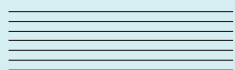


IS Series Actuator Operating Manual

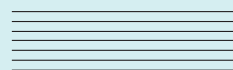
Dust-proof Type
ISD·ISDA·ISPDA

Cleanroom Type
ISDCR·ISPDCR·ISDACR·ISPDACR

Cleanroom Type, Antistatic Specification
ISDACR-ESD



Sixth Edition



Please Read Before Use

Thank you for purchasing our product.

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

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

The CD or 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

CE Marking

If a compliance with the CE Marking is required, please follow Overseas Standards Compliance Manual (ME0287) that is provided separately.

[Applicable Units]

ISDA/ISPDA-S, M, L, LX

ISDACR/ISPDACR-S, M, L, LX

ISDACD (ESD Specification) -S, M, L, LX

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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	<ul style="list-style-type: none"> This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> • 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. <ol style="list-style-type: none"> 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	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> • 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. <p>(3) Grounding</p> <ul style="list-style-type: none"> • 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 0.5mm^2 (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	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>

No.	Operation Description	Description
6	Trial Operation	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. <p>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.</p>
9	Modification and Dismantle	<ul style="list-style-type: none"> • Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 Precautions

1. Do not set speeds and accelerations/decelerations equal to or greater than the respective ratings.

Do not set speeds and accelerations/decelerations equal to or greater than the respective ratings. Doing so may result in vibration, failure or shorter life. In synchronized operation of combined axes, adjust the speed and acceleration/deceleration to the maximum speed and minimum acceleration/deceleration among the combined axes, respectively.

In particular, note that if an acceleration/deceleration equal to or greater than the rated acceleration/deceleration is set, a creep phenomenon or slipped coupling may occur.

2. Keep the load moment within the allowable value.

Keep the load moment within the allowable value. If a load equal to or greater than the allowable load moment is applied, the life may be shortened. In an extreme case, flaking may occur.

3. Keep the overhung length to within the allowable value.

Keep the overhung length of the load to within the allowable value. If the overhung length is equal to or greater than the allowable value, vibration or abnormal noise may occur.

4. Use a duty of 50% or less.

Use a duty of 50% or less. If the duty exceeds 50%, an overload may occur or the motor may generate heat. In an extreme case, motor damage, etc., may occur.

Duty (%) = (Continuous operation / (Continuous operation + Stationary time)) / 100



Caution: If an overload error generates at a duty below 50%, extend the stationary time and lower the duty, or decrease the acceleration/deceleration.

5. If the actuator is moved back and forth over a short distance, grease film may run out.

If the actuator is moved back and forth continuously over a short distance of 30 mm or less, grease film may run out. As a guide, move the actuator back and forth repeatedly for around 5 cycles over a distance of 50 mm or more after every 5,000 to 10,000 cycles.

6. Make sure to attach the actuator properly by following this operation manual.

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

7. Transport

7.1 Handling a Single Axis

Take note of the following points when transporting each actuator alone.

7.1.1 Handling the Packed Unit

Unless otherwise instructed, each actuator axis is packed individually and shipped.

- Do not bump or drop the package. The package is not specially designed to withstand the impact of dropping or bumping.
- The operator should not carry heavy shipping boxes by himself. (Transport the package using an appropriate transport means.)
- If the shipping box is to be left standing, it should be in a horizontal position. (If the packing specification is instructed, follow the instruction.)
- Do not climb on top of the shipping box.
- Do not place objects that may deform or damage the shipping box on top of the shipping box.

7.1.2 Handling an Actuator after Unpacking

- Do not transport the actuator by holding the cables or move it by pulling the cables.
- When transporting the actuator, do so by holding the base.
- Be careful not to bump the actuator during transport.
- Do not exert an excessive force on any part of the actuator.

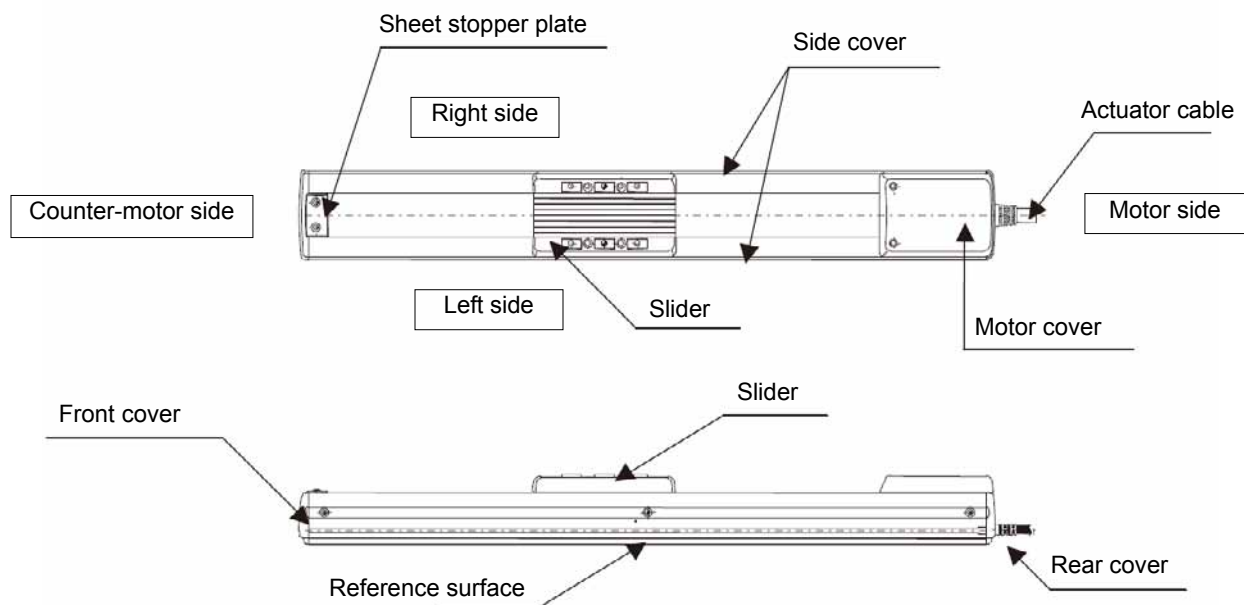
8. Stainless Sheet

- The stainless sheet is held in place by the attraction force of magnets. If the ambient air contains a lot of iron powder or other magnetic matters, they may be attracted to the magnets and cause problems. Accordingly, avoid using the actuator in such environment.
- Avoid letting any adhesive, paint or other viscous substance attach to the stainless sheet, because it may cause slider malfunction or sheet damage.
- Take note that applying a force on a small area of the stainless sheet may cause the sheet to deform and consequently create problems. Also avoid grabbing or pressing the stainless sheet when installing or transporting the actuator. The sheet may be damaged.
If the stainless sheet is found dirty, use alcohol to wipe the soiled area.

Names of the Parts

In this operating manual, the left and right sides are indicated by looking at the actuator from the motor end, with the actuator placed horizontally, as shown in the figure below.


1. Standard Types ISD/ISDA/ISPD



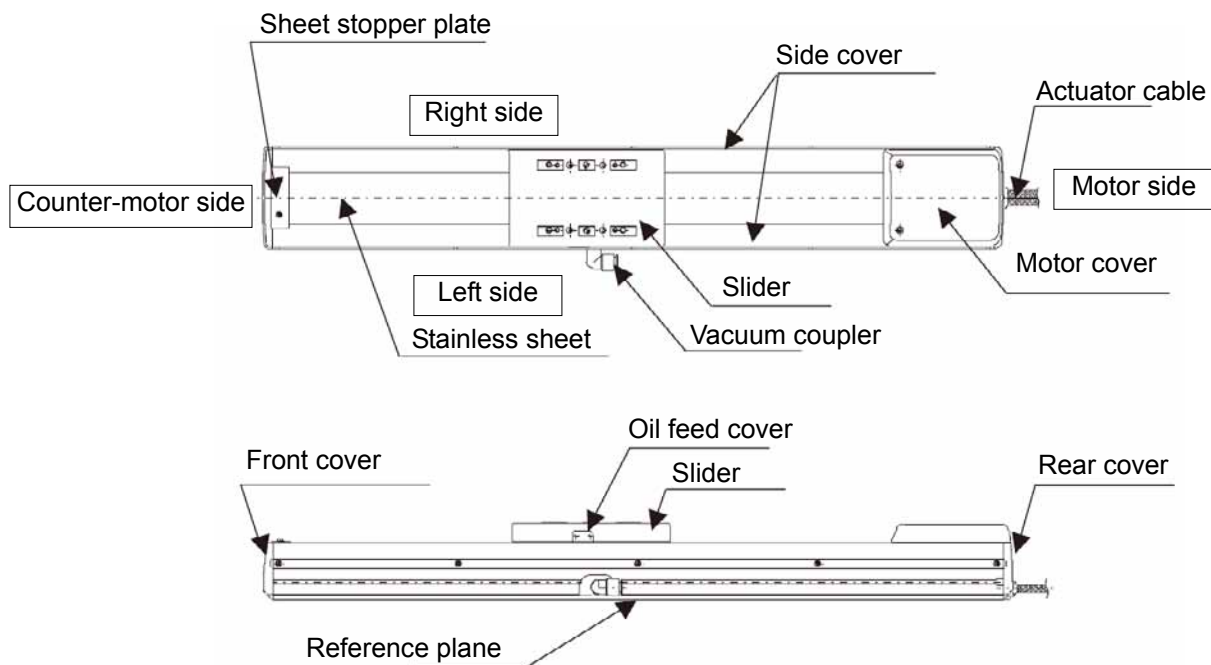
[Refer to 13.1, "External Dimensions" for details on the reference surface.]

For details on the reference surfaces of ISD series actuators, refer to General Catalog for Small Industrial Robots 2003 (back number).

You can download catalogs from IAI's website.

 **Caution:** The cable that comes out of the actuator is not a robot cable. Wire the actuator properly so that this cable will not receive any flexing force. If you specify the robot cable option, only the relay cables will be supplied as robot cables.

2. Cleanroom Types ISDCR/ISPDCR/ISDACR/ISPDACR



[Refer to 13.1, "External Dimensions" for details on the reference surface.]

For details on the reference surfaces of ISDCR, ISPDCR series actuators, refer to General Catalog for Small Industrial Robots 2003 (back number).

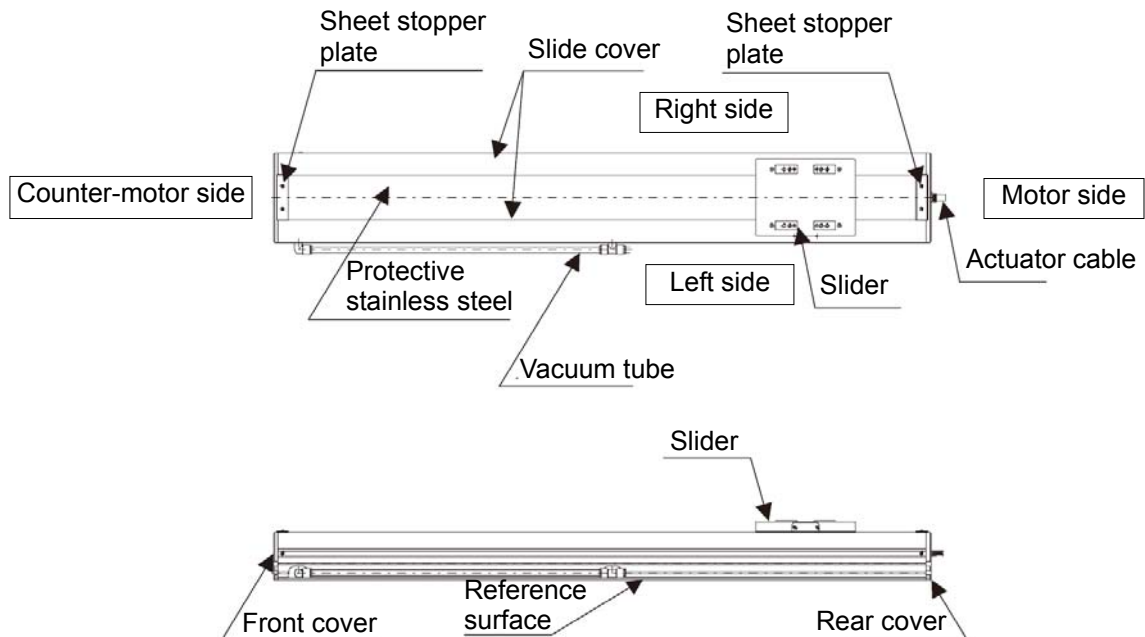
You can download catalogs from IAI's website.



Caution: The cable that comes out of the actuator is not a robot cable. Wire the actuator properly so that this cable will not receive any flexing force. If you specify the robot cable option, only the relay cables will be supplied as robot cables.



3. Cleanroom Types ISPDQR-W/ISDAGR-W/ISPDAGR-W



[Refer to 13.1, "External Dimensions" for details on the reference surface.]

For details on the reference surfaces of ISPDQR-W actuators, refer to General Catalog for Small Industrial Robots 2003 (back number).

You can download catalogs from IAI's website.



Caution: The cable that comes out of the actuator is not a robot cable. Wire the actuator properly so that this cable will not receive any flexing force. If you specify the robot cable option, only the relay cables will be supplied as robot cables.

1. Checking the Product

If based on a standard configuration, this product consists of the items listed below.



Caution: Check the packed items against the packing specification. Should you find a wrong model or any missing item, please contact your IAI dealer or IAI.

1.1 Components

No.	Name	Remarks
1	Actuator	Refer to “How to Read the Model Nameplate” and “How to Read the Model.”
Accessories		
2	Quick Step Guide	
3	Operation Manual (CD/DVD)	
4	Safety Guide	

1.2 Operation Manuals for Controllers Supported by This Product

1.2.1 XSEL-J/K controllers

No.	Name	Control No.
1	Operation Manual for XSEL-J/K Controller	MJ0116
2	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	MJ0154
3	Operation Manual for Teaching Pendant SEL-T/TD/TG	MJ0183
4	Operation Manual for Teaching Pendant IA-T-X/XD	MJ0160
5	Operation Manual for DeviceNet	MJ0124
6	Operation Manual for CC-Link	MJ0123
7	Operation Manual for PROFIBUS	MJ0153
8	Operation Manual for X-SEL Ethernet	MJ0140
9	Operation Manual for Multi-point I/O Board	MJ0138
10	Operation Manual for Dedicated Multi-point I/O Board Terminal Block	MJ0139

1.2.2 XSEL-P/Q controllers

No.	Name	Control No.
1	Operation Manual for XSEL-P/Q Controller	MJ0148
2	Operation Manual for XSEL-P/Q/PX/QX RC Gateway Function	MJ0188
3	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	MJ0154
4	Operation Manual for Teaching Pendant SEL-T/TD/TG	MJ0183
5	Operation Manual for Teaching Pendant IA-T-X/XD	MJ0160
6	Operation Manual for DeviceNet	MJ0124
7	Operation Manual for CC-Link	MJ0123
8	Operation Manual for PROFIBUS	MJ0153

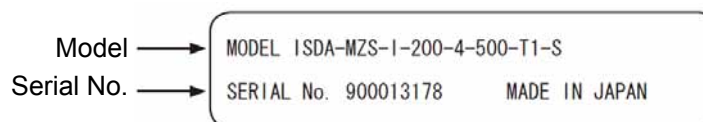
1.2.3 SSEL controllers

No.	Name	Control No.
1	Operation Manual for SSEL Controller	MJ0157
2	Operation Manual for XSEL-P/Q/PX/QX RC Gateway Function	MJ0188
3	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	MJ0154
4	Operation Manual for Teaching Pendant SEL-T/TD/TG	MJ0183
5	Operation Manual for Teaching Pendant IA-T-X/XD	MJ0160
6	Operation Manual for DeviceNet	MJ0124
7	Operation Manual for CC-Link	MJ0123
8	Operation Manual for PROFIBUS	MJ0153

1.2.4 SCON controllers

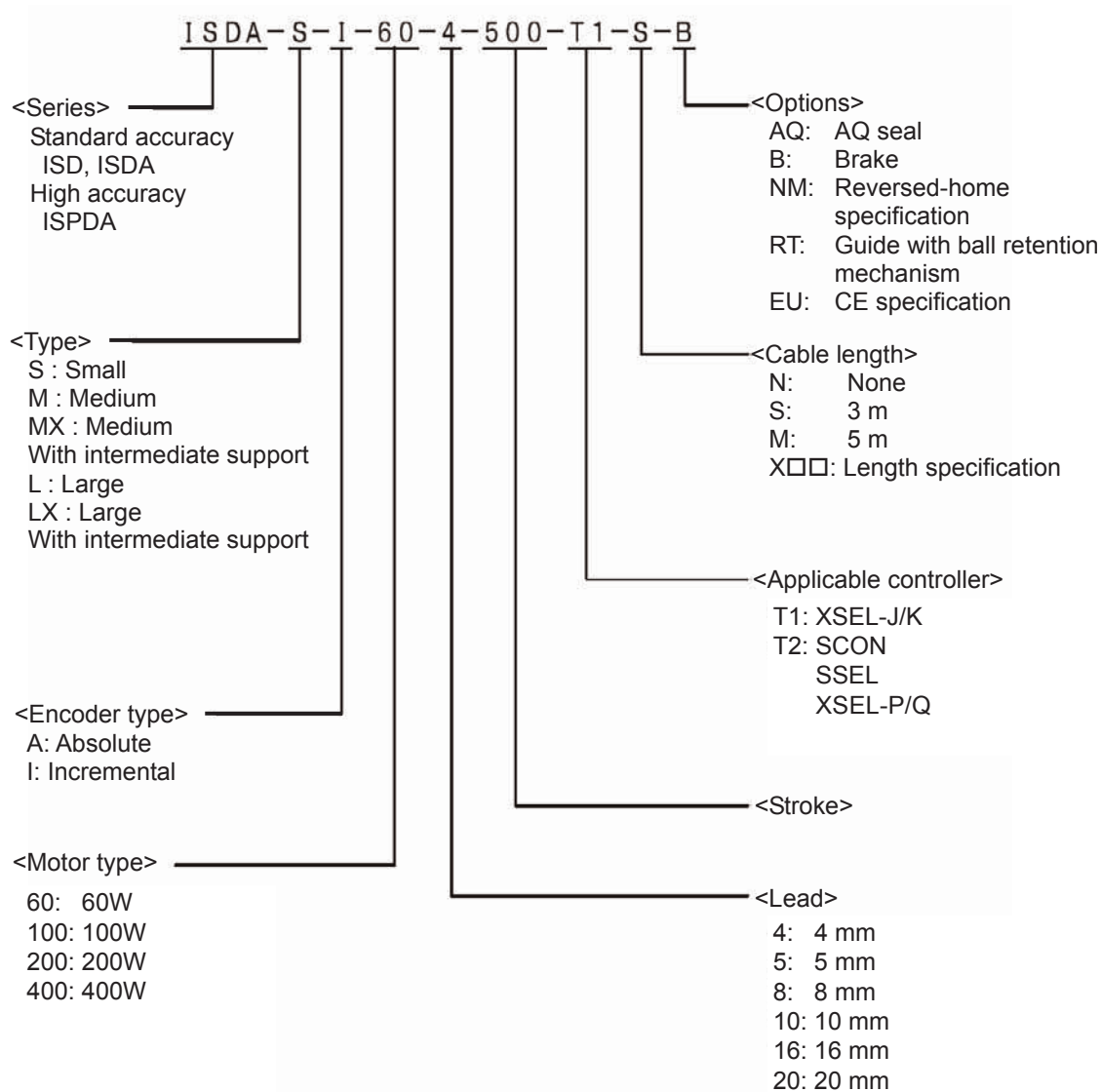
No.	Name	Control No.
1	Operation Manual for SCON Controller	MJ0161
2	Operation Manual for PC Software RCM-101-MW/RCM-101-USB	MJ0155
3	Operation Manual for Teaching Pendant CON-T/TG	MJ0178
4	Operation Manual for Teaching Pendant RCM-T/TD	MJ0173
5	Operation Manual for Simple Teaching Pendant RCM-E	MJ0174
6	Operation Manual for Data Setter RCM-P	MJ0175
7	Operation Manual for Touch Panel Display RCM-PM-01	MJ0182
8	Operation Manual for DeviceNet	MJ0124
9	Operation Manual for CC-Link	MJ0123
10	Operation Manual for PROFIBUS	MJ0153

1.3 How to Read the Model Nameplate



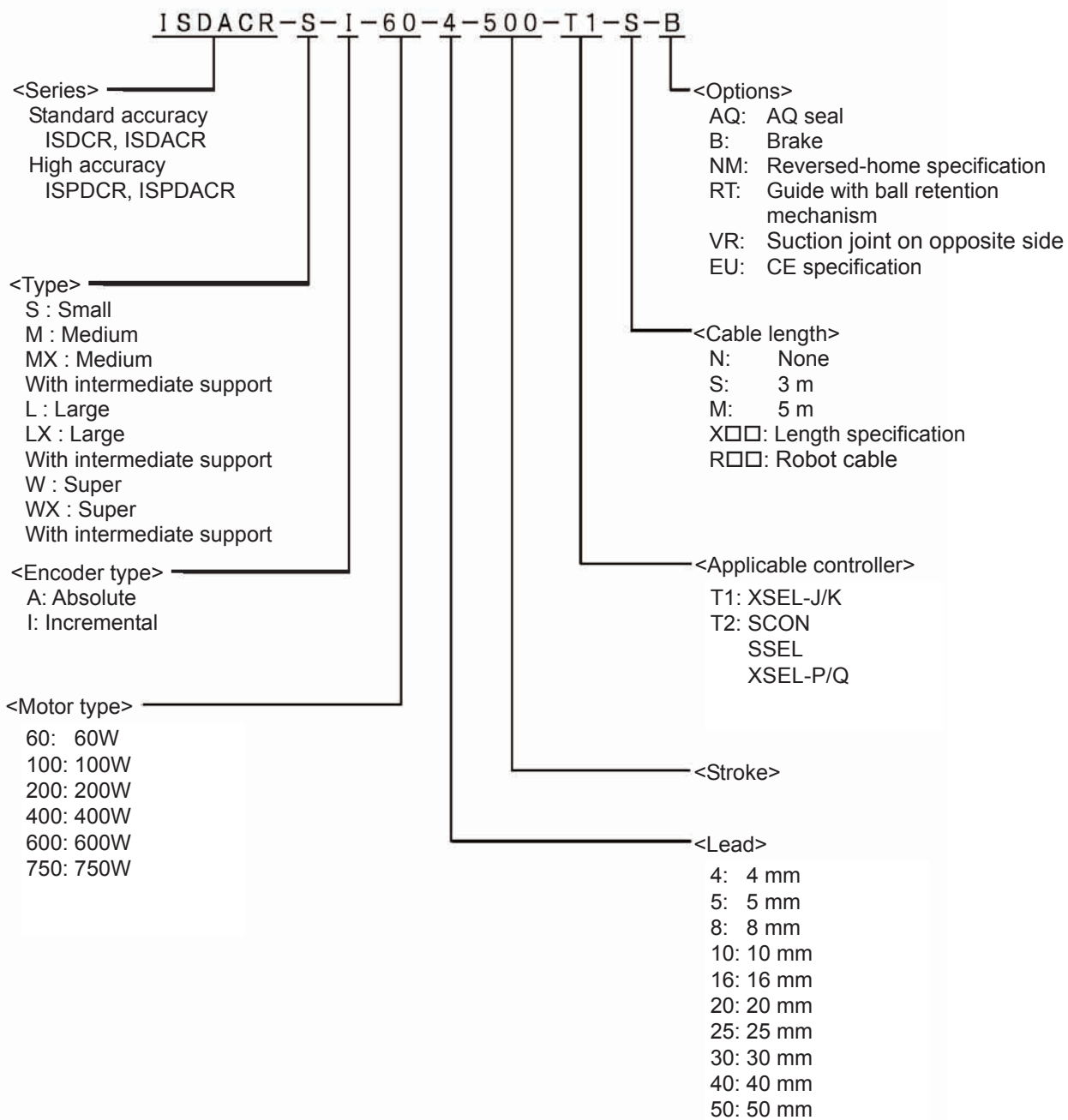
1.4 How to Read the Model

1.4.1 Standard type ISDA/ISPDA series



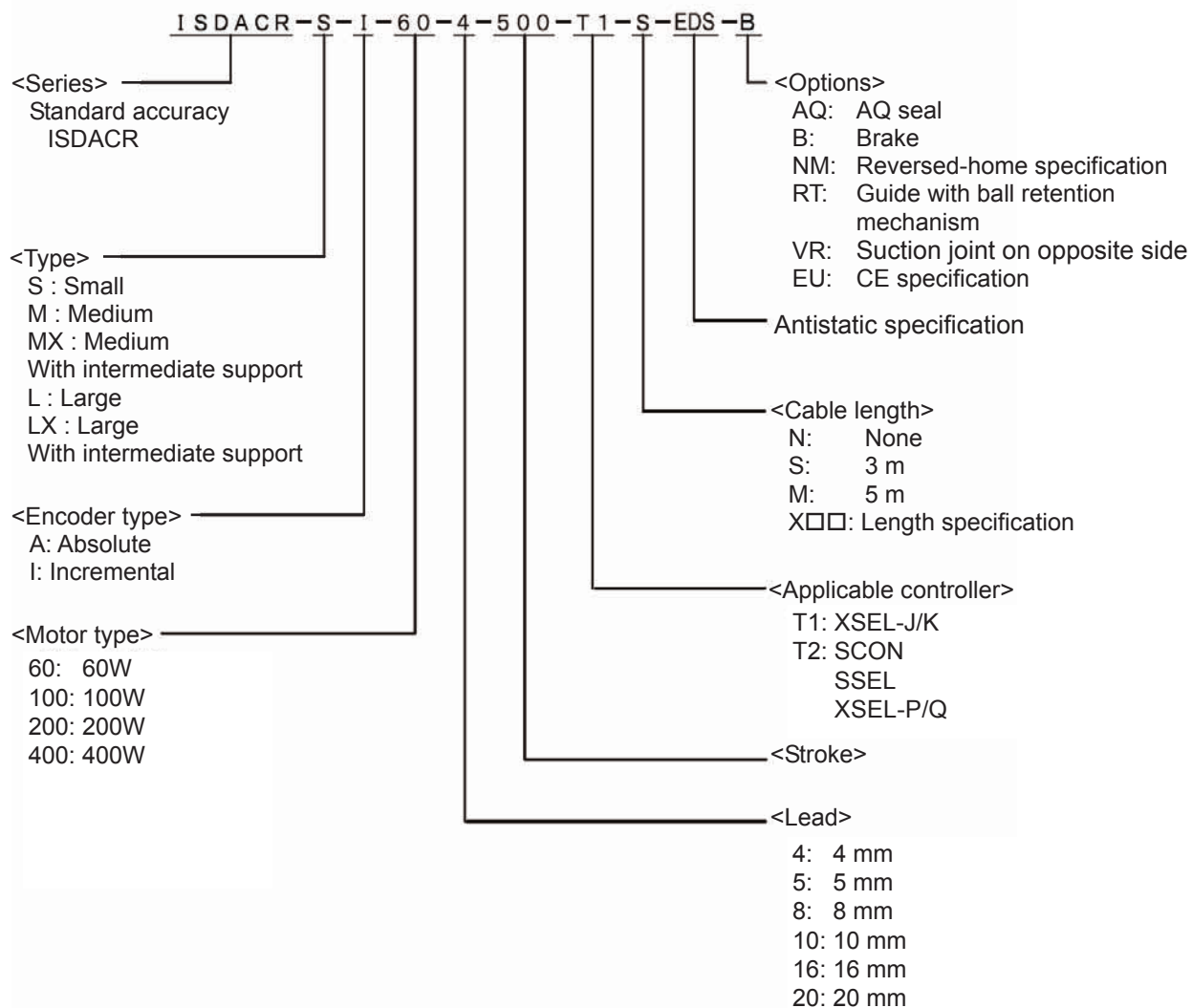


1.4.2 Cleanroom Type ISDACR/ISPDACR





1.4.3 Cleanroom Type, Antistatic Specification ISDACR-EDS



2. Specification

(1) Maximum speed

The maximum speed of the actuator is limited to prevent resonance of the ball screw shaft and also by the motor speed limit. Be sure to observe the applicable maximum speed shown in the table below.

Strokes and maximum speed limits (Unit: mm/s)

Type	Motor capacity (W)	Lead (mm)	Stroke (mm)																	
			<500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
S	60	4	200	190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		8	400	380	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		16	800	760	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M	100	5	250	250	225	180	150	125	-	-	-	-	-	-	-	-	-	-	-	-
		10	500	500	455	365	300	250	-	-	-	-	-	-	-	-	-	-	-	-
		20	1000	1000	915	735	600	500	-	-	-	-	-	-	-	-	-	-	-	-
	200	10	500	500	455	365	300	250	-	-	-	-	-	-	-	-	-	-	-	-
		20	1000	1000	915	735	600	500	-	-	-	-	-	-	-	-	-	-	-	-
MX	200	20	-	-	-	1000	1000	1000	1000	1000	1000	950	800	700	600	550	500	450	-	-
L	200	10	500	500	500	465	380	320	270	230	-	-	-	-	-	-	-	-	-	-
		20	1000	1000	1000	930	765	640	545	465	-	-	-	-	-	-	-	-	-	-
	400	20	1000	1000	1000	930	765	640	545	465	-	-	-	-	-	-	-	-	-	-
LX	200	20	-	-	-	-	-	1000	1000	1000	1000	1000	950	830	740	650	590	540	490	440
	400	20	-	-	-	-	-	1000	1000	1000	1000	1000	950	830	740	650	590	540	490	440
W	600	10	500	500	500	490	400	330	280	240	210	-	-	-	-	-	-	-	-	-
		20	1000	1000	1000	980	800	665	565	485	420	-	-	-	-	-	-	-	-	-
		40	2000	2000	2000	1965	1605	1335	1130	970	840	-	-	-	-	-	-	-	-	-
	750	25	1250	1250	1250	1250	1050	890	760	660	-	-	-	-	-	-	-	-	-	-
		50	2000	2000	2000	2000	2000	1780	1525	1320	-	-	-	-	-	-	-	-	-	-
WX	600	20	-	-	-	-	1000	1000	1000	1000	1000	980	860	765	680	610	555	500	455	420
		40	-	-	-	-	2000	2000	2000	2000	2000	1965	1725	1530	1365	1225	1110	1005	915	840
	750	25	-	-	-	-	1250	1250	1250	1250	1250	1250	1250	1200	1075	965	870	790	720	660
		50	-	-	-	-	2000	2000	2000	2000	2000	2000	2000	2000	2000	1930	1740	1580	1440	1320



Caution: Do not set speeds and accelerations/decelerations equal to or greater than the respective ratings. Doing so may result in vibration, failure or shorter life.

In synchronized operation of combined axes, adjust the speed and acceleration/deceleration to the maximum speed and minimum acceleration/deceleration among the combined axes, respectively.

In particular, note that if an acceleration/deceleration equal to or greater than the rated acceleration/deceleration is set, a creep phenomenon or slipped coupling may occur.

(2) Acceleration and loading capacity

Type	Motor output (W)	Lead (mm)	Maximum Speed (mm/sec)	Rated acceleration (G)	Loading capacity at rated acceleration (kg)		Maximum acceleration (G)	Loading capacity by acceleration (kg)							
								0.3G	0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G
S	60	16	800	0.3	Horizontal	12	1.0	12	9	7	6	5	4.5	4	3.5
				0.3	Vertical	3	0.7	3	2.5	2.3	2.1	2	-	-	-
		8	400	0.3	Horizontal	25	0.6	25	18.5	15	12	-	-	-	-
				0.3	Vertical	6	0.5	6	5.5	5	-	-	-	-	-
		4	200	0.15	Horizontal	50	0.5	50	37.5	30	-	-	-	-	-
					Vertical	14	0.3	12	-	-	-	-	-	-	-
M	100	20	1000	0.3	Horizontal	20	1.0	20	15	12	10	8.5	7.5	6.5	6
				0.3	Vertical	3.5	0.8	3.5	3.2	2.9	2.7	2.4	2	-	-
		10	500	0.3	Horizontal	40	0.6	40	30	24	20	-	-	-	-
				0.3	Vertical	9	0.5	9	7.6	7	-	-	-	-	-
		5	250	0.15	Horizontal	80	0.5	80	60	45	-	-	-	-	-
					Vertical	19	0.3	15	-	-	-	-	-	-	-
M	200	20	1000	0.3	Horizontal	40	1.0	40	30	24	20	17	15	13.5	12
				0.3	Vertical	9	0.8	9	7.6	7	6.5	6	5	-	-
		10	500	0.3	Horizontal	80	0.6	80	60	48.5	40	-	-	-	-
				0.3	Vertical	19	0.5	19	16.3	15	-	-	-	-	-
L	200	20	1000	0.3	Horizontal	40	1.0	40	30	24	20	17	15	13.5	12
				0.3	Vertical	9	0.8	9	6.6	6	5.5	5	4	-	-
		10	500	0.3	Horizontal	80	0.6	80	60	48.5	40	-	-	-	-
				0.3	Vertical	19	0.5	19	15.3	14	-	-	-	-	-
L	400	20	1000	0.3	Horizontal	80	1.0	80	60.5	48.5	40.5	34.5	30	27	24
				0.3	Vertical	19	0.8	19	15.3	14.1	13.1	12.2	10	-	-
W	600	40	2000	0.3	Horizontal	60	1.0	60	45	36	30	26	22	20	18
				0.3	Vertical	14	1.0	14	12	10	8	6.7	6.1	5.6	5
		20	1000	0.3	Horizontal	120	1.0	120	91	72	60	52	45	40	36
				0.3	Vertical	29	0.8	29	26	23	20	17.5	15	-	-
		10	500	0.3	Horizontal	150	0.6	150	112	90	75	-	-	-	-
				0.3	Vertical	60	0.5	60	50	40	-	-	-	-	-
	750	50	2000	0.3	Horizontal	60	1.0	60	45	36	30	25	22	20	18
				0.3	Vertical	14	1.0	14	12	10	8	6.7	6.1	5.6	5
		25	1250	0.3	Horizontal	120	1.0	120	91	72	60	52	45	40	36
				0.3	Vertical	29	0.8	29	26	23	20	17.5	15	-	-



- Caution:**
1. The figures of loading capacity by acceleration other than those at the rated acceleration of 0.3 G and 0.15 G are reference values and not guaranteed. Use these values only as a reference.
 2. Even when the acceleration is less than the rated acceleration, the loading capacity will not exceed the loading capacity at the rated acceleration.



(3) Rated thrust

Type	Motor type (W)	Lead (mm)	Rated thrust (N)
S	60	4	254.8
		8	127.4
		16	63.7
M	100	5	340.1
		10	169.5
		20	84.3
	200	10	340.1
		20	169.5
MX	200	20	169.5
L	200	10	340.1
		20	169.5
	400	20	340.1
LX	200	20	169.5
	400	20	340.1
W	600	10	1020
		20	510
		40	255
	750	25	510
		50	255
WX	600	20	510
		40	255
	750	25	510
		50	255

(4) Driving method

Type	Motor type (W)	Lead (mm)	Encoder pulses ^{*1}	Driving method		
					ISD, ISDA, ISDCR, ISDACR	ISPDA, ISPDCR, ISPDACR
S	60	4	16384	Ball screw Ø12 mm	Rolled, C10	Rolled, C5 or equivalent
		8				
		16				
M	100	5		Ball screw Ø16 mm	Rolled, C10	Rolled, C5 or equivalent
		10				
		20				
	200	10				
		20				
MX	200	20		Ball screw Ø20 mm	Rolled, C10	Rolled, C5 or equivalent
L	200	10				
		20				
		20				
LX	200	20				
		20				
W	600	10		Ball screw Ø25 mm	Rolled, C10	Rolled, C5 or equivalent
		20				
		40				
	750	25				
		50				
WX	600	20		Ball screw Ø20 mm	Rolled, C10	Rolled, C5 or equivalent
		40				
	750	25		Ball screw Ø25 mm	Rolled, C10	Rolled, C5 or equivalent
		50				

*1. Number of pulses input to the controller.

(5) Common specifications

Item	Specification	
	ISD, ISDA, ISDCR, ISDACR	ISPDA, ISPDCR, ISPDACR
Positioning repeatability ^{*1}	±0.02 mm	±0.01 mm
Lost motion ^{*1}	0.05 mm or less	0.02 mm or less
Base	Material: Aluminum with white alumite treatment	

*1 Default

(6) Loads applied to the actuator

[Standard types ISD/ISDA/ISPDA and cleanroom types ISDCR/ISPDCR/ISDACR/ISPDACR (excluding ISPDCR-W/ISDACR-W/ISPDACR-W)]

Allowable load moments and allowable overhung load lengths of each actuator are shown below. Make sure the applicable allowable values are not exceeded.

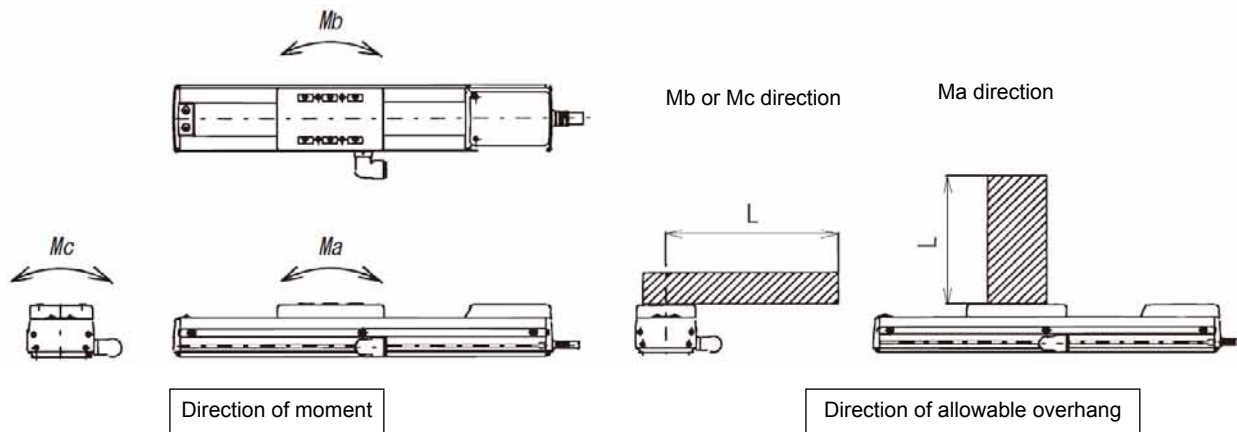
Allowable load moment (Nm)

Actuator	Ma	Mb	Mc
S	28.4 N-m (2.9 kgf-m)	40.2 N-m (4.1 kgf-m)	28.4 N-m (2.9 kgf-m)
M·MX	69.6 N-m (7.1 kgf-m)	99.0 N-m (10.1 kgf-m)	161.7 N-m (16.5 kgf-m)
L·LX	104.9 N-m (10.7 kgf-m)	149.9 N-m (15.3 kgf-m)	248.9 N-m (25.4 kgf-m)

Allowable overhung load (L)

Actuator	Ma Direction	Mb Direction	Mc Direction
S	450 or less	450 or less	450 or less
M·MX	600 or less	600 or less	600 or less
L·LX	750 or less	750 or less	750 or less

The allowable overhangs assume that the center of gravity of the installed object is located at a position one half the overhang length.



[Cleanroom types ISPD-CR-W/ISD-ACR-W/ISPD-ACR-W]

Allowable load moments and allowable overhung load lengths of each actuator are shown below. Make sure the applicable allowable values are not exceeded.

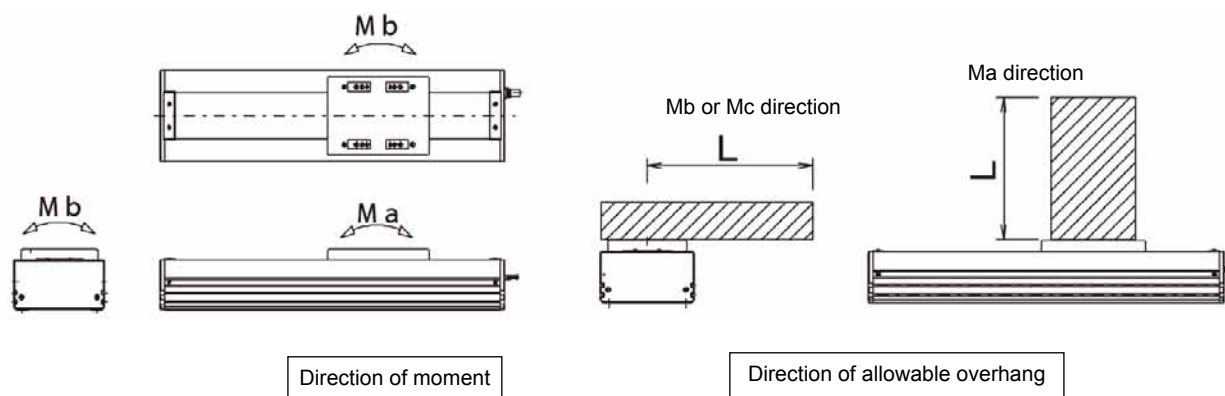
Allowable load moment (Nm)

Ma	Mb	Mc
112.7 N-m (11.5 kgf-m)	161.7 N-m (16.5 kgf-m)	356.7 N-m (36.4 kgf-m)

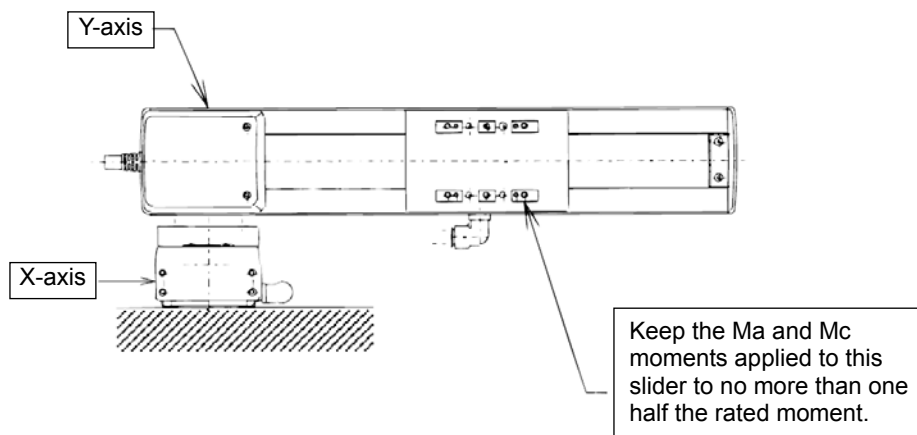
Allowable overhung load (L)

Ma Direction	Mb Direction	Mc Direction
800 or less	800 or less	800 or less

The allowable overhangs assume that the center of gravity of the installed object is located at a position one half the overhang length.



- ⚠ Caution: Make sure the load installed on the actuator is not longer than the allowable overhung load length (L). If the load is longer than L, vibration may occur or the settling time may increase. If the allowable load moment is applied, not only the life of the guide will become shorter but vibration or longer settling time may also result.
- : If X and Y-axes are combined in a cantilever configuration, the base may deform. Accordingly, keep the M_a and M_c moments to no more than one half the rated moment.



3. Life

The “rated load” is one factor that relates to the traveling life.

There are two types of “rated load,” namely “static rated load” and “dynamic rated load.”

- “Static rated load”: Load which, when applied to a stationary actuator, leaves a minor pressure mark on the contact surface.
- “Dynamic rated load”: Load which applies after a specified traveling distance under a load based on a specific probability of survival at which the guide does not break

Guide manufacturers indicate the life of a guide using a dynamic rated load when the provability of survival after 50 km of traveling is 90%.

Considering their moving speed, utilization ratio, etc., however, industrial equipment must have their dynamic rated load defined based on a traveling distance of 5,000 km to 10,000 km.

Also, the life of a guide has a sufficient allowance relative to a radial load, and receives the greatest impact by a moment load offset from the center of the guide.

With the IS series, the life is designed to ensure a traveling distance of 10,000 km under a load corresponding to the allowable load moment and at a load coefficient of 1.2.

[For the dynamic allowable load moment, refer to 2, “Performance”]

The calculation formula for allowable load moment at a traveling life of 10,000 km is shown below:

$$C_{IA} = \frac{M_{50}}{f_w} \times \left(\frac{50\text{km}}{10000\text{km}} \right)^{\frac{1}{3}}$$

C_{IA} : Allowable load moment
 f_w : Load coefficient (= 1.2)
 M_{50} : Dynamic rated moment when the probability of survival after 50 km of traveling is 50%

The life at the actual moment is calculated by the formula below:

$$L = \left(\frac{C_{IA}}{P} \right)^3 \times 10000\text{km}$$

L : Traveling live (probability of survival: 90%)
 C_{IA} : Allowable dynamic moment
 P : Actual moment



4. Installation and Storage/Preservation Environment

4.1 Installation Environment

The actuator should be installed in an environment meeting the following criteria:

- Avoid direct sunlight.
- The machine should not receive radiant heat from strong heat sources such as a furnace.
- The surrounding air temperature should be 0 to 40°C.
- The relative humidity should be 85% or below and there should be no condensation.
- Avoid exposure to corrosive or combustible gases.
- The cleanroom standards must be satisfied. (Cleanroom types ISDCR/ISPD CR/ISDACR/ISPDACR)
- The area should have very little dust and be suitable for normal assembly operations.
- Avoid exposure to oil mist or fluids using in cutting.
- Avoid exposure to splashed chemical solutions.
- The actuator should not be subject to impact or vibration.
- Avoid extreme electromagnetic waves, ultraviolet rays and radiation.
- Enough work space shall be available to carry out maintenance/inspection.

In general, the environment should be one in which an operator can work without protective gear.

4.2 Storage/Preservation Environment

The storage/preservation environment should be similar to the operating environment. In addition, take precautions against condensation if the actuator is to be stored/preserved for a long period of time. Unless otherwise specified, we do not include drying agents when shipping the actuator. If you are storing the actuator in an environment where condensation might occur, you must treat the entire shipping box, or treat the actuator itself after unpacking, to prevent condensation. The unit can withstand temperatures up to 60°C during a short storage period, but only up to 50°C if the storage period is longer than one month.

Keep the actuator horizontal during storage/preservation.

5. Installation

This chapter explains how to install your actuator on a mechanical system.

5.1 Installation


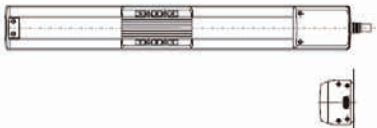

Install the actuator as explained below, as a rule.

Pay attention to these items when installing the actuator (except for custom-order models).

○: Installable △: Installable if the stroke is less than 1,300 mm x: Not installable

Type	Horizontal installation	Vertical installation	Sideway installation *1	Hanging from ceiling *1
S	○	○	○	○
M	○	○	○	○
MX	○	x	x	△
L	○	○	○	○
LX	○	x	x	△
W	○	○	○	△
WX	○	x	x	△

Installation postures

Horizontal	Sideway	Vertical
		



Caution: 1. When the unit is installed vertically oriented, attempt to put the motor up unless there is a special reason. Putting the motor on the lower side would not cause a problem in an ordinary operation. However, it may rarely cause a problem, when it is not operated for a long period, depending on the surrounding environment (especially high temperature), caused by the grease being separated and the base oil flowing into the motor unit.

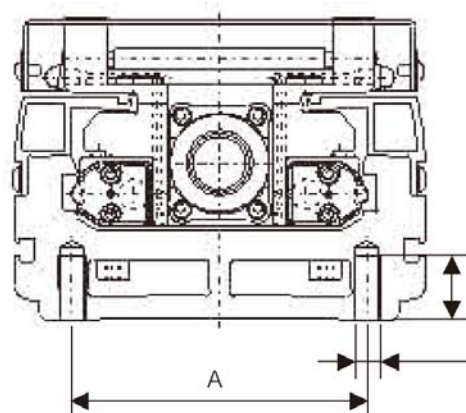
2. When an actuator with a stroke of over 400 mm is installed sideways or hung from the ceiling, the stainless sheet may slacken or shift. If the actuator is used continuously in this condition, the stainless sheet may eventually break or other problems may occur. Inspect the stainless sheet daily and make adjustment as necessary.
[For the procedure to adjust the stainless sheet, refer to 11, "Replacing/Adjusting the Stainless Sheet."]

5.2 Installing the Actuator

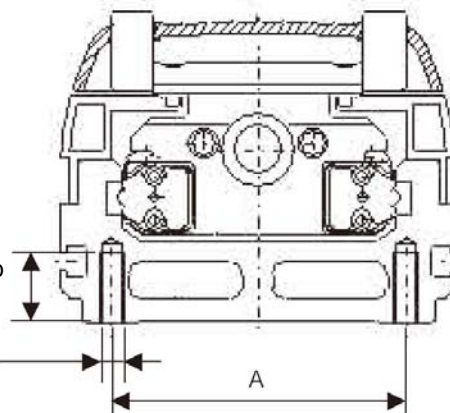
Tapped mounting holes are provided on the back of the actuator base. Use these tapped holes to install the actuator.

How each model should be installed is shown in a section view.

ISDCR • ISDACR • ISPDCR • ISPDACR



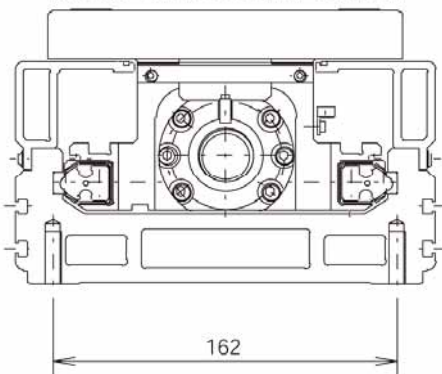
ISD • ISDA • ISPDA



Type	Tap size	Effective tap length	A
S	M6	17 mm	70 mm
M•MX	M8	20 mm	90 mm
L•LX	M8	20 mm	120 mm

Applicable bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M6	12.3 N-m (1.26 kgf-m)	5.4 N-m (0.55 kgf-m)
M8	30.0 N-m (3.06 kgf-m)	11.5 N-m (1.17 kgf-m)

ISPDCR-W/ISDACR-W/ISPDACR-W

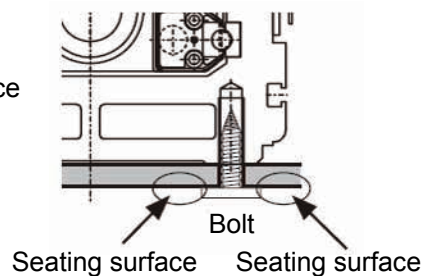


Tap size	Effective tap length
M8	25 mm



Applicable bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M8	31.3 N-m (3.19 kgf-m)	14 N-m (1.43 kgf-m)

Bolt seating surface



Caution: The tapped holes are closed at the end, so pay careful attention when selecting the bolt length. If inappropriate bolts are used, the tapped holes may be damaged or installation strength of the actuator may become insufficient, resulting in poor accuracy or unexpected accidents.

About tightening screws

- When installing the base, use hexagonal socket head bolts, etc., for the male threads.
- Use high-tension bolts conforming to ISO 10.9 or higher.
- If a tapped hole is used, use a screw not longer than the engagement length.
- If the tapped hole is through, be careful not to let the tip of the bolt project from the hole.
- Note changed to 1.8 times more of the nominal diameter for the length of thread engagement.
- If the bearing surface of the base is made of aluminum, insert a dedicated washer for high-tension bolt at each bolt (otherwise, the bearing surface may buckle).

5.3 Installing the Slider

- The slider has tapped holes, so affix the load using these holes. Affix the transferring load in the same manner as you would with the actuator.
- Similarly when the slider is affixed and actuator is moved, install the slider using the tapped holes on the slider.
- The slider has two reamed holes, so use these holes if repeatability is required after removal/re-installation. If fine adjustment of squareness, etc., is required, use one reamed hole on the slider to make adjustment.

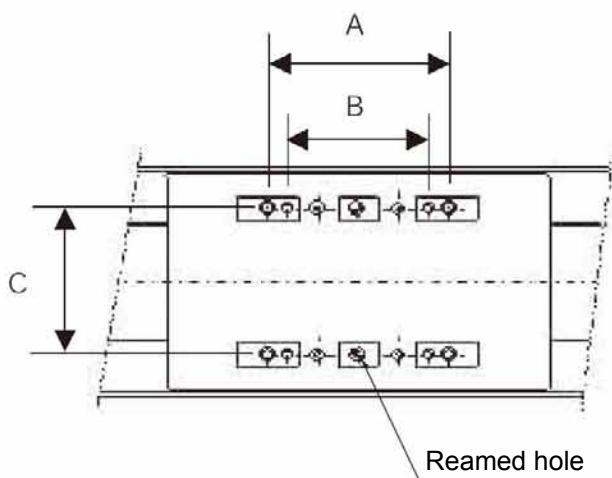
Tapped hole sizes and reamed holes of ISD/ISDA/ISPDA/ISDCR/ISPDACR sliders

Type	Tapped diameter	Tapped depth	A	B	C	Reamed hole	Reamed depth
S	M6	13 mm	70 mm	-	60 mm	Ø6H10	10 mm
M·MX	M6	18 mm	-	70 mm	80 mm	Ø8H10	10 mm
	M8		90 mm	-			
L·LX	M8	20 mm	120 mm	90 mm	105 mm	Ø8H10	10 mm

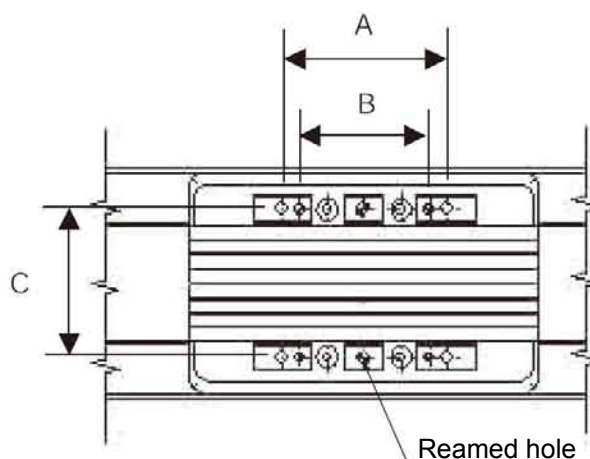
Tapped hole sizes and reamed holes of ISDACR·ISPDACR Sliders

Type	Tapped diameter	Tapped depth	A	B	C	Reamed hole	Reamed depth
S	M6	13 mm	70 mm	-	60 mm	Ø6H10	10 mm
M	M6	18 mm	-	70 mm	80 mm	Ø8H10	10 mm
	M8		90 mm	-		Ø8H10	10 mm
MX	M6	18 mm	-	70 mm	105 mm	Ø8H10	10 mm
	M8		90 mm	-		Ø8H10	10 mm
L	M8	20 mm	120 mm	90 mm	105 mm	Ø8H10	10 mm
LX	M8	20 mm	120 mm	90 mm	130 mm	Ø8H10	10 mm

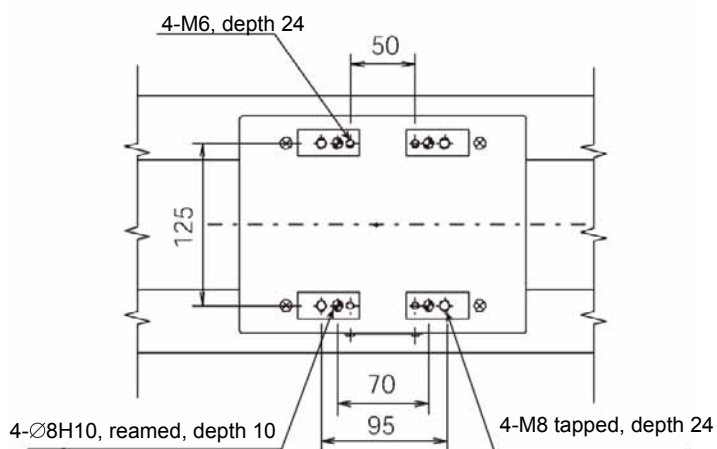
ISDCR · ISDACR · ISPDACR · ISPDACR



ISD · ISDA · ISPDA



ISPDQR-W/ISDQR-W/ISPDQR-W



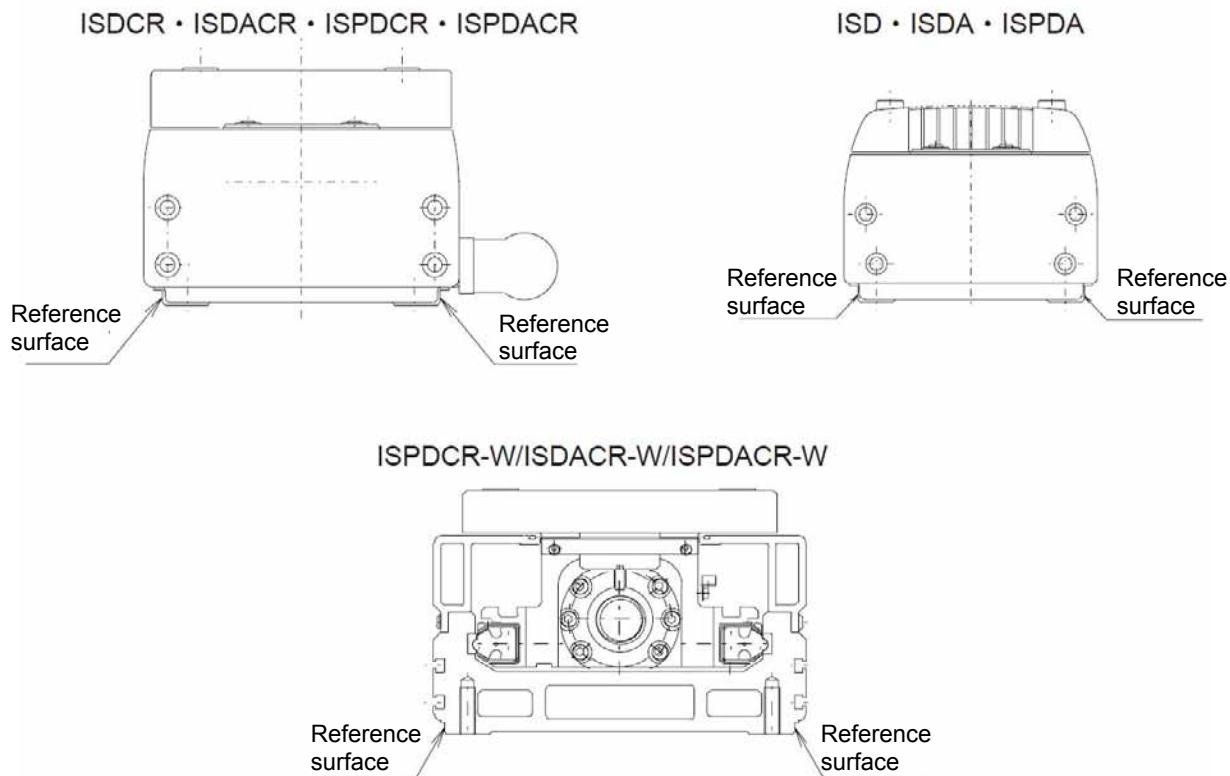
Applicable bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M6	12.3 N-m (1.26 kgf-m)	5.4 N-m (0.55 kgf-m)
M8	30.0 N-m (3.06 kgf-m)	11.5 N-m (1.17 kgf-m)

About tightening screws

- Use high-tension bolts conforming to ISO 10.9 or higher.
- If a tapped hole is used, use a screw not longer than the engagement length.
- Note changed to 1.8 times more of the nominal diameter for the length of thread engagement.

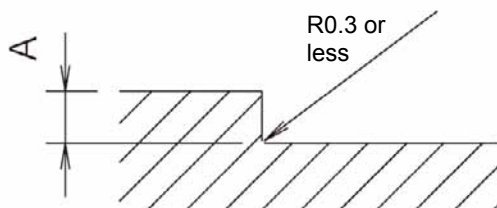
5.4 Mounting Surface

- The mounting frame should have sufficient rigidity to avoid generation of vibration.
- The surface where the actuator will be mounted should be machined or be equally level, and the flatness between the actuator and the frame should be within 0.05 mm.
- Provide enough space around the actuator so that maintenance work can be carried out.
- The side and bottom of the actuator base provide reference planes for slider travel.
- When traveling precision is required, use these surfaces as the reference for mounting.



As shown in the figure above, each side face of the base provides a reference surface for traveling alignment of the slider. If accuracy is required, install the actuator with reference to this surface.

When installing the actuator on a frame using a reference surface of the base, follow the figure below. With the ISPDCR-W, ISDACR-W and ISPDACR-W actuators, the front cover and rear cover located at both ends of the actuator make contact. When machining the necessary locations, therefore, provide sufficient allowances corresponding to the thickness of each cover to prevent contact.



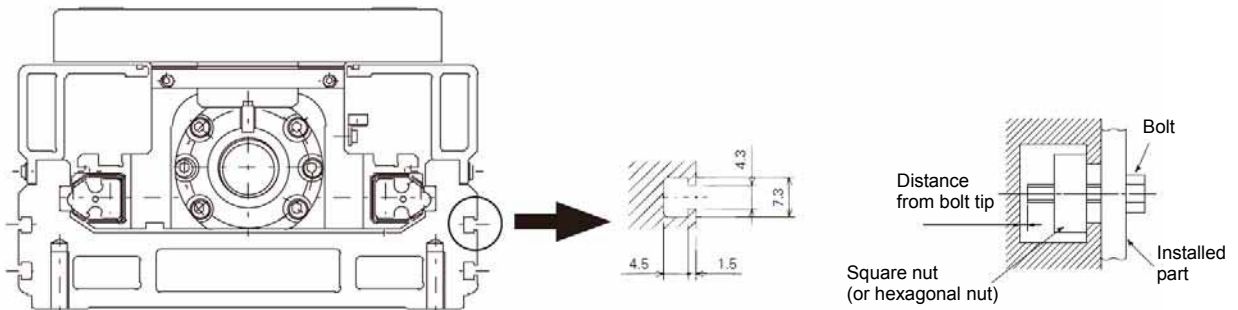
Type	Dimension A (mm)
S	2~5
M·MX	2~5
L·LX	2~5
W	3~5

5.5 Using T-slots

M4 T-slots are provided on the side face of the base for installing the connector box or other item that must be combined. (See the figure below.)

If a wiring kit is combined, use these T-slots to install the kit.

You can also use these T-slots freely for installing sensors, securing wires or for other purposes as necessary.



Caution: Square nuts are recommended for use with T-slots, but general hexagonal nuts can also be used. When installing bolts in T-slots, pay attention to the length of each bolt to prevent the bolt tip from contacting the bottom of the T-slot.



5.6 Suction for the Cleanroom Type

IS actuators of cleanroom specification with protective stainless sheet can demonstrate their designed cleanliness of cleanroom class 10 ($0.3 \mu\text{m}$) when air is suctioned from the suction joint. The table below lists reference suctioning rates for each model at different rated speeds.

5.6.1 Reference Suctioning Rates

Model	Lead	Suctioning rate (N/min)	Pressure (mmAq)
IS(P)D(A)CR-S	4	10	-3
	8	20	-6
	16	30	-13
IS(P)D(A)CR-M	5	15	-4
	10	30	-12
IS(P)D(A)CR-M(X)	20	70	-40
IS(P)D(A)CR-L	10	30	-10
IS(P)D(A)CR-L(X)	20	90	-60
IS(P)D(A)CR-W(X)-600	10	40	-60
	20	60	-170
	40	120	-520
IS(P)D(A)CR-W(X)-750	25	60	-170
	50	120	-520

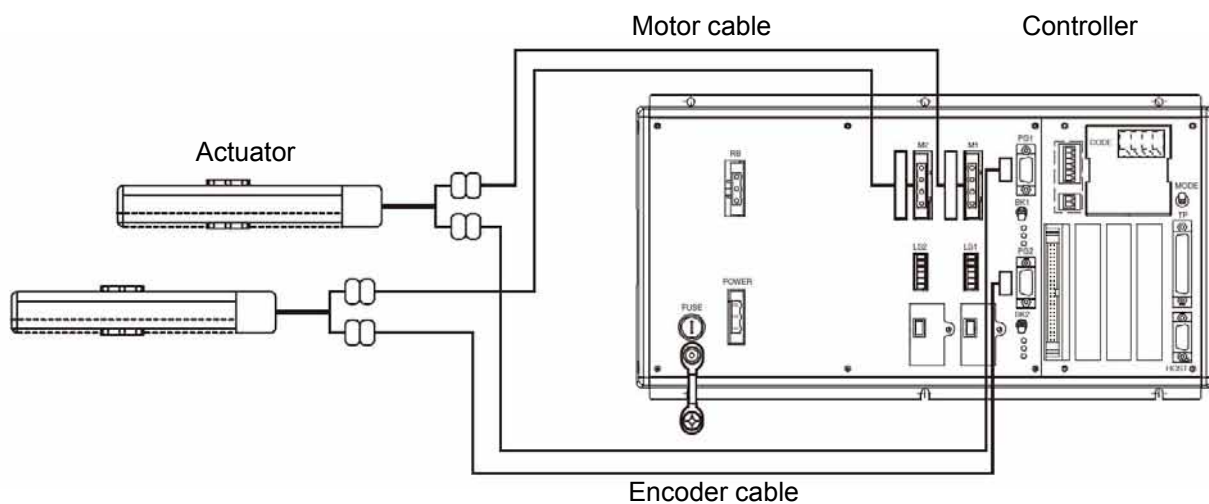
- Prepare an air tube and connect it to the suctioning port, or the quick joint of $\varnothing 12$ in external diameter provided on a side face of the actuator, and use a vacuum pump, blower, ejector, etc., to suction air at an appropriate flow rate as specified above.
- If suctioning equipment is available, check its capacity. If no suctioning equipment is available, select a vacuum pump, blower or other appropriate suctioning equipment by referring to the values listed above.

6. Connecting the Controller

The controller wiring is explained using a single-axis actuator.

6.1 Wiring

The actuator and controller are connected via the motor cable and encoder cable (genuine parts) using connectors.



Example of connection with XSEL Controller

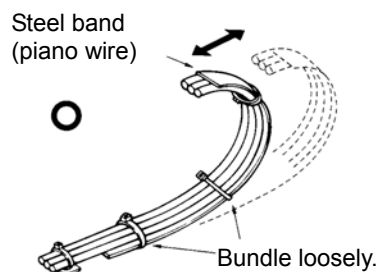
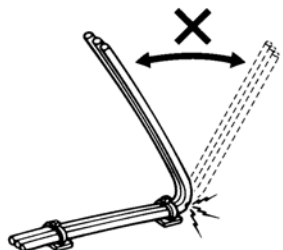
[For details on extension cables, refer to 9, “Motor/Encoder Cables.”]



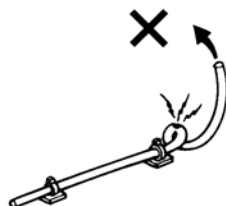
- Caution:**
- If the application does not permit the cable to be fixed, make sure the cable will not deflect more than by its dead weight, or use a self-supporting cable hose, keep the wiring radius sufficiently large, or otherwise reduce the load received by the cable.
 - Do not cut the cable for the purpose of extension, shortening, or reconnection.
 - Do not pull on the cable or apply an excessive force to bend it. The cables may break.

When designing an application system using IAI actuators and controllers, incorrect wiring or connection of each cable may cause unexpected problems such as a disconnected cable or poor contact. The following explains examples of prohibited handling of cables. Read the information carefully to connect the cables properly.

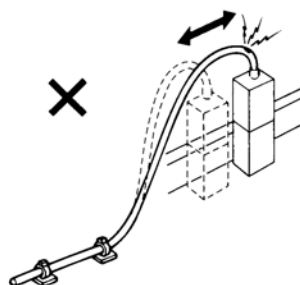
- Do not let the cable flex at a single point.



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

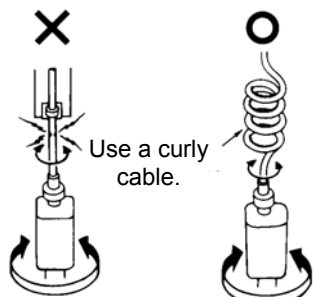


- Do not pull the cable with a strong force.

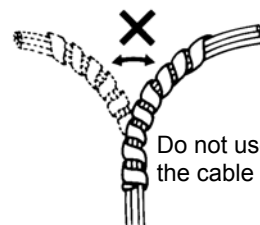
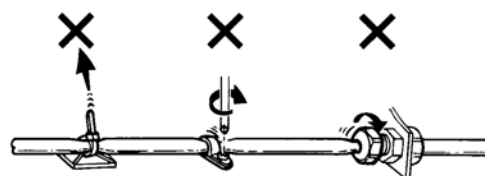


- Do not let the cable receive a turning force at a single point.

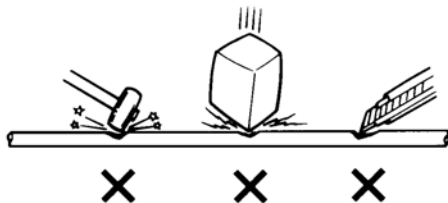
- When fixing the cable, provide a moderate slack and do not tension it too tight.



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

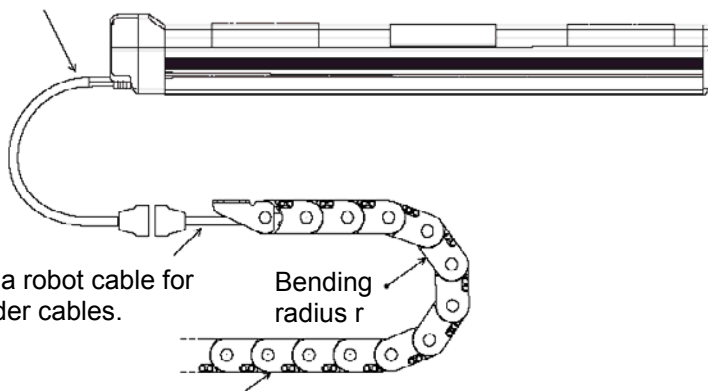


Do not use a spiral tube where the cable flexes frequently.

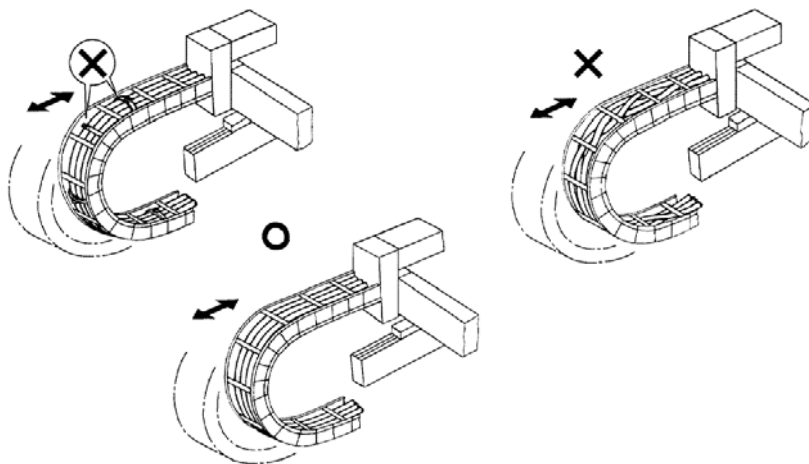


- Cautions for use of a cable track

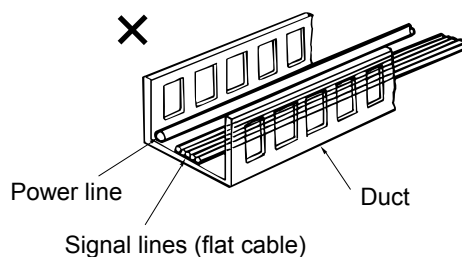
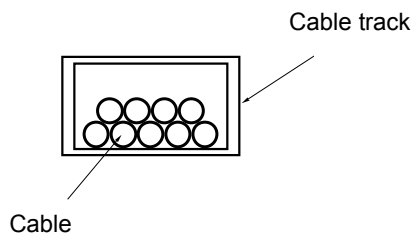
- The supplied cable is not a robot cable, so never store it in a cable track.



- Always use a robot cable for motor/encoder cables.
- Make sure the bending radius of the cable track is at least the minimum bending radius of the cable. (Refer to 9, "Motor/Encoder Cables.")
- Do not let the cable get tangled or kinked in a cable track or flexible tube. When bundling the cable, keep a certain degree of flexibility (so that the cable will not become too taut when bent).



- Do not cause the cables to occupy more than 60% of the space in the cable track.
- Do not lay signal lines together with circuit lines that create a strong electric field.





7. Setting the Home Position

7.1 Home Return

The home return procedure for this actuator is explained below.

Home return involves the operation explained below:

- [1] When a home return command is issued, the actuator moves in the direction set by the parameter for moving direction.
- [2] The software senses the mechanical end in the return operation.
- [3] The slider reverses its direction when this end is reached, after which the position where the Z-phase signal is detected becomes the reference point.
- [4] The slider travels further by the offset amount set by the parameter, and this position becomes home.

7.2 Fine-tuning the Home Position

The number of motor revolutions from the time the slider hits the stopper until the Z-phase signal is generated has been adjusted before the actuator is shipped. The standard value of the reversing distance when the slider hits the stopper, reverses its direction, and then stops at the home position, is shown in the table below.

Standard Types ISD/ISDA/ISDA

Cleanroom Types ISDCR/ISPDACR/ISDACR/ISPDACR (excluding W)

Type	Distance from mechanical stopper to home (approx. in mm)
S	5
M·MX	5
L·LX	5

Cleanroom Types ISDCR-W/ISDACR-W/ISPDACR-W

Type	Distance from mechanical stopper
Standard	7 ± 2
Intermediate support	15 ± 2

As long as the home direction is the same, you can fine-tune the home position for each actuator by changing the parameter based on this value. Fine-tuning is made as follows:

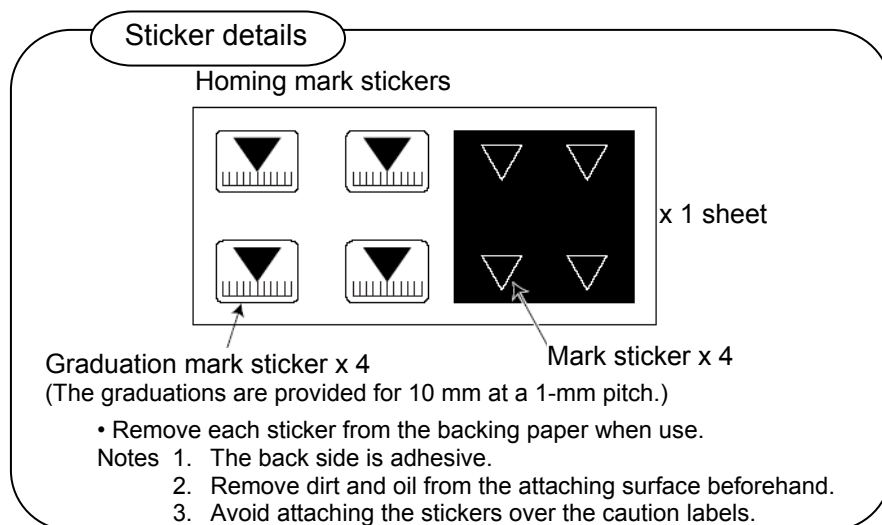
- [1] Perform homing operation and confirm home.
- [2] Next, move to a desired home position and check the difference between the two positions. In the case of a XSEL or SSEL, correct the parameter for home preset. In the case of a SCON, correct the parameter for home return offset. Add or subtract an applicable value to or from the value currently set.
- [3] If you allow for a large offset, the movement range is limited by the amount of offset. If the offset is greater than 1 mm, you must also adjust the stroke soft limits.

7.3 Changing the Home Direction

If the home direction is changed after the actuator has been delivered, the home direction parameter must be changed, and the encoder's Z-phase may also need to be adjusted on some models. Contact IAI.

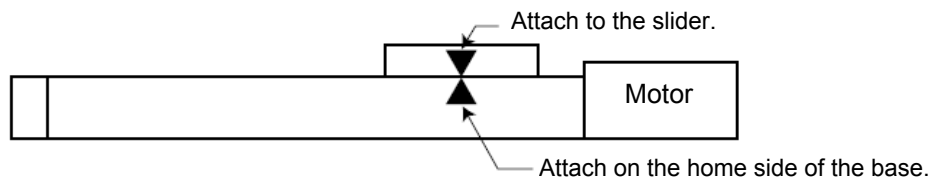
7.4 How to Use the Homing Mark Stickers

- ◆ Attach these stickers to the product, as necessary, to indicate the home direction of the actuator, etc.

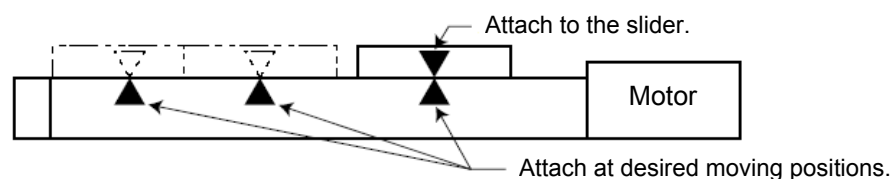


Examples of use

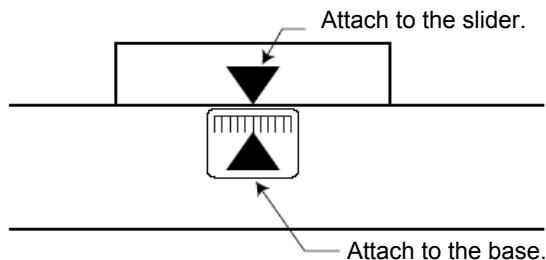
- [1] For marking the home direction of the actuator



- [2] As positioning marks



- [3] For displacement check



- Attach two stickers when the actuator is stopped at home.

8. Options

8.1 AQ Seal

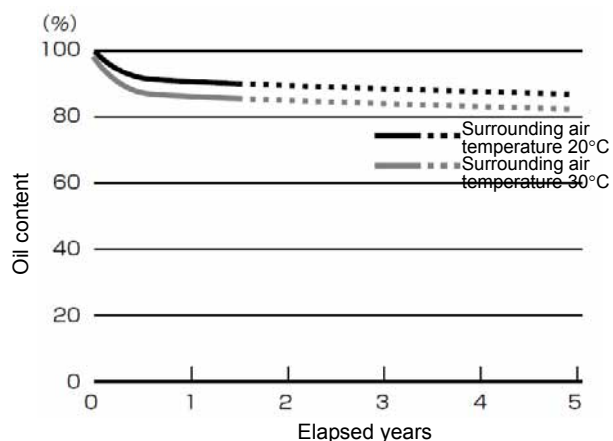
(Features)

- The AQ seal is a lubrication unit that uses a lubricating member made of resin-solidified lubricating oil.
- The AQ seal is a porous member containing a lot of lubricating oil, so lubricating oil oozes out to the surface by means of capillary phenomenon.
- When the AQ seal is pressed against the guide and ball screw surface (steel-ball rolling surface), lubricating oil is supplied and this, combined with use of grease, keeps the actuator maintenance-free for a long time.

(Effects)

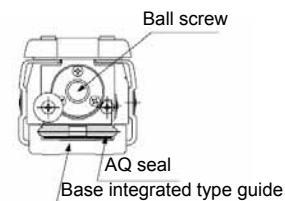
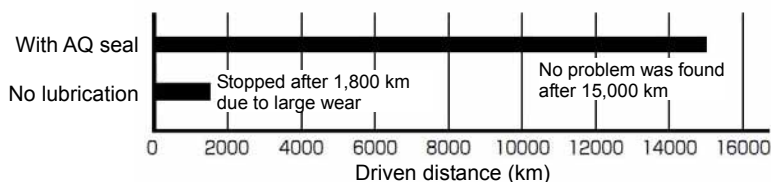
- Combined with the effect of grease charged before shipment, the actuator can remain maintenance-free for 5,000 km or 3 years.
- However, it is recommended that the actuator be greased regularly according to the standard maintenance schedule to ensure a stable use for a long term.

■ Change in Oil Content of AQ Seal (Figures after 1.5 years are projections.)

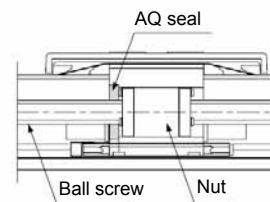
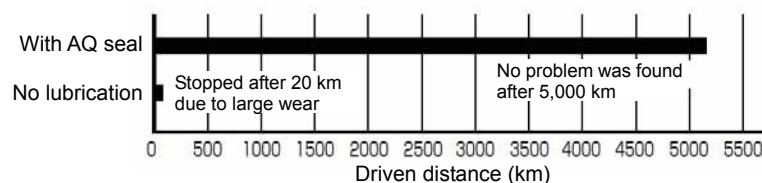


- Based on 12 hours of operation a day, 250 days a year
- Aging of lubricating oil content and factors relating to driving of the actuator are excluded.

■ Life of guide (with/without AQ Seal)



■ Life of Ball Screw (with/without AQ Seal)





8.2 Brake

The brake is a mechanism to retain the slider of a vertically installed actuator so that the slider will not drop when the power is cut off or servo turns off. If any axis is used vertically, an optional brake is required. Brakes of S, M and L types are installed outside the end cover on the counter-motor side, but brakes of W types are built into the actuator.

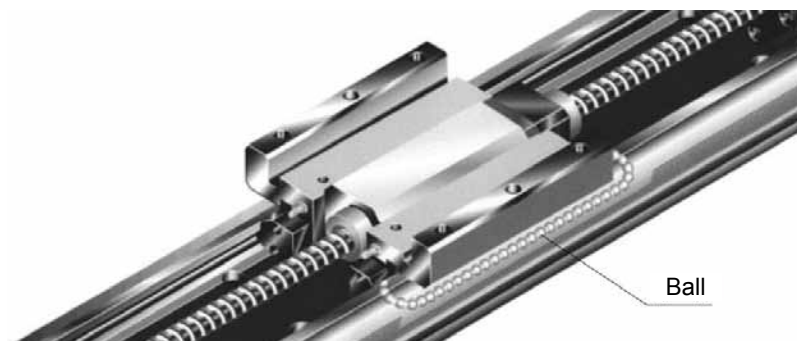
8.3 Reversed-home Specification

In the reversed-home specification, the home is located on the counter-motor side. This is indicated by "NM" in the model number. If you wish to change the home direction after the delivery, consult IAI because the moving direction parameter must be adjusted, as well as the encoder's Z-phase on certain models.

8.4 Guide with Ball Retention Mechanism

(Structure)

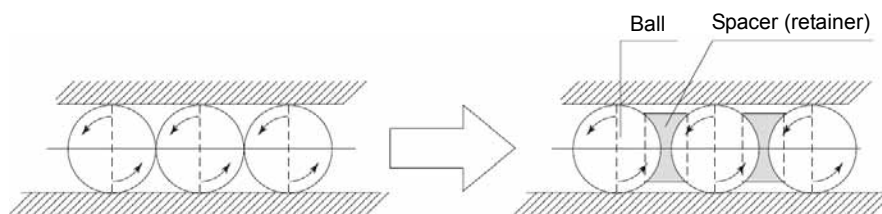
A spacer (retainer) is inserted between adjacent balls (steel balls) in the guide to reduce noise and achieve smooth operation. This specification is indicated by "RT" in the model number.



(Features)

[1] Reduced noise

There is no longer metal noise generated by colliding balls and thus noise is reduced. Since balls are aligned by retainers, annoying noise decreases.



[2] Smooth operation

Wear caused by friction between balls decreases, oil no longer runs out due to contact, and lubricating oil collects at the retainers. Accordingly, operation becomes smooth.

8.5 Suction Joint on Opposite Side

This option is available for the cleanroom types ISDCR/ISPDCR/ISDACR/ISPDACR.

On actuators of cleanroom types, the suction joint is normally located on the left side of the actuator as viewed from the motor end. Specify this option if you want to have this joint on the other (opposite) side.

9. Motor/Encoder Cables

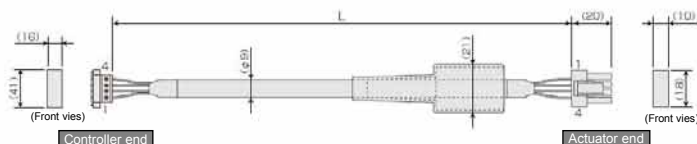
9.1 Standard

The same cables are used regardless of the actuator model. The applicable cables vary depending on the combined controller.

Correspondence table of controllers and motor/encoder cables

Controller	XSEL-J/K		XSEL-P/Q		SSEL		SCON	
LS	Without LS	With LS	Without LS	With LS	Without LS	With LS	Without LS	With LS
Applicable cables	[1], [2]	[1], [2], [3]	[1], [4]	[1], [5]	[1], [4]	[1], [5]	[1], [4]	[1], [5]

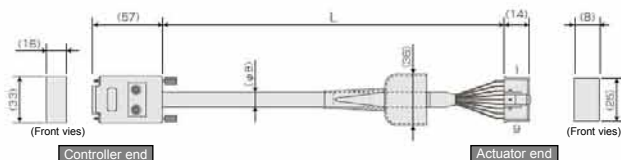
[1] Motor cable CB-X-MA***



* *** indicates the cable length (L). Up to 30 m can be specified.
Example) 080 = 8 m
[Minimum bending radius]
Movable: 51 mm
Fixed: 34 mm

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

[2] Encoder cable CB-X-PA***



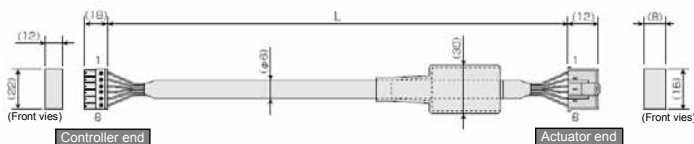
* *** indicates the cable length (L). Up to 30 m can be specified.
Example) 080 = 8 m
[Minimum bending radius]
Movable: 44 mm
Fixed: 29 mm

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
0.15 sq (crimped)	---	---	1	1	BAT+	Black	0.15 sq (crimped)
	---	---	2	2	BAT-	Yellow	
	---	---	3	3	SD	Blue	
	---	---	4	4	SD	Orange	
	---	---	5	5	VDC	Green	
	---	---	6	6	GND	Brown	
	---	---	7	7	FG	Ground	
	---	---	8	8	BK+	Gray	
	---	---	9	9	BK+	Red	
	Blue	SD	7	7	SD	Orange	
	Orange	SD	8	8	SD	Blue	
	Black	BAT+	9	9	BAT+	Black	
	Yellow	BAT-	10	10	BAT-	Yellow	
	Green	VDC	11	11	VDC	Green	
	Brown	GND	12	12	GND	Brown	
	Gray	BK+	13	13	BK+	Gray	
	Red	BK+	14	14	BK+	Red	
	---	---	18	18	---	---	

The shield is clamped to the hood.

Drain wire and braided shield wires

[3] Limit switch cable CB-X-LC***



* *** indicates the cable length (L). Up to 30 m can be specified.

Example) 080 = 8 m

[Minimum bending radius]

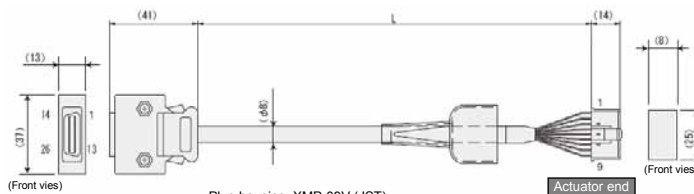
Movable: 33 mm

Fixed: 22 mm

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
AWG24	Skyblue	24VOUT	6	1	24VOUT	Skyblue	AWG24
	Pink	N	5	2	N	Pink	
	Light green	LS	4	3	LS	Light green	
	Orange	CLEEP	3	4	CLEEP	Orange	
	Gray	OT	2	5	OT	Gray	
	Brayblue	RSV	1	6	RSV	Brayblue	

Note) 1B indicates one black dot mark.

[4] Encoder cable CB-X1-PA***



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

* *** indicates the cable length (L). Up to 30 m can be specified.

Example) 080 = 8 m

[Minimum bending radius]

Movable: 44 mm

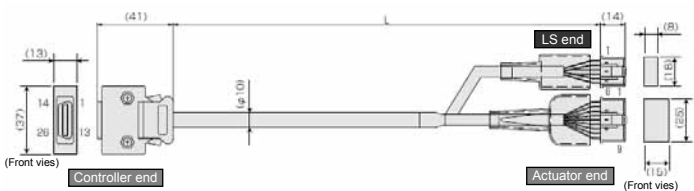
Fixed: 29 mm

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
AWG26 (soldered)	---	---	10	1	BAT+	Black	AWG26 (crimped)
	---	---	11	2	BAT-	Yellow	
	---	---	12	3	SD	Blue	
	---	---	26	4	SD	Orange	
	---	---	25	5	VCC	Green	
	---	---	24	6	GND	Brown	
	---	---	23	7	FG	Drain	
	---	---	9	8	BK-	Gray	
	---	---	18	9	BK+	Red	
	---	---	19	---	---	---	
AWG26	---	A+	1	1	A	Whiteblue	AWG26 (soldered)
	---	A-	2	2	A	Whiteblue	
	---	B+	3	3	B	Whiteblue	
	---	B-	4	4	B	Whiteblue	
	---	Z+	5	5	Z	Whitepurple	
	---	Z-	6	6	Z	Whitepurple	
	Orange	SRD+	7	7	---	---	
	Green	SRD-	8	8	---	---	
	Purple	BAT+	14	9	FG	Ground	
	Gray	BAT-	15	10	SD	Orange	
AWG26 (soldered)	Red	VCC	16	11	SD	Green	AWG26 (soldered)
	Black	GND	17	12	BAT+	Purple	
	Blue	BKR-	20	13	BAT-	Gray	
	Yellow	BKR+	21	14	VCC	Red	
	---	---	22	15	GND	Black	
	---	---	---	16	---	---	
	---	---	---	17	BK-	Blue	
	---	---	---	18	BK+	Yellow	
	---	---	---	---	---	---	
	---	---	---	---	---	---	

The shield is clamped to the hood.

Ground wire and braided shield wires

[5] Encoder cable with LS CB-X2-PLA***



* *** indicates the cable length (L). Up to 30 m can be specified.

Example) 080 = 8 m

[Minimum bending radius]

Movable: 58 mm

Fixed: 38 mm

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
AWG26 (soldered)	---	---	10	1	24V	Whiteorange	AWG26 (soldered)
	---	---	11	2	OV	Whitegreen	
	---	---	12	3	LS	Brownblue	
	---	---	26	4	CLEEP	Brownblue	
	---	---	25	5	OT	Brownblue	
	---	---	24	6	RSV	Brownblack	
	---	---	23	---	---	---	
	---	---	9	---	---	---	
	---	---	18	---	---	---	
	---	---	19	---	---	---	
AWG26 (soldered)	Whiteblue	A+	1	1	A	Whiteblue	AWG26 (soldered)
	Whiteblue	A-	2	2	A	Whiteblue	
	Whiteblue	B+	3	3	B	Whiteblue	
	Whiteblue	B-	4	4	B	Whiteblue	
	Whitepurple	Z+	5	5	Z	Whitepurple	
	Whitepurple	Z-	6	6	Z	Whitepurple	
	Orange	SRD+	7	7	---	---	
	Green	SRD-	8	8	---	---	
	Purple	BAT+	14	9	FG	Ground	
	Gray	BAT-	15	10	SD	Orange	
AWG26 (soldered)	Red	VCC	16	11	SD	Green	AWG26 (soldered)
	Black	GND	17	12	BAT+	Purple	
	Blue	BKR-	20	13	BAT-	Gray	
	Yellow	BKR+	21	14	VCC	Red	
	---	---	22	15	GND	Black	
	---	---	---	16	---	---	
	---	---	---	17	BK-	Blue	
	---	---	---	18	BK+	Yellow	
	---	---	---	---	---	---	
	---	---	---	---	---	---	

The shield is clamped to the hood.

Drain wire and braided shield wires

(As for wire color, "White/blue" indicates that the band is white and insulator is blue.)

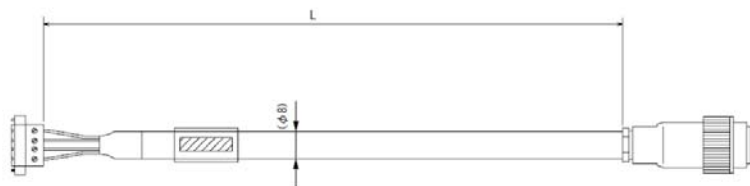
9.2 CE Specification (Option Indicated by “EU” in Model Number)

The same cables are used regardless of the actuator model. The applicable cables vary depending on whether or not LSs are used.

Correspondence table of controllers and motor/encoder cables

Controller	XSEL-P/Q, SSEL, SCON	
LS	Without LS	With LS
Applicable cables	[1], [2]	[1], [3]

[1] Motor cable CB-XEU-MA***



* *** indicates the cable length (L). Up to 30 m can be specified.

Example) 080 = 8 m

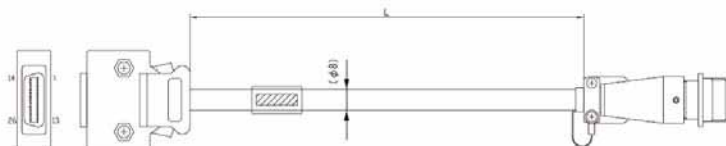
[Minimum bending radius]

Movable: 48 mm

Fixed: 48 mm

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
0.75sq	Green	PE	1	①	PE	Green	0.15 sq (crimped)
	Red	U	2	1	U	Red	
	White	V	3	2	V	White	
	Black	W	4	3	W	Black	

[2] Encoder cable CB-XEU1-PA***



* *** indicates the cable length (L). Up to 30 m can be specified.

Example) 080 = 8 m

[Minimum bending radius]

Movable: 44 mm

Fixed: 29 mm

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
AWG26 (soldered)	---	---	10	1	SD	Orange	AWG26 (soldered)
	---	---	11	2	SD	Green	
	---	E24V	12	3	---	---	
	---	OV	26	4	---	---	
	---	L5	25	5	---	---	
	---	CLEUP	24	6	---	---	
	---	OT	23	7	---	---	
	---	RSV	9	8	---	---	
	---	---	18	9	---	---	
	---	---	19	10	VCC	Red	
	---	A+	1	11	OND	Black	
	---	A-	2	12	BAT+	Purple	
	---	B+	3	13	BAT-	Gray	
	---	B-	4	14	---	---	
	---	Z+	5	15	BAT+	Blue	
	---	Z-	6	16	BAT-	Yellow	
	Orange	BRD+	7	---	---	---	
	Green	BRD-	8	---	---	---	
	Purple	BAT+	14	---	---	---	
	Gray	BAT-	15	---	---	---	
	Red	VCC	16	---	---	---	
	Black	OND	17	---	---	---	
	Blue	BKR+	20	---	---	---	
	Yellow	BKR-	21	---	---	---	
	---	---	22	---	---	---	

The shield is clamped to the hood.

Drain wire and braided shield wires
(As for wire color, "White/blue" indicates that the band is white and insulator is blue.)

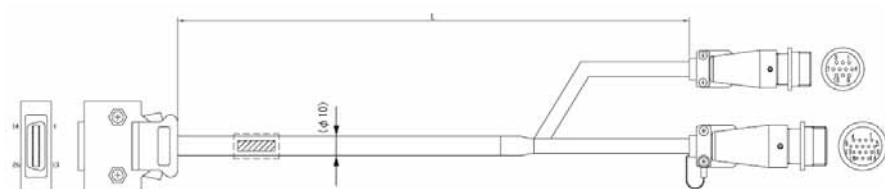
[3] Encoder cable with LS CB-XEU1-PLA***

* *** indicates the cable length (L). Up to 30 m can be specified.
Example) 080 = 8 m

[Minimum bending radius]

Movable: 58 mm

Fixed: 33 mm



Wiring	Color	Signal	No.
—	—	—	10
—	—	—	11
White/blue	E24V	12	12
White/yellow	OV	13	13
White	LS	20	20
White/black	CLEEP	25	25
White/yellow	QT	24	24
White/grey	RSV	23	23
—	—	—	9
—	—	—	18
—	—	—	19
—	A+	1	1
—	A-	2	2
—	B+	3	3
—	B-	4	4
—	Z+	5	5
—	Z-	6	6
—	SRD+	7	7
Green	SRD-	8	8
Purple	BAT+	14	14
Grey	BAT-	15	15
Red	VCC	16	16
Black	GND	17	17
Blue	BKR+	20	20
Yellow	BKR-	21	21
—	—	—	22

The shield is clamped to the hood.

Drain wire and braided shield wires.

(As for wire color, "White/blue" indicates that the band is white and insulator is blue.)

No.	Signal	Color	Wiring
1	E24V	White/black	AWG26 (crimped)
2	OV	White/yellow	
3	—	—	
4	LS	White/red	
5	CLEEP	White/black	
6	QT	White/yellow	
7	RSV	White/grey	
8	—	—	
9	—	—	
10	—	—	

No.	Signal	Color	Wiring
1	SD	Orange	AWG26 (crimped)
2	SD	Green	
3	—	—	
4	—	—	
5	—	—	
6	—	—	
7	—	—	
8	—	—	
9	—	—	
10	VCC	Red	
11	GND	Black	AWG26 (crimped)
12	BAT+	Purple	
13	BAT-	Grey	
14	—	—	
15	BK+	Blue	
16	BK-	Yellow	

The shield is connected to the earth sleeve.

10. Maintenance/Inspection

10.1 Inspection Items and Intervals

Perform maintenance/inspection according to the following timetable.

The operating time is assumed to be 8 hours a day. If the actuator is used continuously for 24 hours or the utilization rate is otherwise high, shorten the inspection intervals accordingly.

	Visual inspection of machine exterior	Interior check	Lubrication ^{*2}
At start of operation	○		
After 1 month of operation	○		
After 6 months of operation	○	○	○ ^{*1}
After 1 year of operation	○	○	○
Every 6 months thereafter	○		
Every year thereafter	○	○	○

*1 If the interior check found deteriorated grease, add grease.

*2 When the actuator is moved back and forth continuously over a distance of 30 mm or less, grease film may disappear. As a guide, move the actuator back and forth over a distance of 50 mm or more for five cycles or so after every 5,000 to 10,000 back-and-forth operations over a short distance. This will restore the oil film.

10.2 Visual Inspection of the Machine Exterior

Check the following items visually.

Main body	Loose mounting bolts
Cables	Damage to cables, connection of connectors
Stainless sheet	Damage to cables, slack
General	Noise, vibration

- If the stainless sheet has slack, make appropriate adjustment to remove the slack.
- As a guide, the stainless sheet will last for 5,000 km in travelled distance.
However, replace the stainless sheet as necessary depending on the condition of use.
If you want to replace the sheet, you must bring the actuator to your nearest IAI facility or arrange for IAI's service person to visit your site and replace the sheet on site, as a rule.
- If the actuator is affixed vertically, grease applied to the guide may drip depending on the environment. Accordingly, clean the areas affected by dripping grease and add grease as necessary.



10.3 External Cleaning

- Clean the exterior surfaces from time to time.
- Wipe off dirt with a soft cloth.
- Depending on the situation, base oil or grease may ooze out to the actuator surface. If oil has oozed out, wipe it off using a soft cloth, etc.
- Do not spray compressed air on the actuator that might force dust into the crevices.
- Do not use petroleum-based solvents as they damage plastic parts and painted surfaces.
- If the unit gets badly soiled, moisten a soft cloth with a neutral detergent or alcohol and wipe the soiled area gently.

10.4 Adjusting the Stainless Sheet

If the actuator stroke is 400 mm or more, check the stainless sheet as necessary for slack, etc. If the sheet has slack, adjust the stainless sheet.

[For the procedure to adjust the stainless sheet, refer to 11, "Replacing/Adjusting the Stainless Sheet."]



10.5 Interior Check

Turn off the power, remove the stainless sheet and visually inspect the interior.

For the interior inspection, check the following items.

Actuator	Loosening of actuator mounting bolts, etc.
Guide	Lubrication condition, soiling
Joint	Lubrication condition, soiling

Visually check the condition of the interior. Specifically, see if there is any dust or foreign object inside the actuator and also check the condition of lubrication.

Even if the grease has turned brown, lubrication is fine as long as the traveling surface appears shiny.

If the grease becomes dirty and dull due to dust, or if the grease has worn away due to an extended operating time, lubricate the parts after cleaning them.

The procedure for checking the interior is explained below.

- (1) Move the slider to the motor end.
- (2) Remove the screws from the sheet retainer using an Allen wrench of 2.5 mm across flats.
- (3) Turn up the sheet and check the interior.
- (4) When you are done, assemble the parts by following the same procedure in reverse.



Caution:

- Do not disassemble the front cover because the ball screw is supported by the front cover. If a proper adjustment of the front cover is lost, the shaft center may become offset and the traveling resistance may increase or life of each part may become shorter, or abnormal noises may generate.
- Be careful not to forcibly bend or accidentally scratch the stainless sheet when checking the interior.

Do not pull the sheet or otherwise cause its state after initial installation to change. If the installed state of the sheet is changed, the sheet may shift to one side or its life may be reduced. If you have accidentally caused such change, contact IAI's Sales Engineering. Also remember to wear gloves or use other means to protect your hands from cuts at the end face of the stainless sheet.



10.6 Cleaning the interior

- Wipe off dirt with a soft cloth.
- If constituents of grease have separated and base oil has accumulated on both ends of the guide rail, wipe off the oil using a soft cloth, etc. If the accumulated oil is not wiped off, it may seep out to the exterior of the actuator.
- Do not spray compressed air on the actuator that might force dust into the crevices.
- Do not use petroleum-based solvents, neutral detergents or alcohol.



Caution: If grease contains a large amount of foreign matter, be sure to wipe off the dirty grease before adding new grease.

10.7 Adding Grease

10.7.1 ISD/ISDA/ISPD

Applicable Grease

Lithium grease No. 2 is used.

The following blends of grease are charged before shipment from IAI.

Idemitsu Kosan	Daphne Eponex GreaseNo.2
----------------	--------------------------

Equivalent grease blends are also available from various companies. For details, inform the name of the above grease to your supplier and ask them to select an equivalent product. Examples of equivalent products are shown below.

Showa Shell Sekiyu	Albania GreaseNo.2
Mobil Sekiyu	Mobilux 2

Grease Supply Method

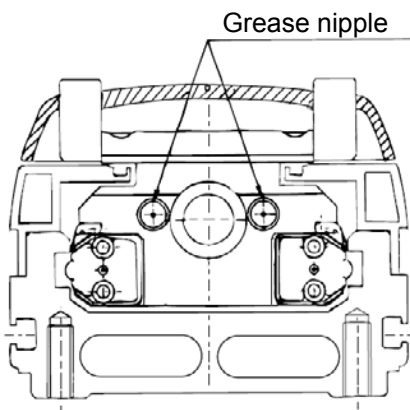
Grease nipples are provided on the end face of the slider, so add grease from these nipples. To add grease, turn up the stainless sheet. (For the method to turn up the stainless sheet, check "Interior Check.")

- [1] Squirt grease using the grease gun from grease nipples. (Refer to the figure below for positions.)
- [2] Squirt grease in from the other grease nipple in the same manner. (Add grease from both grease nipples.)
- [3] Move the slider back and forth several times by hand.



Caution: It is difficult to move actuators of short leads by hand. With these actuators, do not try to move the actuator by force, but connect a controller and move the actuator by jog operation.

- [4] Repeat the above lubrication process one more time.
- [5] Wipe off the excess grease that has overflowed from the slider.



Type	Nipple diameter
IS (P)D(A)-S	φ 3.5
IS (P)D(A)-M	φ 6.0
IS (P)D(A)-L	φ 6.0



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

10.7.2 ISDCR/ISPDCR/ISDACR/ISPDACR

Applicable Grease

Our guides use urea grease that offers excellent low-dust-raising property, stable torque characteristics, excellent lubrication performance, and rust-preventive effect similar to lithium grease. The following grease has been applied to the guides of your actuator prior to shipment from IAI.

Kuroda-precision Co.	Kuroda C grease
----------------------	-----------------

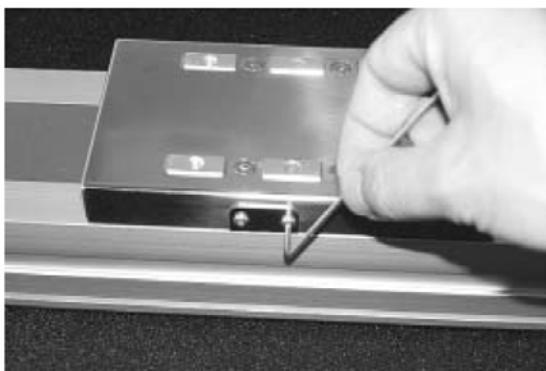


- Warning:**
- If your actuator is of cleanroom type, use low-dust-raising grease. If standard grease is used, dust may be raised.
 - Never use fluorine or lithium grease. If fluorine or lithium grease is mixed with urea grease, the lubrication performance normally expected from urea grease may be lost and consequently the mechanical parts may be damaged or cleanliness may drop.

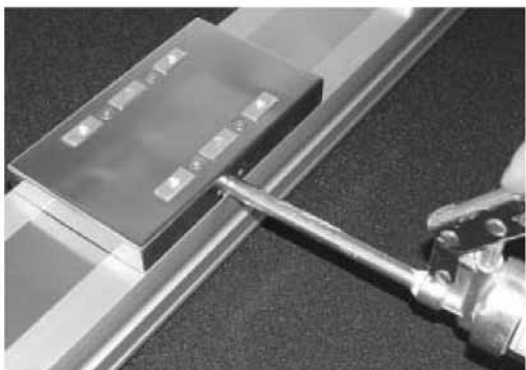
Grease Supply Method

Grease nipples are provided on the side of the slider, so add grease for the guide from these nipples.

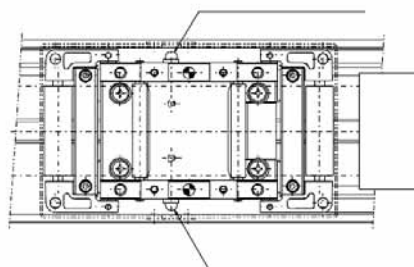
- [1] Remove the lubrication covers on both sides of the slider cover.



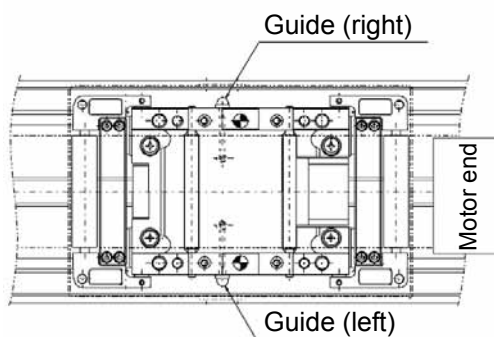
- [2] Squirt in grease of the blend specified by IAI from the grease nipples. Two grease nipples are available, one each on the left and right. They are used to grease the left and right guides, respectively.



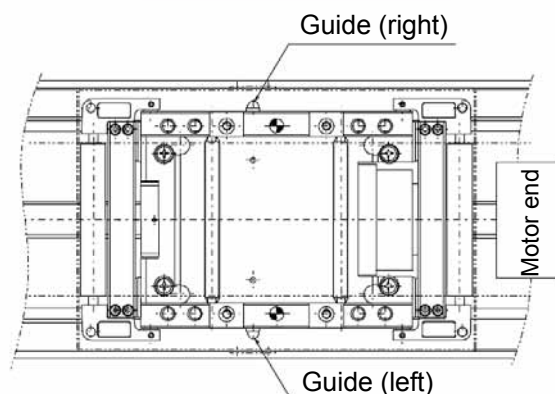
IS (P) D (A) CR-S



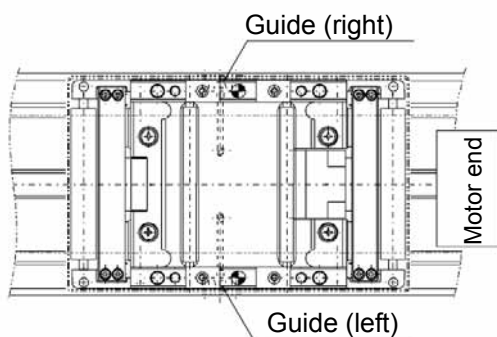
IS (P) D (A) CR-M



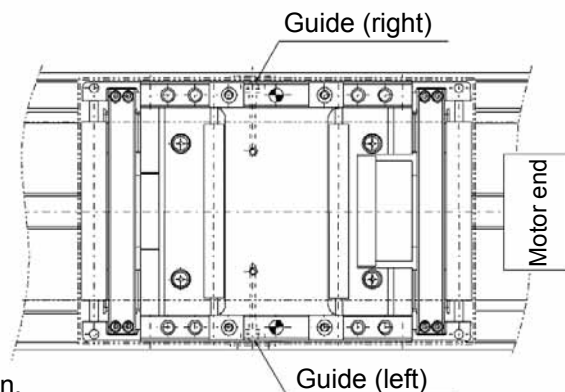
IS (P) D (A) CR-L



IS (P) D (A) CR-MX



IS (P) D (A) CR-LX



- [3] As a guide on how much grease should be squirted in, repeat a pumping action roughly twice, although the specific number varies depending on the size of the grease gun, etc.
- [4] Move the slider back and forth several times by hand.
- [5] Repeat the above lubrication process one more time.
- [6] Wipe off grease attached around the grease nipple.
- [7] Install the lubrication covers on both sides of the slider cover.

Type	Nipple diameter
IS (P)D(A)CR-S	Ø 3.5
IS (P)D(A)CR-M	Ø 6.0
IS (P)D(A)CR-L	Ø 6.0



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

10.7.3 ISPCR-W/ISDACR-W/ISPDACR-W

Applicable Grease

Low-dust-raising urea grease is used.

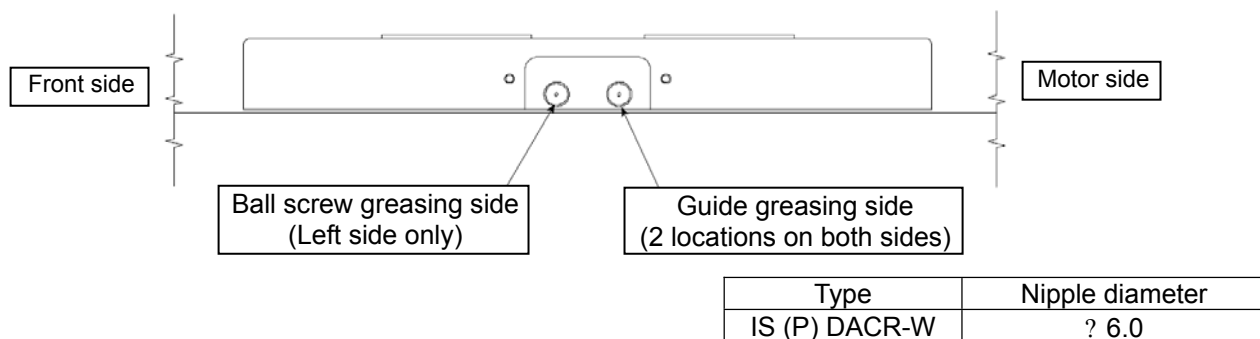
The following blends of grease are charged before shipment from IAI.

Kuroda-precision Co.	C grease
----------------------	----------

Grease Supply Method

Remove the two pan head machine screws on both sides of the slider cover to access a total of three grease nipples. Use these grease nipples to add grease. As you see the grease nipples from the front side of the actuator, those on the right are used to grease the guides, while the one on the left is used to grease the ball screw shaft. (The grease nipples for guides are located on both sides of the slider, while the grease nipple for ball screw shaft is provided on the left side as viewed from above the actuator with the motor facing toward you.)

- [1] Remove the two pan head machine screws on the side faces of the slider cover to remove the cover.
- [2] Squirt grease in using a grease gun. Repeat a pumping action three times at each grease nipple. (See the figure below for the positions.)
- [3] Install the cover and put the two pan head machine screws back to reverse the step in [1].



- Warning:**
- If your actuator is of cleanroom type, use low-dust-raising grease. If standard grease is used, dust may be raised.
 - Never use fluorine or lithium grease. If fluorine or lithium grease is mixed with urea grease, the lubrication performance normally expected from urea grease may be lost and consequently the mechanical parts may be damaged or cleanliness may drop.



- Caution:**
- Charging too much grease may increase the agitation resistance and the ball screw may generate heat easily, or excess grease attached to the ball screw may scatter due to rotation of the ball screw to dirty the surrounding areas. To prevent these problems, avoid adding too much grease. Also remember to wipe off excess grease. [Refer to 10.5, "Interior Check."]
 - In case the grease got into your eye, immediately go to see the doctor to get an appropriate care. After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

11. Replacement/Adjustment Procedure for Stainless Sheet

“What you need for replacement”

- New stainless sheet
- Clearance checking jig (A normal slider cover with holes)
(This jig is available from IAI's Sales Engineering Section. Contact the Sales Engineering Section when replacing the stainless sheet. You can also purchase the jig.)
- Allen wrench set
- Phillips screwdriver
- Scale

“Notes on tension of the stainless sheet”

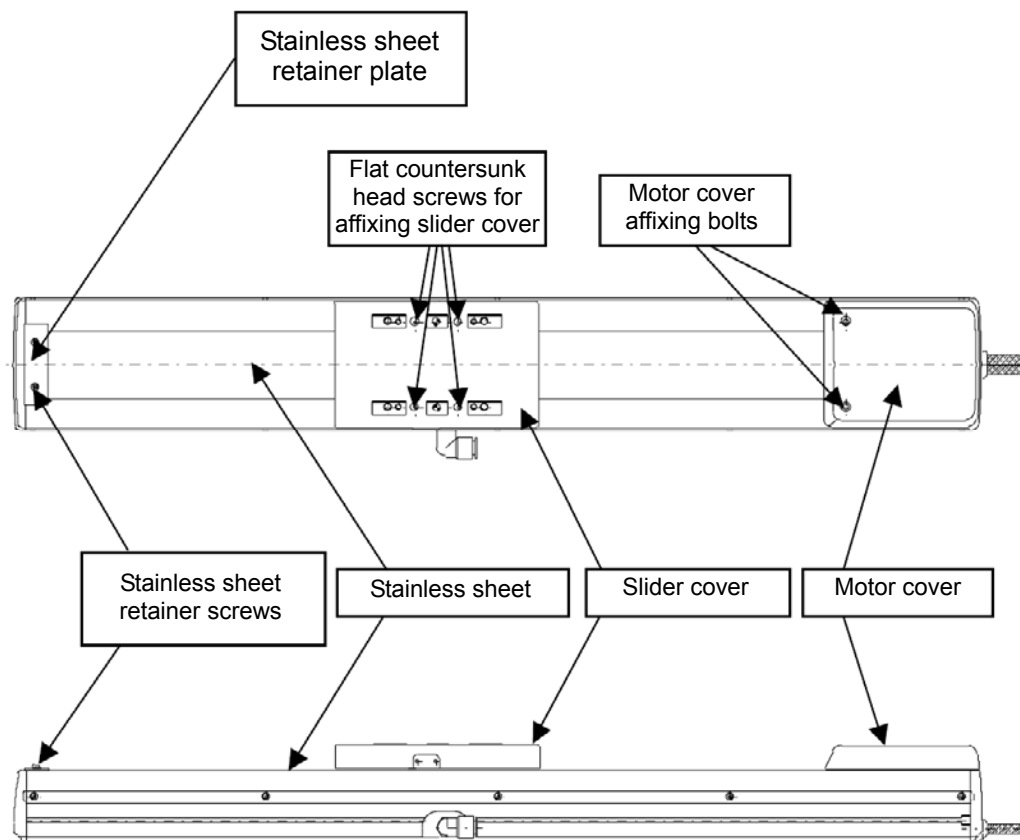
Deterioration/wear of the stainless sheet is affected by the tension.

If the stainless sheet is tensioned with a strong force and there is an excessive clearance from the slider cover, the stainless sheet may undergo fatigue fracture.

On the other hand, too small a tension may cause the stainless sheet to slacken and contact the back of the slider cover, consequently raising dust.

Accordingly, use a dedicated adjustment jig to adjust the tension of the stainless sheet until the clearance from the back of the slider cover corresponds to the specified dimension.

“Name of each part”

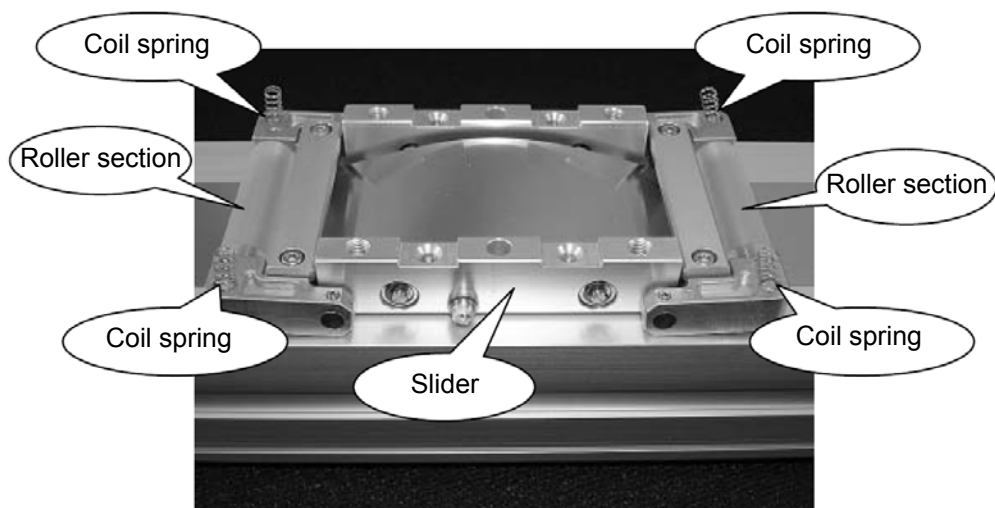


“Procedure”

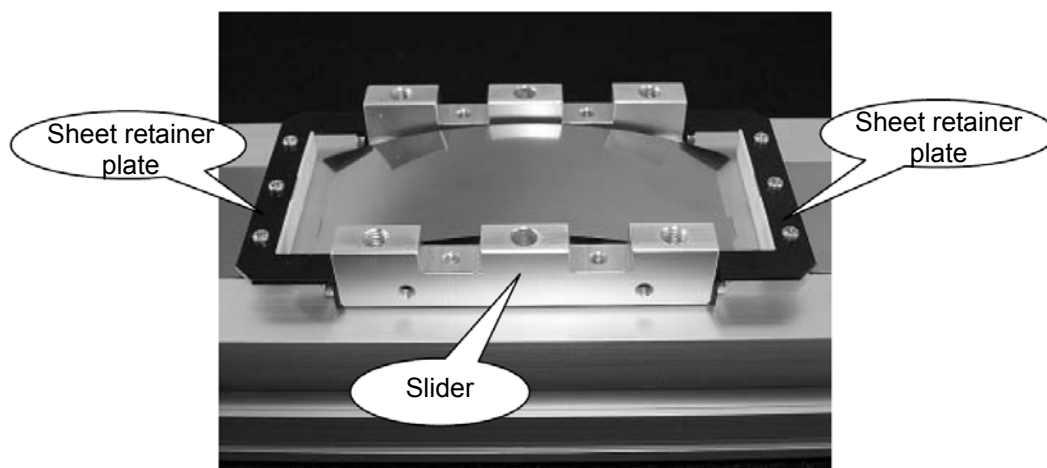
- (1) Remove the screws affixing the slider cover.

After removing the slider cover

- [1] ISDCR/ISPDQR/ISDACR/ISPDACR (roller structure)

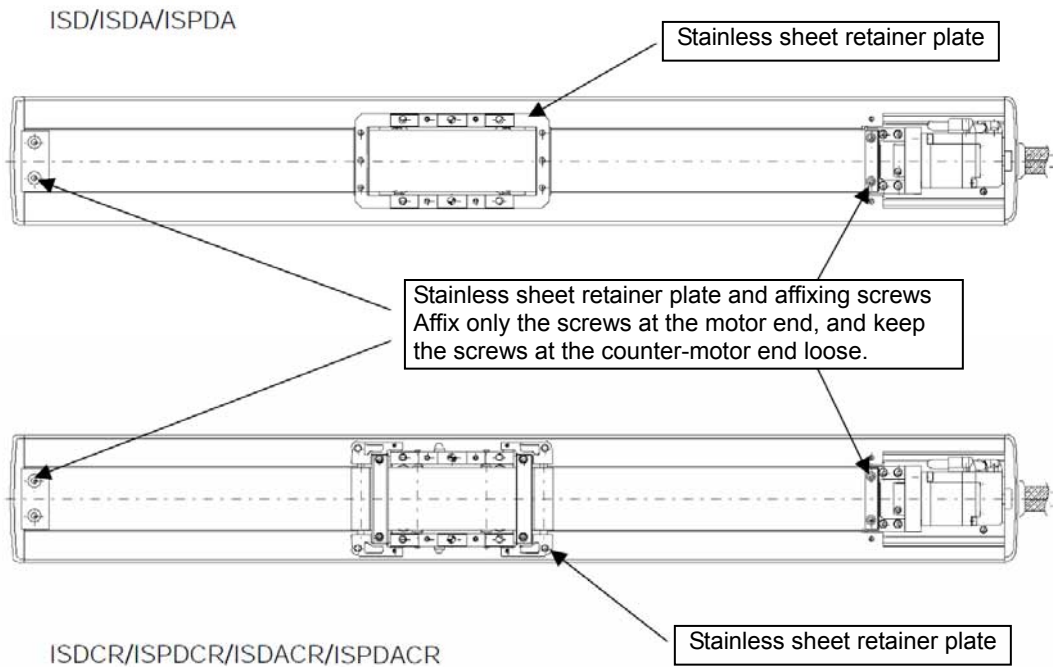


- [2] ISD/ISDA/ISDA (slide structure)

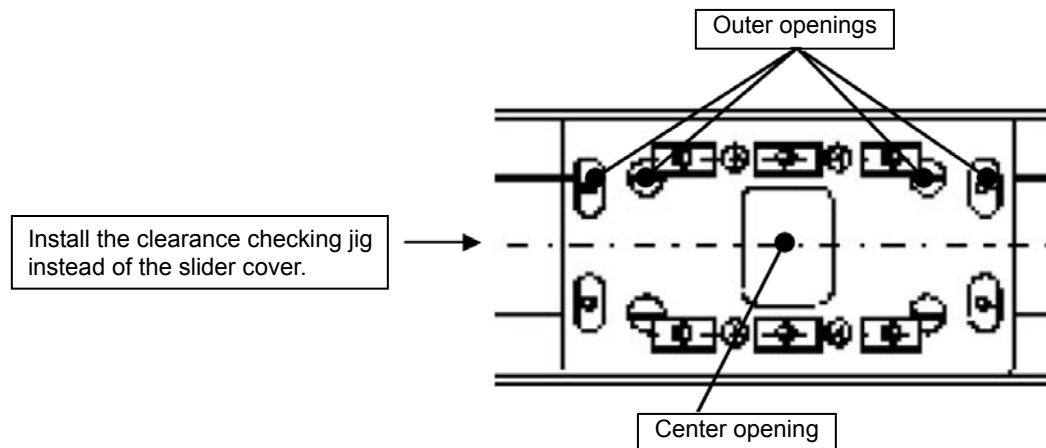


Caution: Remove the slide cover slowly and gently. If the actuator is hung from the ceiling or installed vertically or sideways horizontally, put a plastic bag, etc., below the slider cover to prevent the coil springs from getting lost should they detach and fall.

- (2) Remove the motor cover.
- (3) Remove the screws retaining the current stainless sheet and pull out the stainless sheet.
- (4) Guide the new stainless sheet through the stainless sheet retainer plate.
- (5) Affix the stainless sheet with the retainer plate and screws.
Affix only the screws at the motor end, and keep the screws at the counter-motor end loose.

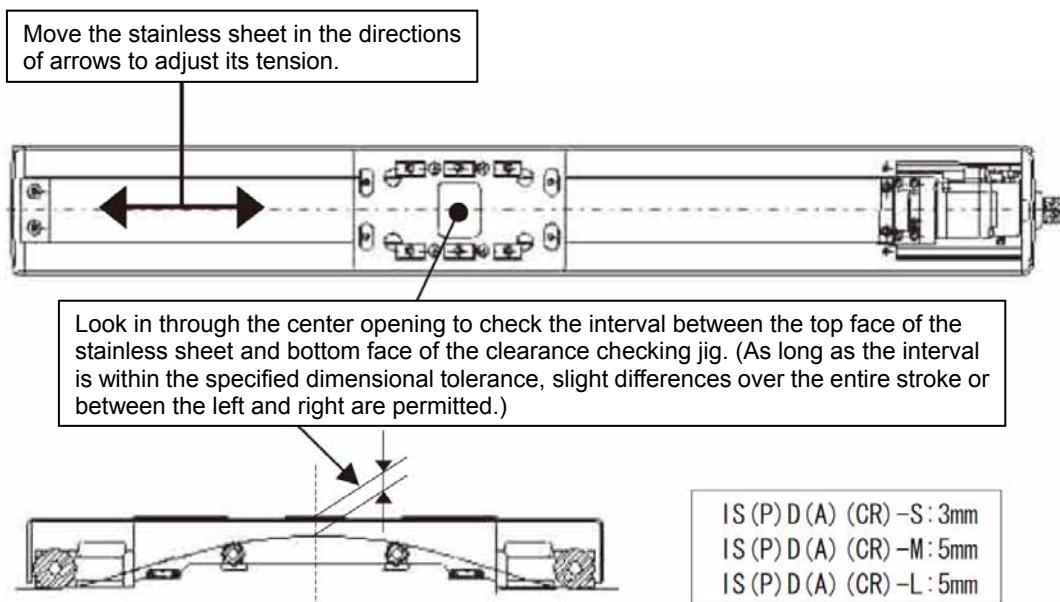


- (6) Install the clearance checking jig.



(7) Adjust the tension of the stainless sheet.

- [1] While looking in through the center opening in the clearance checking jig, move the loose side of the stainless sheet in the directions of arrows until the clearance between the top face of the stainless sheet and bottom face of the clearance checking jig corresponds to the specified interval.

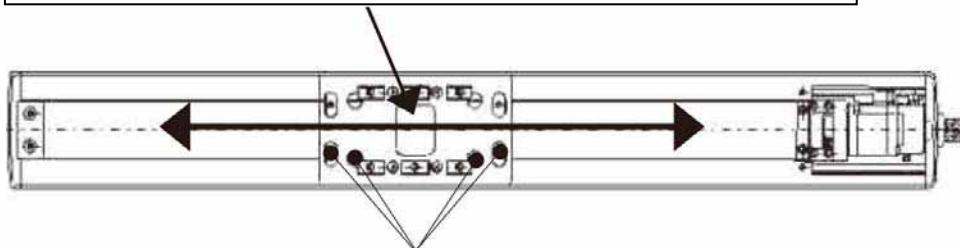


- [2] When the stainless sheet is properly positioned, slightly tighten the screws you have kept loose until the stainless sheet no longer moves.

[3] Move the slider and check the tension of the stainless sheet over the entire stroke.

Key point of check – 1

Check if the specified interval is ensured between the top face of the stainless sheet and top face of the slider over the entire stroke.



Key point of check – 2:

Confirm that the edges on the stainless sheet do not contact the slider at the positions of outer openings.

Perform this check over the entire stroke and confirm that contact does not occur at least for the first three back-and-forth movements.

The sheet may shift during back-and-forth movements, but if the amount of shift does not increase and the slider makes contact, adjust again by repeating the steps from [1].

Also note that the stainless sheet is not perfectly straight and is somewhat waving, which makes it impossible to achieve a uniform interval on the left and right. However, there shouldn't be any problem as long as the edges on the stainless sheet do not contact the slider over the entire stroke.



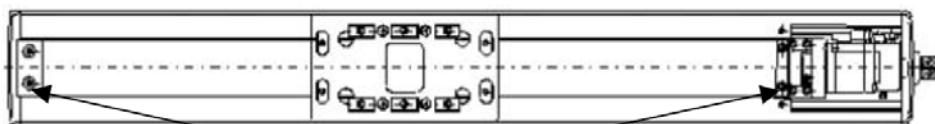
Keep the clearance here even with the one on the opposite side.

If the requirement in key point of check – 1 or 2 or both requirements cannot be met, loosen the screws again and readjust the position and tension of the stainless sheet by repeating the steps from [1].



Caution: If the requirement in key point of check – 2 cannot be achieved even after readjustment, try installing the stainless sheet front side back or upside down to see if the sheet can be adjusted properly. If the problem still persists, replace the stainless sheet.

[4] After confirming the specified interval and absence of contact with the slider, alternately tighten the two screws you have kept loose and then finally tighten all screws to an equal torque to affix the stainless sheet. If the two screws are tightened unevenly, the sheet may wave or lift.



Firmly tighten the screws on both sides to prevent the stainless sheet from moving.
Tightening torque: 204 N-cm (20.8 kgf-cm)

[5] Remove the clearance checking jig and install the original slider cover and motor cover.



Caution: Again, pay attention not to lose the coil springs.


12. Motor Replacement Procedures

(Note) Motors in the ISD, ISDCR and ISPD CR series cannot be replaced by customers. Should you require motor replacement on any of these actuators, please consult IAI.

12.1 Replacing the Motor of the Standard Type ISDA/ISPDA/ISDACR/ISPDACR Series

- * All photographs are those of the ISDACR.
“What you need for replacement”
- New motor (with a coupling on the motor shaft, as shown in the photograph on the right)



 Caution: Never remove this coupling.

- Allen wrench set
- Phillips screwdriver
- Scale

[Steps]

- (1) Removing the Motor Cover
Remove the two bolts that secure the motor cover.

<List of motor cover affixing bolts>

Type	Nominal diameter	Length (mm)	Quantity
IS(P)DA(CR)-S	M4	12	2
IS(P)DA(CR)-M	M5	20	2
IS(P)DA(CR)-L	M5	25	2

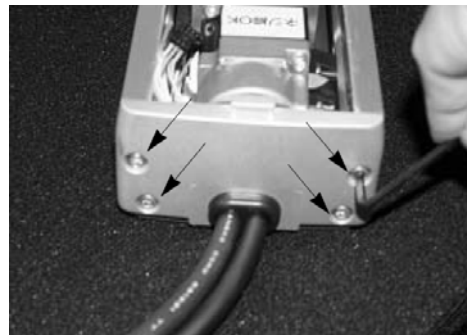
Hold the cover and pull it backward to remove.



- (2) Removing the rear cover
Remove the four bolts affixing the rear cover.

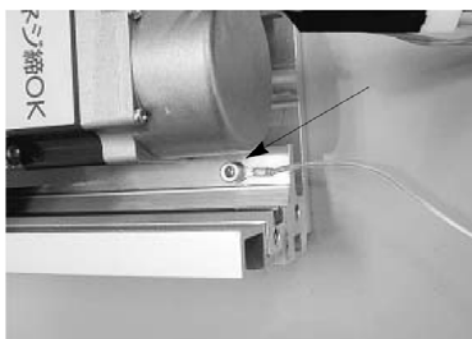
<List of rear cover affixing bolts>

Type	Nominal diameter	Length (mm)	Quantity
IS(P)DA(CR)-S	M4	12	4
IS(P)DA(CR)-M	M5	12	4
IS(P)DA(CR)-L	M5	15	4



- (3) Removing Wire/Cable Lines for the Motor Unit
- Remove the ground wire affixed on the encoder cover (or base in the case of ISDA (CR)-S models).

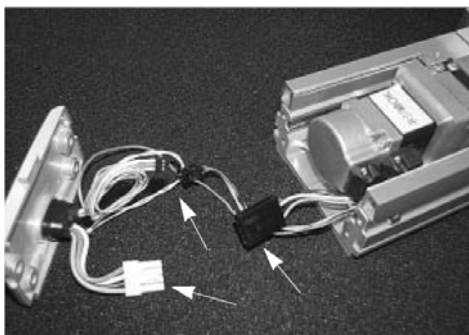
IS (P) DA (CR)-S



IS (P) DA (CR) M, L



- Disconnect the encoder signal line connector and the motor power line connector.
- * If a brake is provided, the brake lead connector should also be disconnected.



- (4) Removing the coupling (on the ball screw side)
Loosen the bolts affixing the coupling.

<List of coupling affixing bolts>

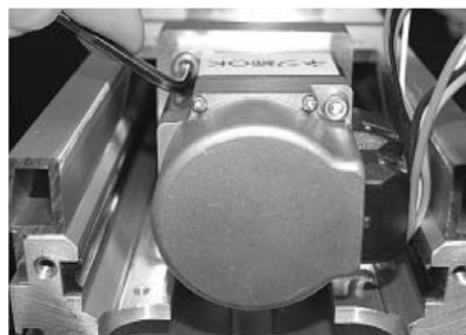
Type	Nominal diameter	Length (mm)	Quantity
IS(P)DA(CR)-S	M3	10	1 x 1
IS(P)DA(CR)-M	M3	10	1 x 1
IS(P)DA(CR)-L	M4	12	1 x 1



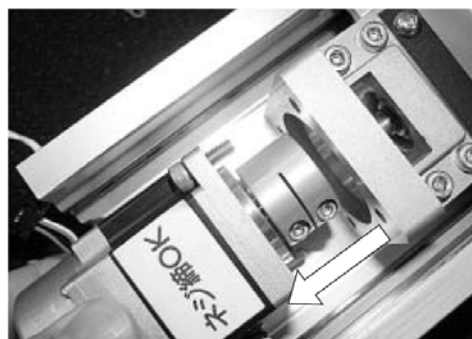
- (5) Removing the motor
Remove the bolts affixing the motor.

<List of motor affixing bolts>

Type	Nominal diameter	Length (mm)	Quantity
IS(P)DA(CR)-S	M4	10	2
IS(P)DA(CR)-M	M5	12	4
IS(P)DA(CR)-L	M5	12	4



- (6) Pulling out the motor
Pull the motor backward toward you to remove.





(7) Wiring the new motor unit

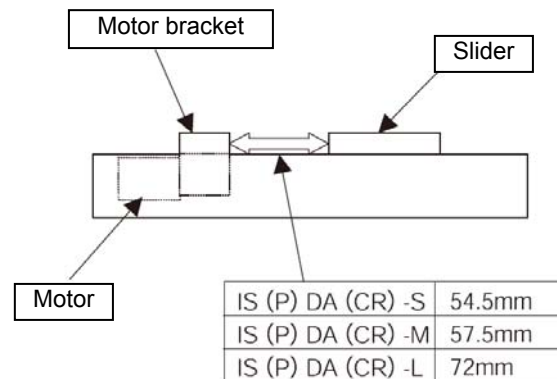
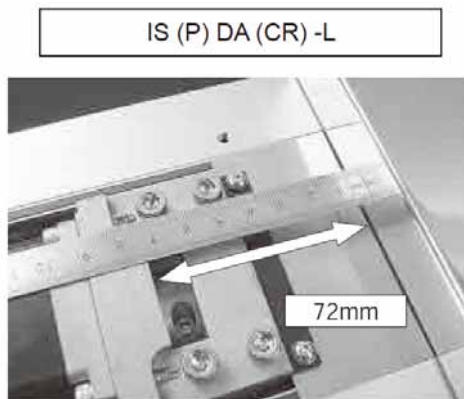
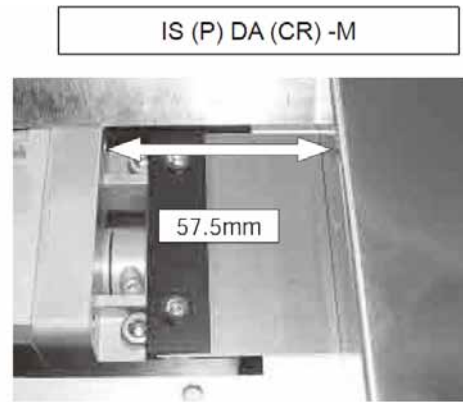
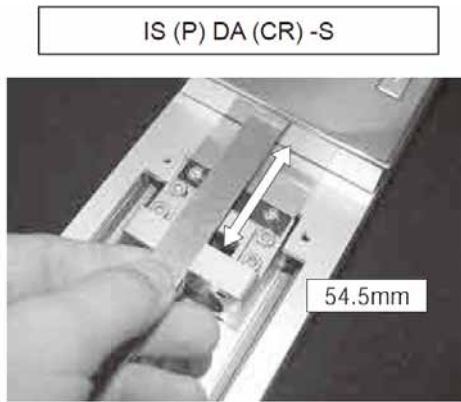
- Connect to the motor unit the motor cable and encoder cable attached to the motor cover you have removed, and also connect them to the controller using relay cables (for motor cable and encoder cable).
- * If the actuator has a brake, also connect the brake wire connector.





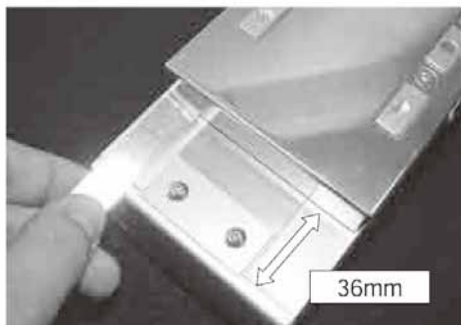
- (8) Positioning the slider
Adjust the affixed position of the slider so that the motor can be installed.
Use a scale, etc., to adjust the distance shown in the photograph below.

- Standard home specification

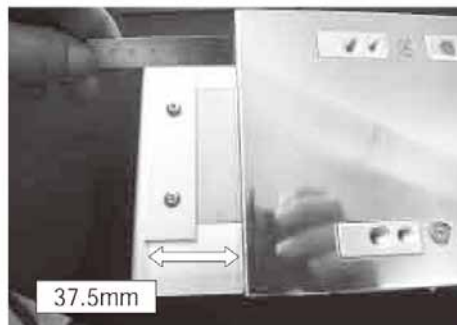


- Reversed-home specification

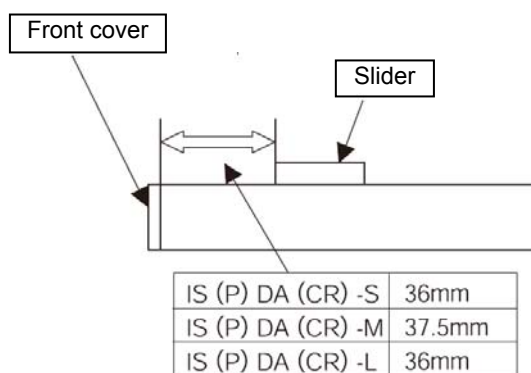
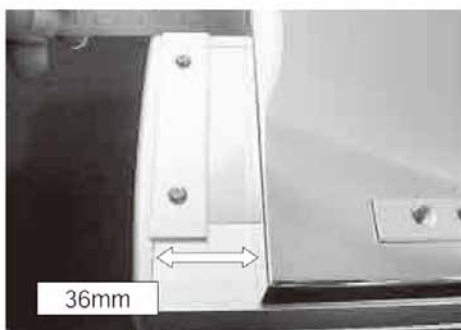
IS (P) DA (CR) -S



IS (P) DA (CR) -M



IS (P) DA (CR) -L



(9) Positioning the motor

- Turn on the controller power and use the PC software or teaching pendant to jog the actuator until the home position marked on the motor aligns with the slit in the coupling.
- Jog the actuator at the minimum speed (1 mm/s).



- Keep the motor servo on.

(10) Installing the new motor unit

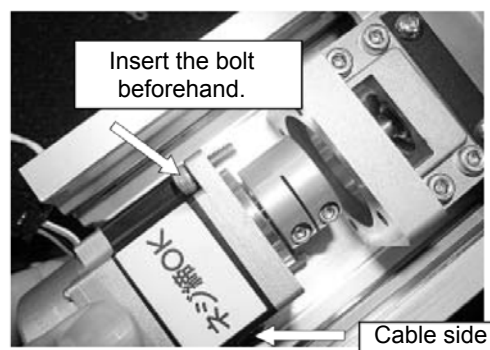
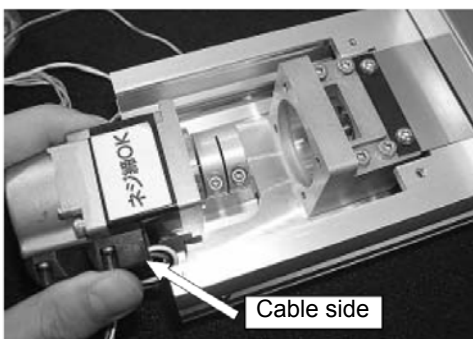
- With the servo turned on, insert the coupling of the motor unit into the opening at the end of the ball screw shaft to affix the motor housing and motor unit.



Caution: When installing the motor, pay attention to its orientation.

<List of motor unit affixing bolts and tightening torques> N-cm {kgm-cm}

Type	Nominal diameter	Length (mm)	Torque	Quantity
IS(P)DA-S	M4	10	176 {18.0}	2
IS(P)DA-M	M5	12	342 {34.9}	4
IS(P)DA-L	M5	12	342 {34.9}	4
IS(P)DACR-S	M4	10	207 {21.2}	2
IS(P)DACR-M	M5	12	411 {41.9}	4
IS(P)DACR-L	M5	12	411 {41.9}	4



- * If the slider already positioned in (8) has moved when inserting the motor unit, adjust the position again.



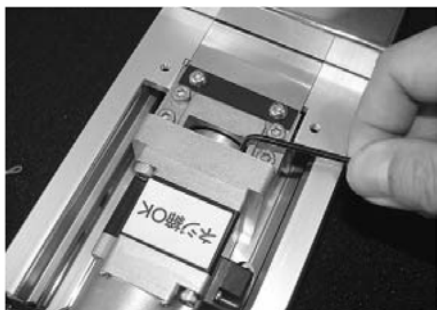
(11) Tightening the coupling

- Loosely tighten the coupling bolt using an Allen wrench, and then turn off the servo and tighten the bolt to the specified torque.

<List of tightening torques>

N-cm {kgm-cm}

Type	Nominal diameter	Length (mm)	Torque	Quantity
IS(P)DA(CR)-S	M3	10	150 {15.4}	1 x 1
IS(P)DA(CR)-M	M3	10	150 {15.4}	1 x 1
IS(P)DA(CR)-L	M4	12	250 {25.6}	1 x 1



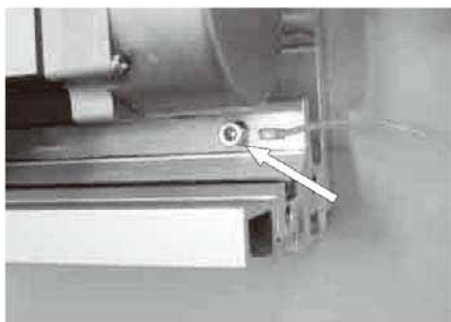
(12) Installing the rear cover

- Affix the ground wire using the cap screw.

<List of ground wires, affixing bolts and tightening torques> N-cm {kgm-cm}

Type	Nominal diameter	Length (mm)	Torque	Quantity
IS(P)DA-S	M3	5	83.0 {8.47}	1
IS(P)DA-M	M2.6	8	34.5 {3.52}	1
IS(P)DA-L	M2.6	8	34.5 {3.52}	1
IS(P)DACR-S	M3	5	88.7 {9.05}	1

ISDA (CR)-S



ISDA (CR)-M, L



- Store the wires below the motor so that the M connector and PG connector are no longer seen.



- Affix the ground wire, and then affix the rear cover using the four bolts.

<List of rear cover affixing bolts and tightening torques> N-cm {kgm-cm}

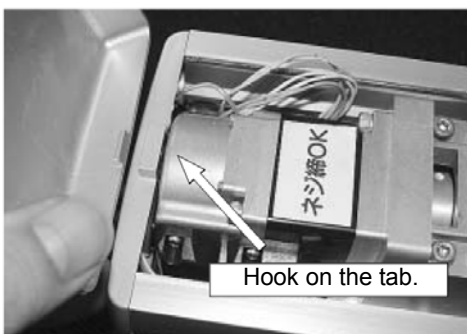
Type	Nominal diameter	Length (mm)	Torque	Quantity
ISDA-S	M4	12	176 {18.0}	4
ISDA-M	M5	12	342 {34.9}	4
ISDA-L	M6	15	536 {54.7}	4
ISDACR-S	M4	12	207 {21.1}	4
ISDACR-M	M5	12	411 {41.9}	4
ISDACR-L	M6	15	644 {65.7}	4



- (13) Installing the motor cover
Affix the motor cover using two bolts.

<List of motor cover affixing bolts and tightening torques> N-cm {kgm-cm}

Type	Nominal diameter	Length (mm)	Torque	Quantity
ISDA-S	M4	12	114 {11.7}	2
ISDA-M	M5	20	222 {22.7}	2
ISDA-L	M5	25	222 {22.7}	2
ISDACR-S	M4	12	137 {14.0}	2
ISDACR-M	M5	20	267 {27.2}	2
ISDACR-L	M5	25	267 {27.2}	2



- (14) Correcting for position deviation

- [1] Connect the motor cable and encoder cable and turn on the controller power.
Use the PC software or teaching pendant to perform homing and check the home position.
Repeat homing several times to confirm that the actuator returns to the same position.
 - [2] Check the amount of position deviation.
The position may have changed slightly from where it was before the motor was replaced.
Accordingly, select a desired position number that allows you to check the amount of deviation before and after the replacement, and then perform positioning to that position and measure the amount of deviation.
 - [3] In the case of a X-SEL or SSEL controller, reflect the amount of deviation in the parameter for home preset. In the case of a SCON controller, reflect it in the parameter for home return offset.
[For the methods to set these parameters, refer to 12.3, "How to Set the Home Preset and Home Return Offset."]
- * If the two positions differ significantly (one ball screw revolution or more = lead or more) or if the actuator does not return to the same position when homing is repeated, install the motor again by following the procedure described in this manual.
The distance from the reference surface may have been set wrongly when the slider position was aligned.

- (15) Checking the operation after replacing the motor

After the motor has been replaced, operate the actuator continuously to confirm absence of vibration or abnormal noises.

12.2 Replacing the Motor of the ISDACR/ISPDACR Series

“What you need for replacement”

- New motor (with a coupling on the motor shaft, as shown in the photograph on the right)



Caution: Never remove this coupling.



Motor models: 600-watt incremental specification
TS4613N1023E200
600-watt absolute specification
TS4613N2032E200
750-watt incremental specification
TS4614N1023E200
750-watt absolute specification
TS4614N2032E200

- Allen wrench set • Scale • Oil-based marker pen • Waste cloths • Industrial alcohol

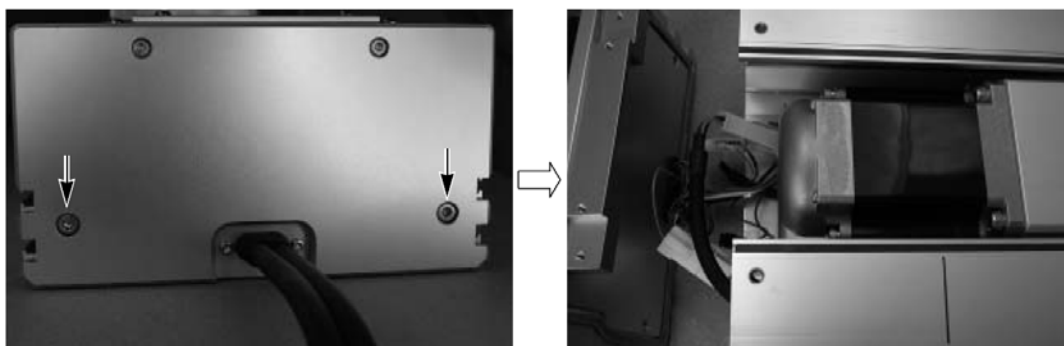
[Steps]

- (1) Use a thin oil-based marker pen to draw countermarks on the stainless sheet and side cover near the motor end. (These marks will be used as a reference when putting back the removed sheet.)




- (2) Use an Allen wrench of 2.5 mm across flats to remove the hexagonal socket head button bolts that are affixing the stainless sheet retainer plate and side cover.


- (3) Remove the rear cover.
Use an Allen wrench of 4 mm across flats to remove the two hexagonal socket head bolts.

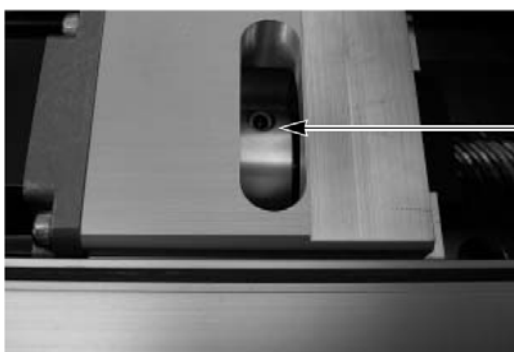


The stainless sheet is turned up

- (4) Turn up the stainless sheet and position the slider so that the coupling affixing bolt comes directly above it. Use a scale to adjust the distance as shown in the photograph below.

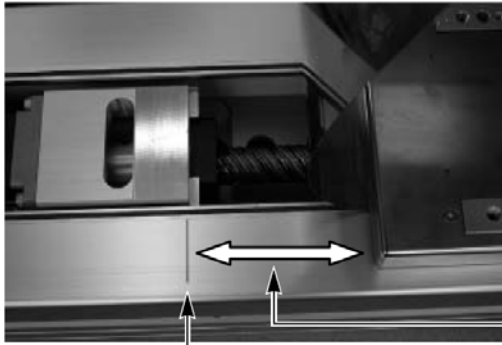
 **Caution:** When turning up the stainless sheet, allow the slider end face to bend gradually to prevent folding lines.
It is also recommended that you wear gloves so as not to cut your hands.

 **Warning:** If the axis is installed vertically, turn on the controller power and forcibly release the brake to move the slider. Note, however, that the slider may drop suddenly as the brake is released, to create a dangerous situation.
To prevent pinching your hands or damaging the load, be sure to provide a pedestal to support the load and take an appropriate measure to prevent the slider from dropping suddenly.

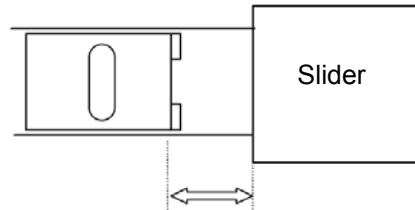


Position the slider so that the coupling affixing bolt comes directly above it.

- Standard home specification (home on the motor side)



Draw a countermark along the same line on the end face of the motor bracket.



Adjust the distance between the inner end face of the motor bracket and end face of the slider so that the coupling affixing bolt comes directly above the slider.

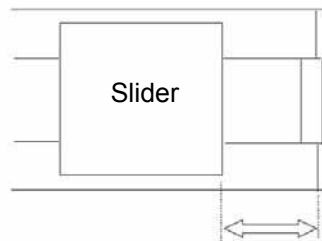
Type		Distance between the inner end face of the motor bracket and end face of the slider
Without intermediate support	Lead 10 mm	95 mm
	Lead 20 mm	105 mm
	Lead 40 mm	105 mm
	Lead 25 mm	85 mm
	Lead 50 mm	85 mm
With intermediate support	Lead 20 mm	96 mm
	Lead 40 mm	116 mm
	Lead 25 mm	101 mm
	Lead 50 mm	76 mm

- Reversed-home specification (home on the counter-motor side)



57 mm (or 140 mm if there is an intermediate support)

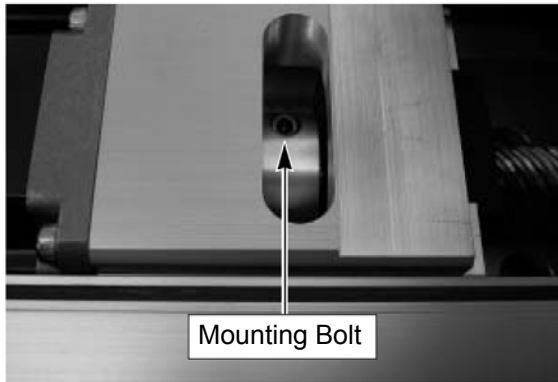
Adjust the distance between the end face of the slider and inner end face of the front cover so that the coupling affixing bolt comes directly above the slider.



Distance between the end face of the slider and end face on the inner side of the front cover
Without intermediate support --- 57 mm
With intermediate support --- 140 mm



- (5) Loosen the coupling (ball screw side).
Use an Allen wrench of 4 mm across flats to loosen the hexagonal socket head bolt affixing the coupling.



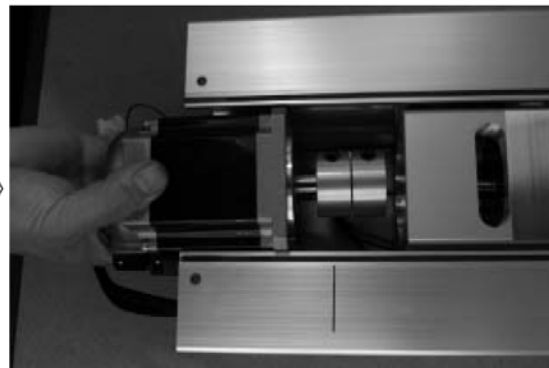
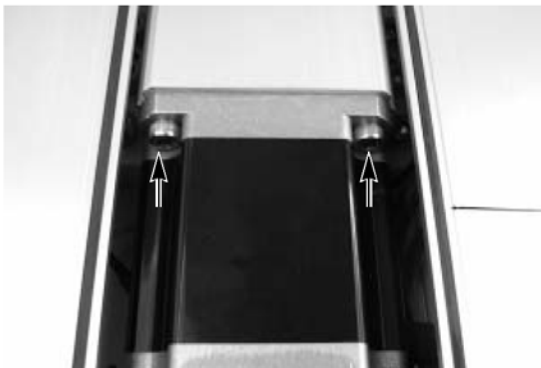
- (6) Cut off the power and then unplug all extension cable connectors.



- (7) Remove the motor.

- Use an Allen wrench of 5 mm across flats to remove the four hexagonal socket head bolts affixing the motor.

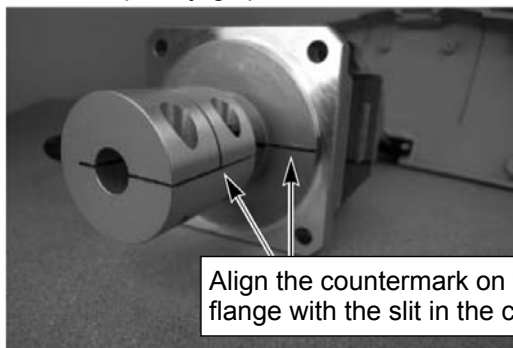
- Hold the motor with both hands and pull it out slowly.



- (8) Plug the motor connector and encoder connector on the extension cables into the new motor.



- (9) Adjust the motor shaft position.
Turn on the controller power and turn the motor in the jog mode using a PC or teaching pendant until the home countermark on the motor flange aligns with the position of the slit in the coupling.
* Keep the jog speed at the lowest level (1 mm/s).



(10) Install the new motor.

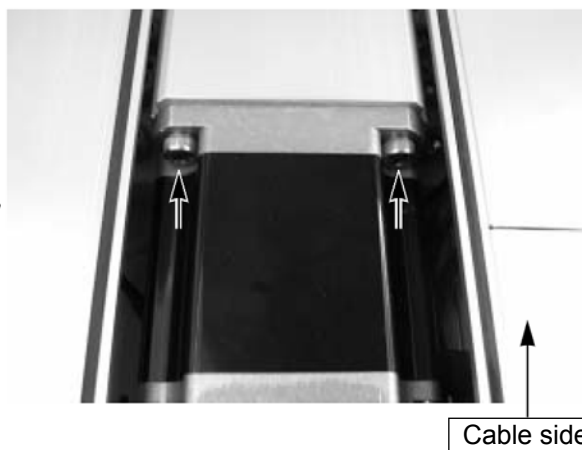
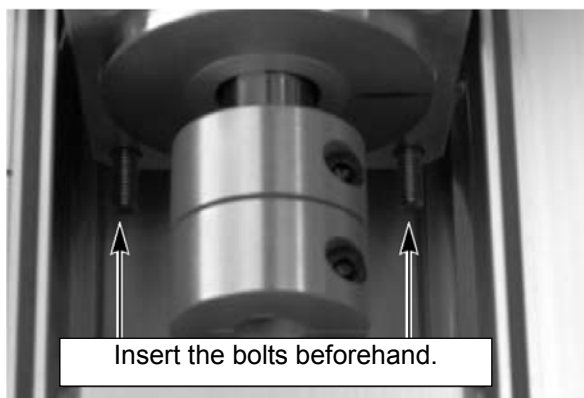
With the servo turned on, press the motor coupling into the end of the ball screw shaft and affix the motor to the motor bracket.



Caution: Be careful not to pinch the LS lead wires and brake lead wires.

- Insert the bottom affixing bolts beforehand.

- Use an Allen wrench of 5 mm across flats to tighten the hexagonal socket head bolts (M6 x 22 x 4 pcs).



Tightening torque: 536 N-cm (54.7 kgf-cm)

- * If the slider positioned in (4) has moved before the motor is pressed into position, readjust the slider position.

(11) Affix the coupling.

Use an Allen wrench of 4 mm across flats to loosely tighten the hexagonal socket head bolts (M5 x 15) to affix the coupling, and then turn off the servo and tighten the bolts to the specified torque.



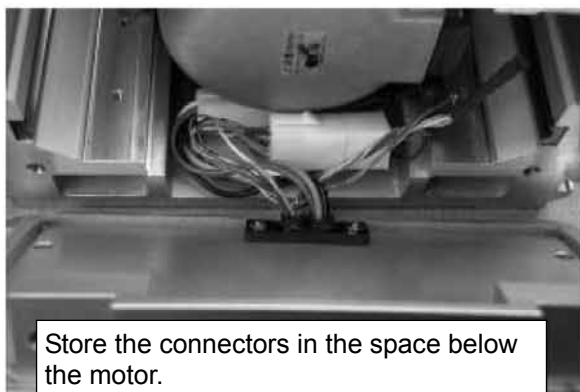
Tightening torque: 700 N-cm (71.4 kgf-cm)

(12) Cut off the controller power.

(13) Plug in the LS connectors on the extension cables, and also the brake connector if there is a brake.

(14) Install the rear cover.

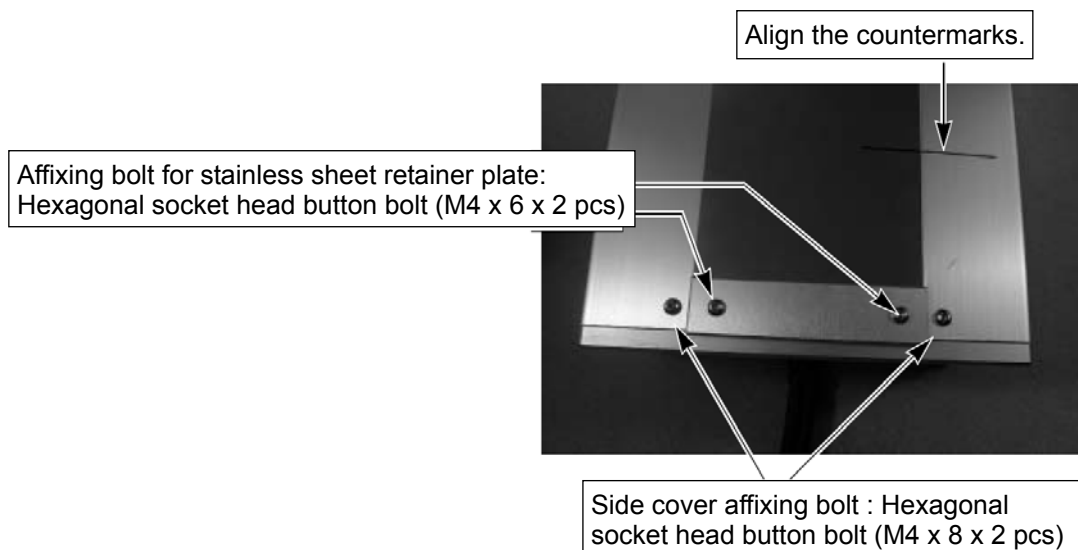
Store the connectors in the space below the motor, and use an Allen wrench of 4 mm across flats to tighten the hexagonal socket head bolts (M5 x 15 x 2 pcs) by paying attention not to pinch the cables.



Tightening torque 342 N-cm (34.9 kgf-cm)

(15) Tighten the hexagonal socket head button bolts affixing the side cover and stainless sheet retainer plate using an Allen wrench of 2.5 mm across flats.

When doing this, adjust the countermarks of the sheet and side cover. Also remember to insert a urethane sheet between the retainer plate and stainless sheet.



Button bolt tightening torque: 191 N-cm (19.5 kgf-cm)

(16) Wipe off the countermarks using a waste cloth moistened with alcohol.



(17) Correcting the position deviation

[1] Turn on the controller power.

Next, use a PC software or teaching pendant to perform home return and confirm the home position. Repeat this several times to confirm that the actuator returns to the same home position every time.

[2] Checking the position deviation

The actuator may have moved slightly from the position assumed before replacing the motor. Accordingly, select any position number that lets you check the deviation between the positions before and after replacing the motor, and perform positioning to this position to measure the deviation.

[3] In the case of a X-SEL or SSEL controller, reflect the amount of deviation in the parameter for home preset. In the case of a SCON controller, reflect it in the parameter for home return offset. [For the methods to set these parameters, refer to 12.3, "How to Set the Home Preset and Home Return Offset."]

- * If the position is deviated significantly (by at least one rotation of the ball screw = at least the lead length), or if the actuator does not return to the same home position in each of the repeated home return operations, reinstall the motor according to the procedure explained herein.

The slider may have been positioned at a wrong distance from the reference surface.

(18) Checking the operation after replacing the motor


After the motor has been replaced, operate the actuator continuously to confirm absence of vibration or abnormal noises.

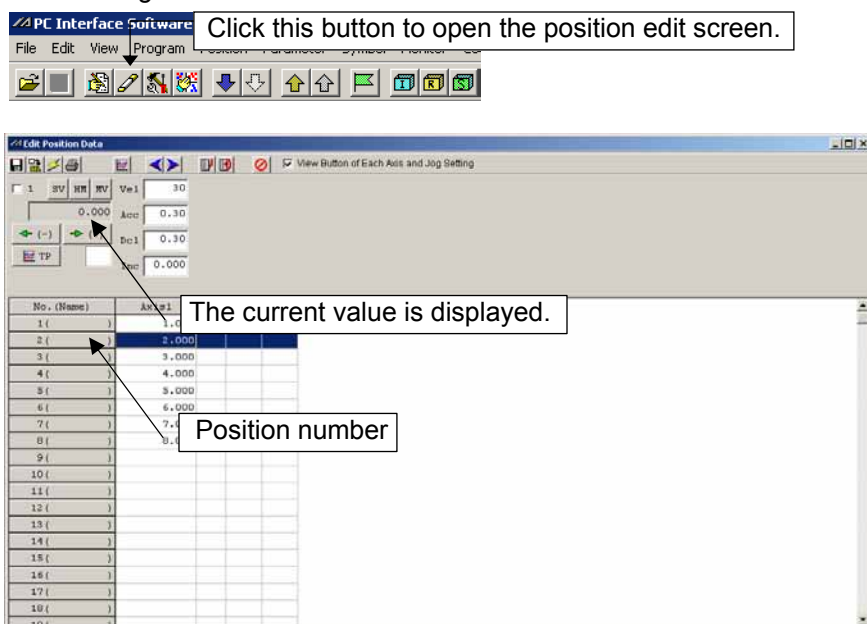
12.3 How to Set the Home Preset and Home Return Offset

Correct the position deviation by changing the parameter for home preset in the case of a XSEL or SSEL controller, or by changing the parameter for home return offset in the case of a SCON parameter. How to set these parameters is explained below.

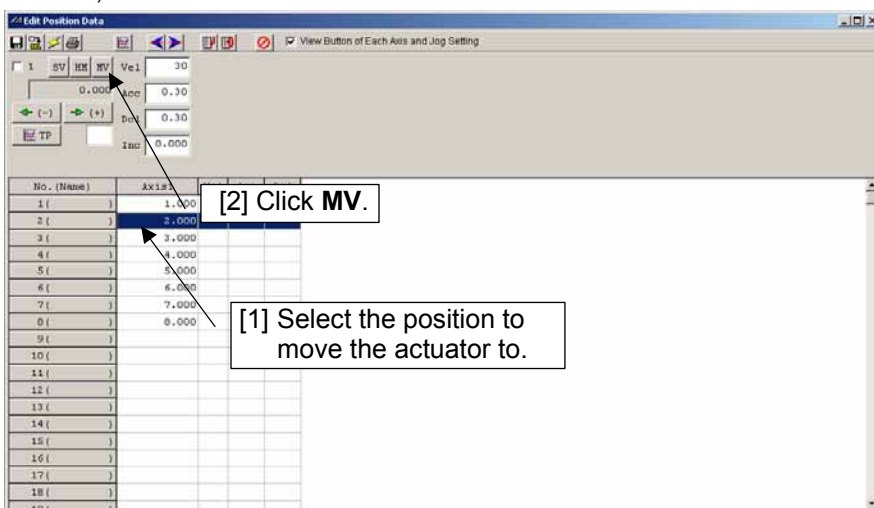
12.3.1 XSEL and SSEL Controllers

- (1) Open the position edit screen.

On the PC software screen, click , select a desired position number, and then click **OK** to display the following screen.



- (2) Compare the current value and the value achieved by positioning the actuator to the selected position number, and check the amount of deviation.

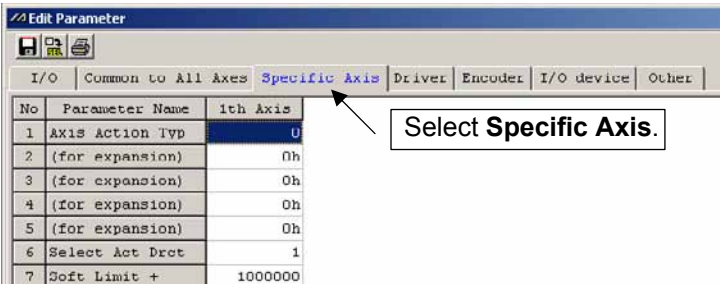


- (3) Open the parameter screen.

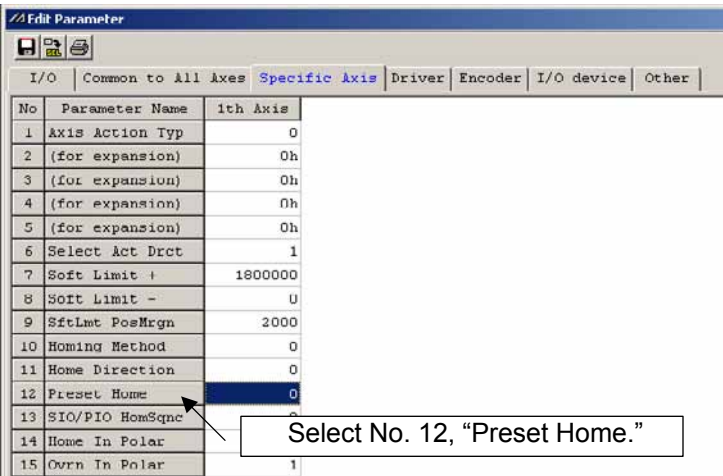


Click this button to open the parameter edit screen.

- (4) Select the axis-specific parameter tab.

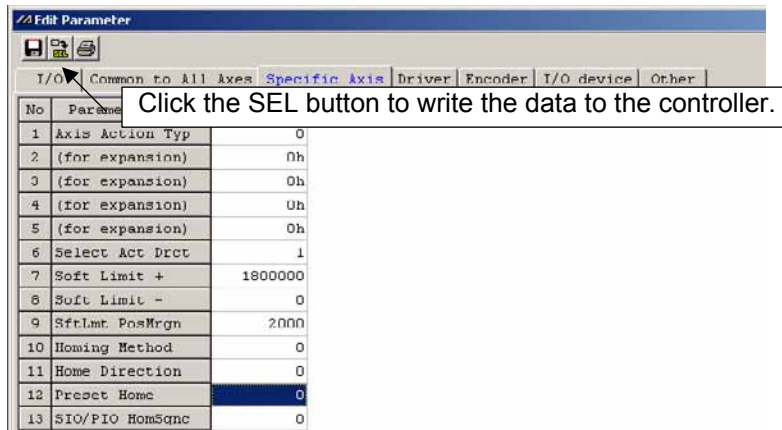


- (5) In the axis-specific parameter tab, select No. 12, "Preset Home."

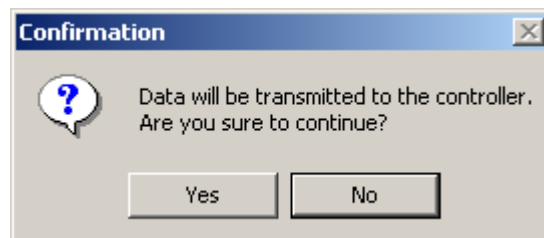


- (6) Change the setting of axis-specific parameter No. 12 (Preset Home).
Add or subtract the value measured in (2) to/from the value currently input.
The setting unit is 0.001 mm.
Example: When subtracting 1 mm
Current preset value = Current setting – 1000

(7) Write the new data.



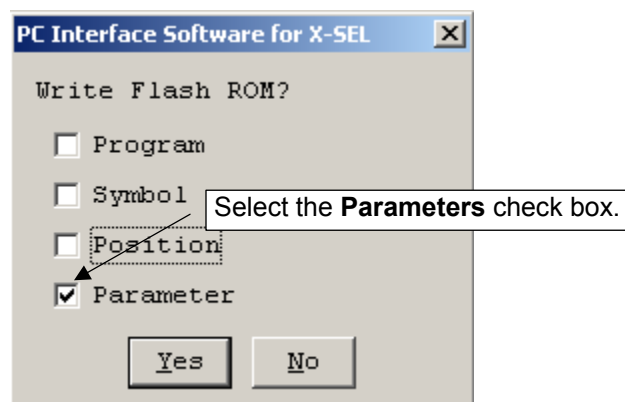
(8) Transfer the data to the controller.



(9) Click **OK**.

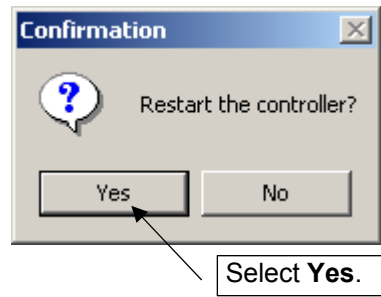


(10) Write the data to the flash ROM.




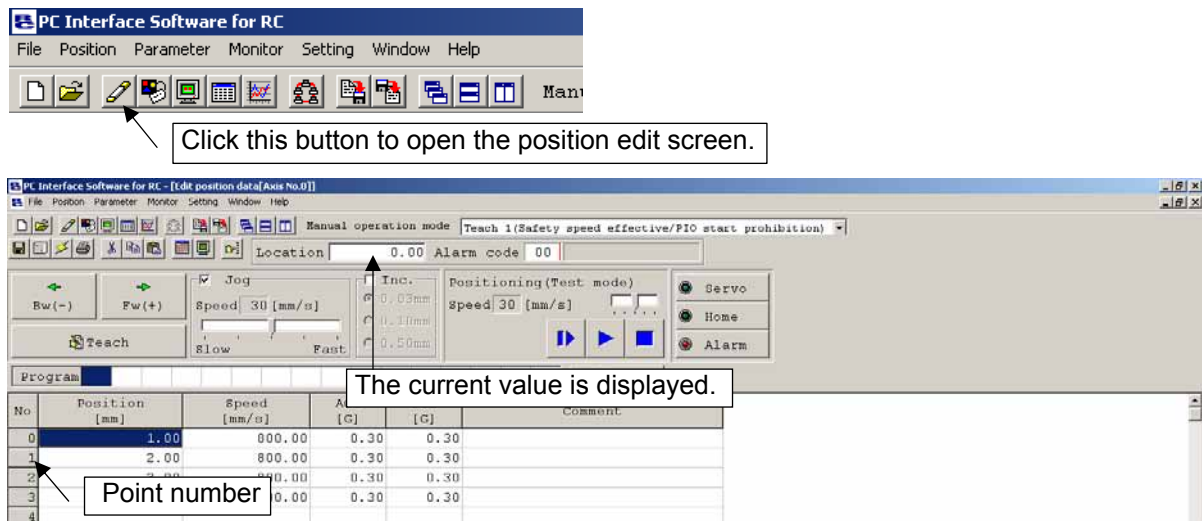


(11) Restart the controller.

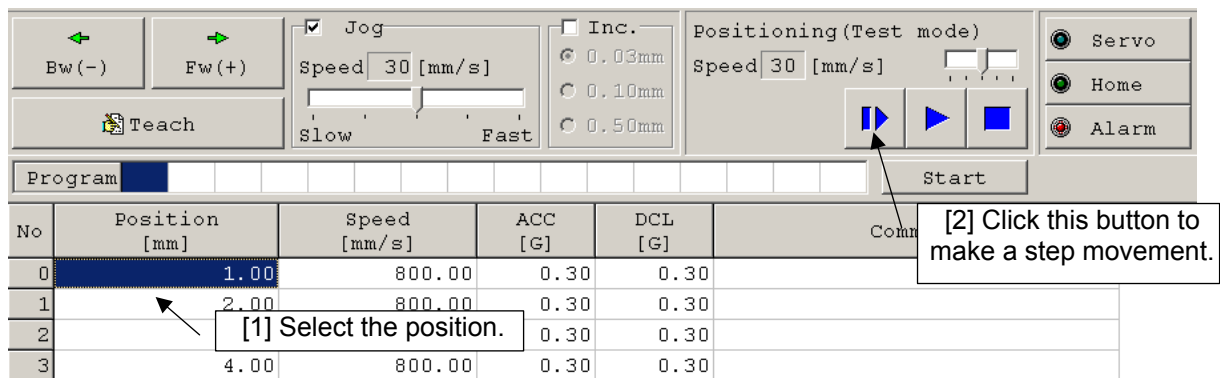


12.3.2 ECON and SCON Controllers

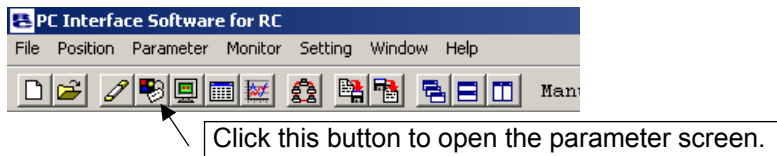
- (1) Open the position edit screen.
On the PC software screen, click , select a desired position number, and then click **OK** to display the following screen.



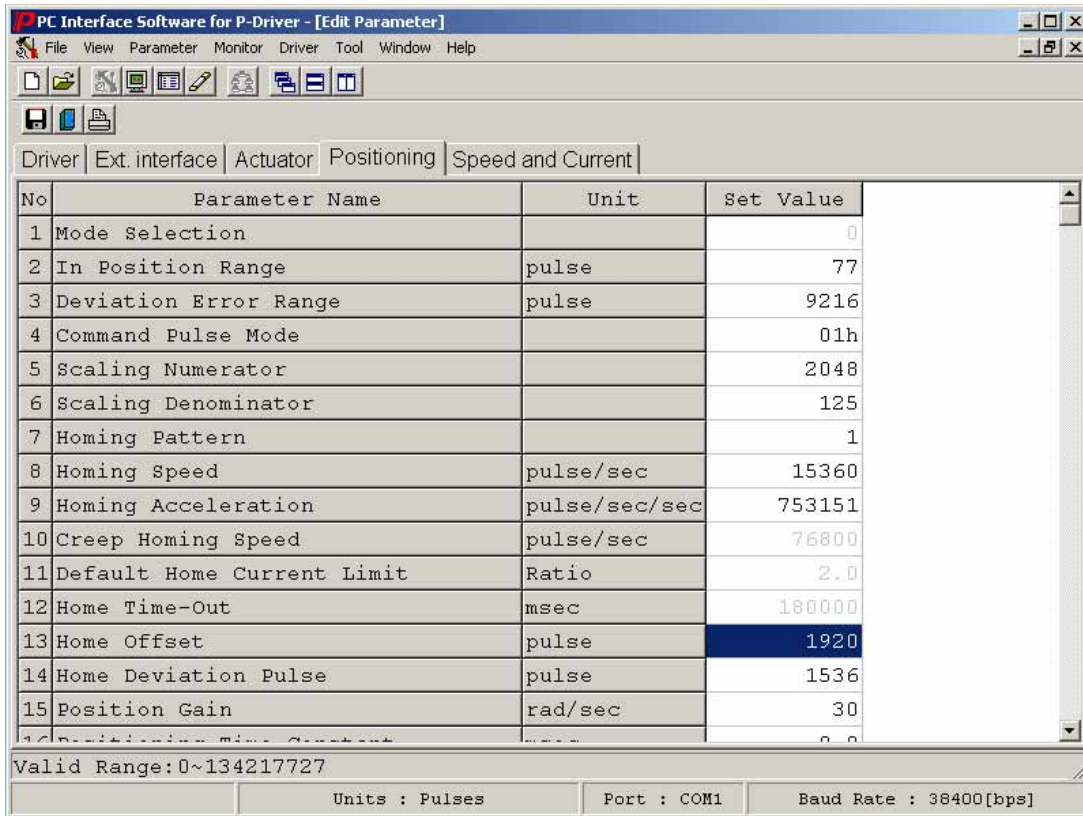
- (2) Compare the current value and the value achieved by positioning the actuator to the selected position number.



- (3) Open the parameter screen.

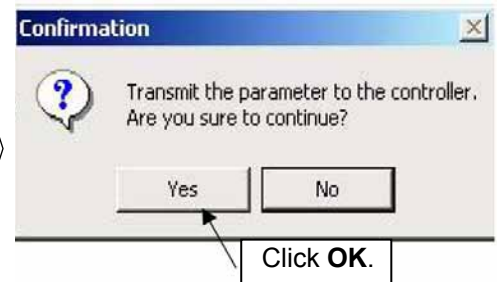
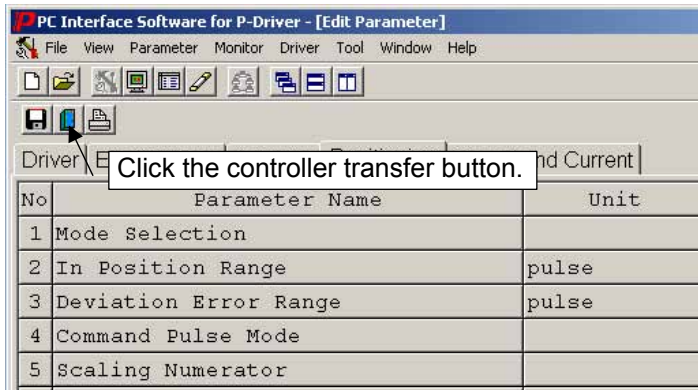


- (4) The user parameter screen appears.




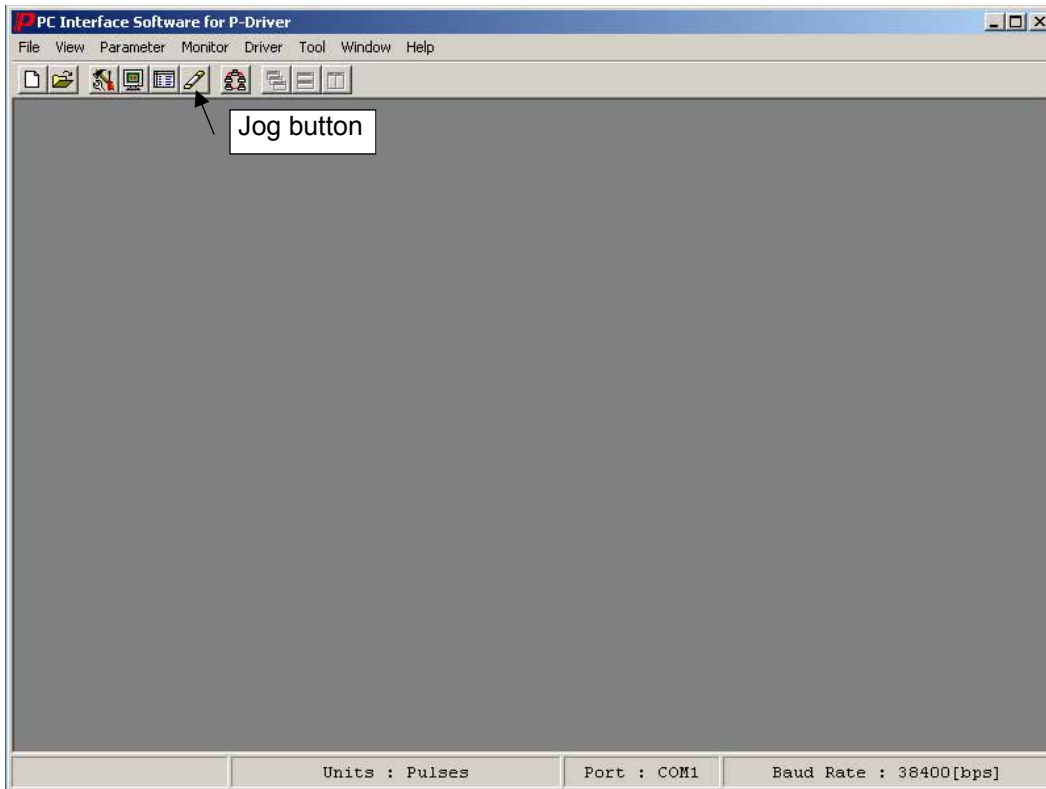
- (5) Change user parameter No. 13 (Home Return Offset).
 * The setting unit is mm.
 Add or subtract the value measured in (2) to/from the value currently input.
 Example: When subtracting 0.5 mm
 Home offset = Current setting – 0.5 mm

- (6) Write the new data.
Click the controller transfer button, and then click **OK**.
* After the data has been written, turn off the controller power.

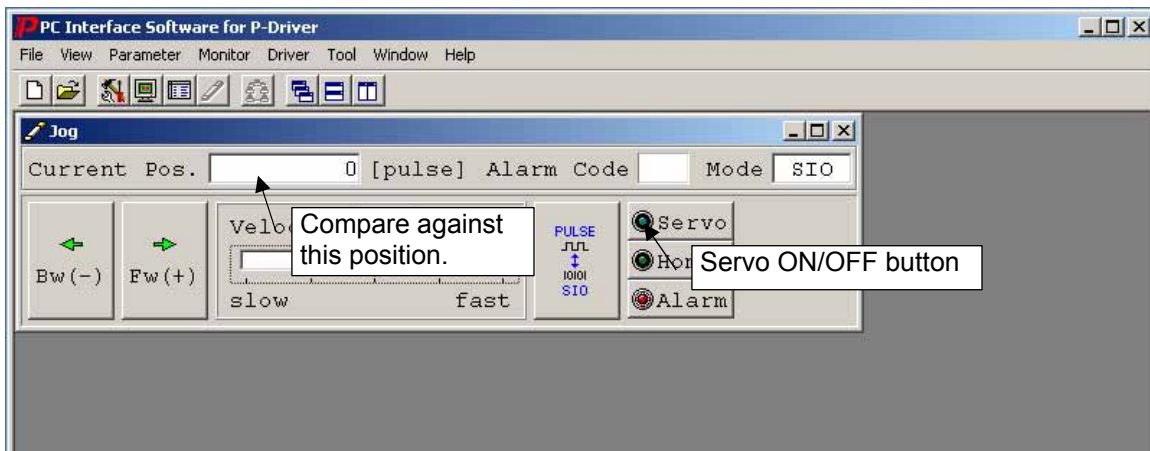


12.3.3 P-Driver Controllers

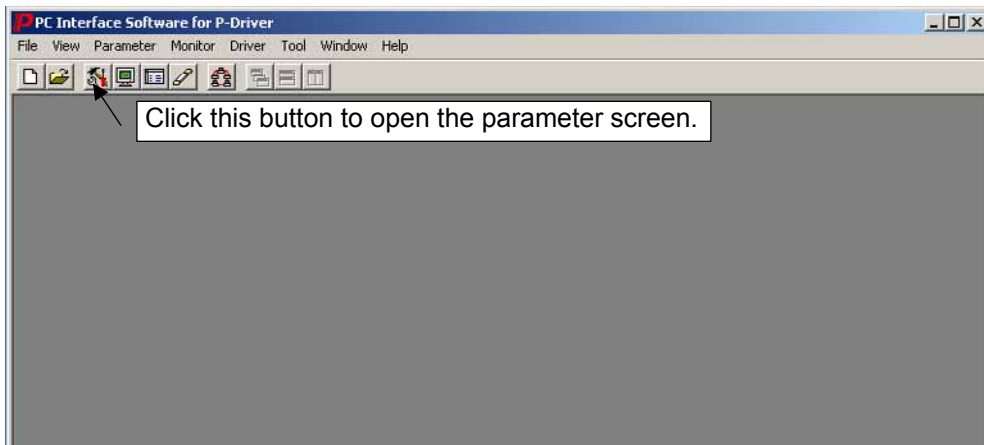
- (1) Open the jog screen.
Click the jog button  on the PC software screen.
Next, select the pulse mode.



- (2) Position the actuator to a desired position and compare the command pulse position and the position actually achieved, and write down the difference. Adjust the position by jogging the actuator or by turning off the servo and moving the actuator manually.

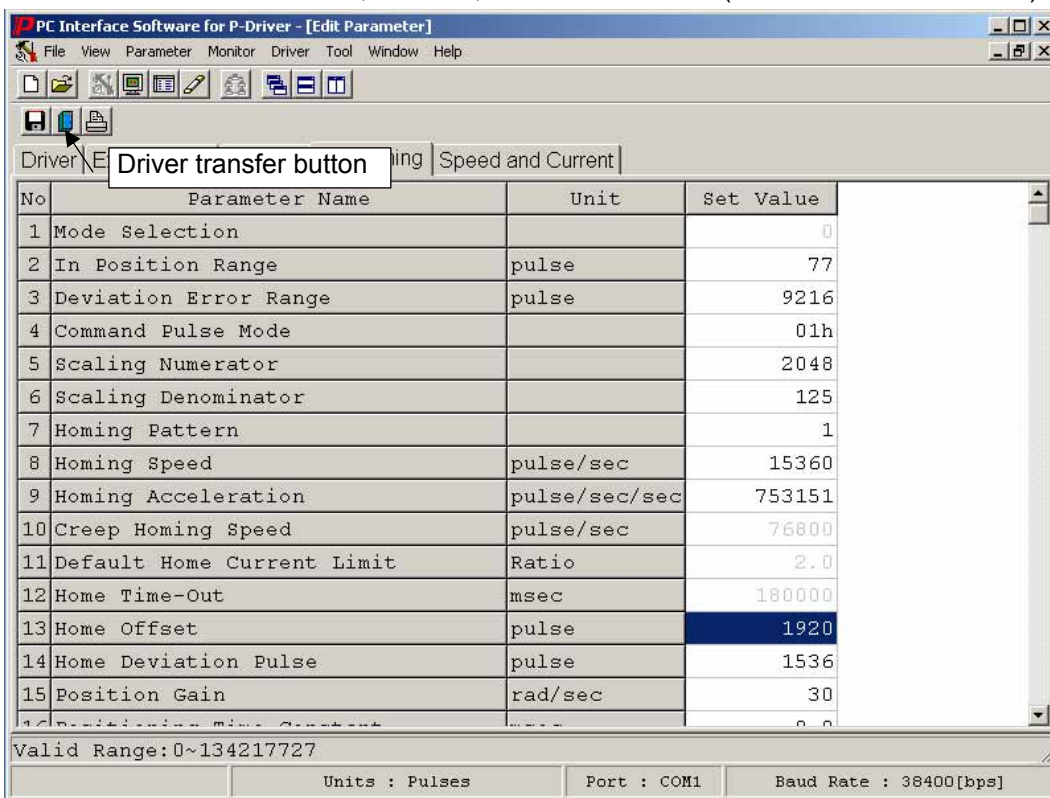


- (3) Open the parameter edit screen.
Click this button to open the parameter screen.



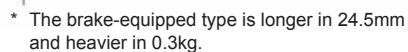
- (4) Change the setting of No. 13, "Home Offset."
* The setting unit is pulse.
Add or subtract the value measured in (2) to/from the value currently input.
Example: When subtracting 150 pulses
Home offset = Current setting – 150

- (5) Write the new data.
Click the driver transfer button, click **OK**, and then click **Yes**. (The controller will restart.)



 Caution: For the external dimensions of ISD/ISDCR/ISPDCR actuators, refer to the catalogs of old products. You can download the catalogs of old products from IAI's website.

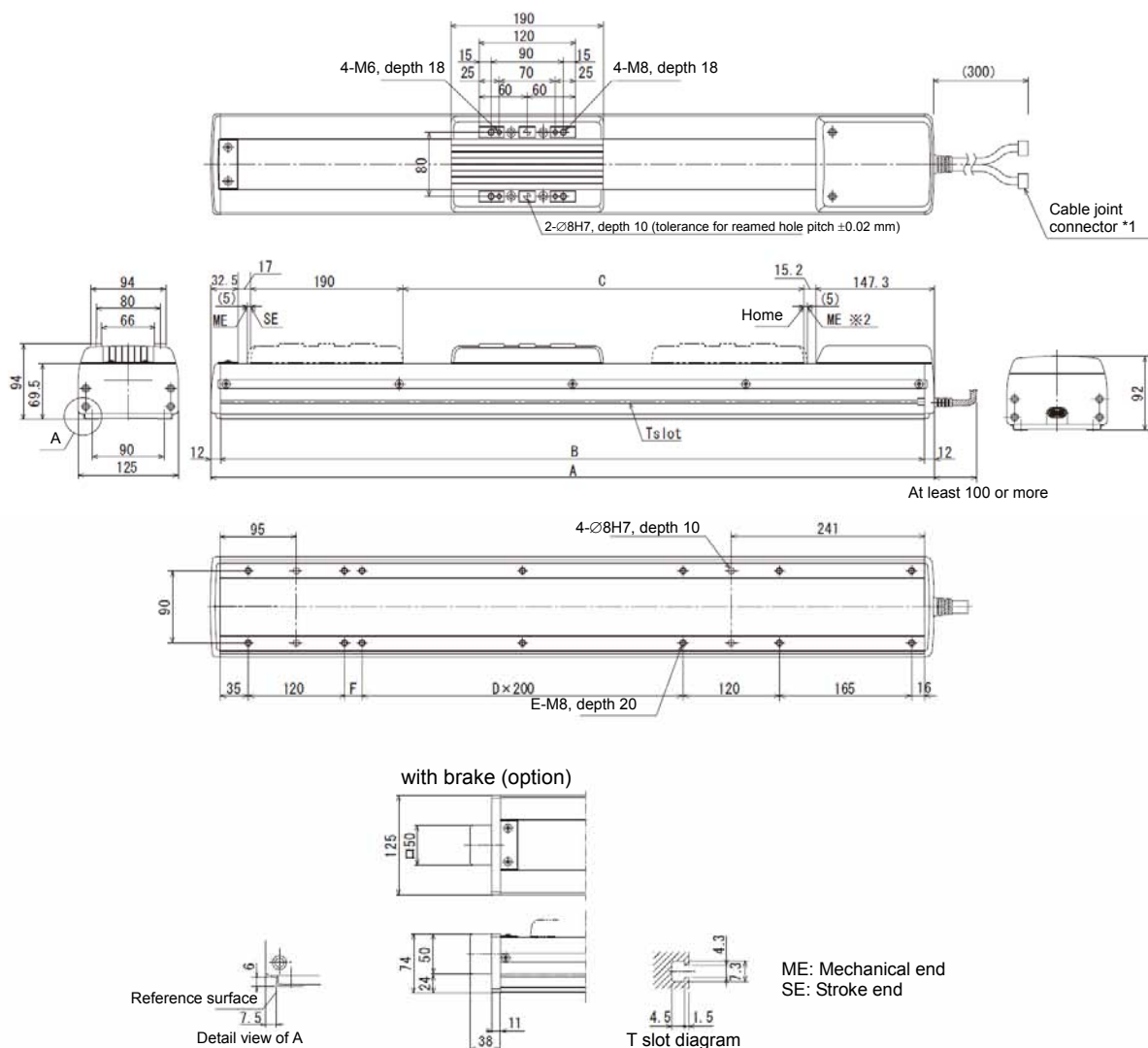
13.1.1 ISDA-S, ISPDA-S



■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	150	200	250	300	350	400	450	500	550	600
A	434	484	534	584	634	684	734	784	834	884	934
B	414	464	514	564	614	664	714	764	814	864	914
C	100	150	200	250	300	350	400	450	500	550	600
D	–	–	–	–	1	1	1	1	2	2	2
E	45	95	145	195	45	95	145	195	45	95	145
F	10	10	10	10	12	12	12	12	14	14	14
Weight (kg)	3.8	4.1	4.4	4.7	5.1	5.4	5.7	6.0	6.3	6.6	7.0

13.1.2 ISDA-M-100, ISPDA-M-100



■ Dimension, Mass and Maximum Speed by Stroke

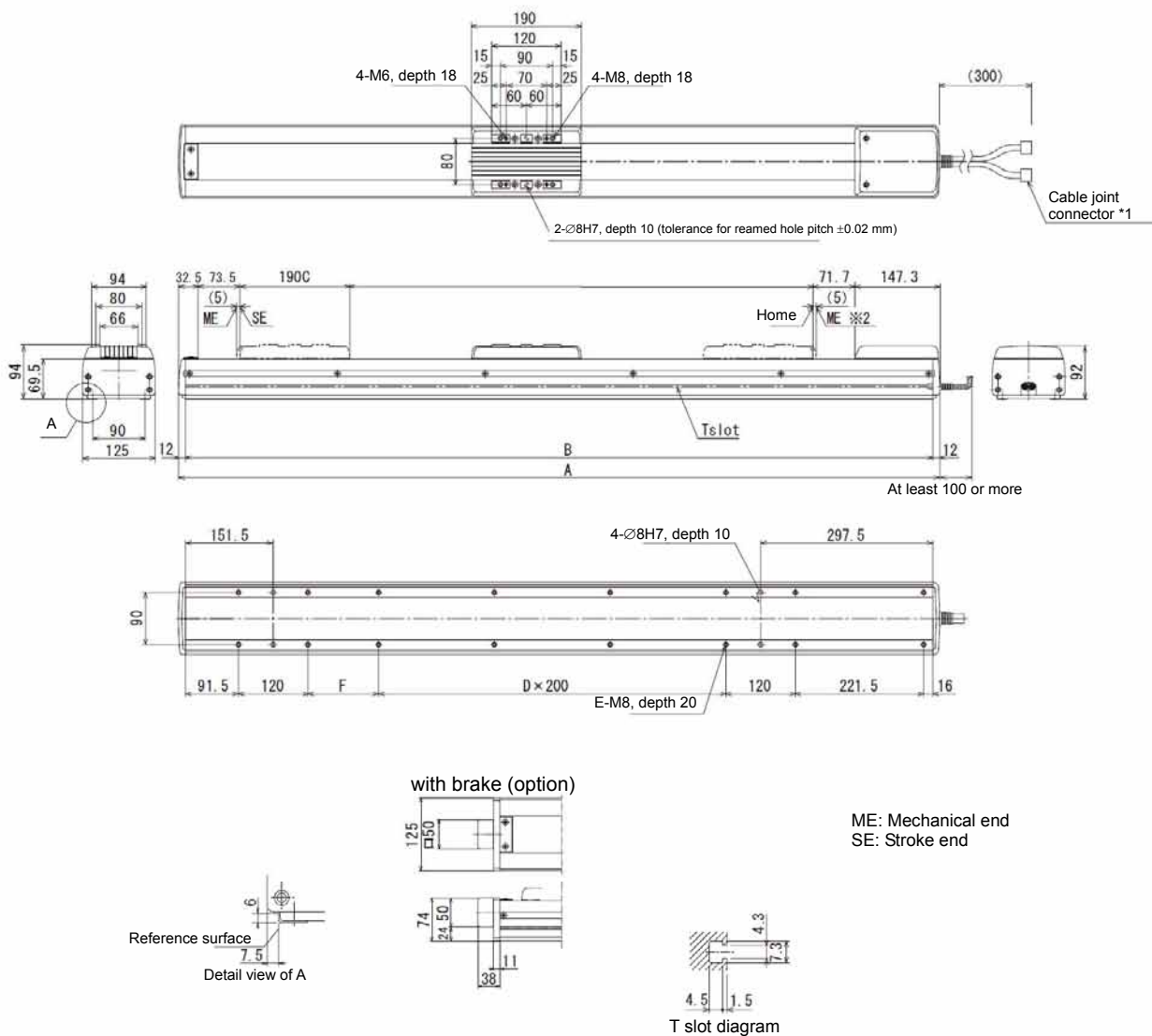
Stroke	100	150	200	250	300	350	400	450	500	550	600
A	502	552	602	652	702	752	802	852	902	952	1002
B	478	528	578	628	678	728	778	828	878	928	978
C	100	150	200	250	300	350	400	450	500	550	600
D	-	-	-	-	1	1	1	1	2	2	2
E	10	10	10	10	12	12	12	12	14	14	14
F	22	72	122	172	22	72	122	172	22	72	122
Weight (kg)	8.2	8.8	9.3	9.9	10.5	11.1	11.6	12.2	12.7	13.3	13.9

Stroke	650	700	750	800	850	900	950	1000
A	1052	1102	1152	1202	1252	1302	1352	1402
B	1028	1078	1128	1178	1228	1278	1328	1378
C	650	700	750	800	850	900	950	1000
D	2	3	3	3	3	4	4	4
E	14	16	16	16	16	18	18	18
F	172	22	72	122	172	22	72	122
Weight (kg)	14.5	15.0	15.6	16.1	16.7	17.3	17.9	18.4

* The brake-equipped type is longer in 26mm and heavier in 0.6kg.

Stroke	650	700	750	800	850	900	950	1000
A	1052	1102	1152	1202	1252	1302	1352	1402
B	1028	1078	1128	1178	1228	1278	1328	1378
C	650	700	750	800	850	900	950	1000
D	2	3	3	3	3	4	4	4
E	14	16	16	16	16	18	18	18
F	172	22	72	122	172	22	72	122
Weight (kg)	14. 7	15. 3	15. 9	16. 4	17. 0	17. 5	18. 1	18. 7

13.1.4 ISDA-MX-200, ISPDA-MX-200



* The brake-equipped type is longer in 26mm and heavier in 0.6kg.

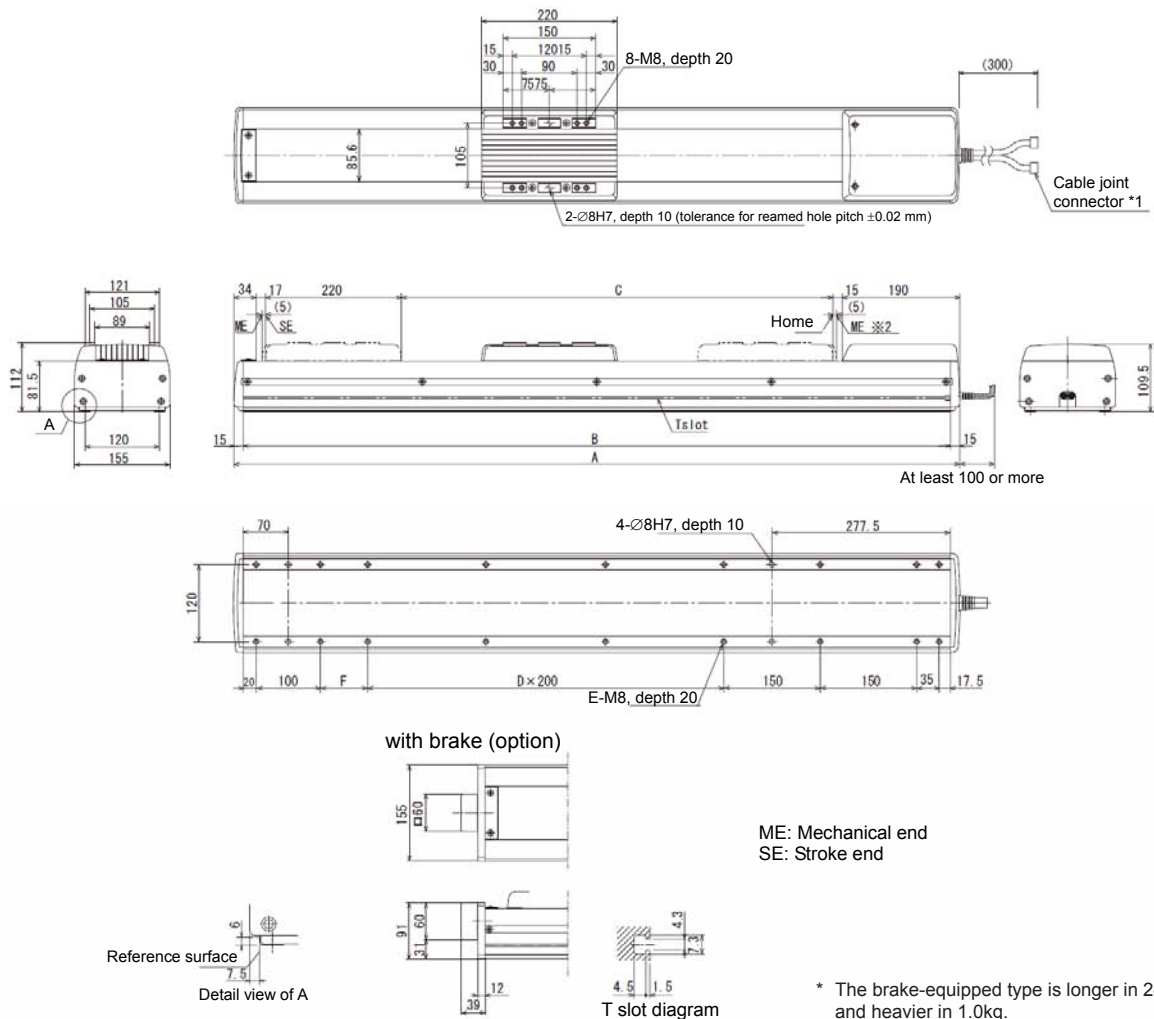
■ Dimension, Mass and Maximum Speed by Stroke

Stroke	800	900	1000	1100	1200	1300	1400	1500	1600
A	1315	1415	1515	1615	1715	1815	1915	2015	2115
B	1291	1391	1491	1591	1691	1791	1891	1991	2091
C	800	900	1000	1100	1200	1300	1400	1500	1600
D	3	3	4	4	5	5	6	6	7
E	16	16	18	18	20	20	22	22	24
F	122	222	122	222	122	222	122	222	122
Weight (kg)	18.2	19.3	20.5	21.6	22.7	23.9	25.0	26.2	27.3

* The brake-equipped type is longer in 24mm and heavier in 1.0kg.

Stroke	750	800	850	900	950	1000	1050	1100	1150	1200
A	1226	1276	1326	1376	1426	1476	1526	1576	1626	1676
B	1196	1246	1296	1346	1396	1446	1496	1546	1596	1646
C	750	800	850	900	950	1000	1050	1100	1150	1200
D	3	3	4	4	4	5	5	5	5	5
E	18	18	20	20	20	22	22	22	22	22
F	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5	123.5	173.5
Weight (kg)	23.6	24.4	25.2	26.0	26.8	27.6	28.4	29.2	30.0	30.8

13.1.6 ISDA-L-400, ISPDA-L-400

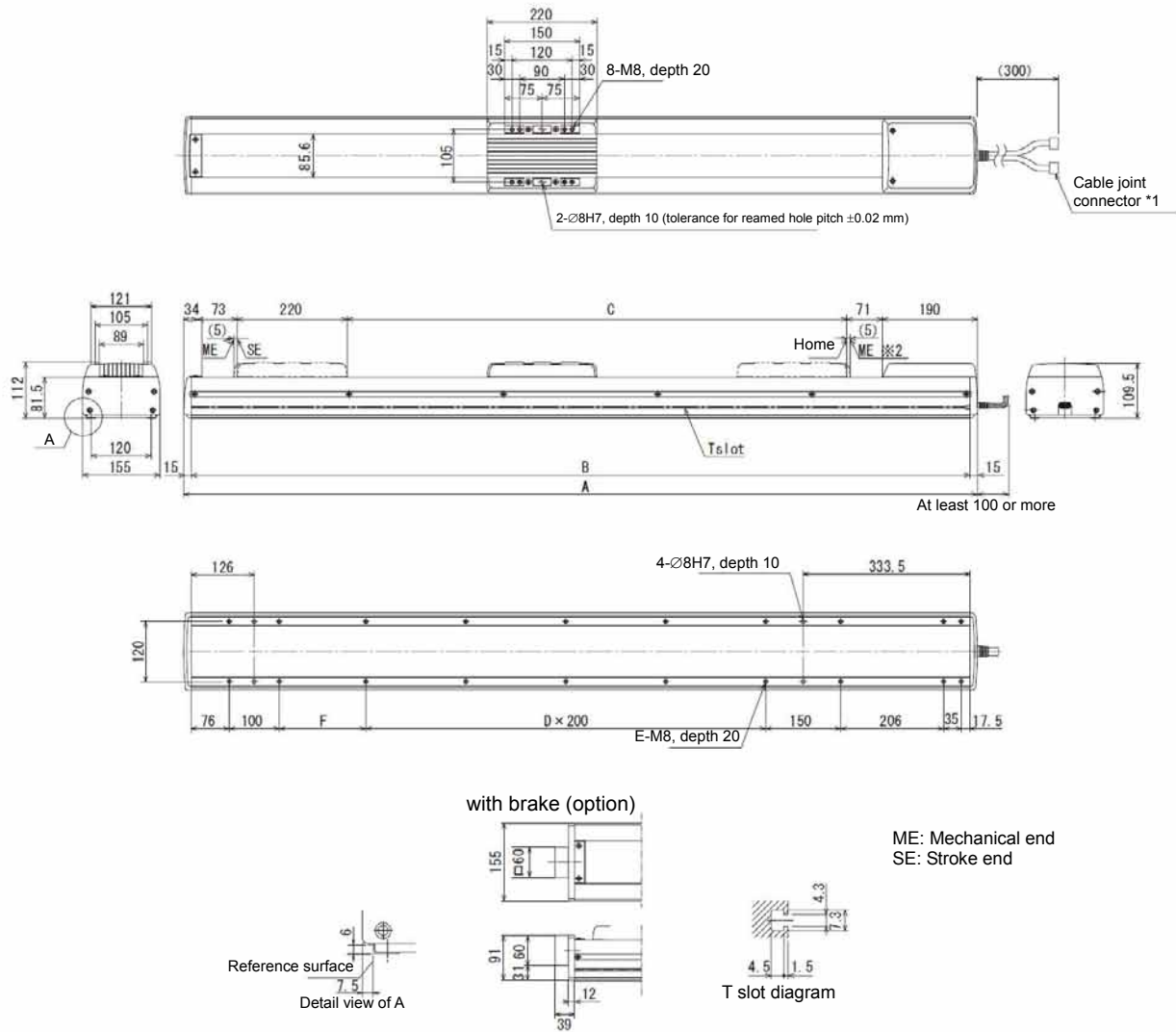


■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	150	200	250	300	350	400	450	500	550	600	650	700
A	576	626	676	726	776	826	876	926	976	1026	1076	1126	1176
B	546	596	646	696	746	796	846	896	946	996	1046	1096	1146
C	100	150	200	250	300	350	400	450	500	550	600	650	700
D	-	-	-	-	1	1	1	2	2	2	2	3	3
E	12	12	12	14	14	14	14	16	16	16	16	18	18
F	73.5	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5
Weight (kg)	13.6	14.4	15.2	16.0	16.8	17.6	18.4	19.2	20.0	20.8	21.6	22.4	23.2

Stroke	750	800	850	900	950	1000	1050	1100	1150	1200
A	1226	1276	1326	1376	1426	1476	1526	1576	1626	1676
B	1196	1246	1296	1346	1396	1446	1496	1546	1596	1646
C	750	800	850	900	950	1000	1050	1100	1150	1200
D	3	3	4	4	4	4	5	5	5	5
E	18	18	20	20	20	20	22	22	22	22
F	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5	123.5	173.5
Weight (kg)	24.0	24.8	25.6	26.4	27.2	28.0	28.8	29.6	30.4	31.2

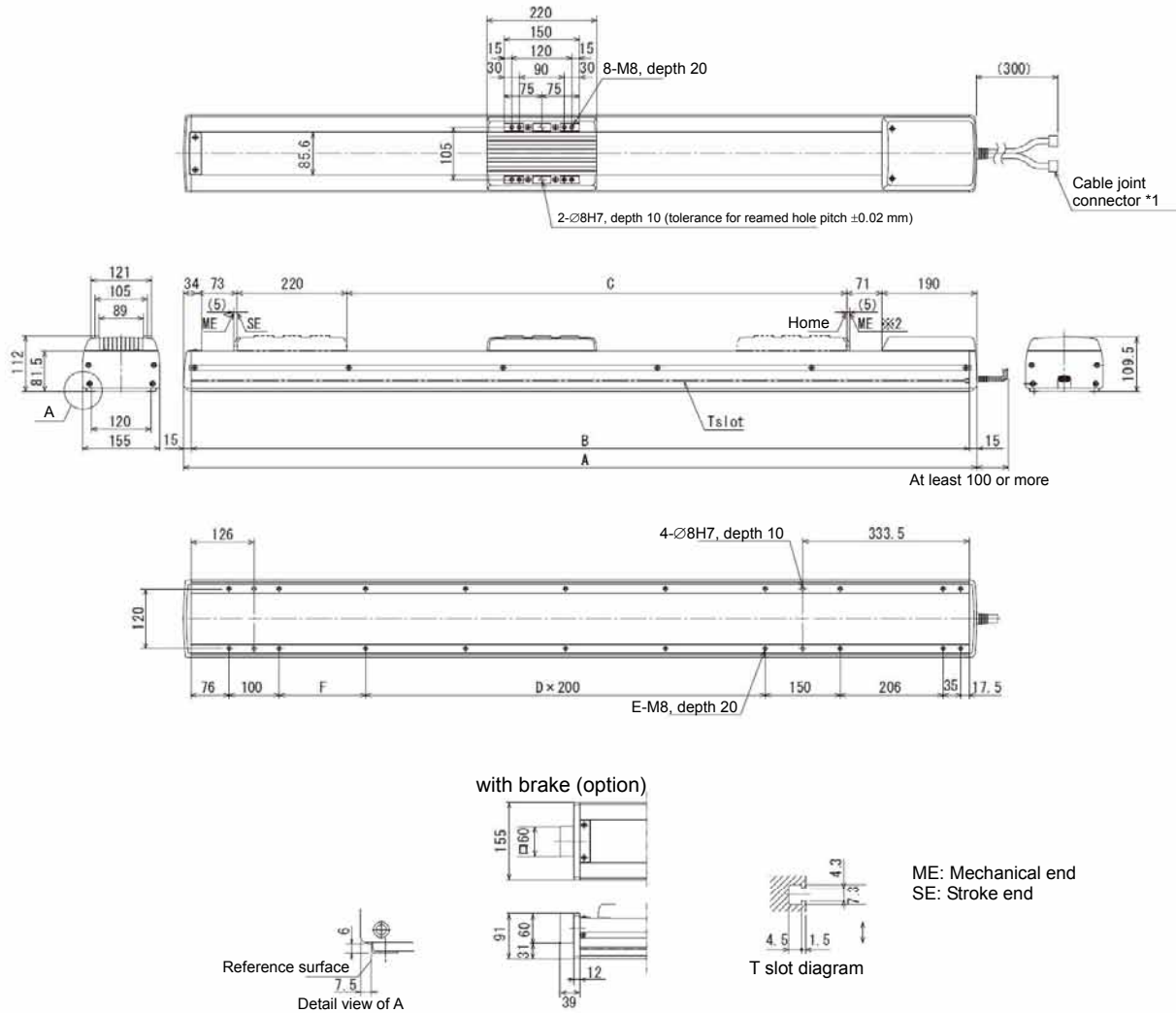
13.1.7 ISDA-LX-200, ISPDA-LX-200



■ Dimension, Mass and Maximum Speed by Stroke

Stroke	1000	1100	1200	1300	1400	1500	1600
A	1588	1688	1788	1888	1988	2088	2188
B	1558	1658	1758	1858	1958	2058	2158
C	1000	1100	1200	1300	1400	1500	1600
D	4	5	5	6	6	7	7
E	20	22	22	24	24	26	26
F	173.5	73.5	173.5	73.5	173.5	73.5	173.5
Weight (kg)	30.8	32.4	34.0	35.6	37.2	38.9	40.5

13.1.8 ISDA-LX-400, ISPDA-LX-400

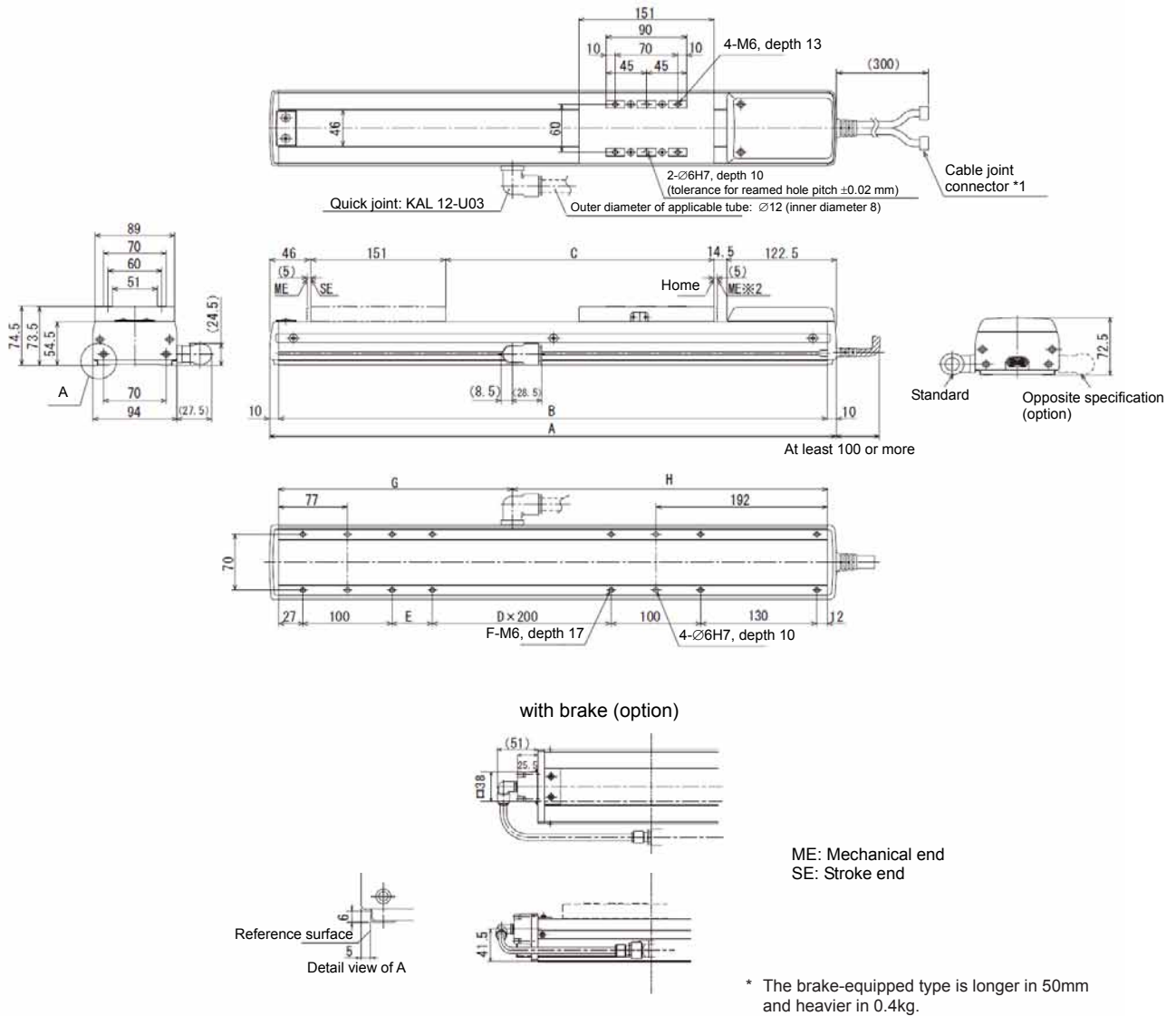


* The brake-equipped type is longer in 24mm and heavier in 1.0kg.

■ Dimension, Mass and Maximum Speed by Stroke

Stroke	1000	1100	1200	1300	1400	1500	1600
A	1588	1688	1788	1888	1988	2088	2188
B	1558	1658	1758	1858	1958	2058	2158
C	1000	1100	1200	1300	1400	1500	1600
D	4	5	5	6	6	7	7
E	20	22	22	24	24	26	26
F	173.5	73.5	173.5	73.5	173.5	73.5	173.5
Weight (kg)	31.2	32.8	34.4	36.0	37.6	39.2	40.8

13.1.9 ISDACR-S, ISPDACR-S



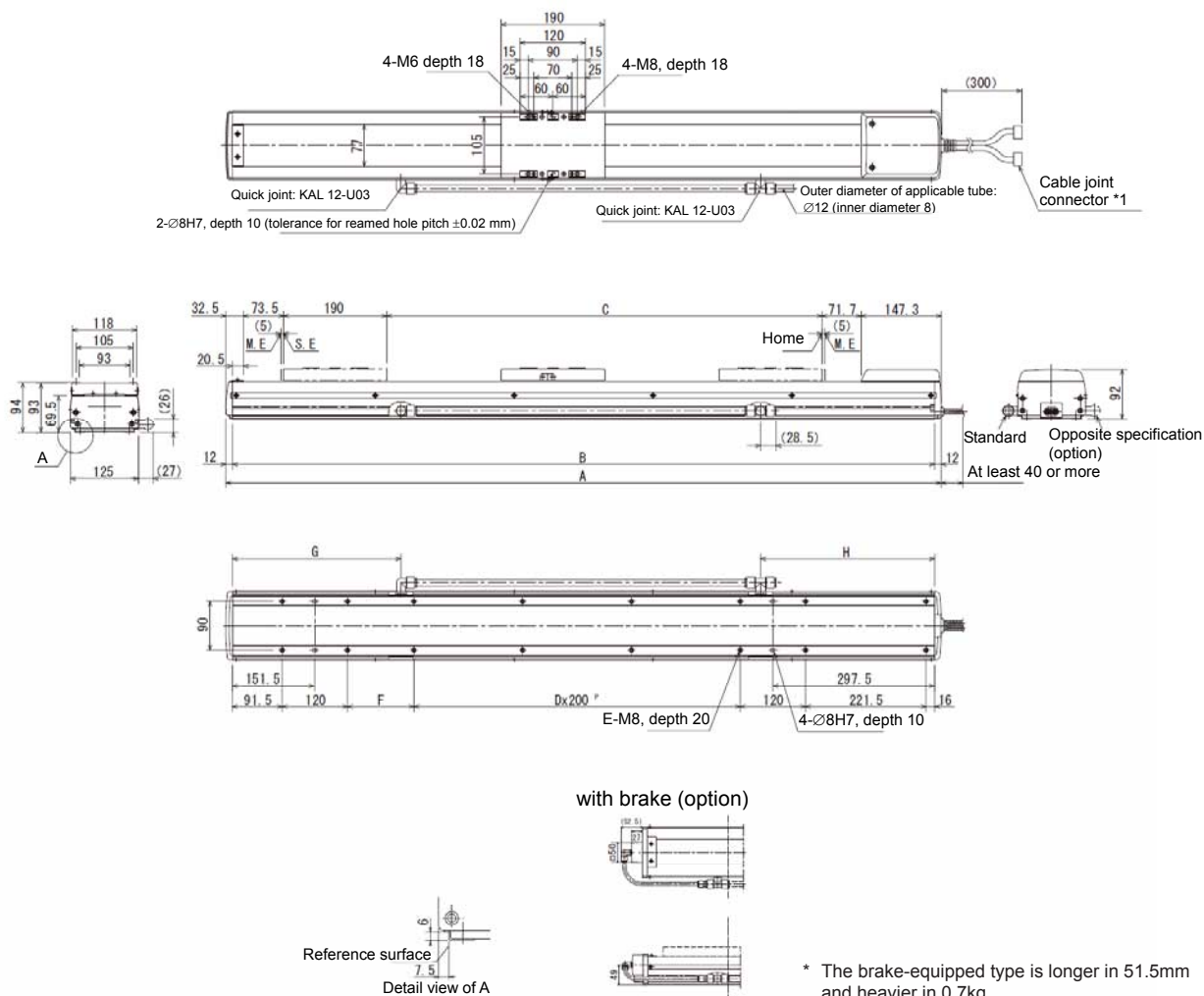
■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	150	200	250	300	350	400	450	500	550	600
A	434	484	534	584	634	684	734	784	834	884	934
B	414	464	514	564	614	664	714	764	814	864	914
C	100	150	200	250	300	350	400	450	500	550	600
D	-	-	-	-	1	1	1	1	2	2	2
E	45	95	145	195	45	95	145	195	45	95	145
F	10	10	10	10	12	12	12	12	14	14	14
G	159.0	186.5	211.5	236.5	261.5	286.5	311.5	336.5	359.0	386.5	411.5
H	255.0	277.5	302.5	327.5	352.5	377.5	402.5	427.5	455.0	477.5	502.5
Weight (kg)	3.8	4.1	4.4	4.7	5.1	5.4	5.7	6.0	6.3	6.6	7.0

* The brake-equipped type is longer in 51.5mm and heavier in 0.7kg.

Stroke	650	700	750	800	850	900	950	1000
A	1052	1102	1152	1202	1252	1302	1352	1402
B	1028	1078	1128	1178	1228	1278	1328	1378
C	650	700	750	800	850	900	950	1000
D	2	3	3	3	3	4	4	4
E	14	16	16	16	16	18	18	18
F	172	22	72	122	172	22	72	122
G	465	490	515	540	565	591	613	640
H	563	588	613	638	663	687	715	738
Weight (kg)	15.7	15.3	15.9	16.4	17.0	17.5	18.1	18.7

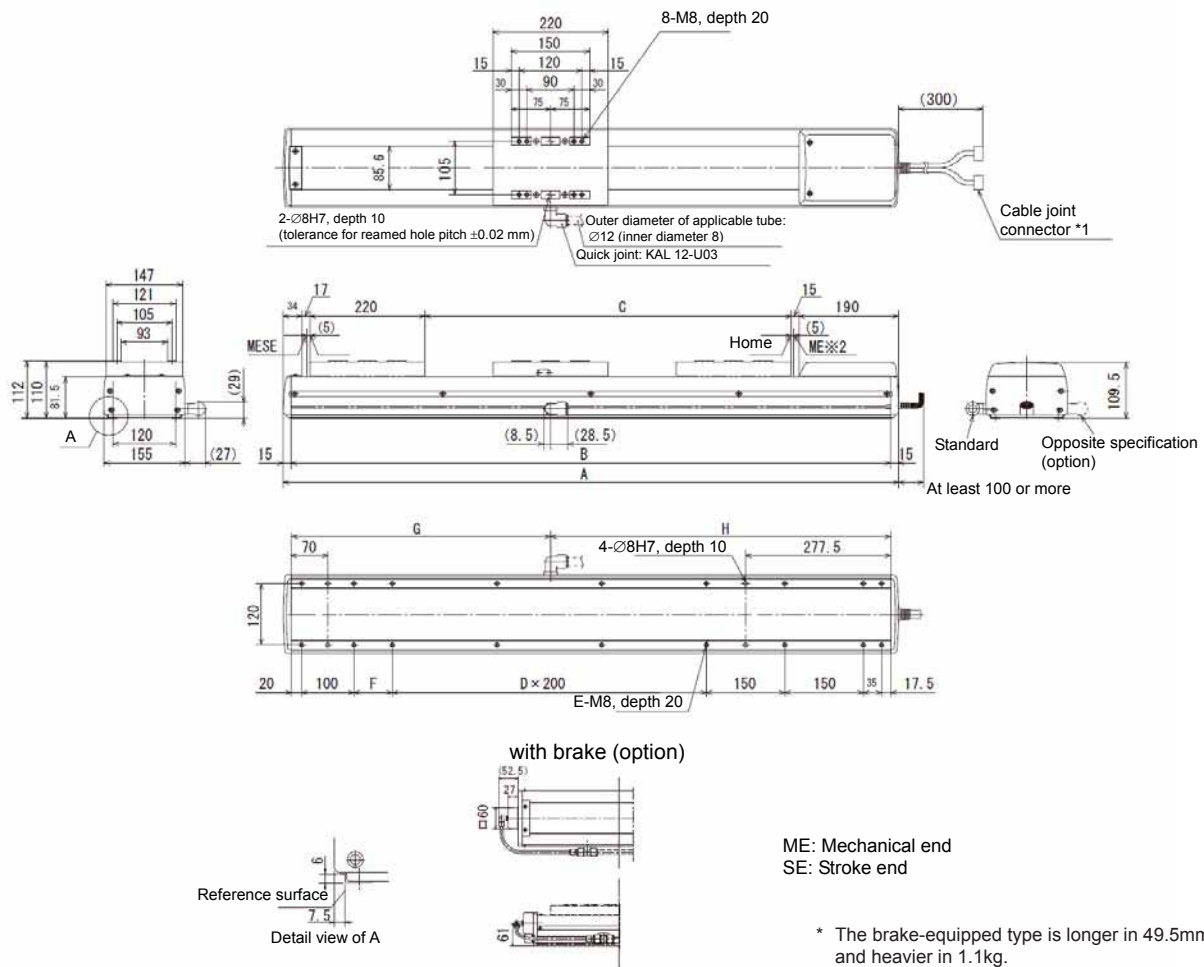
13.1.12 ISDACR-MX-200, ISPDACR-MX-200



■ Dimension, Mass and Maximum Speed by Stroke

Stroke	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
A	1315	1415	1515	1615	1715	1815	1915	2015	2115	2215	2315	2415	2515
B	1291	1391	1491	1591	1691	1791	1891	1991	2091	2191	2291	2391	2491
C	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
D	3	3	4	4	5	5	6	6	7	7	8	8	9
E	16	16	18	18	20	20	22	22	24	24	26	26	28
F	122	222	122	222	122	222	122	222	122	222	122	222	122
G	310	350	370	400	420	450	470	500	510	550	570	600	620
H	320	380	380	430	420	480	470	530	520	580	580	630	620
Weight (kg)	19.3	20.4	21.6	22.7	23.8	25.0	26.1	27.3	28.4	29.5	30.7	31.8	32.9

13.1.13 ISDACR-L, ISPDACR-L-200



ME: Mechanical end
SE: Stroke end

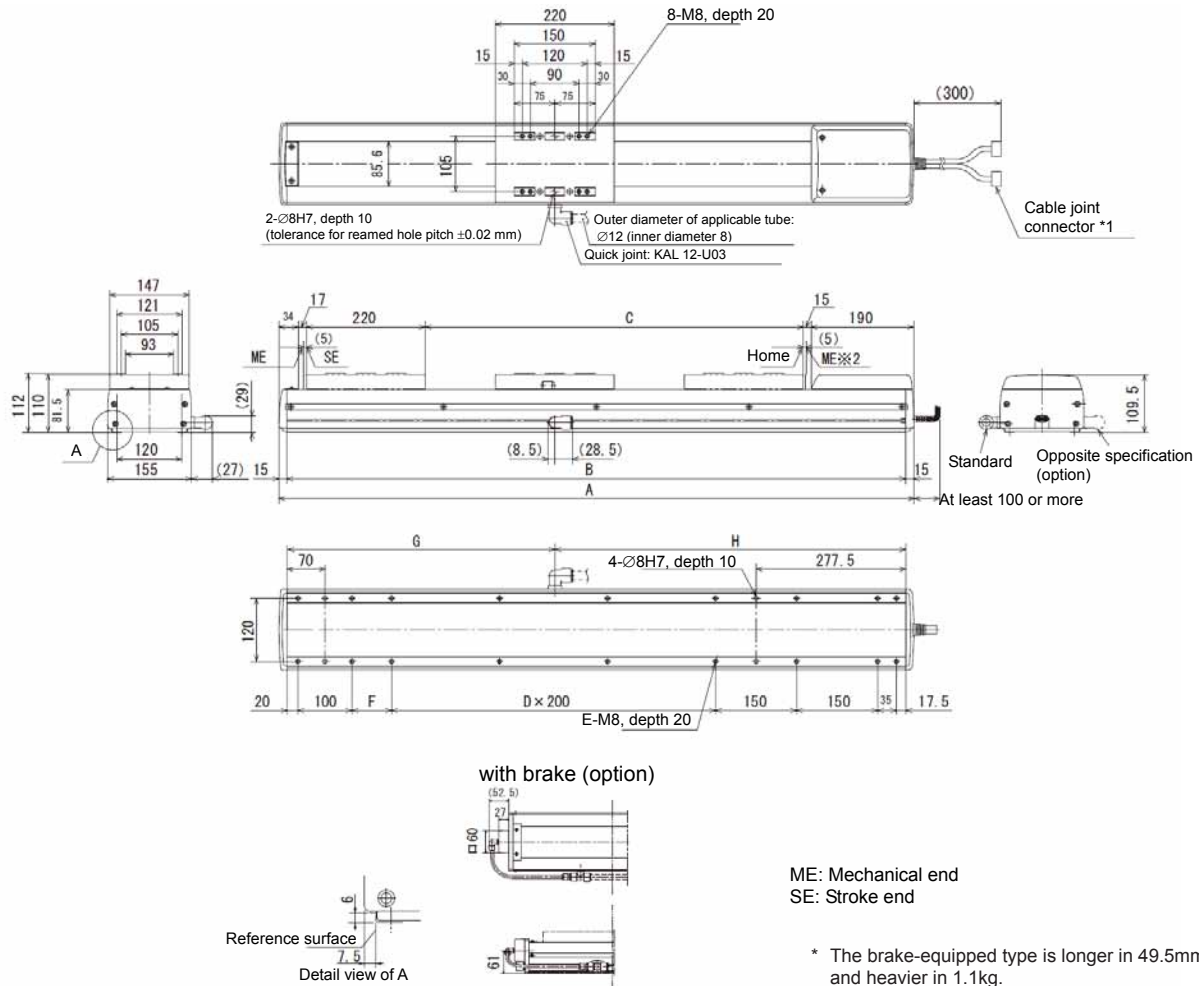
* The brake-equipped type is longer in 49.5mm and heavier in 1.1kg.

■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	150	200	250	300	350	400	450	500	550	600	650	700
A	576	626	676	726	776	826	876	926	976	1026	1076	1126	1176
B	546	596	646	696	746	796	846	896	946	996	1046	1096	1146
C	100	150	200	250	300	350	400	450	500	550	600	650	700
D	-	-	-	1	1	1	1	2	2	2	2	3	3
E	12	12	12	14	14	14	14	16	16	16	16	18	18
F	73.5	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5
G	179.5	221.0	246.0	271.0	296.0	321.0	346.0	371.0	379.5	421.0	446.0	471.0	496.0
H	366.5	375	400.0	425.0	450.0	475.0	500.0	525.0	566.5	575.0	600.0	625.0	650.0
Weight (kg)	13.2	14.0	14.8	15.6	16.4	17.2	18.0	18.8	19.6	20.4	21.2	22.0	22.8

Stroke	750	800	850	900	950	1000	1050	1100	1150	1200
A	1226	1276	1326	1376	1426	1476	1526	1576	1626	1676
B	1196	1246	1296	1346	1396	1446	1496	1546	1596	1646
C	750	800	850	900	950	1000	1050	1100	1150	1200
D	3	3	4	4	4	4	5	5	5	5
E	18	18	20	20	20	20	22	22	22	22
F	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5	123.5	173.5
G	521.0	546.0	571.0	579.5	621.0	646.0	671.0	696.0	721.0	746.0
H	675.0	700.0	725.0	766.5	775.0	800.0	825.0	850.0	875.0	900.0
Weight (kg)	23.6	24.4	25.2	26.0	26.8	27.6	28.4	29.2	30.0	30.8

13.1.14 ISDACR-L-400, ISPDACR-L-400

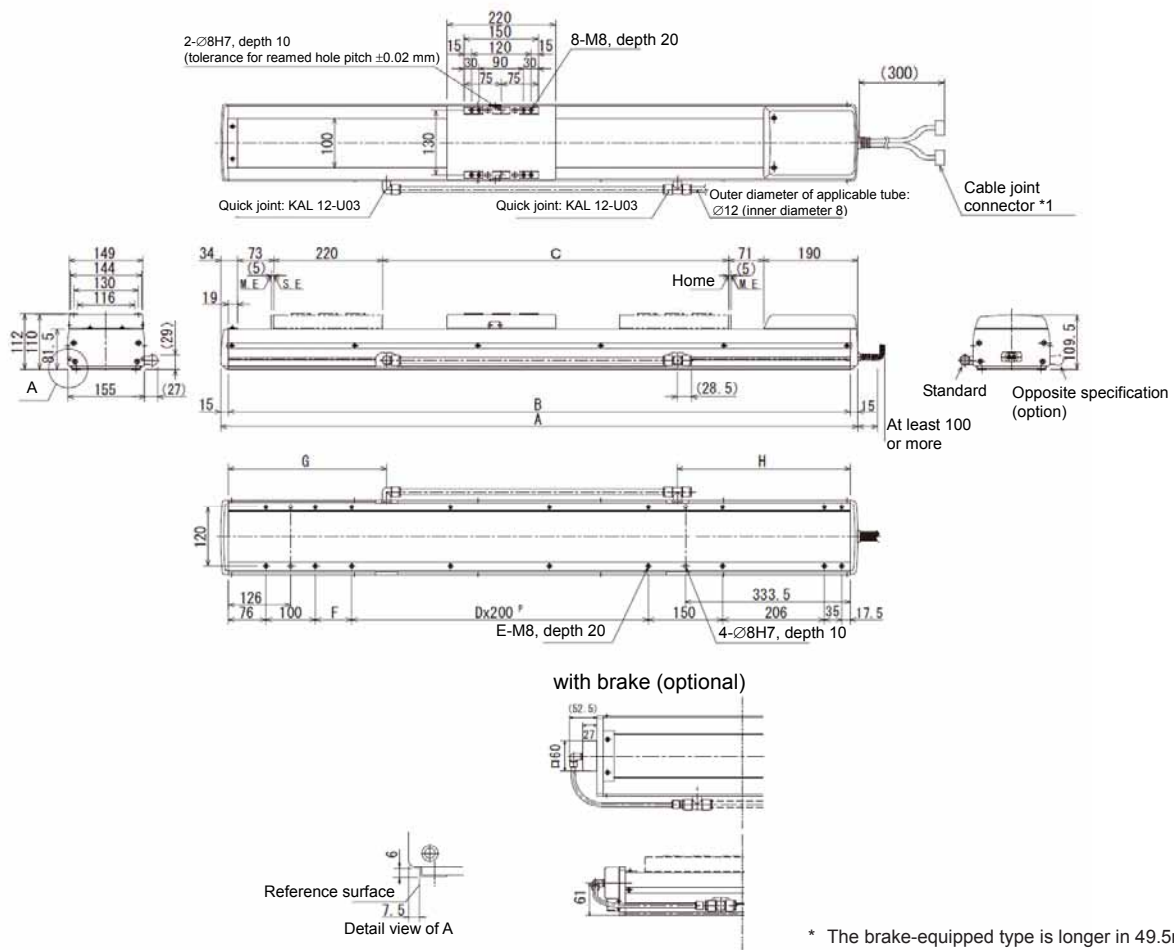


■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	150	200	250	300	350	400	450	500	550	600	650	700
A	576	626	676	726	776	826	876	926	976	1026	1076	1126	1176
B	546	596	646	696	746	796	846	896	946	996	1046	1096	1146
C	100	150	200	250	300	350	400	450	500	550	600	650	700
D	—	—	—	1	1	1	1	2	2	2	2	3	3
E	12	12	12	14	14	14	14	16	16	16	16	18	18
F	73.5	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5
G	179.5	221.0	246.0	271.0	296.0	321.0	346.0	371.0	379.5	421.0	446.0	471.0	496.0
H	366.5	375	400.0	425.0	450.0	475.0	500.0	525.0	566.5	575.0	600.0	625.0	650.0
Weight (kg)	13.6	14.4	15.2	16.0	16.8	17.6	18.4	19.2	20.0	20.8	21.6	22.4	23.2

Stroke	750	800	850	900	950	1000	1050	1100	1150	1200
A	1226	1276	1326	1376	1426	1476	1526	1576	1626	1676
B	1196	1246	1296	1346	1396	1446	1496	1546	1596	1646
C	750	800	850	900	950	1000	1050	1100	1150	1200
D	3	3	4	4	4	4	5	5	5	5
E	18	18	20	20	20	20	22	22	22	22
F	123.5	173.5	23.5	73.5	123.5	173.5	23.5	73.5	123.5	173.5
G	521.0	546.0	571.0	579.5	621.0	646.0	671.0	696.0	721.0	746.0
H	675.0	700.0	725.0	766.5	775.0	800.0	825.0	850.0	875.0	900.0
Weight (kg)	24.0	24.8	25.6	26.4	27.2	28.0	28.8	29.6	30.4	31.2

13.1.15 ISDACR-LX-200, ISPDACR-LX-200



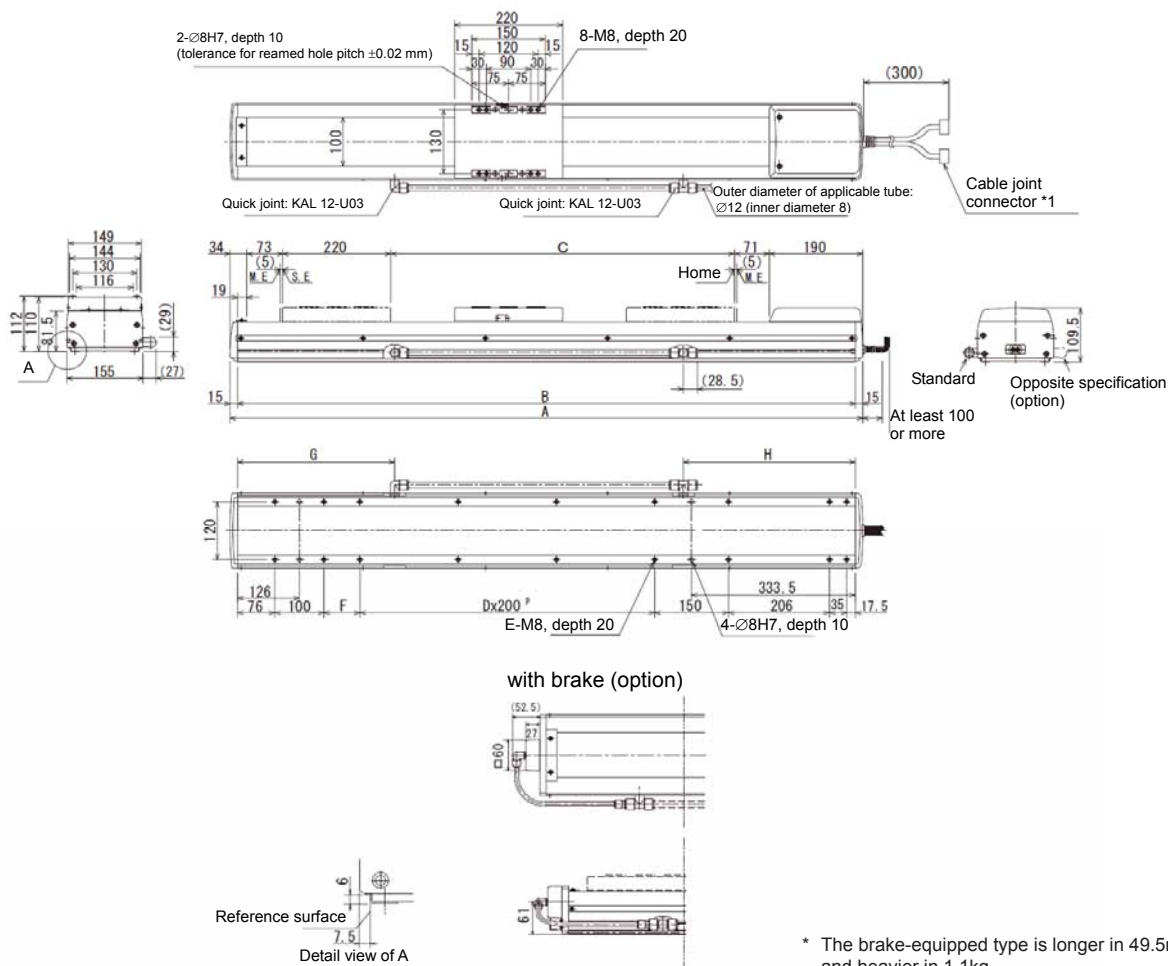
* The brake-equipped type is longer in 49.5mm and heavier in 1.1kg.

■ Dimension, Mass and Maximum Speed by Stroke

Stroke	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
A	1588	1688	1788	1888	1988	2088	2188	2288	2388	2488	2588
B	1558	1658	1758	1858	1958	2058	2158	2258	2358	2458	2558
C	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
D	4	5	5	6	6	7	7	8	8	9	9
E	20	22	22	24	24	26	26	28	28	30	30
F	173.5	73.5	173.5	73.5	173.5	73.5	173.5	73.5	173.5	73.5	173.5
G	390	420	440	470	490	520	530	570	590	620	640
H	390	450	440	500	490	550	540	590	590	650	640
Weight (kg)	31.7	33.3	34.9	36.5	38.1	39.8	41.1	43.0	44.6	46.2	47.8

Stroke	2100	2200	2300	2400	2500
A	2688	2788	2888	2988	3088
B	2658	2758	2858	2958	3058
C	2100	2200	2300	2400	2500
D	10	10	11	11	12
E	32	32	34	34	36
F	73.5	173.5	73.5	173.5	73.5
G	670	690	720	730	770
H	700	690	750	740	790
Weight (kg)	49.4	51.0	52.6	54.2	55.8

13.1.16 ISDACR-LX-400, ISPDACR-LX-400



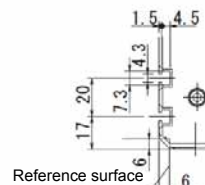
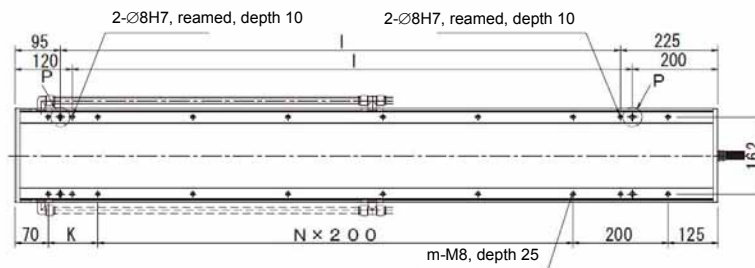
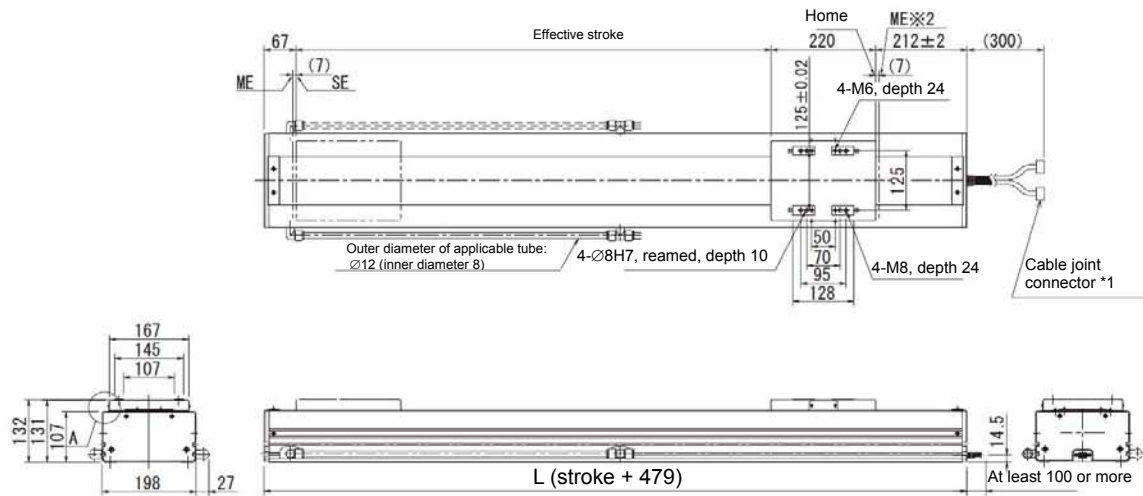
* The brake-equipped type is longer in 49.5mm and heavier in 1.1kg.

■ Dimension, Mass and Maximum Speed by Stroke

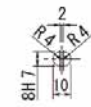
Stroke	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
A	1588	1688	1788	1888	1988	2088	2188	2288	2388	2488	2588
B	1558	1658	1758	1858	1958	2058	2158	2258	2358	2458	2558
C	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
D	4	5	5	6	6	7	7	8	8	9	9
E	20	22	22	24	24	26	26	28	28	30	30
F	173.5	73.5	173.5	73.5	173.5	73.5	173.5	73.5	173.5	73.5	173.5
G	390	420	440	470	490	520	530	570	590	620	640
H	390	450	440	500	490	550	540	590	590	650	640
Weight (kg)	32.1	33.7	35.3	36.9	38.5	40.1	41.7	43.4	45.0	46.6	48.2

Stroke	2100	2200	2300	2400	2500
A	2688	2788	2888	2988	3088
B	2658	2758	2858	2958	3058
C	2100	2200	2300	2400	2500
D	10	10	11	11	12
E	32	32	34	34	36
F	73.5	173.5	73.5	173.5	73.5
G	670	690	720	730	770
H	700	690	750	740	790
Weight (kg)	49.8	51.4	53.0	54.6	56.2

13.1.18 ISDACR-W-750, ISPDACR-W-750



Detail view of A



Detail view of P

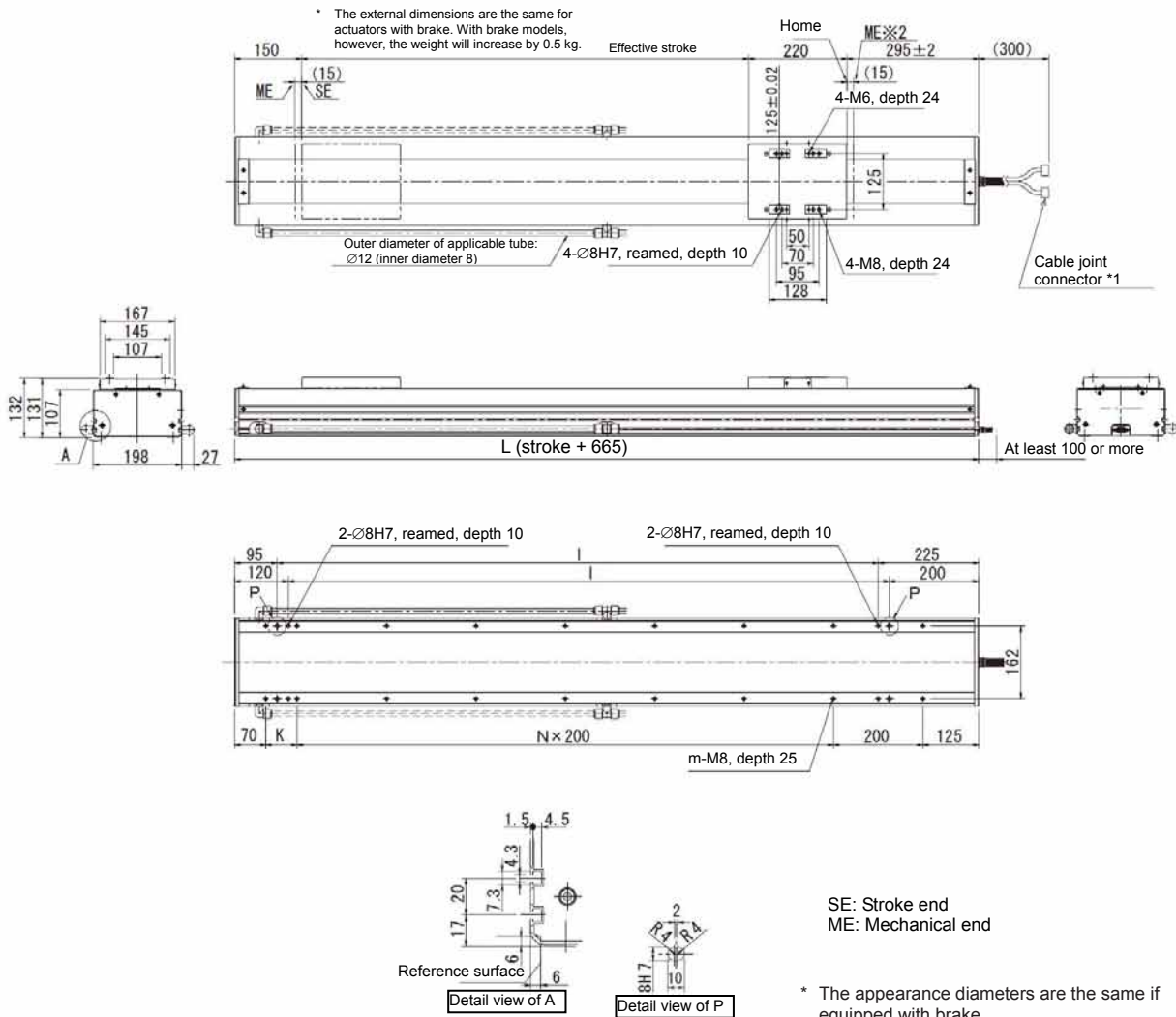
SE: Stroke end
ME: Mechanical end

* The appearance diameters are the same if equipped with brake.
The weight increases in 0.5kg

■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300
L	599	699	799	899	999	1099	1199	1299	1399	1499	1599	1699	1799
I	279	379	479	579	679	779	879	979	1079	1179	1279	1379	1479
K	204	104	204	104	204	104	204	104	204	104	204	104	204
N	0	1	1	2	2	3	3	4	4	5	5	6	6
m	6	8	8	10	10	12	12	14	14	16	16	18	18
Weight (kg)	23.4	25.5	27.5	29.5	31.6	33.6	35.6	37.7	39.7	41.7	43.8	45.8	47.8

13.1.19 ISDACR-WX-600, ISPDACR-WX-600

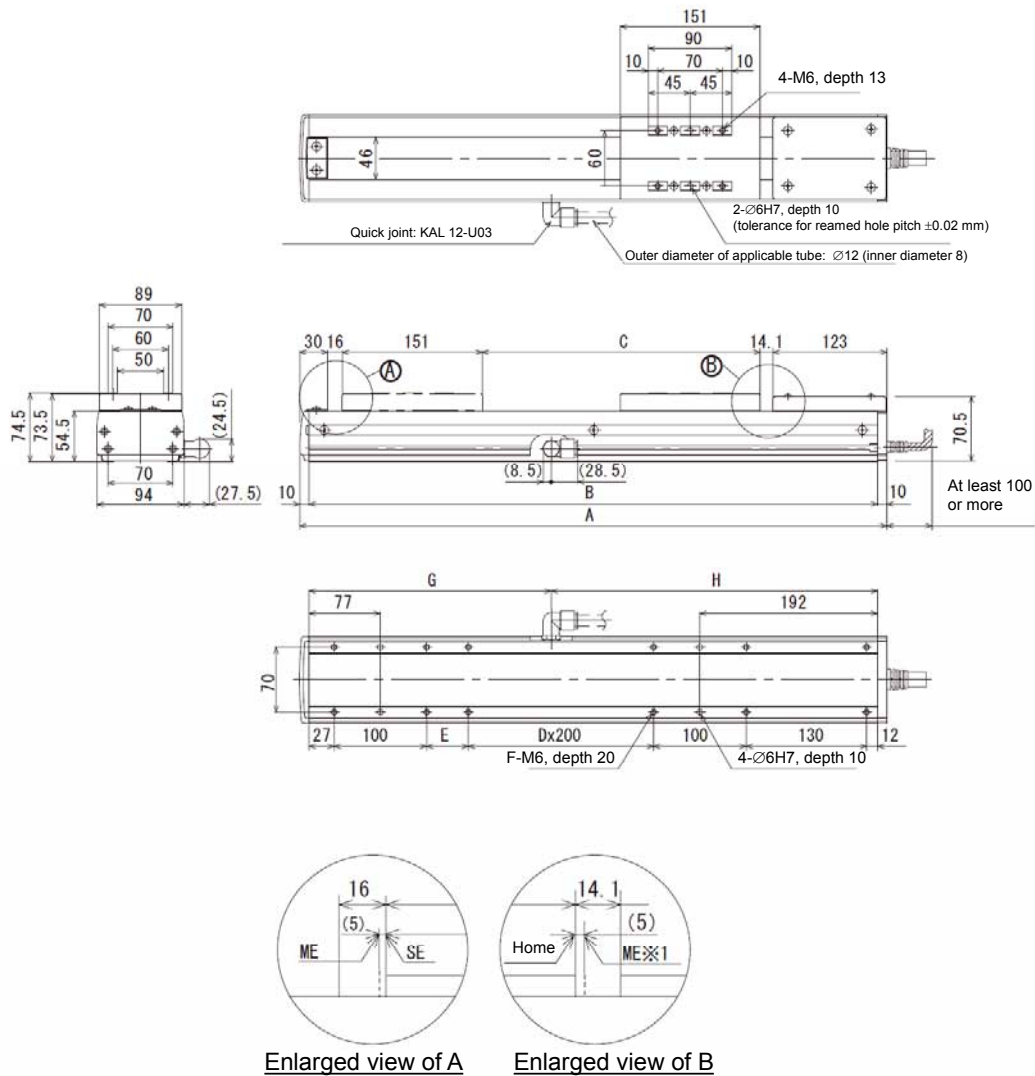


■ Dimension, Mass and Maximum Speed by Stroke

Stroke	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900
L	1565	1665	1765	1865	1965	2065	2165	2265	2365	2465	2565
l	1245	1345	1445	1545	1645	1745	1845	1945	2045	2145	2245
K	170	70	170	70	170	70	170	70	170	70	170
N	5	6	6	7	7	8	8	9	9	10	10
m	16	18	18	20	20	22	22	24	24	26	26
Weight (kg)	39.5	41.5	43.6	45.6	47.6	49.7	51.7	53.8	55.8	57.8	59.9

Stroke	2000	2100	2200	2300	2400	2500
L	2665	2765	2865	2965	3065	3165
l	2345	2445	2545	2645	2745	2845
K	70	170	70	170	70	170
N	11	11	12	12	13	13
m	28	28	30	30	32	32
Weight (kg)	61.9	63.9	66.0	68.0	70.0	72.1

13.1.21 ISDACR-ESD S (Small) Type (60 W)

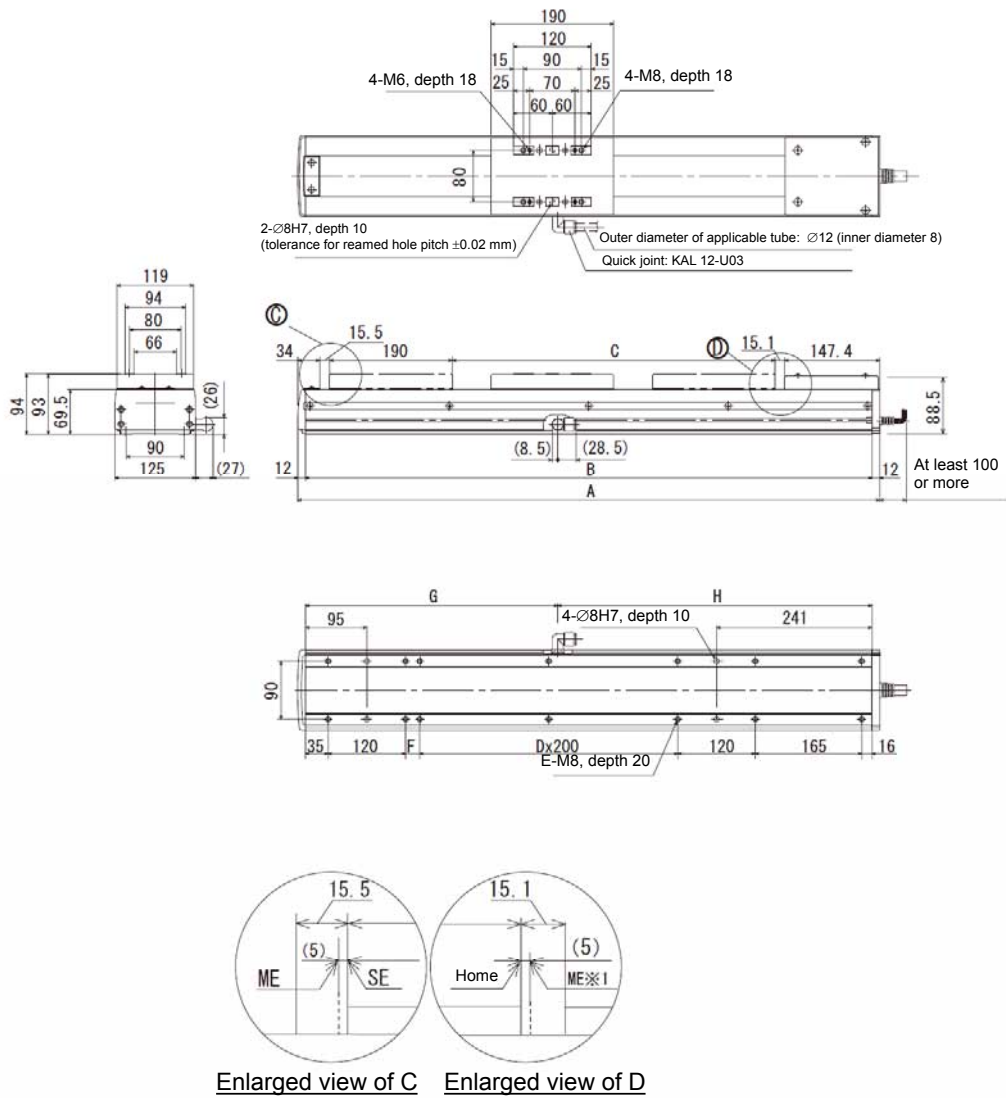


■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	200	300	400	500	600
A	434	534	634	734	834	934
B	414	514	614	714	814	914
C	100	200	300	400	500	600
D	-	-	1	1	2	2
E	45	145	45	145	45	145
F	10	10	12	12	14	14
G	159.0	211.5	261.5	311.5	359.0	411.5
H	255.0	302.5	352.5	402.5	455.0	502.5
Weight (kg)	4.0	4.6	5.3	5.9	6.5	7.2



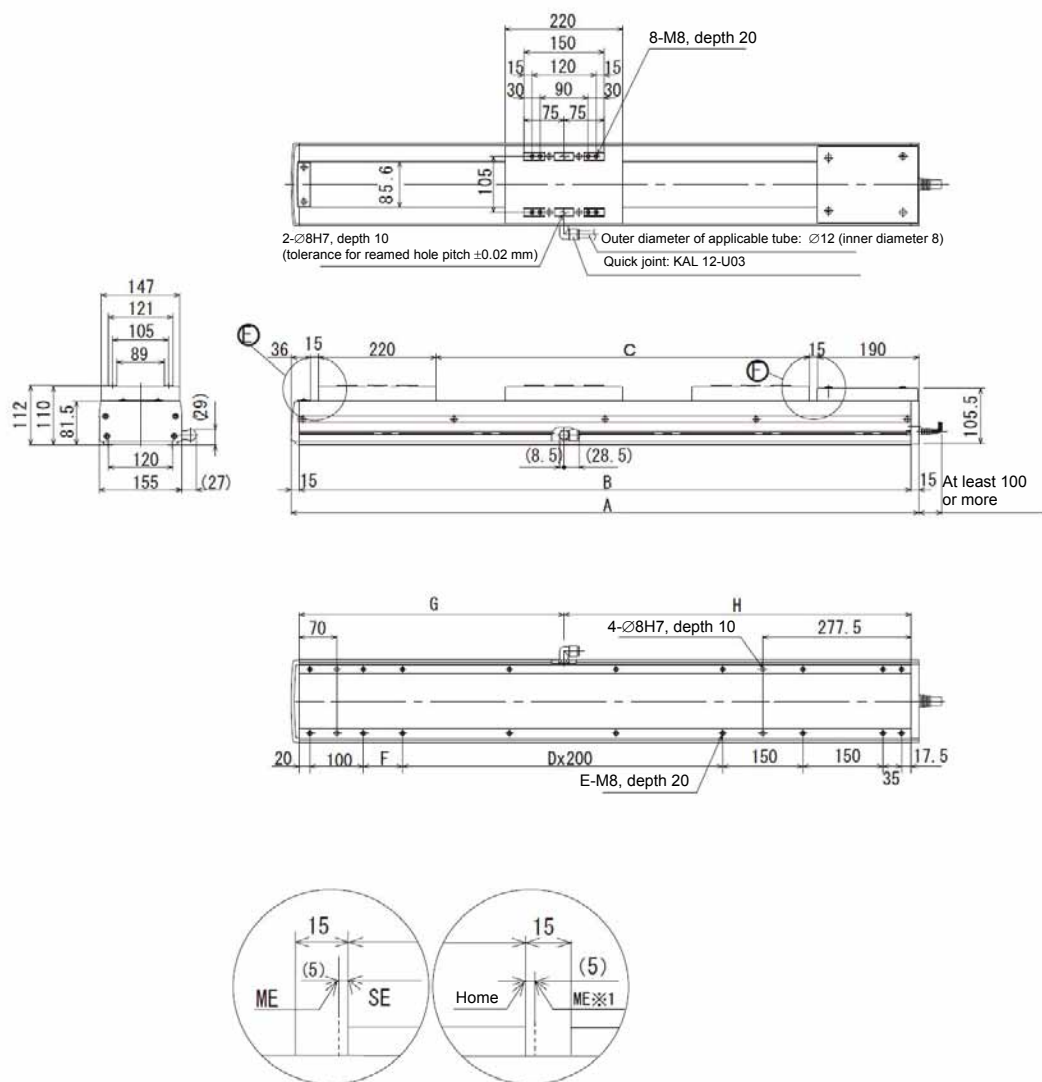
13.1.22 ISDACR-ESD M (Medium) Type (100 W/200 W)



■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	200	300	400	500	600	700	800	900	1000
A	502	602	702	802	902	1002	1102	1202	1302	1402
B	478	578	678	778	878	978	1078	1178	1278	1378
C	100	200	300	400	500	600	700	800	900	1000
D	-	-	1	1	2	2	3	3	4	4
E	10	10	12	12	14	14	16	16	18	18
F	22	122	22	122	22	122	22	122	22	122
G	191	240	290	340	391	440	490	540	591	640
H	287	338	388	438	487	538	588	638	687	738
Weight (kg)	7.8	8.9	10.1	11.2	12.3	13.5	14.6	15.7	16.9	18.0

13.1.23 ISDACR-ESD L (Large) Type (200 W/400 W)



Enlarged view of E Enlarged view of F

■ Dimension, Mass and Maximum Speed by Stroke

Stroke	100	200	300	400	500	600	700	800	900	1000
A	576	676	776	876	976	1076	1176	1276	1376	1476
B	546	646	746	846	946	1046	1146	1246	1346	1446
C	1000	200	300	400	500	600	700	800	900	1000
D	-	-	1	1	2	2	3	3	4	4
E	12	12	14	14	16	16	18	18	20	20
F	73.5	173.5	73.5	173.5	73.5	173.5	73.5	173.5	73.5	173.5
G	179.5	246.0	296.0	346.0	379.5	446.0	496.0	546.0	579.5	646.0
H	366.5	400.0	450.0	500.0	566.5	600.0	650.0	700.0	766.5	800.0
Weight (kg)	13.2	14.8	16.4	18.0	19.6	21.2	22.8	24.4	26.0	27.6

14. Warranty

14.1 Warranty Period

One of the following periods, whichever is shorter:

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

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 or problem in question was caused by a specification defect or problem, or by the poor quality of 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. Change History

Revision Date	Description of Revision
March 2010	First edition
May 2010	Second edition <ul style="list-style-type: none"> P. 9 Handling Precautions Changed "...duty of 50%" to "...duty of 50% or less." Changed "...equal to or greater than 50%" to "...greater than 50%." P. 39 Deleted 6.2, "Wiring Using Dedicated Self-supporting Cables (ICS Series)." P. 40 Changed to "Make sure the bending radius of the cable track is at least the minimum bending radius of the cable." P. 51 Added a "O" in the field for "After 6 months of operation" under "Lubrication." P. 54 Added "If constituents of grease have separated and base oil has accumulated on both ends of the guide rail, wipe off the oil using a soft cloth, etc." P. 55 Added a note that actuators of short leads should be moved by jog operation.
April 2011	Third edition <ul style="list-style-type: none"> A page for CE Marking added
June 2011	Fourth edition <ul style="list-style-type: none"> P.30 Contents of caution for vertically oriented mount changed.
March 2012	Fifth edition <ul style="list-style-type: none"> Contents changed in Safety Guide Caution notes added for when working with two or more persons P.30, 32 Note changed to 1.8 times more of the nominal diameter for the length of thread engagement on aluminum P.112, 113 Contents changed in 14. Warranty
March 2012	Sixth edition <ul style="list-style-type: none"> P.1 to 7 Contents added and changed in Safety Guide P.8 Note "Make sure to attach the actuator properly by following this instruction manual." added in Caution in Handling P.54, 56, 57 Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care



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