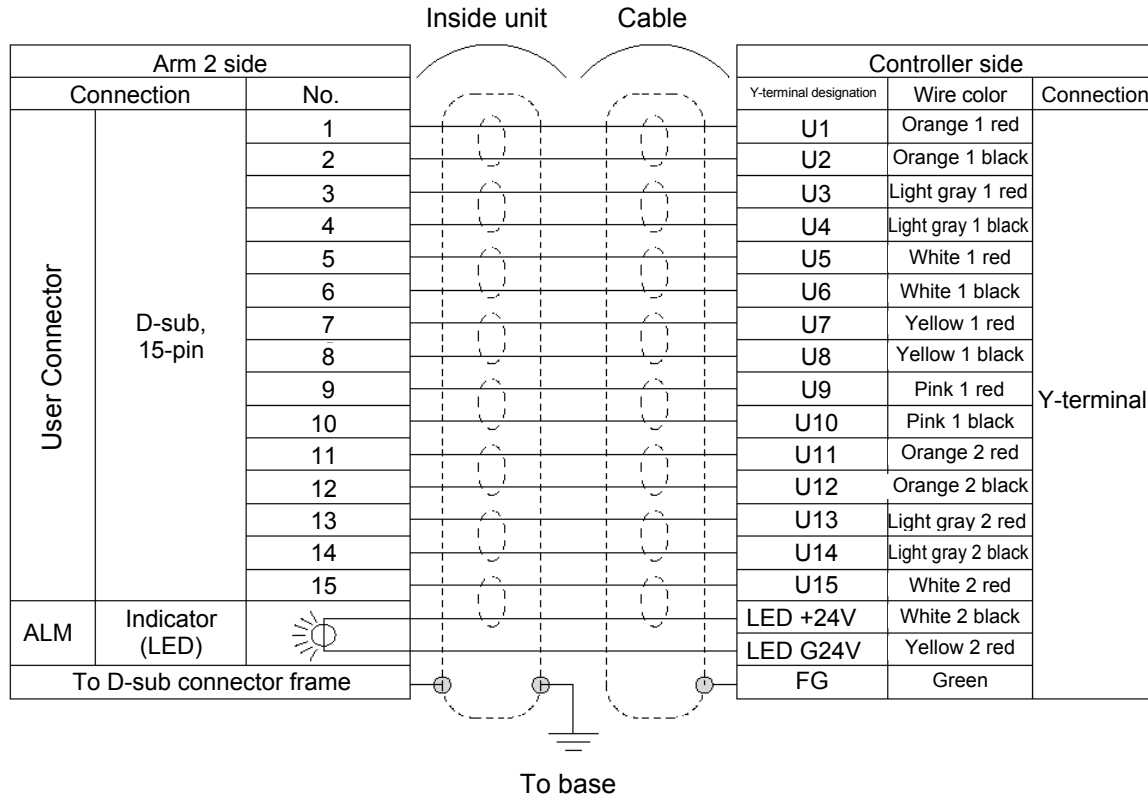
The user connector comes with the mating D-sub 25-pin plug.

The robot comes with a 15-pin plug for the D-sub connector for user wiring.

Solder a user-supplied cable to the D-sub connector (plug), attach the supplied hood, and then connect to the user connector (socket). Use a shielded cable with an outer diameter of $\varnothing 11$ or less.

To turn on the ALM (indicator), the user must configure a dedicated circuit that uses the controller I/O output signal, etc.

User connector pins and corresponding Y-terminals

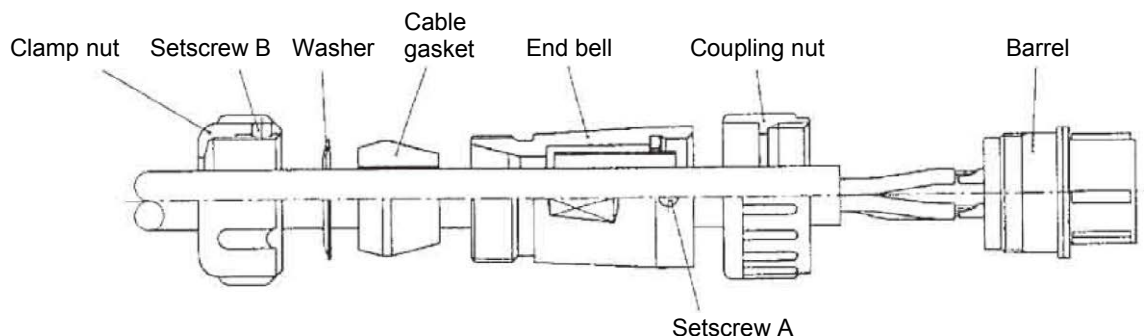


Warning

- Before commencing wiring/piping work, turn off the power to the controller and the power/air supplies to the robot. Failure to do so may cause the robot to malfunction.
- Use cables and tubes within their specifications. Failure to do so may result in fire or short circuit due to an overheated cable, or may cause air leaks.
- Connect the shielded cable to the hood. Otherwise, the robot may malfunction due to noise.
- Secure the supplied D-sub connector using the screws on the hood.

The user connector comes with a mating 16-pin plug.

Connector pins 1 to 15 can be used. Pin 16 is connected to a shield wire and cannot be used as a signal wire. Use a cable with an outer diameter of $\varnothing 13.1$ to 15.0 . The wiring method for the supplied connector is shown below.



- [1]: Screw the barrel into the end bell and secure with setscrew A.
- [2]: Push the cable gasket and washer into the end bell and screw in the clamp nut by holding the end bell in position.
- [3]: Move the cable back and forth and to the left and right to ensure smooth movement, tighten the clamp nut again to the specified torque, and secure with screw B.

⊙ Tightening torque for each screw

- End bell: 10 kgf-cm to 15 kgf-cm
- Clamp nut: 15 kgf-cm to 20 kgf-cm
- Setscrew A, B: 2 kgf-cm to 3 kgf-cm

If the waterproof user connector and user piping joint are not used, put the supplied cap and blind plug to seal the openings, respectively. If not, water and dust will enter.



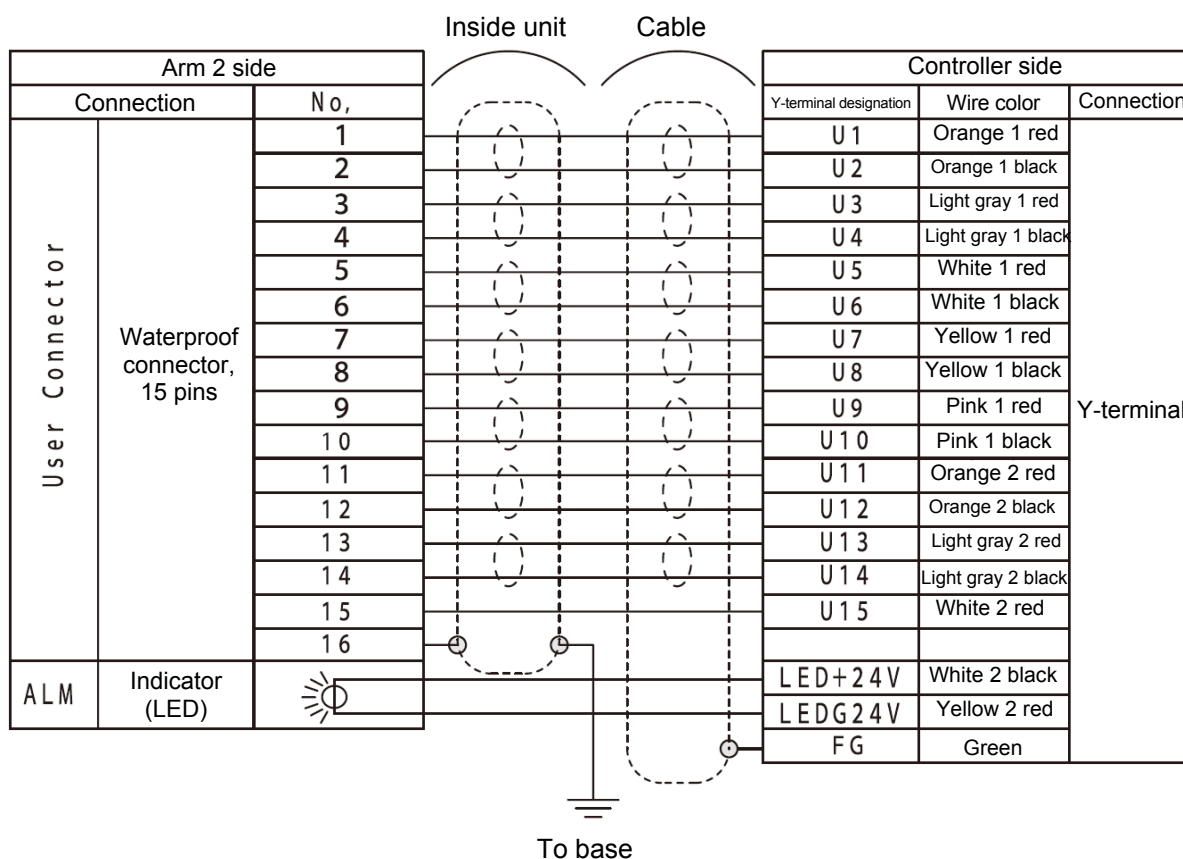
Warning



Caution

- Before commencing wiring/piping work, turn off the power to the controller and the power/air supplies to the robot. Failure to do so may cause the robot to malfunction.
- Use cables and tubes within their specifications. Failure to do so may result in fire or short circuit due to an overheated cable, or may cause air leaks.
- Connect the shielded cable to the hood. Otherwise, the robot may malfunction due to noise.
- If the user connector is not used, put the cap to seal the opening. If not, water and dust will enter.
- Tighten the connector to the specified torque.
- If the outer diameter is smaller than the one specified for the applicable cable, use tape, etc., to adjust the outer diameter before installing.

User connector pins and corresponding Y-terminals



Warning

- Before commencing wiring/piping work, turn off the power to the controller and the power/air supplies to the robot. Failure to do so may cause the robot to malfunction.
- Use cables and tubes within their specifications. Failure to do so may result in fire or short circuit due to an overheated cable, or may cause air leaks.
- Connect the shielded cable to the pin 16. Otherwise, the robot may malfunction due to noise.

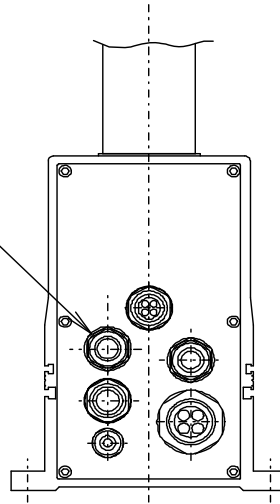
12.6 Suction Rate of Cleanroom Specification IX-NNC2515H/3515H

Cleanness class 10 can be achieved by suctioning air at the specified rate through the quick joints for suction provided on the base and rear panel.

- The suction device and suction air tubes ($\varnothing 12$) are provided by the customer.

Suction rate (NI/min)
80

Quick joint for suction (applicable tube: outer diameter $\varnothing 12$, inner diameter $\varnothing 8$)



12.7 Air Purge for Dust-proof/Splash-proof Specification IX-NNW2515H/3515H

By applying the pressure specified below from the air supply port provided on the side face of the base, the robot will conform to the IP65 dust-proof/splash-proof specification.

Service pressure	Pressure in a range of 0.3 to 0.6 MPa immediately before the bellows inflates
Outer diameter x Inner diameter	Outer diameter $\varnothing 6$ x Inner diameter $\varnothing 4$
Fluid used	Clean, dry air free from compressor oil, etc. The air filtration rating shall be $10\mu\text{m}$ or less (dew point of dry air in atmosphere shall be -20°C or less).

● Flow rate adjustment method

The customer should provide a relief valve. Fully close the speed controller supplied with the actuator, set the pressure to 0.3 MPa or more but not exceeding 0.6 MPa, and then adjust the flow rate using the speed controller supplied with the actuator.

Supplying too much air will inflate the bellows.

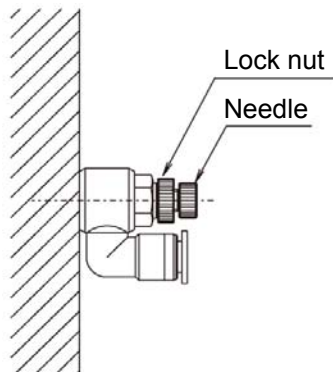
Adjust the speed controller by following the procedure below.

<Increase the flow rate>

Turn the needle of the speed controller counterclockwise from the fully closed position to increase the flow rate.

Supplying too much air will inflate the bellows, so adjust the needle until immediately before the bellows inflates.

After the adjustment, be sure to tighten the lock nut to maintain the flow rate.



Caution

- Be sure to use clean, dry air with an atmospheric dew point of -20°C or less. If dry air is not used, condensation may occur inside the robot, resulting in earth leakage or malfunction.
- Do not apply pressure exceeding the specified maximum pressure of 0.6 MPa. Doing so may cause the seals to break and impair the robot's dust-proof/drip-proof performance.
- Adjust the pressure and also adjust the flow rate using the speed controller at the back of the base to prevent intrusion of powder dust.

13. Maintenance and 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 harmonic speed reducer
 - Disassembly of the brake
 - Cutting of the cable

13.1 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.

[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. Confirm that the interlock mechanism is operating properly.
Appearance of Robot	Check the exterior for abnormality, flaws, dents, etc. (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 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. (Tighten if any loosened bolt is found.)
Ball Spline	Supply grease to ball screw and ball splined. • Other Types than Dustproof/Splash proof type and Clean type: Multemp LRL No. 3 Grease by Kyodo Yushi • Dustproof/Splash proof type and Clean type: AFE-CA Grease by THK [Refer to 13.2, "Ball Screw Spline Grease Supply".]
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 Arm Attachment Bolts	Check for any looseness of the bolts on the arm. (If any play is found on the arm attachment, tighten up the bolts.) [Refer to 13.3, "Check for Looseness of Arm Attachment Bolts".]

[4] 2.5 Years Maintenance Inspection

Have a maintenance and inspection for the following items once every 2.5 years.

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

Maintenance Inspection Area	Maintenance Inspection Details
Battery Replacement	Replace the absolute data backup battery. The battery life may vary depending on the condition and environment of the robot use, but it is approximately three years. It is recommended to have the battery replaced every 2.5 years. (Battery model code: AB-3, Quantity to use: 4 units) [Refer to 13.4, "Replacement of Absolute Backup Battery".]
Third Axis Belt	Check the third axis (vertical axis) timing belt surface for any defect or excessive wear. (Check it five years later from the operation start, and after that, check it every year). When any defect is found, the replacement of the timing belt is required. (If any defect is found, contact IAI). [Refer to 13.5, "Third Axis Timing Belt Visual Check".]

Note 1: In case the duty of the robot operation is high, or ambient temperature is high, supply the grease frequently (every year).

[5] 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
First axis and Second axis speed reducer Bearings on joints	Lost motion measurement 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. (Please contact IAI if any abnormality is found.) (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. [Refer to 13.6, "How to Measure Lost Motion".]
Forth Axis Belt	Check the forth axis (rotational axis) timing belt surface for any defect or excessive wear. (Check it five years later from the operation start, and after that, check it every year). When any defect is found, the replacement of the timing belt is required. [Refer to 13.7, "Forth Axis Timing Belt Visual Check".]

13.2 Ball Screw Spline Grease Supply

The Ball Screw Spline on the vertical axis require grease to be supplied.

13.2.1 Applicable Grease and Supply Period

Types	Grease to Apply		Supply Period
Other Types than Dustproof/Splash proof type and Clean type	Kyodo Yushi	Multemp LRL No. 3	Every half a year
Dustproof/Splash proof type and Clean type	THK	AFE-CA	

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

13.2.2 Grease Supply

Tool necessary for work
Grease, Cloth

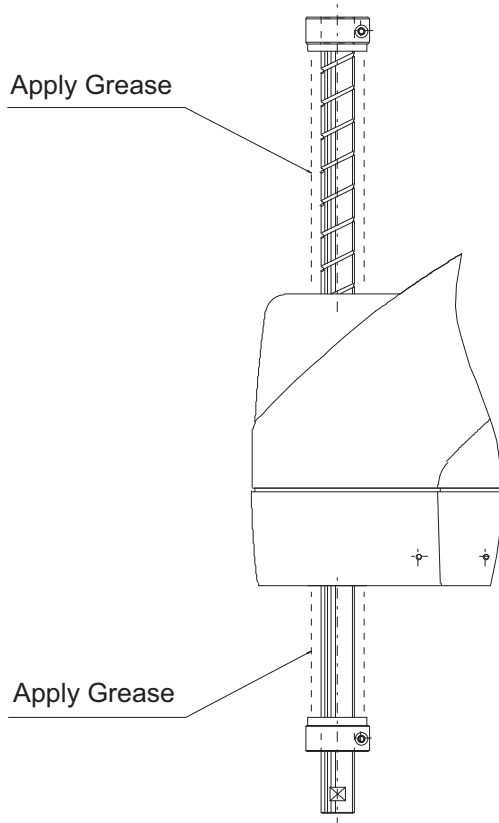
Procedure

- 1) Wipe old grease away from entire surface of the ball screw spline axis using a cloth.
- 2) Apply new grease on the entire surface of the ball screw spline axis.
- 3) Apply grease two or three times and after the grease application, move the ball screw spline up and down so that grease is spread smoothly all over the inside bearing.

[Apply grease]

Quantity
6 to 12 cc (5 to 10g)

- 4) Wipe off excessive grease on the ball screw spline axis surface (to the extent that grease does not fly off when the spline axis is operated).

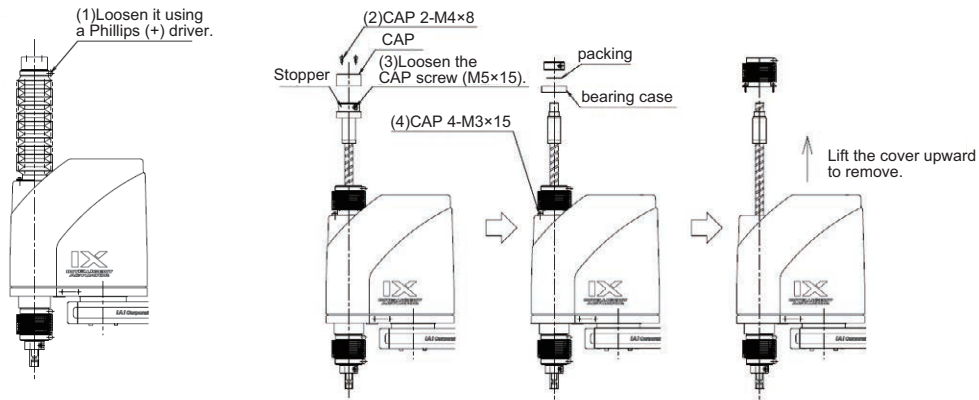


Caution: In case the grease got into your eye, immediately go see the doctor to get appropriate care. After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

In the case of the dust-proof and rain-proof type, or clean type, it is required to remove the bellows unit fixed on the arm #2 to expose the ball screw spline.

- 1) Loosen the clamp for the bellows using a Phillips (+) driver.
- 2) Remove the two cap screws (M4 × 8) fixing the cap, and remove the cap.
- 3) Loosen the cap screw (M5 × 15) for the stopper to some extent and remove the stopper, packing and bearing case in this order.
- 4) Remove the four cap screws (M3 × 15) fixing the bellows, shown as (4) in the following figure, and remove the bellows.

For the dust and rainproof type, the shape of the upper side is cylindrical. Remove the set screw on the four locations and remove the cylinder.



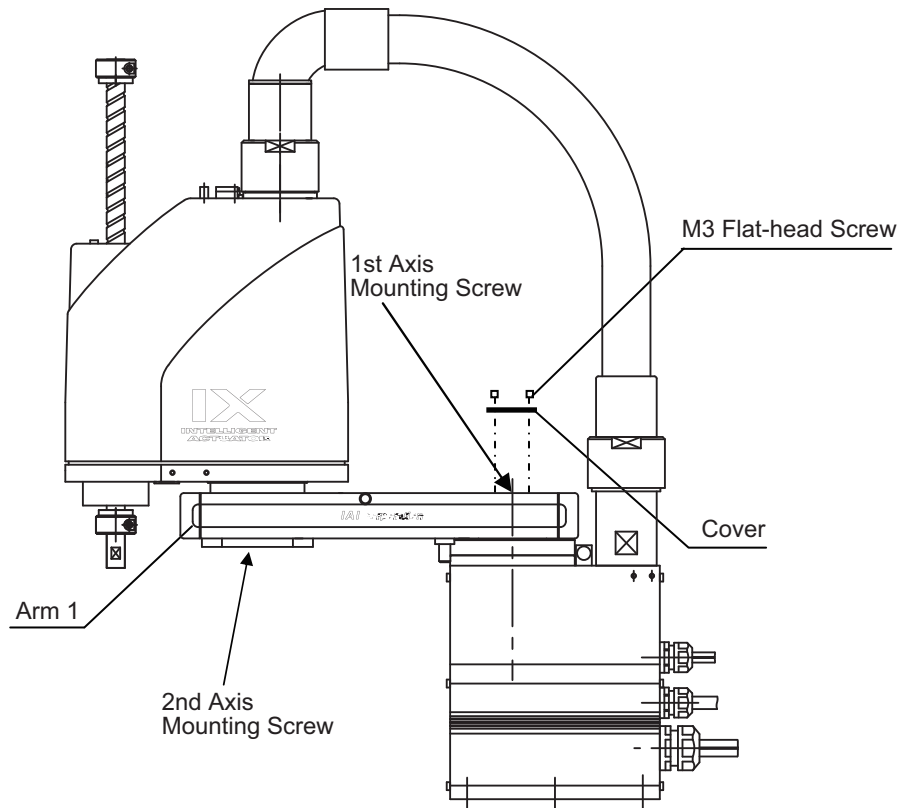
13.3 Check for Looseness of Arm Attachment Screws

Tool necessary for work

Hex wrench set, Phillips Screwdriver (M3 Flat-head screw)

Procedure

- 1) The first axis set screw appears when the cover is removed.
- 2) The second axis set screw can be seen from the position under the arm #1.
- 3) Check for any looseness of the set screws for each axis using the hex wrench.
(Tighten if any loosened screw is found.)
- 4) Attach the cover. Tightening torque for M3 flat-head screw is 0.74 N·m



Tightening Torque [N·m]		Remarks
1st axis	2nd axis	
12.3	7.2	1st axis: Hexagon socket-head screws M6 strength class 10.9 2nd axis: Hexagon socket-head screws M5 strength class 10.9



13.4 Replacement of Absolute Backup Battery

13.4.1 Preparation

The following items are required when replacing the batteries:

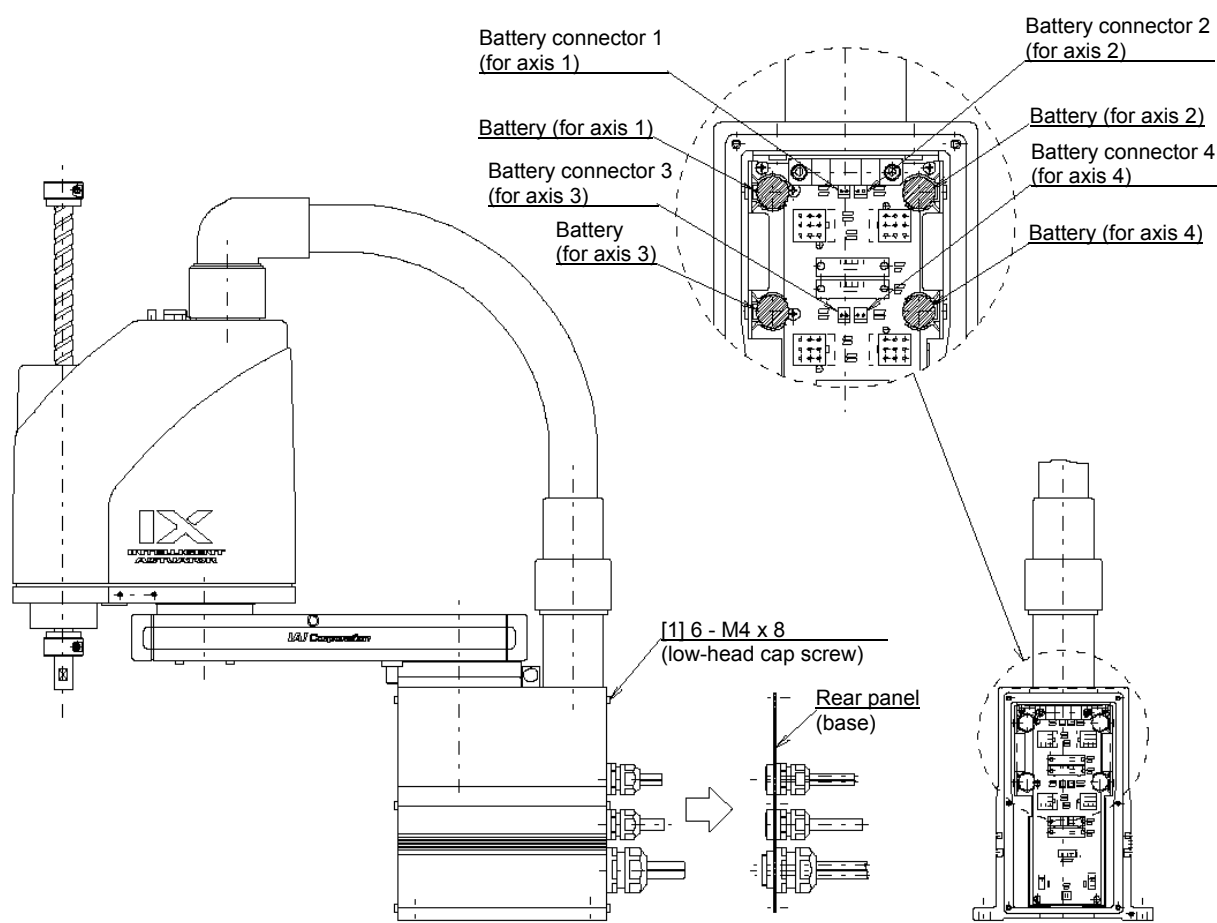
Before replacing the batteries, turn off the power to the controller, control panel and other relevant units.

Model number	Tool	New, 1x-only specification
IX-NNN2515H/3515H IX-NNW2515H/3515H IX-NNC2515H/3515H	Phillips screwdriver	AB3 (4 pcs)

13.4.2 Replacement Procedure IX-NNN2515H/3515H, IX-NNC2515H/3515H

- (1) Remove the six low-head cap screws (6 pcs) and remove the rear panel (base).
- (2) Remove the batteries from the battery holder.
- (3) Remove the batteries from the extension cables from the battery connectors, and connect new batteries.

- After removing the old batteries, quickly connect new batteries (roughly within 5 minutes x number of batteries).
 - If new batteries are not connected for a longer period, the rotation data will be lost and an absolute reset will become necessary.
 - Replace batteries one axis at a time. If the batteries for all axes are replaced at once, the work may not be completed within the specified time.
- (4) Install the batteries into the battery holder.



- (5) Affix the rear panel (base) using the six low-head cap screws [1].

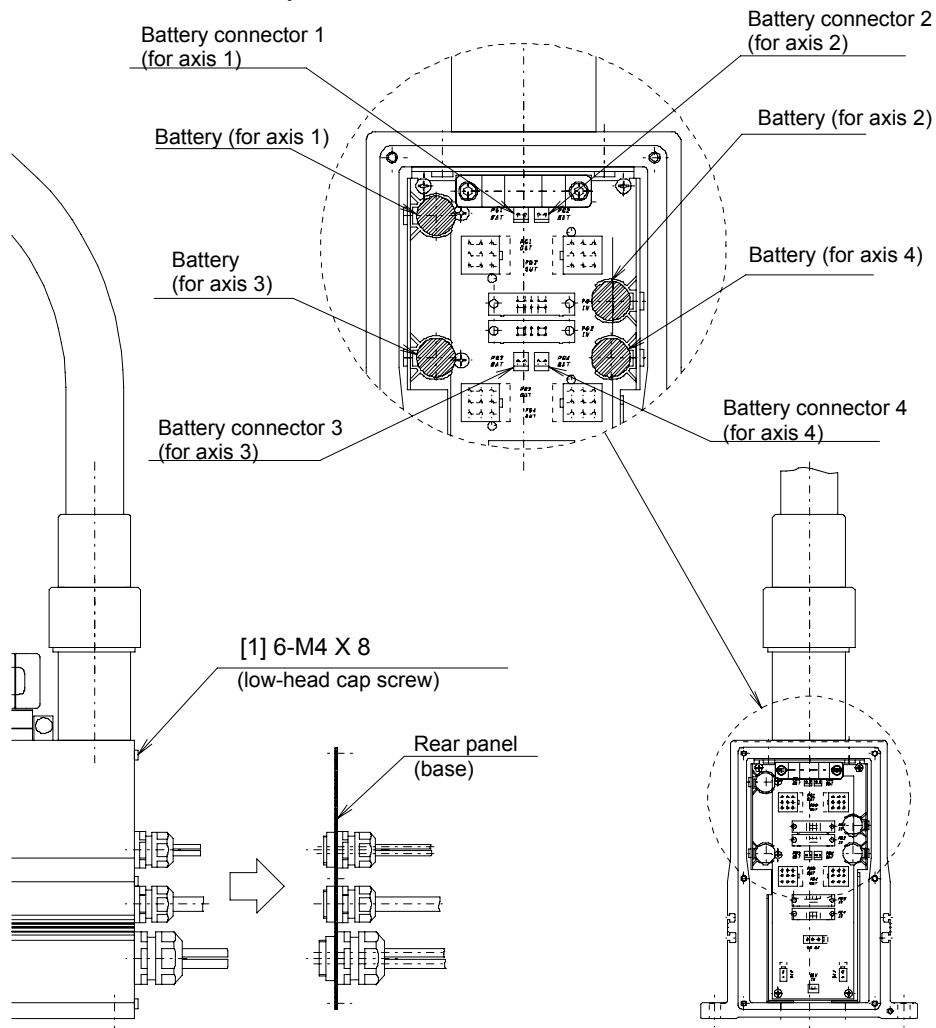
Caution

- When installing the rear panel (base), be careful not to pinch the cables inside.
- Be careful not to leave out the seal washer.

13.4.3 Replacement Procedure IX-NNW2515H/3515H

- (1) Remove the six low-head cap screws (6 pcs) and remove the rear panel (base).
- (2) Remove the batteries from the battery holder.
- (3) Remove the batteries from the extension cables from the battery connectors, and connect new batteries.

- After removing the old batteries, quickly connect new batteries (roughly within 5 minutes x number of batteries).
 - If new batteries are not connected for a longer period, the rotation data will be lost and an absolute reset will become necessary.
 - Replace batteries one axis at a time. If the batteries for all axes are replaced at once, the work may not be completed within the specified time.
- (4) Install the batteries into the battery holder.



- (5) Affix the rear panel (base) using the six low-head cap screws [1].

Caution

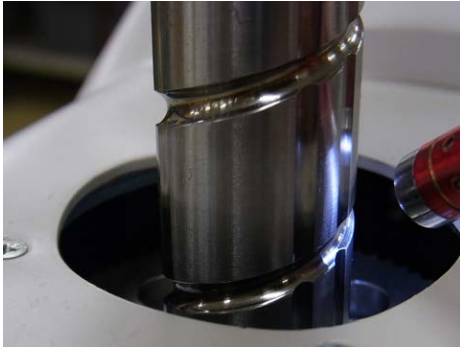
- When installing the rear panel (base), be careful not to pinch the cables inside.
- Remember to insert the seal washer.

13.5 Third Axis Timing Belt Visual Check

Tool necessary for work
Penlight

Procedure

Check the timing belt surface using a penlight as shown in the pictures for any defect or excessive wear.



13.6 How to Measure Lost Motion

Tool necessary for work

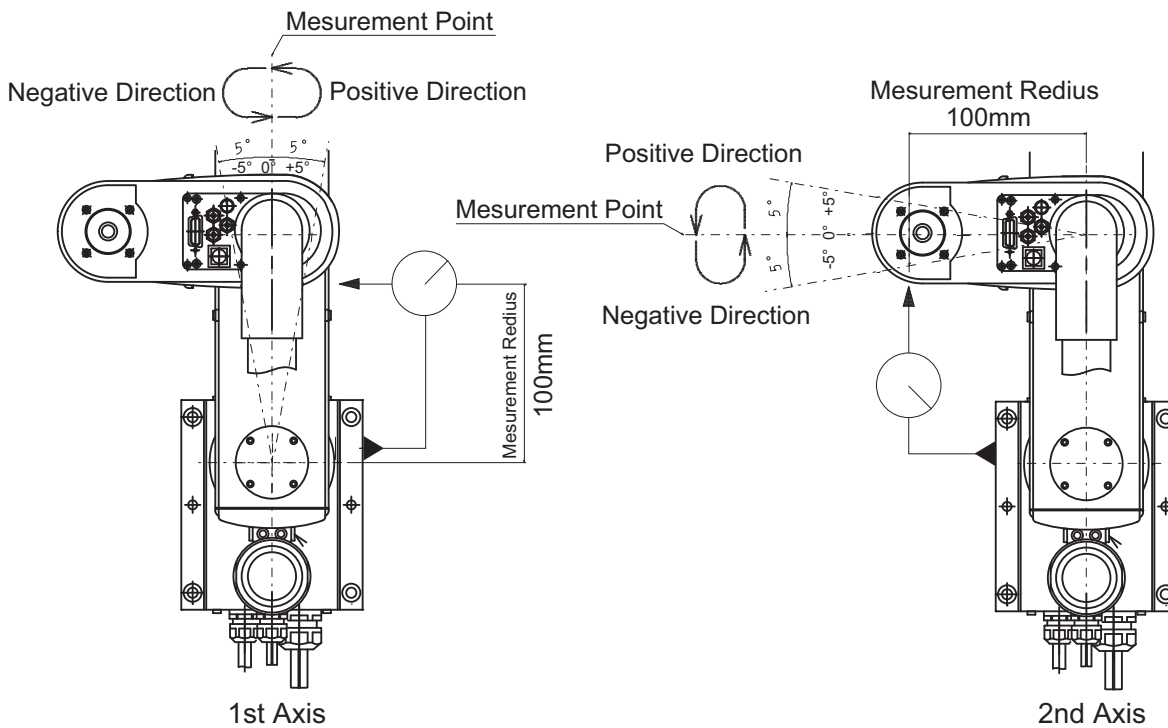
Digimatic Indicator (Measurement range 10mm or more, minimum display 0.001mm) or equivalent acceptable

Magnet stand

Procedure

- 1) Create a position and a program to operate first Axis and second Axis in $\pm 5\text{deg}$ with PTP Operation.
- 2) Take off the cover (on Arm 2) on one side and allocate the measurement equipment as shown in the figure below.

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



- a. Move the axis from +5deg towards 0deg, the measurement point, in the positive direction, and measure the position.
 - b. 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.
 - c. 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)	$[\tan(0.0034/100)] * 60$ 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

Lost Motion (arc min.)		Measurement Radius (mm)
1st axis	2nd axis	
1.0	1.0	100

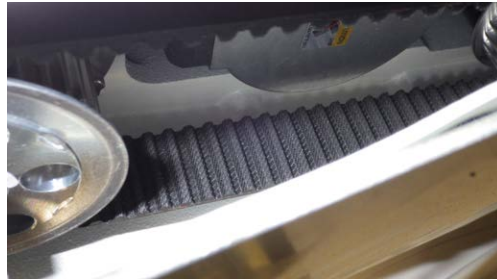
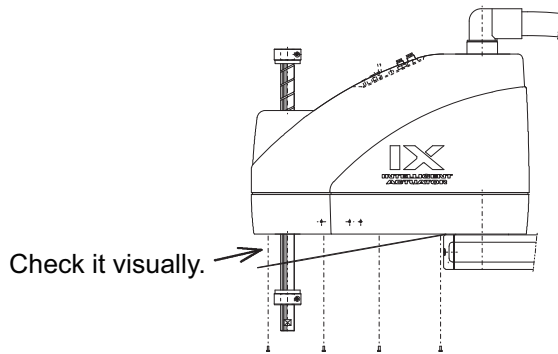
13.7 Forth Axis Timing Belt Visual Check

Tool necessary for work

Penlight, Hex Wrench Set, Phillips Screwdriver (M3 Flat-head screw)

Procedure

- 1) Move the up/down axis to the position of 50 to 100mm.
- 2) Remove the set screw for the arm 2 lower cover.
- 3) Check the timing belt surface using a penlight for any defect or excessive wear.
- 4) Attach the cover.



13.8 Absolute Encoder Reset Method

13.8.1 Preparation for Absolute Reset

The following jigs are required to perform an absolute reset.

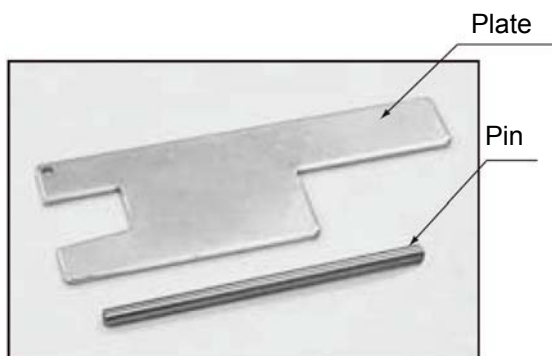
- Absolute reset adjustment jigs

Model number	Remarks
JG-2	For arm length 250/300/350

Connect the robot, controller and PC cables so that the robot/controller can be operated using the PC software. Be sure to check the EMG switch operation beforehand.

An absolute reset of the rotational and vertical axes requires absolute reset adjustment jigs, but jigs are not always required for an absolute reset of arms 1 and 2.

(A multi-rotation reset can be performed as long as the current position is within ± 1 graduation on the positioning mark sticker.)



Example of Absolute Reset Adjustment Jig (Model number JG-2)

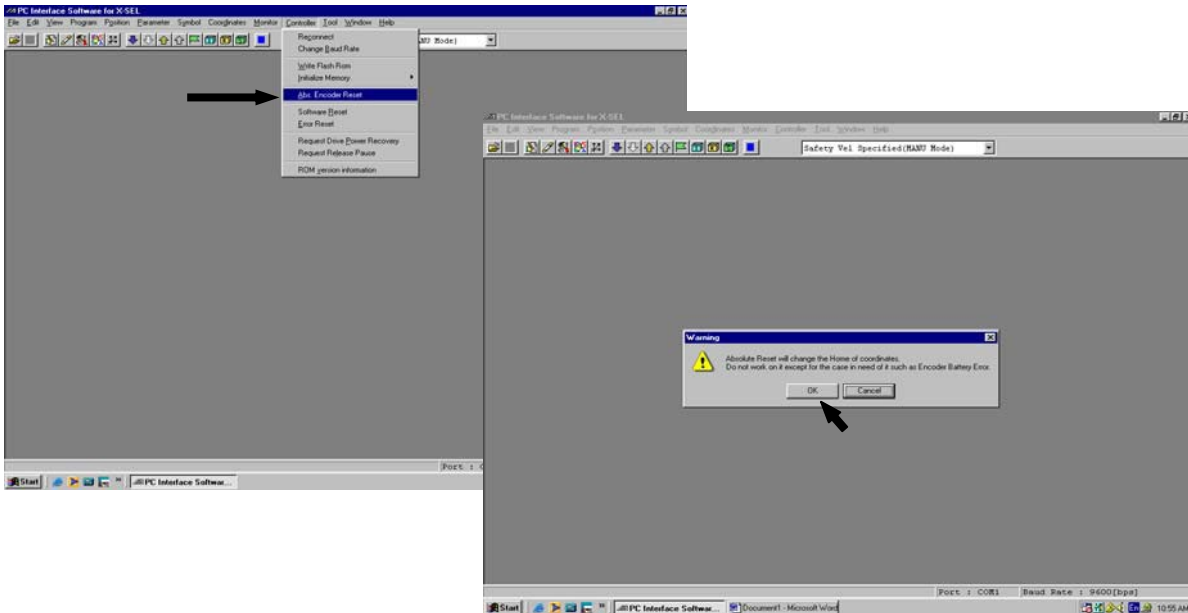


Warning

- Fully understand the applicable inspection/maintenance work, because failure to do so may result in a serious injury accident.
- Put up a "WORK IN PROGRESS" sign to prevent other operators from accidentally operating the controller, operation panel, etc. Remember to insert the seal washer

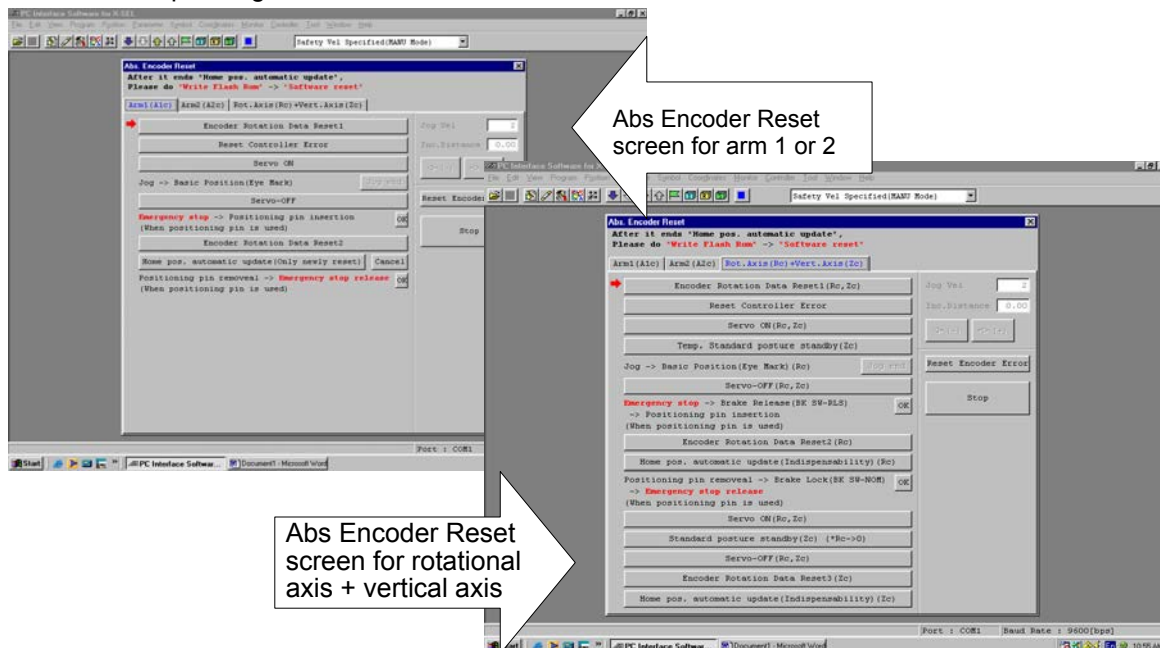
13.8.2 Starting the Absolute Reset Menu

- (1) Open the Abs Encoder Reset window from the PC software.
- (*) Select "Absolute Reset (SCARA Axis) (Y)" if you are using an X-SEL-PX/QX controller.



Starting Up Absolute Reset Window

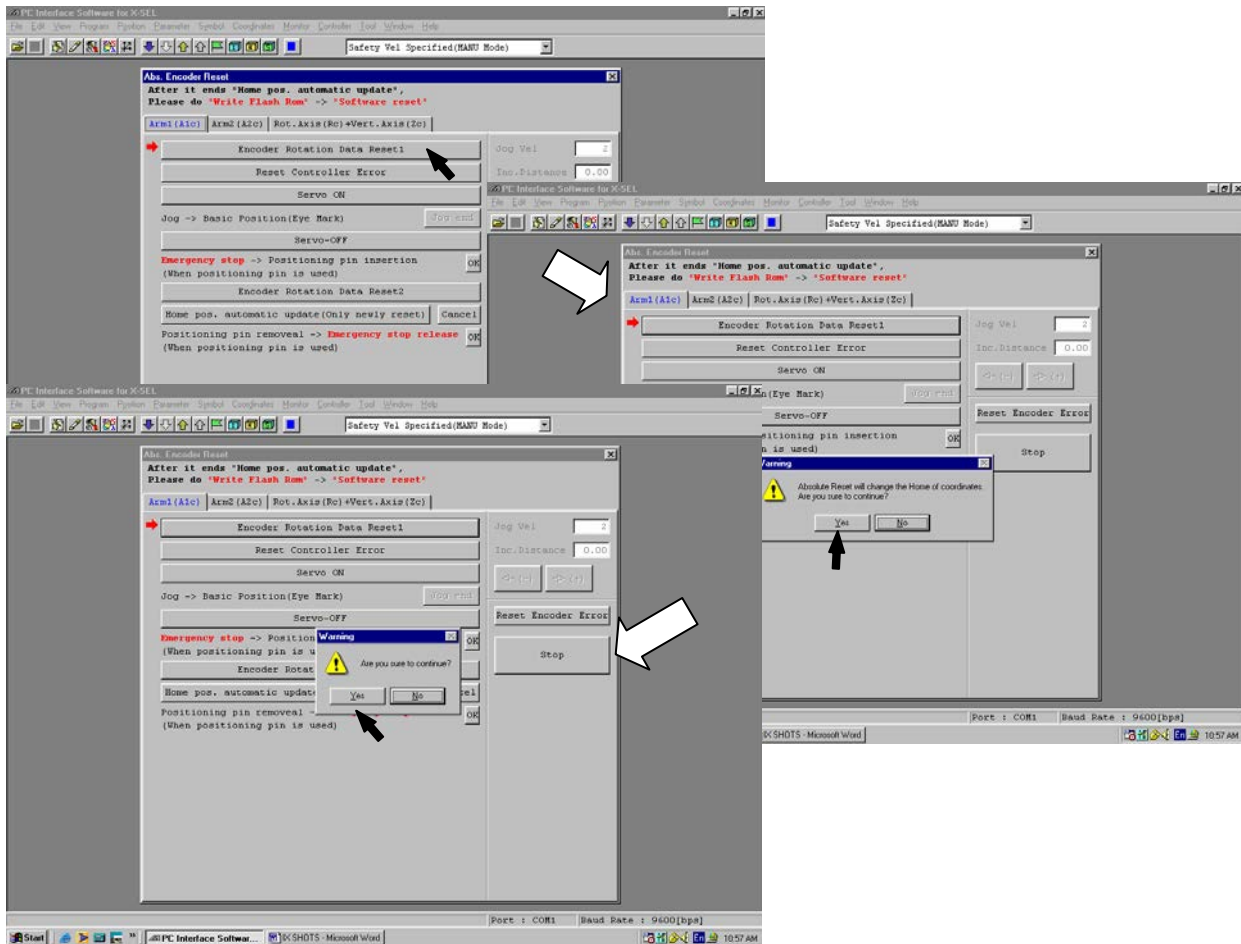
2. The Abs Encoder Reset window opens.
 - One of three absolute reset screens –for arm 1, arm 2 and rotational axis + vertical axis– is displayed when a corresponding tab is clicked.



Absolute Reset Window

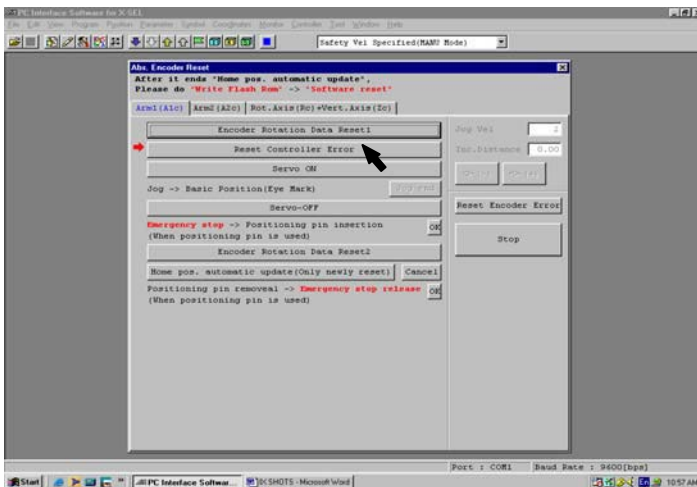
13.8.3 Absolute Reset Procedure for Arm 1 or 2

- (1) Click the “Encoder Rotation Data Reset1” button.



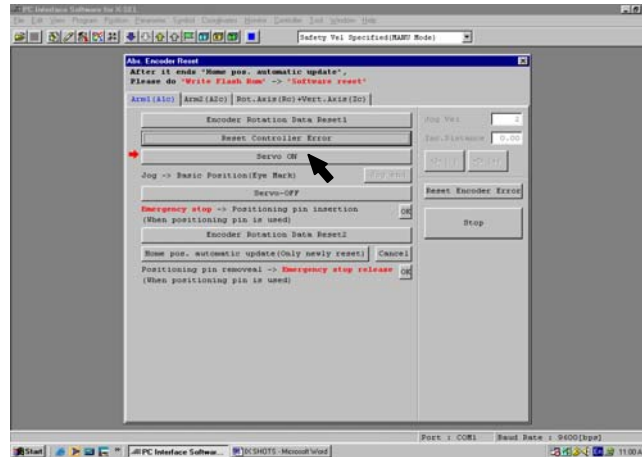
Encoder Multi-rotation Data Reset 1

- (2) Click the “Reset Controller Error” button.



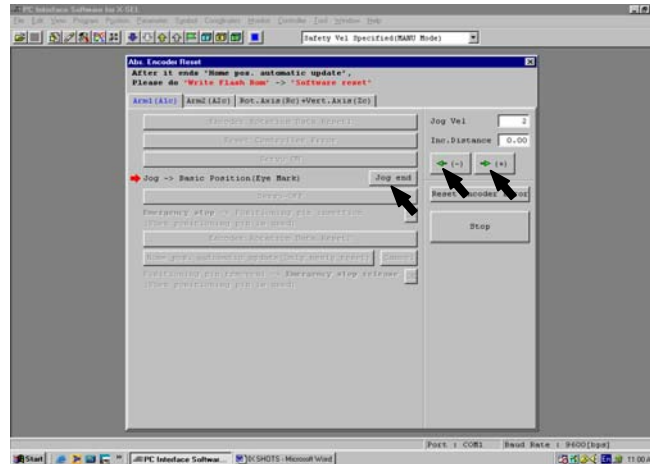
Controller Reset

- (3) Click the “Servo ON” button.



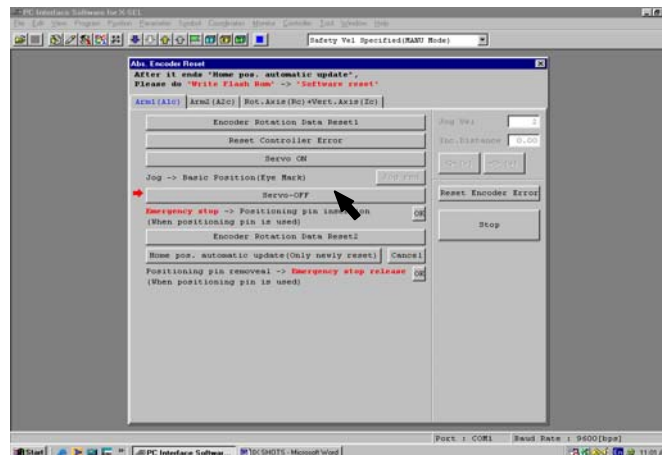
Servo ON

- (4) Jog the arm to near the reference position (see reference position drawing in step (7), and click the “Jog end” button.



Jogging

- (5) Click the “Servo-OFF” button.



Servo OFF

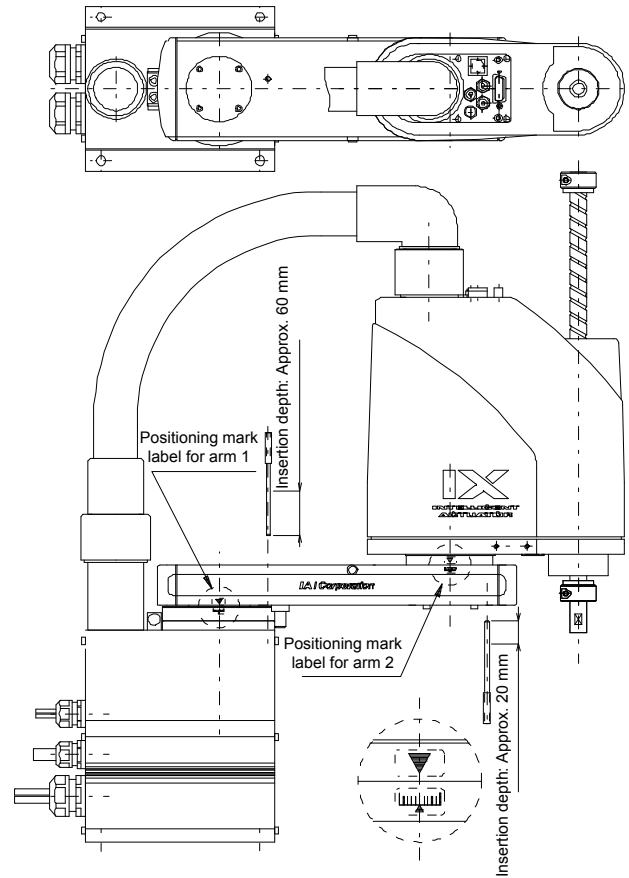
- (6) Press the emergency-stop switch.
- (7) When performing an absolute reset of arm 1, set the adjustment jig (pin) on arm 1 to secure the arm in its reference position. You can move arm 2 when securing arm 1. When performing an absolute reset of arm 2, set the adjustment jig (pin) on arm 2 to secure the arm in its reference position. You can move arm 1 when securing arm 2.
 - Set the jig after confirming that the emergency-stop switch is pressed.
 - Set the jig after adjusting the arm to the reference position, using the positioning mark label as a guide.
 - Arm 1 has a cover, which is fixed with setscrews. Remove the setscrews and detach the cover before setting the jig.
 - It is recommended that an adjustment jig be used to perform an absolute reset. With arm 1 or 2, however, rotation data can be reset as long as a positioning precision of “center of positioning mark label ± 1 graduation” is ensured.



Arm 1
(arm length 250/350)



Arm 2
(arm length 250/350)



Reference Posture for Arm Length 250/350

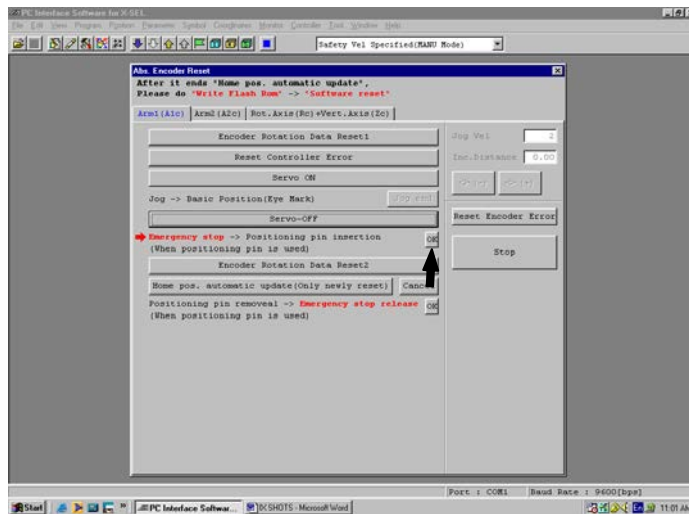
(Note) For an absolute reset of arm 1 of the IX-NNN2515, slightly bend arm 2 and set the adjustment jig (pin).



Warning

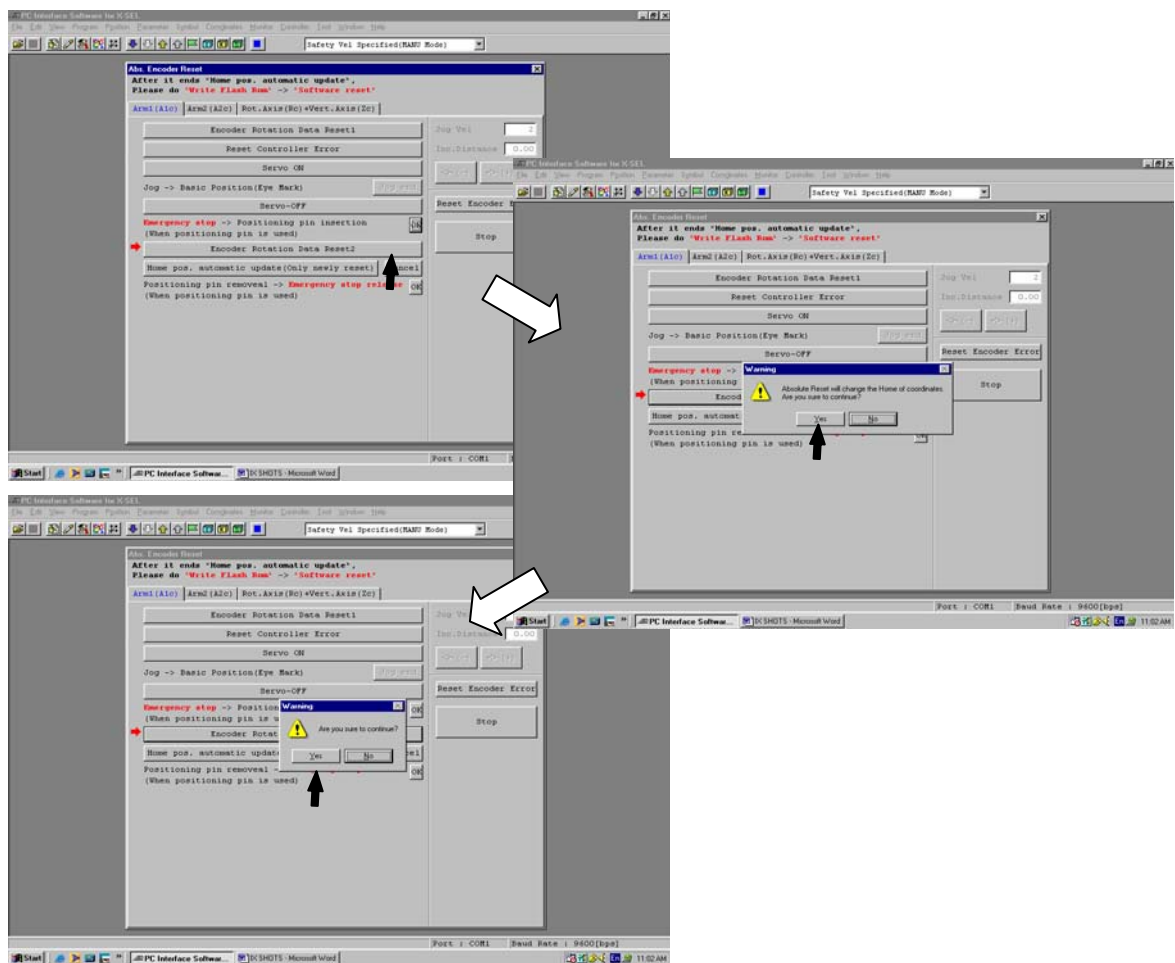
- Always press the emergency-stop switch before setting an adjustment jig. Failure to do so may cause the robot to malfunction and result in a serious accident.

(8) Click the “OK” button.



Confirmation

(9) Click the “Encoder Rotation Data Reset2” button.



Encoder Multi-rotation Data Reset 2

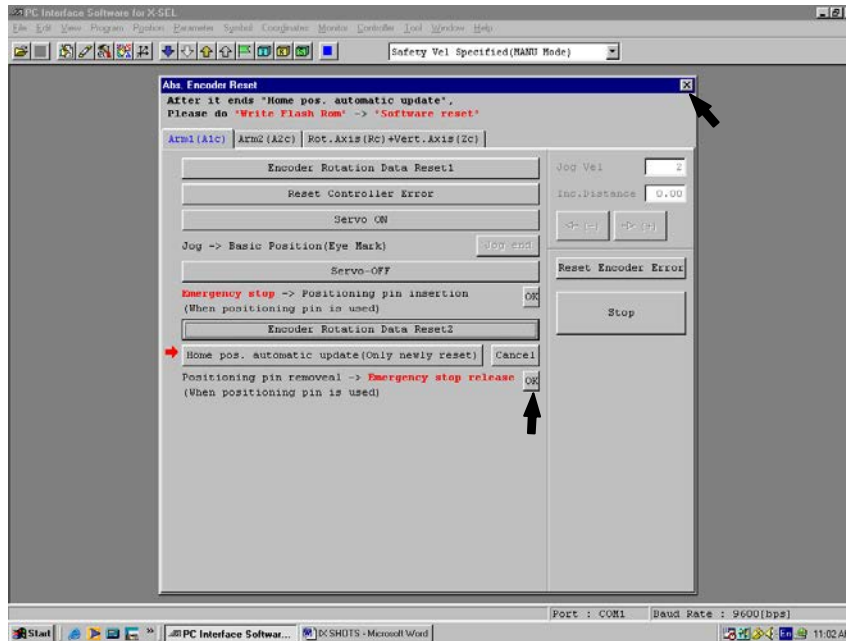
(10) Remove the adjustment jig.

- If you are working on arm 1, install the cover and secure it with the setscrews.

(11) Release the emergency-stop switch.

(12) Click the “OK” button.

- An arrow is shown next to the “Home pos. automatic update” button. Do not set this item. (In particular, be sure this item is not set when performing an absolute reset without using a jig).
- If you have allowed the home preset value to be updated automatically by mistake, do not write the updated data to the flash ROM. Instead, perform a software reset. (After the software reset, the data will return to the original condition before the home preset value was automatically updated.)
- Always click the “OK” button after removing the jig and releasing the emergency-stop switch.



Confirmation

(13) Click “X” in the top right-hand corner to exit the absolute reset window.

- Once the absolute reset is complete, be sure to reset the software.

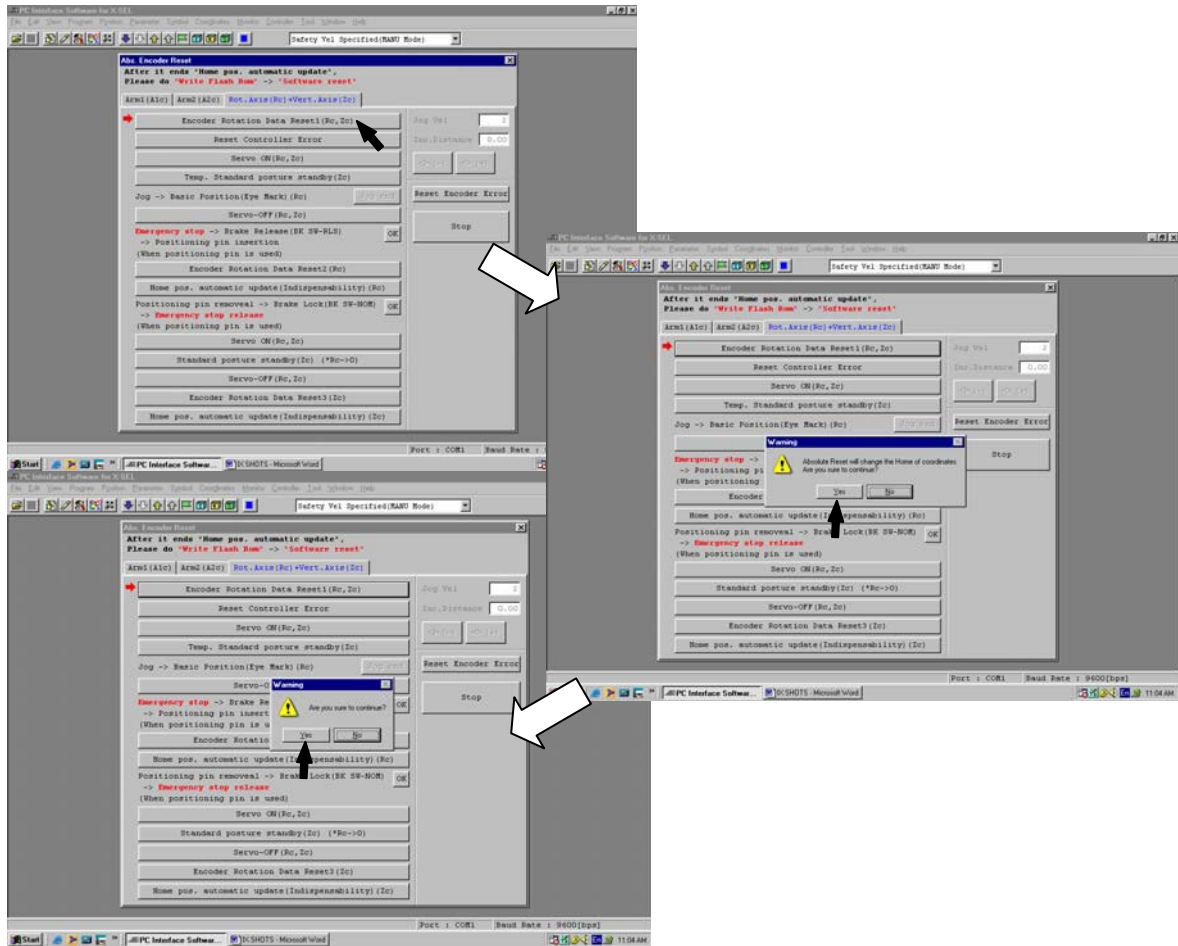


Warning

- Be careful not to perform a reset using an incorrect sequence, since it may cause the arm position to become offset.
- Update the home preset value only if any of the mechanical settings has been changed, such as after an arm has been replaced. (Changes relating to joints only)

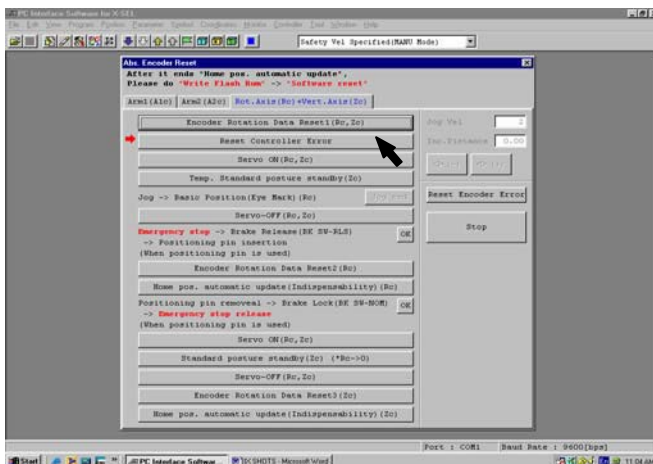
13.8.4 Absolute Reset Procedure for the Rotational Axis + Vertical Axis

(1) Click “Encoder Rotation Data Reset1” button.



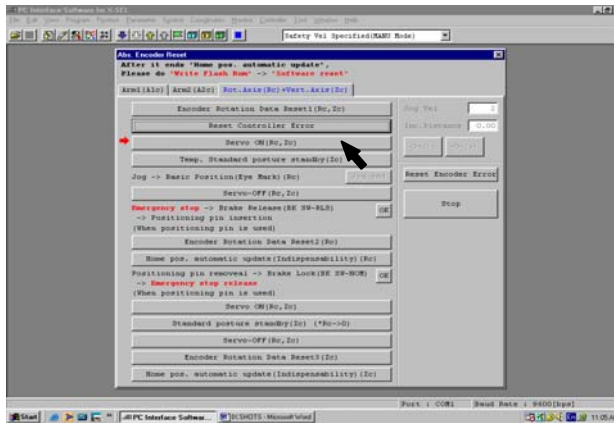
Encoder Multi-rotation Data Reset 1

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



Controller Reset

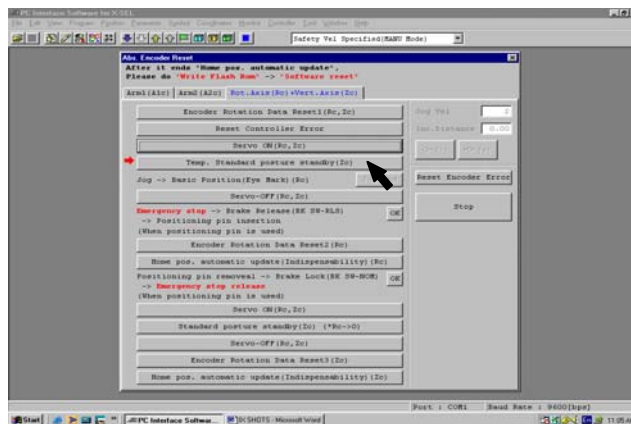
(3) Click the “Servo ON” button.



Servo ON

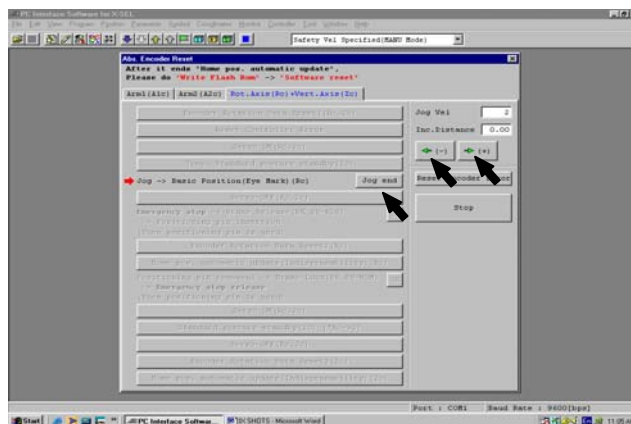
(4) Click the “Temp. Standard posture standby” button.

- The vertical axis returns to its home position. Exercise caution so as not to be injured by the axis during movement.



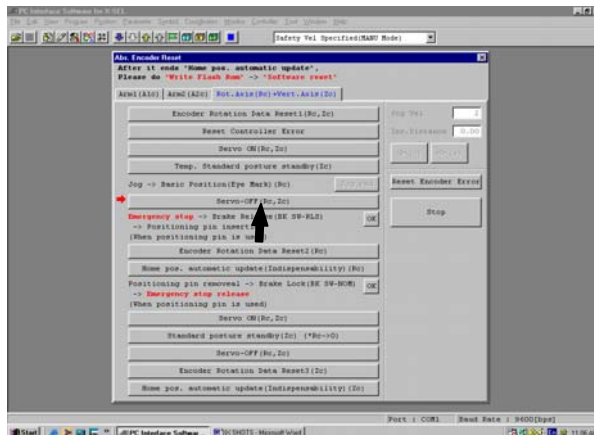
Standing By at Tentative Home Position

(5) Jog the rotational axis to the reference position (see reference position drawing in step 8), and click the “Jog end” button.



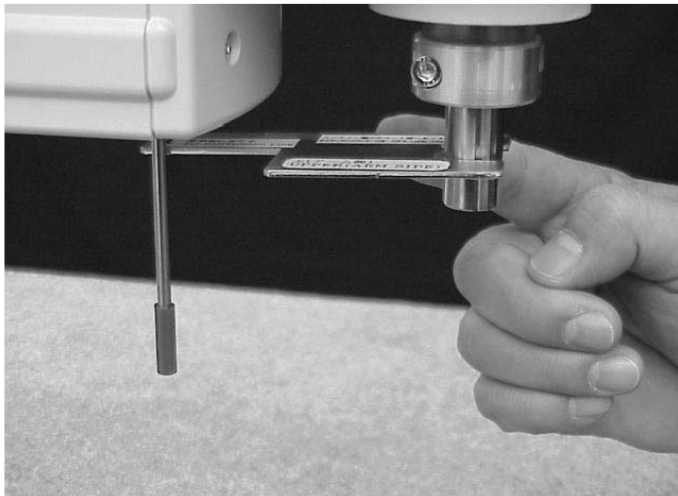
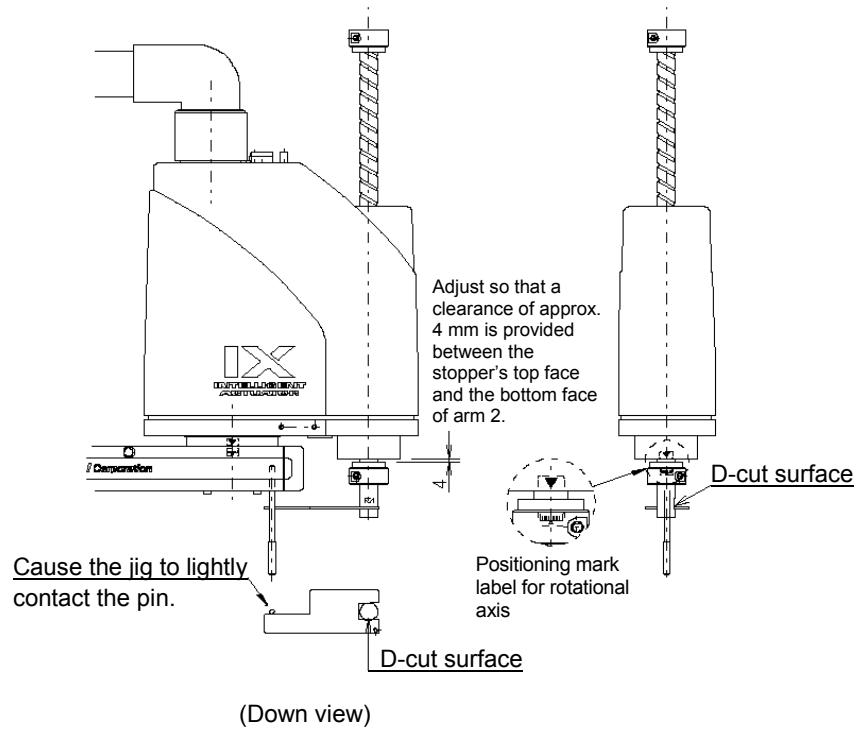
Jogging

(6) Click the “Servo-OFF” button.



Servo OFF

- (7) Press the emergency-stop switch.
- (8) Affix the rotational axis at the reference position by setting the plate and pin of the adjustment jig as illustrated below.
 - Set the jig after confirming that the emergency-stop switch is pressed.
 - Set the jigs by using the positioning mark as a reference.
 - Make sure the top surface of the stopper roughly matches in height with the bottom surface of arm 2.



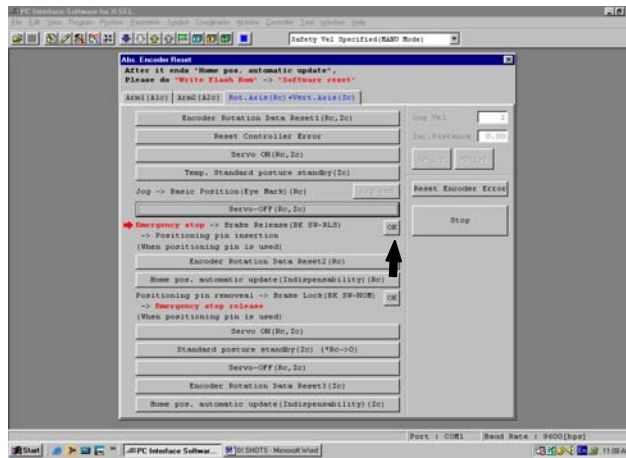
Reference Posture for Arm Length 250/350



Warning

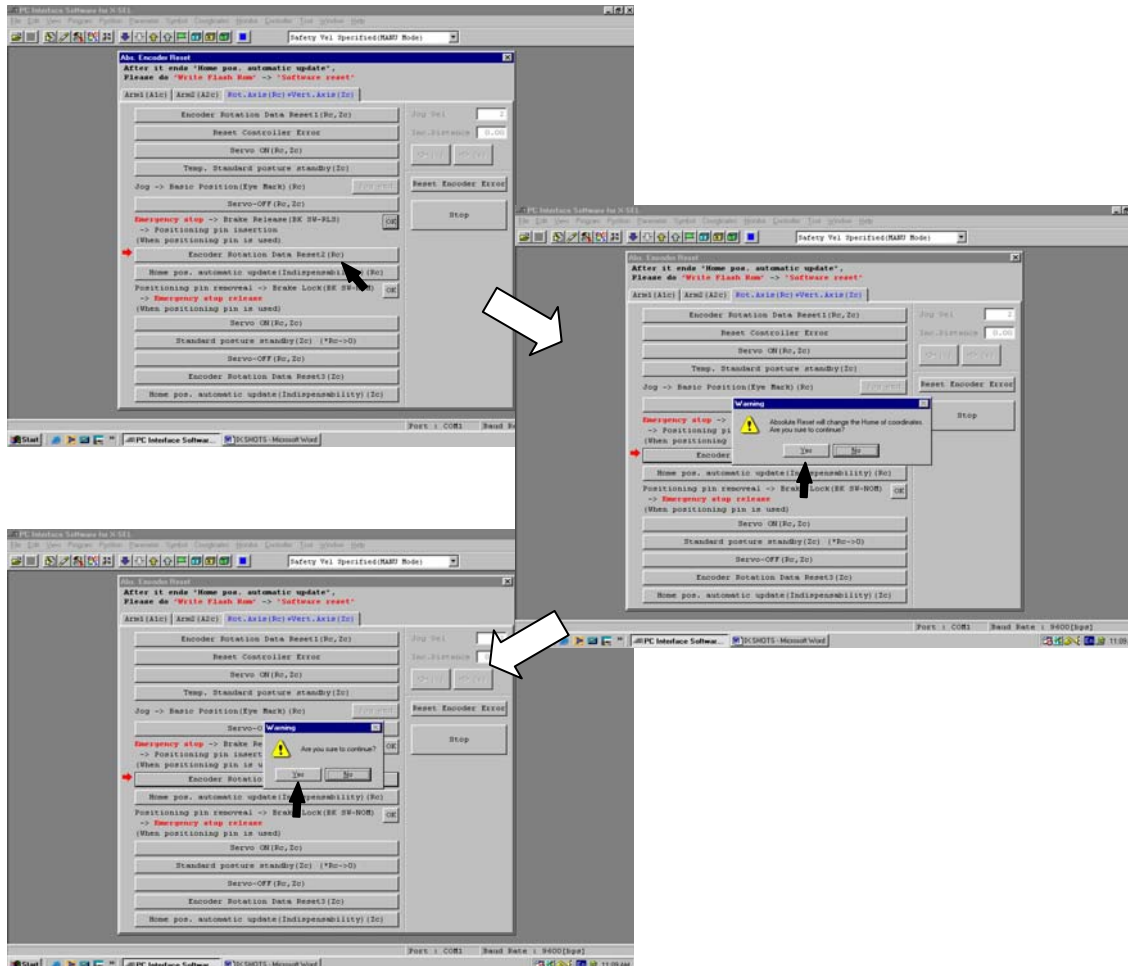
- Always press the emergency-stop switch before setting an adjustment jig. Failure to do so may cause the robot to malfunction and result in a serious accident.

(9) Click the “OK” button.



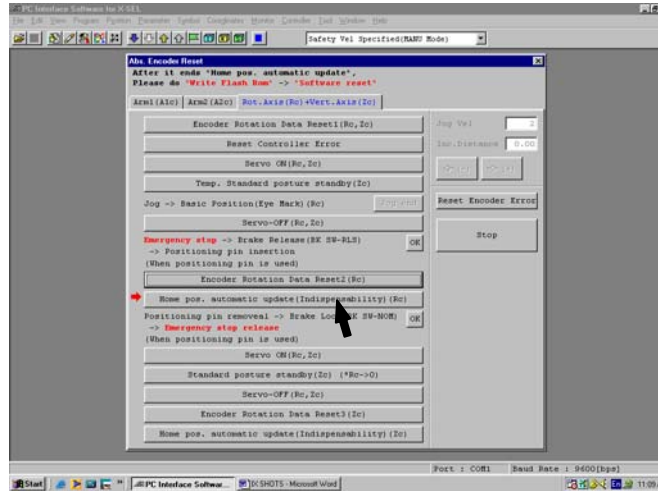
Confirmation

(10) Click the “Encoder Rotation Data Reset2” button.



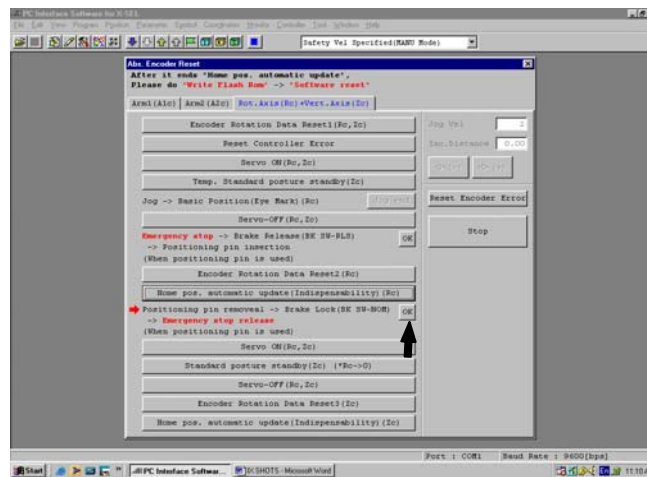
Encoder Multi-rotation Data Reset 2

(11) Click the “Home pos. automatic update” button.



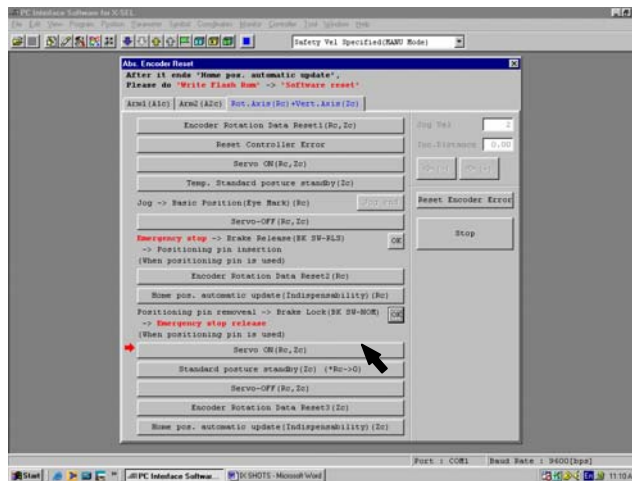
Automatic Refresh of Home Preset Value

- (12) Remove the adjustment jig.
- (13) Release the emergency-stop switch.
- (14) Click the “OK” button.



Confirmation

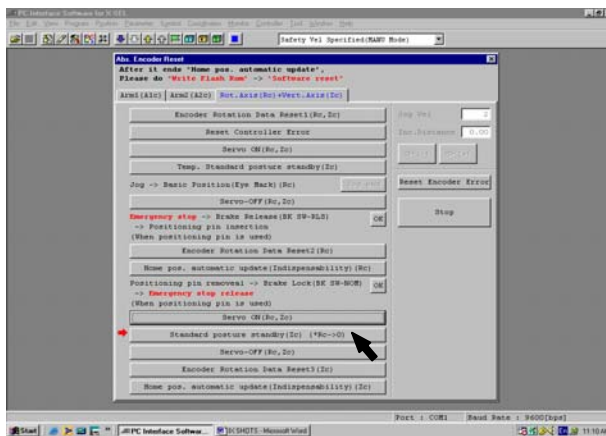
(15) Click the “Servo ON” button.



Confirmation

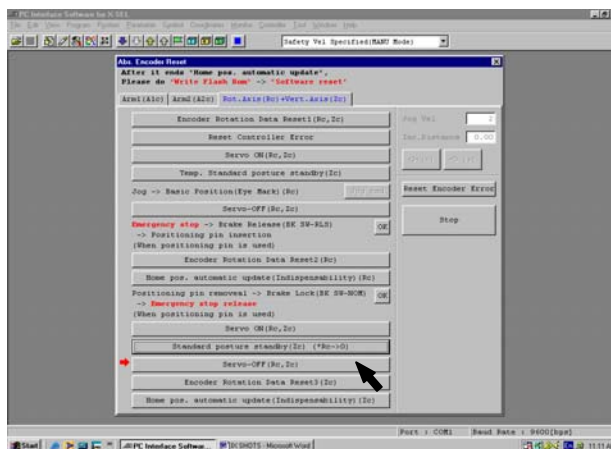
(16) Click the “Standard posture standby” button.

- The vertical axis returns to its home position. Exercise caution so as not to be injured by the axis during movement.



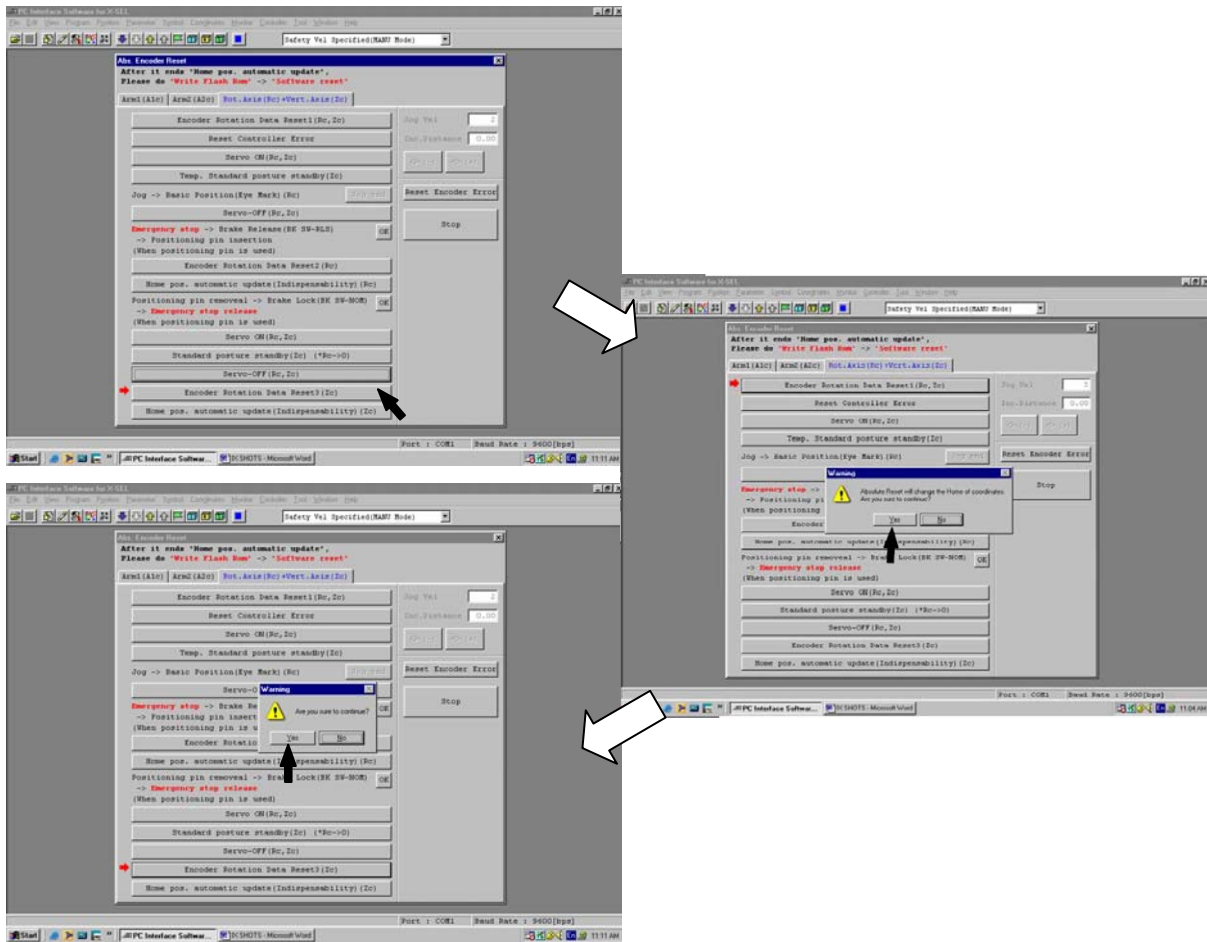
Standing By at Reference Posture

(17) Click the “Servo-OFF” button.



Servo OFF

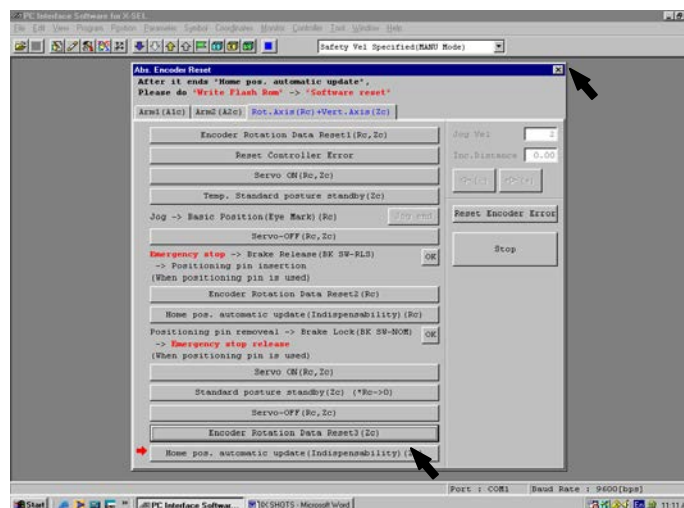
(18) Click the “Encoder Rotation Data Reset3” button.



Encoder Multi-rotation Data Reset 3

(19) Click the “Home pos. automatic update” button, and then click “X” in the top right-hand corner to exit the absolute reset window.

- After the reset is completed, be sure to perform “Software reset.”



Automatic Refresh of Home Preset Value

14. Warranty

14.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after shipment from our company
- 12 months after delivery to the specified location

14.2 Scope of 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 operation 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.

14.3 Honoring the Warranty

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

14.4 Limited Liability

- (1) We shall assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.
- (2) We shall not be liable for any program or control method created by the customer to operate our product or for the result of such program or control method.

14.5 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 operation manual.

14.6 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

15. EC Declaration of Conformity

This product comes with EC Declaration of Conformity as it complies with Machinery Directive if Option CE is selected.



IAI CORPORATION

577-1 Obane, Shimizu-Ku, Shizuoka City, Shizuoka 424-0103 Japan
Phone +81-543-64-5105 Facsimile +81-543-64-5182

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.

IX SCARA Robot
(IX series)

Models covered are shown at appendix 1,2,3, and 4 from the next page.

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

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

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

Done at Shizuoka, Japan,

On 3. Jun. , 2019

President Toru Ishida



ORIGINAL



IAI CORPORATION

577-1 Obane, Shimizu-Ku, Shizuoka City, Shizuoka 424-0103 Japan
Phone +81-543-64-5105 Facsimile +81-543-64-5182

Appendix 1

●Standard Type

Series	Type	Cable length	Controller Type	Option
IX -	NNN1205	3L 5L	T2	JY B CE
	NNN1505			
	NNN1805			
IX -	NNN2515	5L 10L	T1 T2	CE
	NNN3515			
	NNN5020			
	NNN5030			
	NNN6020			
	NNN6030			
	NNN7020			
	NNN7040			
	NNN8020			
	NNN8040			
IX -	NNN2515H	5L 10L	T2	JY CE KCS
	NNN3515H			
	NNN5020H			
	NNN5030H			
	NNN6020H			
	NNN6030H			
	NNN7020H			
	NNN7040H			
	NNN8020H			
	NNN8040H			

●High Speed Type

Series	Type	Cable length	Controller Type	Option
IX -	NSN5016	5L 10L	T1 T2	CE
	NSN6016			
IX -	NSN5016H	5L 10L	T2	JY CE KCS
	NSN6016H			

Appendix 2

●Water and Dust resident Type

Series	Type	Cable length	Controller Type	Option
IX -	NNW2515	5L 10L	T1 T2	CE
	NNW3515			
	NNW5020			
	NNW5030			
	NNW6020			
	NNW6030			
	NNW7020			
	NNW7040			
	NNW8020			
	NNW8040			
IX -	NNW2515H	5L 10L	T2	JY CE KCS
	NNW3515H			
	NNW5020H			
	NNW5030H			
	NNW6020H			
	NNW6030H			
	NNW7020H			
	NNW7040H			
	NNW8020H			
	NNW8040H			

●Wall mount Type

Series	Type	Cable length	Controller Type	Option
IX -	TNN3015	5L 10L	T1 T2	CE
	TNN3515			
IX -	TNN3015H	5L 10L	T2	JY CE KCS
	TNN3515H			

●Wall mount / Inverse Type

Series	Type	Cable length	Controller Type	Option
IX -	UNN3015	5L 10L	T1 T2	CE
	UNN3515			
IX -	UNN3015H	5L 10L	T2	JY CE KCS
	UNN3515H			



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Appendix 3

●Ceiling mount Type

Series	Type	Cable length	Controller Type	Option
IX -	HNN5020	5L 10L	T1 T2	CE
	HNN6020			
	HNN7020			
	HNN7040			
	HNN8020			
	HNN8040			
IX -	HNN5020H	5L 10L	T2	JY CE KCS
	HNN6020H			
	HNN7020H			
	HNN7040H			
	HNN8020H			
	HNN8040H			

●Ceiling mount / Inverse Type

Series	Type	Cable length	Controller Type	Option
IX -	INN5020	5L 10L	T1 T2	CE
	INN6020			
	INN7020			
	INN7040			
	INN8020			
	INN8040			
IX -	INN5020H	5L 10L	T2	JY CE KCS
	INN6020H			
	INN7020H			
	INN7040H			
	INN8020H			
	INN8040H			

Appendix 4

●Greenroom Type

Series	Type	Cable length	Controller Type	Option
IX -	NNC1205 NNC1505 NNC1805	3L 5L	T2	JY B CE
IX -	NNC2515 NNC3515 NNC5020 NNC5030 NNC6020 NNC6030 NNC7020 NNC7040 NNC8020 NNC8040	5L 10L	T1 T2	CE
IX -	NNC2515H NNC3515H NNC5020H NNC5030H NNC6020H NNC6030H NNC7020H NNC7040H NNC8020H NNC8040H	5L 10L	T2	JY CE KCS

●Special Order Type

Series	Type	Cable length	Controller Type	Special Order	CE Option
IX -	NNN2522	3L	T1	SP	CE
IX -	NNN2522	3L	T1	SP2	CE
IX -	NNC3515	5L	T1	SP	CE
IX -	NNC3515	10L	T1	SP	CE
IX -	NNN3515	5L	T2	SP	CE
IX -	NNN3515	10L	T2	SP	CE
IX -	NSN6016	5L	T2	SP	CE
IX -	NSN6016	10L	T2	SP	CE
IX -	HSN6020	5L	T2	SP	CE
IX -	HSN6020	10L	T2	SP	CE

※ Every CE and KCs is set by option.

Change History

Revision Date	Description of Revision
August 2010	First edition
April 2011	Second edition P. 41 Added options “JY (Joint cable specification)”
May 2011	Third edition A page for CE Marking added
March 2012	Fourth edition P. 1 to 7 Contents added and changed in Safety Guide P. 9 Precautions in Handling Note “Certainly attach the Horizontal Articulated Robot by following this operation manual.” added P. 46, 48, 50, 52, 54 Brake voltage source capacity 20W added to specifications P. 60 Brake voltage source capacity from 20W to 30W → changed to 20W P. 79 Caution notes added telling to go to see the doctor to have an appropriate treatment when the grease got into an eye P. 99, 100 Contents changed in 14. Warranty
August 2012	Fifth edition 9.1 Installation Posture added
January 2013	Sixth edition P. 80 Grease applied to ball screw spline changed to Multemp LRL No. 3 for standard type
July 2013	Seventh edition • A page of CE Marking deleted and page for International Standards Compliances added. • Overall Revised 13. Maintenance and Inspection
February 2014	Eighth edition P. 44, 46, 48, 50, 52, 54 Values changed for Axis 3 (vertical axis) Push Force Control Range
July 2015	Ninth edition P. 41 to P. 44 5.4 Cable Joint Type (Model: JY) added
September 2016	9B edition P. 68 Correction made to brake power source from 45W to 30W.



Revision Date	Description of Revision
March 2017	9C edition P. 85 Note corrected AB-6 → AB-3
December 2018	9D edition P. 84, 86 Grease AFE → AFE-CA Grease AFG deleted
July 2019	9E edition P. 115 EC Declaration of Conformity added
June 2020	9F edition P. 45, 46 Connector and PIO flat cable model added
January 2021	9G edition P. 66 Change made to voltage source capacity for brake power supply 9W → 7W



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