IS Series Actuator

Operating Manual

Fourteenth Edition

ISB, ISPB
IS Cast SSPA

IAI Corporation

Please Read Before Use

Thank you for purchasing our product.

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

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.
The DVD that comes with the product contains operation manuals for IAI products.
When using the product, refer to the necessary portions of the applicable operation manual by printing them out or displaying them on a PC.

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

[Important]

- This Operating Manual is original.
- The product cannot be operated in any way unless expressly specified in this Operating Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Operating 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 Operating Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

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Safety Guide

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

Safety Precautions for Our Products

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

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

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

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.
		(3) Grounding ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness $0.5mm^2$ (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	(4) Safety Measures ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign "Under Operation" at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.

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

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

Alert Indication

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

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

Caution in Handling

1. Do not set speeds and accelerations/decelerations equal to or greater than the respective ratings.
   If the actuator is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.
   In the case of interpolated operation of combined axes, the speed and acceleration/deceleration settings should correspond to the minimum values among all combined axes.

2. Keep the load moment within the allowable value.
   If the actuator is operated under a load equal to or greater than the allowable load moment, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur.

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

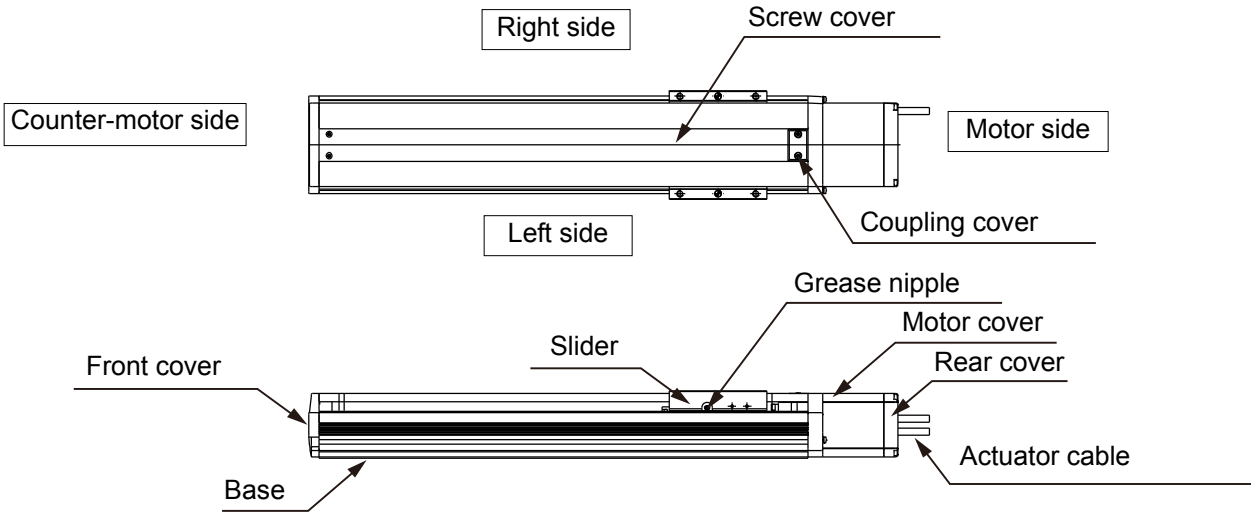
4. Back and forth operation in a short distance may cause wear of grease.
   If the actuator is moved back and forth continuously over a short distance of 30 mm or less, grease film may run out. As a guide, move the actuator back and forth repeatedly for around 5 cycles over a distance of 50 mm or more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

5. 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.

Names of the Parts

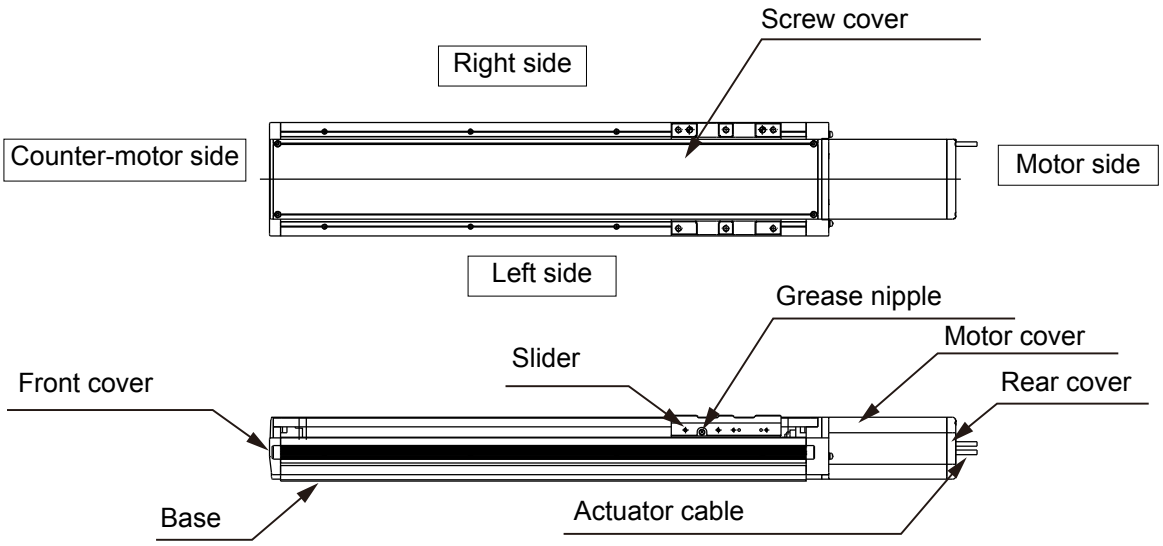
1. ISB/ISPB

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.



2. SSPA

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. 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	Model number	Remarks
1	Actuator	Refer to “How to Read the Model Nameplate” and “How to Read the Model Number.”	
Accessories			
2	Motor/Encoder cables *1		
3	Home making seals		
4	Quick Step Guide		
5	Operation Manual (DVD)		
6	Safety Guide		

*1 The motor/encoder cables supplied vary depending on the controller used. [Refer to 11, "Motor/Encoder Cables."]

1.2 Related Operation Manuals for Each Controller Supported by This Product

The table below lists the related operation manuals for each controller supported by this product, which are included in the Operation Manual DVD.

(1) XSEL-J/K controllers

No.	Name	Control No.
1	Operation Manual for XSEL-J/K Controller	ME0116
2	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
3	Operation Manual for Touch Panel Teaching Pendant TB-02, TB-02D Applicable for Program Controller	ME0356
4	Operation Manual for Touch Panel Teaching TB-01, TB-01D, TB-01DR Applicable for Program Controller	ME0325
5	Operation Manual for Teaching Pendant SEL-T/TD/TG	ME0183
6	Operation Manual for Teaching Pendant IA-T-X/XD	ME0160
7	Operation Manual for DeviceNet	ME0124
8	Operation Manual for CC-Link	ME0123
9	Operation Manual for PROFIBUS-DP	ME0153
10	Operation Manual for X-SEL Ethernet	ME0140
11	Operation Manual for Multi-point I/O Board	ME0138
12	Operation Manual for Dedicated Multi-point I/O Board Terminal Block	ME0139

(2) XSEL-P/Q, XSEL-R/S, XSEL-RA/SA controllers

No.	Name	Control No.
1	Operation Manual for XSEL-P/Q Controller	ME0148
2	Operation Manual for XSEL-R/S Controller	ME0313
3	Operation Manual for XSEL-RA/SA	ME0359
4	Operation Manual for XSEL-P/Q/PX/QX RC Gateway Function	ME0188
5	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
6	Operation Manual for Touch Panel Teaching Pendant TB-02, TB-02D Applicable for Program Controller	ME0356
7	Operation Manual for Touch Panel Teaching TB-01, TB-01D, TB-01DR Applicable for Program Controller	ME0325
8	Operation Manual for Teaching Pendant SEL-T/TD/TG	ME0183
9	Operation Manual for Teaching Pendant IA-T-X/XD	ME0160
10	Operation Manual for DeviceNet	ME0124
11	Operation Manual for CC-Link	ME0123
12	Operation Manual for PROFIBUS-DP	ME0153

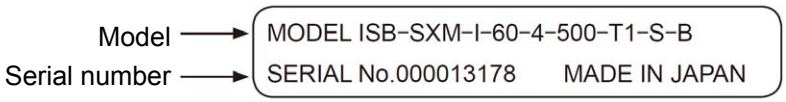
(3) SSEL controllers

No.	Name	Control No.
1	Operation Manual for SSEL Controller	ME0157
2	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
3	Operation Manual for Touch Panel Teaching Pendant TB-02, TB-02D Applicable for Program Controller	ME0356
4	Operation Manual for Touch Panel Teaching TB-01, TB-01D, TB-01DR Applicable for Program Controller	ME0325
5	Operation Manual for Teaching Pendant SEL-T/TD/TG	ME0183
6	Operation Manual for Teaching Pendant IA-T-X/XD	ME0160
7	Operation Manual for DeviceNet	ME0124
8	Operation Manual for CC-Link	ME0123
9	Operation Manual for PROFIBUS-DP	ME0153

(4) SCON, MSCON controllers

No.	Name	Control No.
1	Operation Manual for SCON Controller	ME0161
2	Operation Manual for SCON-CA Controller	ME0243
3	Operation Manual for SCON-CB/CGB Controller	ME0340
4	Operation Manual for MSCON Controller	ME0306
5	Operation Manual for PC Software RCM-101-MW/RCM-101-USB	ME0155
6	Operation Manual for Touch Panel Teaching Pendant TB-02, TB-02D Applicable for Position Controller	ME0355
7	Operation Manual for Touch Panel Teaching TB-01, TB-01D, TB-01DR Applicable for Position Controller	ME0324
8	Operation Manual for Teaching Pendant CON-T/TG	ME0178
9	Operation Manual for Touch Panel Teaching Pendant CON-PT/PD/PG	ME0227
10	Operation Manual for Simple Teaching Pendant RCM-E	ME0174
11	Operation Manual for Data Setter RCM-P	ME0175
12	Operation Manual for Touch Panel Display RCM-PM-01	ME0182
13	Operation Manual for DeviceNet	ME0124
14	Operation Manual for CC-Link	ME0123
15	Operation Manual for PROFIBUS-DP	ME0153

1.3 How to Read the Model Nameplate



1.4 How to Read the Model Numbe

ISB - SXM - I - 60 - 4 - 500 - T1 - S - B - **

<Series>
- Standard aluminum-based
  ISB
- Aluminum-based, high-precision
  ISPB
- Iron-based, high-precision
  SSPA

<Type>
- Small standard slider
  SXM
- Small long slider
  SXL
- Medium standard slider
  MXM
- Medium long slider
  MXL
- Medium standard slider with intermediate support
  MXMX
- Large standard slider
  LXM
- Large long slider
  LXL
- Large standard slider with intermediate support
  LXLM
- Large standard slider Intermediate support double sliders
  LXUWX

<Encoder type>
- A : Absolute
- I : Incremental
- WA : Battery-less Absolute

<Motor type>
- 60 : 60 W
- 100 : 100 W
- 200 : 200 W
- 400 : 400 W
- 750 : 750 W

<Lead>

4	4 mm	5	5 mm
8	8 mm	10	10 mm
16	16 mm	20	20 mm
25	25 mm	30	30 mm
36	36 mm	40	40 mm
48	48 mm	50	50 mm

<Stroke>

<Applicable controller>
- T1 : XSEL-J/K
- T2 : SCON
  SSEL
  XSEL-P/Q/R/S
  MSCON

<Cable length>
- N : None
- S : 3 m
- M : 5 m
- X□□: Length specification

<Options>
- AQ : AQ seal (Standard equipment)
- B : Brake
- C : Creep sensor
- CL : Creep sensor, opposite side
- L : Limit switch
- LL : Limit switch, opposite side
- LLM : Synchronized specification, sensor on opposite side
- LM : Synchronized specification, master axis
- NM : Reversed-home specification
- RT : Guide with ball retention mechanism
- S : Synchronized specification, slave axis
- A1S : Cable exit from the left
- A1E : Cable exit from the back on the left
- A3S : Cable exit from the right
- A3E : Cable exit from the back on the right
- ST : High-precision straightness specification
- MD : Rust prevention film processing (Note) Option limited to the SSPA
- EU : Metal Connecter Type

Identification for IAI use only[*1]

*1 This maybe displayed for the manufacturing reason.
(This is not to indicate the manufacturing model code.)

(Note) SSPA is no setting on WA (Battery-less Absolute).

(Note) In WA (battery-less absolute type) in ISPB, RT (guide with ball retention mechanism) cannot be selected.

(Note) In ISPB and SSPA, Lead 36mm and 48 mm cannot be selected.

(Note) The controllers applicable for WA (battery-less absolute) are SCON-CB/CGB, SCON-CAL/CGL, MSCON, SSEL-CS and XSEL-P/Q/R/S/RA/SA.

2. Specification

2.1 Maximum Speed

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

(1) ISB, ISPB

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

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]									
			100	150 200	250 300	350 400	450 500	550 600	650 700	750 800	850	900
SXM	60	4	240						165	130	100	100
		8	480						330	260	210	210
		16	960						655	515	415	415

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]									
			130	180 230	280 330	380 430	480 530	580	630 680	730 780	830	880
SXL	60	4	240						165	130	100	100
		8	480						330	260	210	210
		16	960						655	515	415	415

ISB

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]																				
			100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100
SXM	100	36	1100	1425	1700	1925	2075	2125	2160				2000	1740	1520	1340	1190	1065	960	865	790	721	660

ISB

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]																			
			130	180	230	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030	1080
SXL	100	36	1425	1700	1925	2075	2125	2160				2000	1740	1520	1340	1190	1065	960	865	790	721	660

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]											
			100	150 200	250 300	350 400	450 500	550 600	650 700	750 800	850 900	950 1000	1050	1100
MXM	100	5	300							215	170	140	115	115
		10	600							430	345	280	230	230
		20	1200							860	695	570	460	460
		30	1800							1290	1045	860	690	690
	200	5	300							215	170	140	115	115
		10	600							430	345	280	230	230
		20	1200							860	695	570	460	460
		30	1800							1290	1045	860	690	690

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]									
			120 170	220 270	320 370	420 470	520 570	620 670	720 770	820 870	920 970	1020	1070
MXL	100	5	300						215	170	140	115	115
		10	600						430	345	280	230	230
		20	1200						860	695	570	460	460
		30	1800						1290	1045	860	690	690
	200	5	300						215	170	140	115	115
		10	600						430	345	280	230	230
		20	1200						860	695	570	460	460
		30	1800						1290	1045	860	690	690

ISB

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]													
			100	150	200	250	300	350	400	450	500	550	600	650	700	750
MXM	400	48	1025	1325	1575	1825	2025	2200	2350	2400	2500					2270
			Stroke [mm]													
			800	850	900	950	1000	1050	1100	1150	1200	1250	1300			
			2030	1825	1645	1495	1365	1250	1150	1060	980	910	845			

ISB

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]													
			120	170	220	270	320	370	420	470	520	570	620	670	720	770
MXL	400	48	1325	1575	1825	2025	2200	2350	2400	2500					2270	2030
			Stroke [mm]													
			820	870	920	970	1020	1070	1120	1170	1220	1270				
			1825	1645	1495	1365	1250	1150	1060	980	910	845				

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]													
			100	150 200	250 300	350 400	450 500	550 600	650 700	750 800	850 900	950 1000	1050 1100	1150 1200	1250	1300
LXM	200	10	600								460	380	320	270	220	220
		20	1200								920	765	645	550	440	440
		40	2400								1840	1530	1290	1100	880	880
	400	10	600								460	380	320	270	220	220
		20	1200								920	765	645	550	440	440
		40	2400								1840	1530	1290	1100	880	880

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]												
			120 170	220 270	320 370	420 470	520 570	620 670	720 770	820 870	920 970	1020 1070	1120 1170	1220	1270
LXL	200	10	600							460	380	320	270	220	220
		20	1200							920	765	645	550	440	440
		40	2400							1840	1530	1290	1100	880	880
	400	10	600							460	380	320	270	220	220
		20	1200							920	765	645	550	440	440
		40	2400							1840	1530	1290	1100	880	880

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]											
			100	200	300	400	500	600	700	800	900	1000	1100	1200	1300
MXMX	200	20	—	—	—	—	—	—	—	1200				1100	1000
		30	—	—	—	—	—	—	—	1800				1650	1500
LXMX	200	20	—	—	—	—	—	—	—	—	—	1200			1150
	400	20	—	—	—	—	—	—	—	—	—	1200			1150
		40	—	—	—	—	—	—	—	—	—	2400			2300
LXUWX	200	20	—	—	—	—	—	—	—	—	—	1200			1150
	400	20	—	—	—	—	—	—	—	—	—	1200			1150
		40	—	—	—	—	—	—	—	—	—	2400			2300

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]											
			1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
MXMX	200	20	950	800	700	600	550	500	450	—	—	—	—	—
		30	1425	1200	1050	900	825	750	675	—	—	—	—	—
LXMX	200	20	1000	950	830	740	650	590	540	490	460	410	370	340
	400	20	1000	950	830	740	650	590	540	490	460	410	370	340
		40	2000	1900	1660	1480	1300	1180	1080	980	900	820	740	680
LXUWX	200	20	1000	950	830	740	650	590	540	490	440	430	370	340
	400	20	1000	950	830	740	650	590	540	490	440	430	370	340
		40	2000	1900	1660	1480	1300	1180	1080	980	880	840	740	680

ISB

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]													
MXMX	400	48	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450
			1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2065	1925	1805
			Stroke [mm]													
			1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000			
			1690	1590	1495	1410	1335	1265	1195	1135	1080	1025	980			

⚠ Caution: (1) Do not set speeds equal to or greater than the respective ratings. Doing so may result in vibration, failure or shorter life.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

(2) SSPA

Stroke and maximum speed (or speed to reach) limits (Unit: mm/s)

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]																
			100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
SXM	200	10	600											560	490	440	390	350	320	290
		20	1200											1120	990	880	780	710	640	580
		30	1800											1680	1480	1320	1180	1060	960	870
MXM	400	10	600													530	480	430	390	360
		20	1200													1070	960	870	790	720
		40	2400													2150	1930	1740	1580	1440
LXM	750	25	1080	1250																
			620	880			1080	1250												
	750	50	1080	1530			1870	2160			2420	2500								
			620	880			1080	1250			1400	1530		1650		1770		1870		

Size	Motor capacity [W]	Lead [mm]	Stroke [mm]									
			1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
SXM	200	10	260	240	220	—	—	—	—	—	—	—	—
		20	530	480	440	—	—	—	—	—	—	—	—
		30	790	730	670	—	—	—	—	—	—	—	—
MXM	400	10	330	300	280	250	240	220	200	—	—	—	—
		20	660	600	560	510	480	440	410	—	—	—	—
		40	1320	1210	1120	1030	960	890	830	—	—	—	—
LXM	750	25	1160		970		830		720		620		550
			1160		970		830		720		620		550
	750	50	2320		1950		1660		1440		1250		1100
			1970		1950		1660		1440		1250		1100

⚠ Caution: (1) Do not set speeds equal to or greater than the respective ratings. Doing so may result in vibration, failure or shorter life.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

2.2 Acceleration/Deceleration, Payload Capacity and Rated Thrust

If the payload capacity is smaller than as specified, the acceleration/deceleration can be raised beyond the applicable level.

(1) ISB, ISPB

Type	Size	Motor capacity [W]	Lead [mm]	Rated acceleration/ deceleration [G]	Maximum acceleration/ deceleration [G]	Horizontal/ Vertical	Payload capacity by acceleration/deceleration [kg]											Rated thrust [N]
							0.2G	0.3G	0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G	1.1G	1.2G	
Guide with ball retention mechanism (RT) not used	SXM SXL	60	4	0.2	0.5	Horizontal	55	50	38	30	-	-	-	-	-	-	-	212.3
				0.2	0.4	Vertical	14	13	12	-	-	-	-	-	-	-	-	
			8	0.4	0.7	Horizontal	27	27	27	20	15	12	-	-	-	-	-	106.1
				0.4	0.6	Vertical	7	7	7	6	5	-	-	-	-	-	-	
			16	0.4	1.2	Horizontal	13	13	13	10.5	8.5	7	6	5.5	4.5	4	3.5	53.1
				0.4	0.8	Vertical	3.5	3.5	3.5	3.0	2.6	2.3	2	-	-	-	-	
	MXM MXL	100	5	0.2	0.5	Horizontal	85	80	60	45	-	-	-	-	-	-	-	339.7
				0.2	0.4	Vertical	20	17	15	-	-	-	-	-	-	-	-	
			10	0.4	0.7	Horizontal	45	45	45	30	23	20	-	-	-	-	-	169.8
				0.4	0.6	Vertical	10	10	10	8	7	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	23	23	23	18	15	13	11	9	8	7	6	84.9
				0.4	1	Vertical	5	5	5	4.5	4	3.5	3	2.8	2.5	-	-	
			30	0.4	1.2	Horizontal	15	15	15	11	9	7	6	5	4	3.5	3	56.6
				0.4	1.2	Vertical	2.5	2.5	2.5	2.2	1.9	1.7	1.5	1.4	1.2	1.1	1	
	MXM MXL	200	5	0.2	0.5	Horizontal	110	100	90	80	-	-	-	-	-	-	-	683.6
				0.2	0.4	Vertical	40	34	30	-	-	-	-	-	-	-	-	
			10	0.4	0.7	Horizontal	90	90	90	66	51	40	-	-	-	-	-	341.8
				0.4	0.6	Vertical	20	20	20	17	15	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	45	45	45	35	28	23	20	17	15	13	12	170.9
				0.4	1	Vertical	10	10	10	8.5	7.5	7	6	5.5	5			
			30	0.4	1.2	Horizontal	30	30	30	24	20	17	15	13	12	10	9	113.9
				0.4	1.2	Vertical	6	6	6	5.5	5	4.5	4	3.5	3	2.5	2	
	MXMX	200	20	0.4	0.4	Horizontal	45	45	45	-	-	-	-	-	-	-	-	170.9
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
			30	0.4	0.4	Horizontal	30	30	30	-	-	-	-	-	-	-	-	113.9
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	

⚠ Caution: (1) Even when the acceleration/deceleration is less than the rated acceleration/deceleration, the payload capacity will not exceed the specified payload capacity at the rated acceleration/deceleration.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

(1) ISB, ISPB (continuous)

Type	Size	Motor capacity [W]	Lead [mm]	Rated acceleration/ deceleration [G]	Maximum acceleration/ deceleration [G]	Horizontal/ Vertical	Payload capacity by acceleration/deceleration [kg]											Rated thrust [N]
							0.2G	0.3G	0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G	1.1G	1.2G	
Guide with ball retention mechanism (RT) not used	LXM LXL	200	10	0.4	0.7	Horizontal	90	90	90	66	51	40	-	-	-	-	-	341.8
				0.4	0.6	Vertical	20	20	20	16	14	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	45	45	45	35	28	23	20	17	15	13	12	170.9
				0.4	1	Vertical	10	10	10	8.5	7.5	7	6	5.5	5			
			40	0.4	1.2	Horizontal	15	15	15	12	10.5	9	8	7.5	7	6.5	6	85.5
				0.4	1.2	Vertical	4	4	4	3.5	3.1	2.8	2.5	2.2	2.0	1.8	1.6	
	LXM LXL	400	10	0.4	0.7	Horizontal	120	120	120	92	73	60	-	-	-	-	-	678.3
				0.4	0.6	Vertical	40	40	40	34	30	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	90	90	90	70	57	47	40	35	30	27	24	339.1
				0.4	1	Vertical	20	20	20	17	15	14	12	11	10	-	-	
			40	0.4	1.2	Horizontal	40	40	40	32	27	23	21	19	17	16	15	169.6
				0.4	1.2	Vertical	10	10	10	8.5	7.5	7	6	5.5	5	4.5	4	
	LXMX	200	20	0.4	0.4	Horizontal	45	45	45	-	-	-	-	-	-	-	-	170.9
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
	LXMX	400	20	0.4	0.4	Horizontal	90	90	90	-	-	-	-	-	-	-	-	339.1
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
			40	0.4	0.4	Horizontal	40	40	40	-	-	-	-	-	-	-	-	169.6
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
	LXUWX	200	20	0.4	0.4	Horizontal	45	45	45	-	-	-	-	-	-	-	-	170.1
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
	LXUWX	400	20	0.4	0.4	Horizontal	90	90	90	-	-	-	-	-	-	-	-	339.1
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
			40	0.4	0.4	Horizontal	40	40	40	-	-	-	-	-	-	-	-	169.6
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	

⚠ Caution: (1) Even when the acceleration/deceleration is less than the rated acceleration/deceleration, the payload capacity will not exceed the specified payload capacity at the rated acceleration/deceleration.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

ISB

Type	Size	Motor capacity [W]	Lead [mm]	Rated acceleration/ deceleration [G]	Maximum acceleration/ deceleration [G]	Horizontal/ Vertical	Payload capacity by acceleration/deceleration [kg]											Rated thrust [N]
Guide with ball retention mechanism (RT) not used	SXM SXL	100	36	0.4	2.0	Horizontal	10.0	9.0	8.2	7.5	6.7	6.0	5.5	5.0	4.5	4.3	4.1	47.2
				0.4	1.6	Vertical	2	2	2	2	2	2	2	2	2	2	2	
							Payload capacity by acceleration/deceleration [kg]											
							1.5G	1.6G	1.7G	1.8G	1.9G	2.0G	-	-	-	-	-	
				0.4	2.0	Horizontal	4.0	3.9	3.8	3.7	3.6	3.5	-	-	-	-	-	
				0.4	1.6	Vertical	2	2	-	-	-	-	-	-	-	-	-	
				* When the actuator is installed in horizontal orientation, acceleration / deceleration can be increased to 3.0G at maximum if gain adjustment is conducted in the offboard tuning.。														
							Payload capacity by acceleration/deceleration [kg]											
							2.1G	2.2G	2.3G	2.4G	2.5G	2.6G	2.7G	2.8G	2.9G	3.0G	-	
				-	3.0	Horizontal	3.2	2.9	2.6	2.3	2.0	1.9	1.8	1.7	1.6	1.5	-	
	MXM MXL	400	48				Payload capacity by acceleration/deceleration [kg]											141.3
							0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G	1.1G	1.2G	1.3G	1.4G	
				0.4	2.0	Horizontal	20.0	19.1	18.2	17.3	16.4	15.5	14.6	13.8	13.0	12.6	12.2	
				0.4	1.6	Vertical	6	6	6	6	6	6	6	6	6	6	6	
							Payload capacity by acceleration/deceleration [kg]											
							1.5G	1.6G	1.7G	1.8G	1.9G	2.0G	-	-	-	-	-	
				0.4	2.0	Horizontal	11.8	11.4	11.0	10.8	10.4	10.0	-	-	-	-	-	
				0.4	1.6	Vertical	6	6	-	-	-	-	-	-	-	-	-	
				* When the actuator is installed in horizontal orientation, acceleration / deceleration can be increased to 3.0G at maximum if gain adjustment is conducted in the offboard tuning.。														
							Payload capacity by acceleration/deceleration [kg]											
							2.1G	2.2G	2.3G	2.4G	2.5G	2.6G	2.7G	2.8G	2.9G	3.0G	-	
				-	3.0	Horizontal	9.4	8.8	8.2	7.6	7.0	6.6	6.2	5.8	5.4	5.0	-	
	MXMX	400	48				Payload capacity by acceleration/deceleration [kg]											141.3
							0.4G	-	-	-	-	-	-	-	-	-	-	
				0.4	0.4	Horizontal	20.0	-	-	-	-	-	-	-	-	-	-	

⚠ Caution: (1) Even when the acceleration/deceleration is less than the rated acceleration/deceleration, the payload capacity will not exceed the specified payload capacity at the rated acceleration/deceleration.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

Type	Size	Motor capacity [W]	Lead [mm]	Rated acceleration/ deceleration [G]	Maximum acceleration/ deceleration [G]	Horizontal/ Vertical	Payload capacity by acceleration/deceleration [kg]											Rated thrust [N]
							0.2G	0.3G	0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G	1.1G	1.2G	
Guide with ball retention mechanism (RT) used	SXM	60	4	0.2	0.5	Horizontal	55	50	38	30	-	-	-	-	-	-	-	212.3
				0.2	0.4	Vertical	13.5	12.5	11.5	-	-	-	-	-	-	-	-	
			8	0.4	0.7	Horizontal	27	27	27	20	15	12	-	-	-	-	-	106.1
				0.4	0.6	Vertical	6.5	6.5	6.5	5.5	4.5	-	-	-	-	-	-	
			16	0.4	1.2	Horizontal	13	13	13	10.5	8.5	7	6	5.5	4.5	4	3.5	53.1
				0.4	0.8	Vertical	3.0	3.0	3.0	2.5	2.1	1.8	1.5	-	-	-	-	
	MXM	100	5	0.2	0.5	Horizontal	85	80	60	45	-	-	-	-	-	-	-	339.7
				0.2	0.4	Vertical	19.5	16.5	14.5	-	-	-	-	-	-	-	-	
			10	0.4	0.7	Horizontal	45	45	45	30	23	20	-	-	-	-	-	169.8
				0.4	0.6	Vertical	9.5	9.5	9.5	7.5	6.5	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	23	23	23	18	15	13	11	9	8	7	6	84.9
				0.4	1	Vertical	4.5	4.5	4.5	4.0	3.5	3.0	2.5	2.3	2.0	-	-	
			30	0.4	1.2	Horizontal	15	15	15	11	9	7	6	5	4	3.5	3	56.6
				0.4	1.2	Vertical	2.0	2.0	2.0	1.7	1.4	1.2	1.0	0.9	0.7	0.6	0.5	
	MXM	200	5	0.2	0.5	Horizontal	110	100	90	80	-	-	-	-	-	-	-	683.6
				0.2	0.4	Vertical	40	34	30	-	-	-	-	-	-	-	-	
			10	0.4	0.7	Horizontal	90	90	90	66	51	40	-	-	-	-	-	341.8
				0.4	0.6	Vertical	20	20	20	17	15	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	45	45	45	35	28	23	20	17	15	13	12	170.9
				0.4	1	Vertical	10	10	10	8.5	7.5	7	6	5.5	5	-	-	
			30	0.4	1.2	Horizontal	30	30	30	24	20	17	15	13	12	10	9	113.9
				0.4	1.2	Vertical	6	6	6	5.5	5	4.5	4	3.5	3	2.5	2	
	MXMX	200	20	0.4	0.4	Horizontal	45	45	45	-	-	-	-	-	-	-	-	170.9
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
			30	0.4	0.4	Horizontal	30	30	30	-	-	-	-	-	-	-	-	113.9
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
	LXM	200	10	0.4	0.7	Horizontal	90	90	90	66	51	40	-	-	-	-	-	341.8
				0.4	0.6	Vertical	19	19	19	15	13	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	45	45	45	35	28	23	20	17	15	13	12	170.9
				0.4	1	Vertical	9	9	9	7.5	6.5	6	5	4.5	4	-	-	
			40	0.4	1.2	Horizontal	15	15	15	12	10.5	9	8	7.5	7	6.5	6	85.5
				0.4	1.2	Vertical	3	3	3	2.5	2.1	1.8	1.5	1.2	1.0	0.8	0.6	
	LXM	400	10	0.4	0.7	Horizontal	120	120	120	92	73	60	-	-	-	-	-	678.3
				0.4	0.6	Vertical	40	40	40	34	30	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	90	90	90	70	57	47	40	35	30	27	24	339.1
				0.4	1	Vertical	20	20	20	17	15	14	12	11	10	-	-	
			40	0.4	1.2	Horizontal	40	40	40	32	27	23	21	19	17	16	15	169.6
				0.4	1.2	Vertical	10	10	10	8.5	7.5	7	6	5.5	5	4.5	4	
	LXMX	200	20	0.4	0.4	Horizontal	45	45	45	-	-	-	-	-	-	-	-	170.9
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
	LXMX	400	20	0.4	0.4	Horizontal	90	90	90	-	-	-	-	-	-	-	-	339.1
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
			40	0.4	0.4	Horizontal	40	40	40	-	-	-	-	-	-	-	-	169.6
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
	LXUWX	200	20	0.4	0.4	Horizontal	45	45	45	-	-	-	-	-	-	-	-	170.1
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
	LXUWX	400	20	0.4	0.4	Horizontal	90	90	90	-	-	-	-	-	-	-	-	339.1
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	
			40	0.4	0.4	Horizontal	40	40	40	-	-	-	-	-	-	-	-	169.6
				-	-	Vertical	-	-	-	-	-	-	-	-	-	-	-	

⚠ Caution: (1) Even when the acceleration/deceleration is less than the rated acceleration/deceleration, the payload capacity will not exceed the specified payload capacity at the rated acceleration/deceleration.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

ISB

Type	Size	Motor capacity [W]	Lead [mm]	Rated acceleration/ deceleration [G]	Maximum acceleration/ deceleration [G]	Horizontal/ Vertical	Payload capacity by acceleration/deceleration [kg]											Rated thrust [N]
							0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G	1.1G	1.2G	1.3G	1.4G	
Guide with ball retention mechanism (RT) used	SXM	100	36	0.4	2.0	Horizontal	10.0	9.0	8.2	7.5	6.7	6.0	5.5	5.0	4.5	4.3	4.1	47.2
				0.4	1.6	Vertical	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
							Payload capacity by acceleration/deceleration [kg]											
							1.5G	1.6G	1.7G	1.8G	1.9G	2.0G	-	-	-	-	-	
				0.4	2.0	Horizontal	4.0	3.9	3.8	3.7	3.6	3.5	-	-	-	-	-	
				0.4	1.6	Vertical	1.5	1.5	-	-	-	-	-	-	-	-	-	
				* When the actuator is installed in horizontal orientation, acceleration / deceleration can be increased to 3.0G at maximum if gain adjustment is conducted in the offboard tuning.。														
							Payload capacity by acceleration/deceleration [kg]											
							2.1G	2.2G	2.3G	2.4G	2.5G	2.6G	2.7G	2.8G	2.9G	3.0G	-	
				-	3.0	Horizontal	3.2	2.9	2.6	2.3	2.0	1.9	1.8	1.7	1.6	1.5	-	
	MXM	400	48				Payload capacity by acceleration/deceleration [kg]											141.3
							0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G	1.1G	1.2G	1.3G	1.4G	
				0.4	2.0	Horizontal	20.0	19.1	18.2	17.3	16.4	15.5	14.6	13.8	13.0	12.6	12.2	
				0.4	1.6	Vertical	6	6	6	6	6	6	6	6	6	6	6	
							Payload capacity by acceleration/deceleration [kg]											
							1.5G	1.6G	1.7G	1.8G	1.9G	2.0G	-	-	-	-	-	
				0.4	2.0	Horizontal	11.8	11.4	11.0	10.8	10.4	10.0	-	-	-	-	-	
				0.4	1.6	Vertical	6	6	-	-	-	-	-	-	-	-	-	
				* When the actuator is installed in horizontal orientation, acceleration / deceleration can be increased to 3.0G at maximum if gain adjustment is conducted in the offboard tuning.。														
							Payload capacity by acceleration/deceleration [kg]											
							2.1G	2.2G	2.3G	2.4G	2.5G	2.6G	2.7G	2.8G	2.9G	3.0G	-	
				-	3.0	Horizontal	9.4	8.8	8.2	7.6	7.0	6.6	6.2	5.8	5.4	5.0	-	
	MXMX	400	48				Payload capacity by acceleration/deceleration [kg]											141.3
							0.4G	-	-	-	-	-	-	-	-	-	-	
				0.4	0.4	Horizontal	20.0	-	-	-	-	-	-	-	-	-	-	

⚠ Caution: (1) Even when the acceleration/deceleration is less than the rated acceleration/deceleration, the payload capacity will not exceed the specified payload capacity at the rated acceleration/deceleration.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

(2) SSPA

Size	Type	Motor capacity [W]	Lead [mm]	Rated acceleration/ deceleration [G]	Maximum acceleration/ deceleration [G]	Horizontal/ Vertical	Payload capacity by acceleration/deceleration [kg]											Rated thrust [N]
							0.2G	0.3G	0.4G	0.5G	0.6G	0.7G	0.8G	0.9G	1.0G	1.1G	1.2G	
SXM	-	200	10	0.4	0.7	Horizontal	90	90	90	72	60	50	-	-	-	-	-	341.8
					0.6	Vertical	12	12	12	10	8	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	45	45	45	36	30	26	22.5	19.5	17	-	-	170.9
					1.2	Vertical	6	6	6	4.8	4	3.4	3	2.7	2.4	-	-	
			30	0.4	1.2	Horizontal	30	30	30	24	20	17	15	13	12	11	10	113.9
					1.2	Vertical	4	4	4	3.2	2.7	2.3	2	1.7	1.4	1.2	1	
MXM	-	400	10	0.4	0.7	Horizontal	120	120	120	96	80	70	-	-	-	-	-	678.3
					0.6	Vertical	25	25	25	20	16.5	-	-	-	-	-	-	
			20	0.4	1.2	Horizontal	90	90	90	72	60	51	45	39	34	-	-	339.1
					1.2	Vertical	12	12	12	9.6	8	6.9	6	5.3	4.8	-	-	
			40	0.4	1.2	Horizontal	45	45	45	36	30	25.5	22.5	19.5	17	15	13.5	169.6
					1.2	Vertical	6	6	6	4.8	4	3.4	3	2.7	2.4	2.2	2	
LXM	Guide with ball retention mechanism (RT) not used	750	25	0.4	1.2	Horizontal	120	120	120	96	80	69	60	53	48	44	40	510
						Vertical	25	25	25	20	17	14	13	11	10	9	8	
			50	0.4	1.2	Horizontal	60	60	60	48	40	34	30	27	24	22	20	255
						Vertical	12	12	12	10	8	7	6	5	5	4	4	
	Guide with ball retention mechanism (RT) used	750	25	0.4	1.2	Horizontal	120	120	120	96	80	69	60	53	48	44	40	510
						Vertical	23	23	23	18	15	12	11	9	8	7	6	
			50	0.4	1.2	Horizontal	60	60	60	48	40	34	30	27	24	22	20	255
						Vertical	10	10	10	8	6	5	4	3	3	2	2	

⚠ Caution: (1) Even when the acceleration/deceleration is less than the rated acceleration/deceleration, the payload capacity will not exceed the specified payload capacity at the rated acceleration/deceleration.

(2) In the case of interpolated operation of two or more orthogonal axes, make sure the command values (settings) of speed and acceleration/deceleration do not exceed the smallest values of all speeds and accelerations/decelerations of the applicable axes.
Even if any speed or acceleration/deceleration is set that exceeds the smallest speed or acceleration/deceleration among all applicable axes, the actual speed or acceleration/deceleration will be clamped to the smallest speed or acceleration/deceleration.

2.3 Driving System/Position Detector

The actuator is driven by the AC servo control method.

(1) ISB, ISPB

Size	Motor capacity [W]	Lead [mm]	Encoder pulses *1	Ball screw specification			
				Type	Diameter	ISB series	ISPB series
SXM SXL	60	4	Incremental Absolute 16384 Battery-less Absolute 131072	Rolled	ϕ 12mm	C10	C5 or equivalent
		8					
		16					
ISB-SXM/SXL	100	36		Rolled	ϕ 12mm	C10	-
MXM MXL	100	5		Rolled	ϕ 16mm	C10	C5 or equivalent
		10					
		20					
		30					
MXM MXL	200	5		Rolled	ϕ 16mm	C10	C5 or equivalent
		10					
		20					
		30					
ISB-MXM/MXL	400	48		Rolled	ϕ 16mm	C10	-
MXMX	200	20		Rolled	ϕ 16mm	C10	C5 or equivalent
		30					
ISB-MXMX	400	48		Rolled	ϕ 16mm	C10	-
LXM LXL	200	10		Rolled	ϕ 20mm	C10	C5 or equivalent
		20					
		40					
LXM LXL	400	10		Rolled	ϕ 20mm	C10	C5 or equivalent
		20					
		40					
LXMX	200	20		Rolled	ϕ 20mm	C10	C5 or equivalent
LXMX	400	20		Rolled	ϕ 20mm	C10	C5 or equivalent
		40					
LXUWX	200	20		Rolled	ϕ 20mm	C10	C5 or equivalent
LXUWX	400	20		Rolled	ϕ 20mm	C10	C5 or equivalent
		40					

*1 Number of pulses input to the controller.

(Note) In Pulse Train Control Mode for SCON-CB Controller, the setting of denominator and numerator for electronic gear ratio is restricted by the upper limit of internal calculation.
For battery-less absolute type, it will be restricted even more as the number of encoder pulse is high.
In case it gets restricted, have a countermeasure such as to adjust the movement per unit.
[Refer to the instruction manuals of SCON-CB controller for details]

(2) SSPA

The actuator is driven by the AC servo control method.

Size	Motor capacity [W]	Lead [mm]	Encoder pulses*1	Ball screw		
				Type	Diameter	
SXM	200	10	16384	Rolled	ϕ 16 mm	C5 or equivalent
		20				
		30				
MXM	400	10		Rolled	ϕ 20 mm	C5 or equivalent
		20				
		40				
LXM	750	25		Rolled	ϕ 25 mm	C5 or equivalent
		50				

*1 This is a number of pulses entered in the controller.

2.4 Positioning Precision

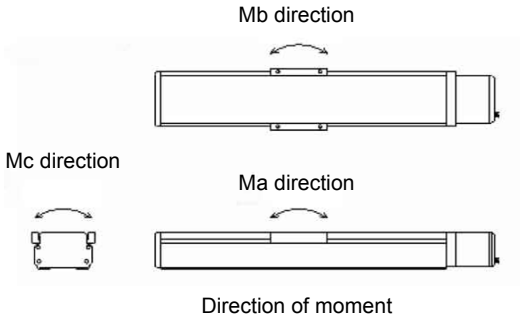
Item	Functions			
	ISB	ISPB (Incremental Absolute)	ISPB (Battery-less Absolute)	SSPA
Positioning repeatability*1	±0.01 mm	±0.005 mm	±0.003 mm	±0.005 mm
Backlash*1	0.05 mm or less	0.02 mm or less	0.02 mm or less	0.02 mm or less

*1 Initial value

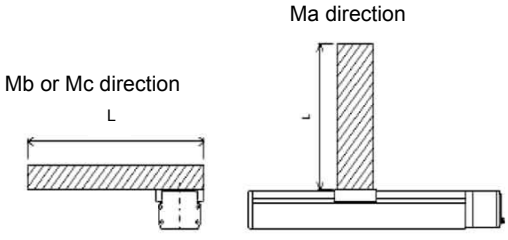
2.5 Allowable Moment of the Actuator

(1) ISB, ISPB

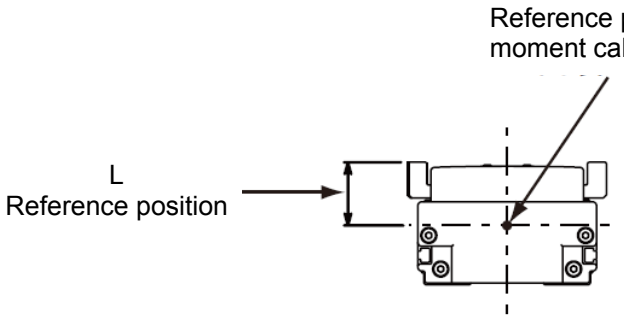
Size	Static allwable moment [N·m]			Dynamic allowable moment [N·m]			Allowable overhang load length (L)
	Ma	Ma	Mb	Mc	Mb	Mc	
SXM	143.8	205.4	336.0	32.9	47.0	76.8	Ma direction: 450 Mb or Mc direction: 450
SXL	216.0	308.5	415.1	46.3	66.2	89.0	Ma direction: 550 Mb or Mc direction: 550
MXM	341.5	487.0	796.5	81.0	116.0	189.0	Ma direction: 600 Mb or Mc direction: 600
MXL	560.3	800.2	1030.8	123.0	176.0	227.0	Ma direction: 600 Mb or Mc direction: 600
MXMX	341.5	487.0	796.5	81.0	116.0	189.0	Ma direction: 600 Mb or Mc direction: 600
LXM	560.2	800.1	1325.3	123.0	176.0	291.0	Ma direction: 750 Mb or Mc direction: 750
LXL	774.6	1106.4	1566.3	162.0	231.0	327.0	Ma direction: 900 Mb or Mc direction: 900
LXMX	560.2	800.1	1325.3	123.0	176.0	291.0	Ma direction: 750 Mb or Mc direction: 750
LXUWX	746.7	1066.4	1086.7	299.0	427.0	292.0	Ma direction: 1250 Mb or Mc direction: 1250



Direction of moment



Direction of allowable overhang

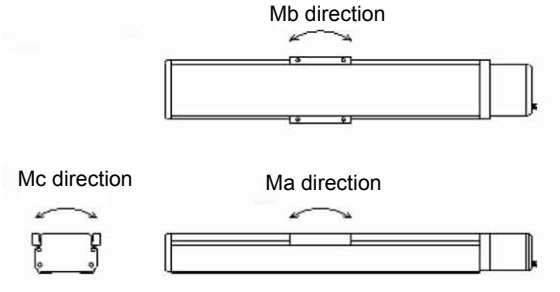


	L [mm]
SXM	30
SXL	30
MXM	37.5
MXL	37.5
MXMX	37.5
LXM	44.5
LXL	44.5
LXMX	44.5
LXUWX	44.5

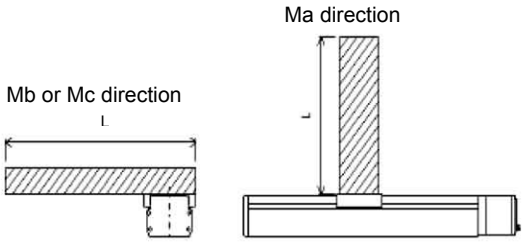
⚠ Caution: Make sure the load installed on the actuator is not longer than the allowable overhang load length (L). If the load is longer than L, vibration may occur or the settling time may increase depending on the position of center of gravity position or weight of the work part.
If a moment exceeding the allowable moment is applied, not only the life of the guide will become shorter but vibration or longer settling time may also result.

(2) SSPA

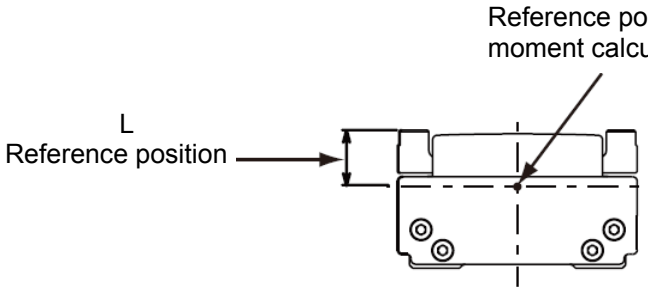
Size	Static allowable moment [N·m]			Dynamic allowable moment [N·m]			Allowable overhang load length (L)
	Ma	Mb	Mc	Ma	Mb	Mc	
SXM	190	190	530	43.4	43.4	116	Ma direction: 450 Mb or Mc direction: 450
MXM	470	470	1210	107	107	276	Ma direction: 600 Mb or Mc direction: 600
LXM	750	750	1850	162	162	391	Ma direction: 750 Mb or Mc direction: 750



Direction of moment



Direction of allowable overhang



	L [mm]
SXM	45.0
MXM	48.5
LXM	50.5

⚠ Caution: Make sure the load installed on the actuator is not longer than the allowable overhang load length (L). If the load is longer than L, vibration may occur or the settling time may increase depending on the position of center of gravity position or weight of the work part.
If a moment exceeding the allowable moment is applied, not only the life of the guide will become shorter but vibration or longer settling time may also result.

3. Life

The mechanical life of the actuator is represented by that of the guide receiving the greatest moment load.
Operation life of the linear guide is to be determined by the total driving distance which can reach without having 90% flaking (peeling on rail surface).
Operation life can be figured out with the calculation method shown below.

3.1 How to Calculate Operation Life

For the operation life of the linear guide, use the dynamic allowable moment stated in 1.2 Specifications, and figure out with the formula below.

$$L = \left(\frac{C_M}{M} \right)^3 \cdot 10000\text{km}$$

L : Operation life (km) C_M : Dynamic allowable moment (N·m)
M : Moment to work (N·m) 10000km : Standard rated life of Single-Axis actuator

In addition, have a calculation for the drop of life with the formula below if there is a concern that the life could drop due to the condition of vibration or way to be attached.

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{ws}}{f_w} \cdot \frac{1}{f\alpha} \right)^3 \cdot 10000\text{km}$$

L : Operation life (km) C_M : Dynamic allowable moment (N·m)
M : Moment to work (N·m) f_{ws} : Standard operational coefficient
f_w : Load coefficient $f\alpha$: Attachment coefficient
10000km : Standard rated life of Single-Axis actuator

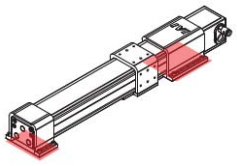
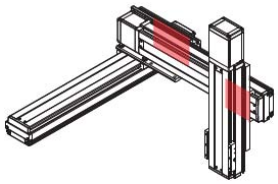
Explained below is regarding the standard operational coefficient f_{ws}, load coefficient f_w and attachment coefficient $f\alpha$.
Refer to the contents below to set them up.

[Standard operatinal coefficient f_{ws}]
For Single-Axis actuator described in this manual, f_{ws} = 1.2. It is a coefficient defined for each model, some models such as RCS3 high-speed type is 1.35.

[Load coefficient f_w]
It is a coefficient to consider the life drop due to operational conditions.

Load coefficient f_w	Operation Condition	Reference for acceleration/deceleration
1.0 to 1.5	Small vibration or impact in slow operation	1.0G or less
1.5 to 2.0	Medium level vibration or impact, sudden acceleration and Immediate braking	1.0G to 1.2G

[Attachment coefficient f_α]
Attachment coefficient f_α is a coefficient to consider the life drop due to the condition of actuator attachment.

Attachment coefficient f_α	1.0	1.2	1.5
Attached condition	Attachment in whole area	Attachment on both ends	Attachment on spots
			

* As the figures are those in common for each manual, they are not for IS(P)B, SSPA Replace to figures for IS(P)B, SSPA and select the attachment coefficient.
* Even when in attachment in whole area, and the actuator is seated in the whole length of the product, select 1.2 or 1.5 for the attachment coefficient depending on the position of screw fixing.
* For attachment in whole area, use all of the tapped holes (counterbored holes) on the seat surface to fix.

3.2 Operation Life

The operation life depends on the moment to work. With light load, it will be longer than 10,000km, the standard rated life. With no consideration of vibration and attachment condition, the operation life is 80,000km according to the calculation with formula in the previous page underassumption that 0.5 C_M (half of dynamic allowable moment) of moment is applied on. It shows that it can be 8 times longer than the standard rated life, which is 10,000km.

4. Installation and Storage/Preservation Environment

4.1 Installation Environment

The actuator should be installed in a location other than those specified below.
In general, the installation environment should be one in which an operator can work without protective gear.
Also provide sufficient work space required for maintenance inspection.

- Where the actuator receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 0 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds 85% RH
- Where the actuator receives direct sunlight
- Where the actuator is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of powder dust, salt or iron (at level exceeding what is normally expected in an assembly plant)
- Where the actuator is subject to splashed water, oil (including oil mist or cutting fluid) or chemical solutions
- Where the actuator receives impact or vibration

If the actuator is used in any of the following locations, provide sufficient shielding measures:
- Where noise generates due to static electricity, etc.
- Where the actuator is subject to a strong electric or magnetic field
- Where the actuator is subject to ultraviolet ray or radiation

4.2 Storage/Preservation Environment

The storage/preservation environment should be similar to the installation environment. In addition, make sure condensation will not occur when the actuator is to be stored or preserved for a long period of time. Unless 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 60ºC during a short storage/preservation period, but only up to 50ºC if the storage/preservation period is longer than one month.

The actuator should be lying flat during storage/preservation.
If the actuator is to be stored in a packed state, follow the specified actuator position if indicated.

5. Transportation

5.1 Handling a Single Axis

5.1.1 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 or transported, 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 heavy objects, or objects having a section where loads concentrate, on top of the shipping box.

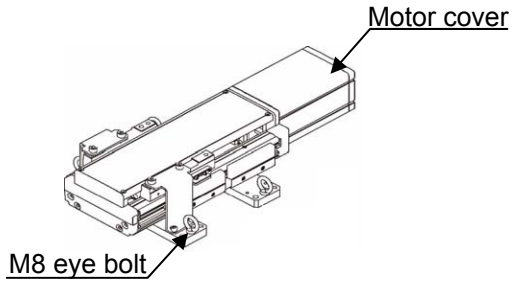
5.1.2 Handling an Actuator after Unpacking

(1) ISB, ISPB

- 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.
- In the case of the high-precision straightness specification type, be careful not to make a damage and the traces of hitting at the base bottom.
  There is a possibility that the running accuracy changes.

(2) SSPA

- Four eye bolts are installed, so use these eye bolts to transport the actuator. The SSPA, when unpacked, looks like the condition shown in the figure below.



- Do not hold the motor cover when transporting the SSPA. Doing so may damage the cover due to the weight of the actuator or the main unit may fall.
- Do not transport the actuator by holding the cable, or move it by pulling the cable.
- Be careful not to bump the actuator against anything when transporting it.
- Do not apply excessive force on any of the actuator parts.
- In the case of the high-precision straightness specification type, be careful not to make a damage and the traces of hitting at the base bottom.
  There is a possibility that the running accuracy changes.

5.2 Handling an Cartesian Robot (ICS)

Take note of the following points when transporting a set of axes that have been combined.

5.2.1 Handling a Package

Before shipment, combined axes are packed in an outer frame nailed to the base made of square lumbers. Each slider is secured to prevent accidental movement during transport. Each actuator end is also secured to prevent oscillating due to external vibration.

- Do not bump or drop the package. The package is not designed to withstand the impact of dropping or bumping.
- An operator must not attempt to carry a heavy package alone. Transport the package using an appropriate transport means.
- When hoisting the package using ropes, etc., support the square lumber base at the reinforcements at the bottom. Similarly when lifting the package with a forklift, insert the forks at the bottom of the square lumber base.
- When setting down the package, be careful not to let the package receive shock or bounce.
- Do not step onto the package.
- Do not put any article on the package which may deform or damage the package.

5.2.2 Handling an Actuator after Unpacking

- Secure the sliders to prevent sudden movement during transport.
- If any end of the actuator is overhanging, secure it properly to avoid significant movement due to external vibration.
- If the actuator assembly is transported without the ends being secured, do not apply an impact of 0.3 G or more.
- When hoisting the actuator using ropes, etc., use appropriate cushioning materials to protect the actuator against strain or distortion. Also keep a stable, horizontal posture. If necessary, use the tapped mounting holes provided on the bottom face of the base to install hoisting jigs.
- Be careful not to apply a load on any of the actuator brackets or covers or on the connector box. Also, do not allow the cable to be pinched or deformed excessively.

5.3 Handling an Actuator Assembled to a Mechanical System

When transporting an actuator that has been assembled to a mechanical system, as the whole system, take note of the following points:

- Secure the sliders to prevent sudden movement during transport.
- If any end of the actuator is overhanging, secure it properly to avoid significant movement due to external vibration.
- If the actuator assembly is transported without the ends being secured, do not apply an impact of 0.3 G or more.
- When hoisting the mechanical system using ropes, etc., prevent the actuator, connector box, etc., from receiving a load. Also make sure the cables are not pinched or deformed unnaturally.

6. Installation

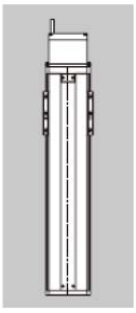
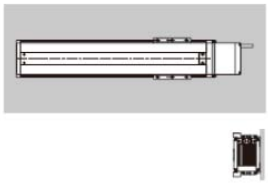
6.1 Installation Orientations

Actuators are subject to certain limitations regarding their installation orientations.
If an actuator is installed in an orientation not allowed for that actuator, the stainless sheet may break or other problems may occur.

○: Installable　△: Unavailable to mount less than 1300mm for stroke　x: Not Installable

Type	Horizontal installation	Vertical installation	Sideway installation	Ceiling mount installation
ISB, ISPB SXM/SXL/MXM/ MXL/LXM/LXL	○	○	○	○
ISB, ISPB MXMX/LXMX/ LXUWX	○	X	X	△
SSPA	○	○	○	○

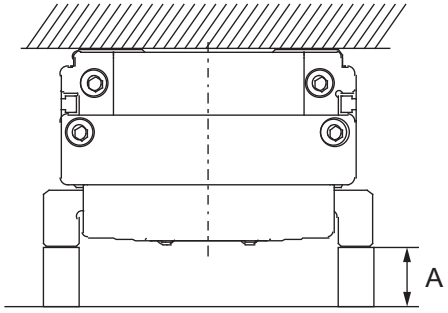
Installation orientations

Horizontal	Vertical	Sideway	Ceiling mount
			

⚠ Caution:

1. When installing the actuator vertically, make sure the motor comes to the top. When the actuator is installed with the motor at the bottom, there shouldn't be any problems during normal operations. If the actuator is not operated for an extended period of time, however, depending on the ambient environment (especially at high temperature) grease may separate and base oil may flow into the motor unit, causing problems on rare occasions.
   In the case of Sideway installation, base oil may flow out from the aperture on the side of the actuator, causing problems on rare occasions.
2. If the actuator is installed in horizontally oriented wall mount, it is easy for a foreign object to get inside the actuator from the opening on the side of the actuator.
3. In the Ceiling mount installation, the screw cover may bend, and it will be likely to interfere with the work part. ISB, when it exceeds the stroke 600mm, SSPA, when it exceeds the stroke 800mm, separate the work etc from slider seating surface and install.

Type	Stroke	Distance
ISB ISPB	600mm or more less than 1000mm	5mm or more
	1000mm or more less than 1300mm	10mm or more
SSPA	800mm or more less than 1500mm	5mm or more

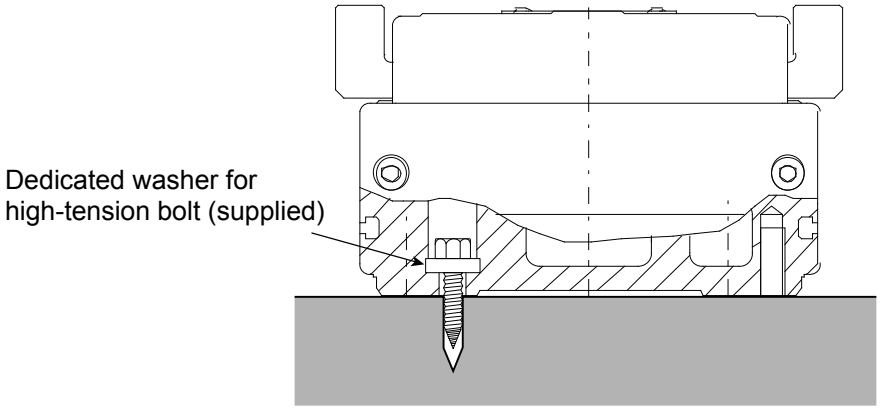


Work seating surface

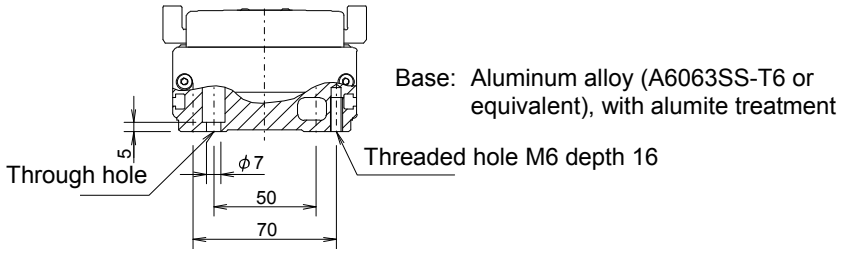
6.2 Installing the Actuator

6.2.1 Installation Method

- Use the threaded holes on the back of the base to install the actuator. Actuators of intermediate support type (MXMX/LXMX/LXUWX) don't have threaded holes. Actuators have through holes, in addition to the aforementioned threaded holes, so that the actuator can be installed using hexagonal socket-head bolts that are guided through from the actuator side. If the throw holes are used, remove the screw cover and install them from the top surface.
- Actuators of intermediate support type (MXMX/LXMX/LXUWX) are installed in the same way as the corresponding actuators without intermediate support. However, be careful not to remove or get caught by the wire rope for the intermediate support during installation.
- When positioning pins are used, use pins with an engagement tolerance of h7 or equivalent.
- Positioning can be performed by pushing the reference surface on the side of the base. [Refer to 6.2.2, "Precision of the Installation Surface."]
- Use high-tension bolts conforming to ISO 10.9 or higher.
- When the threaded holes are used, determine the required thread length as specified below:
  - ISB, ISPB
    Depth of threaded hole > Thread engagement length > Nominal thread size x 1.8
  - SSPA
    Depth of threaded hole > Thread engagement length > Nominal thread size
- If the through holes are used for installation, provide the following effective engagement length, whichever is applicable, for the female thread:
  - If the female thread is made of steel, same as the nominal diameter
  - If the female thread is made of aluminum, 1.8 times of nominal diameter
- If the bolt seating surface is aluminum, or the through holes are used, also use high-tension bolts with dedicated washers. Failure to do so may cause the seating surface to buckle.



- ISB, ISPB: Small type SXM/SXL
  The installation method is shown by a section view.

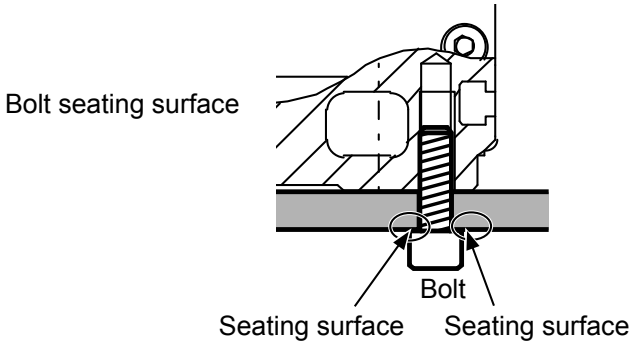


[Through hole]

Installation bolt	Tightening torque
M6	5.4 N·m

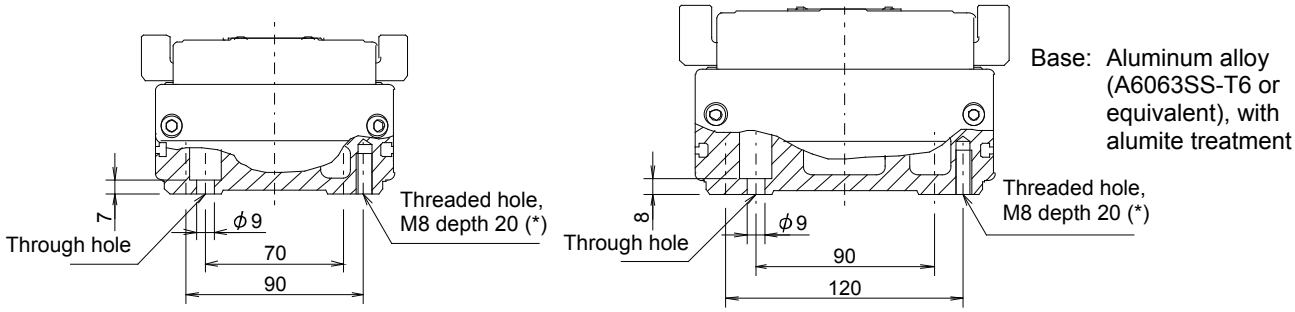
[Threaded hole]

Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M6	12.3 N·m	5.4 N·m



⚠ Warning: The threaded holes are not through, so exercise caution when selecting the bolt length. Use of inappropriate bolts may damage the threaded holes or result in insufficient mounting strength of the actuator, leading to a lower precision or unexpected accident.

- ISB, ISPB: Medium type MXM/MXL/MXMX, Large type LXM/LXL/LXMX/LXUWX
  The installation method is shown by a section view.



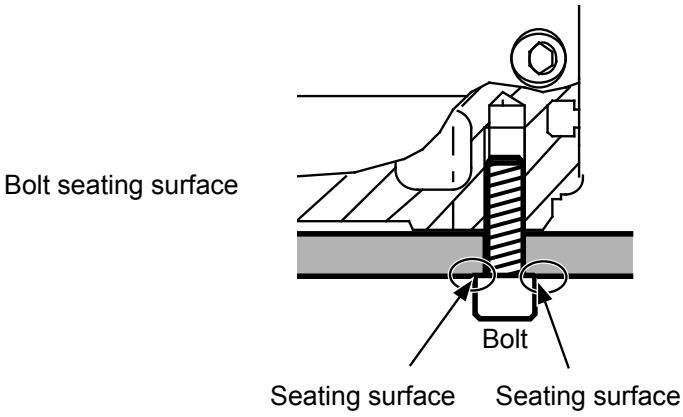
(Note) Threaded hole indicated with (*) in the figure above is not provided on the intermediate support type (MXMX/LXMX/LXUWX).

[Through hole]

Installation bolt	Tightening torque
M8	11.5 N·m

[Threaded hole]

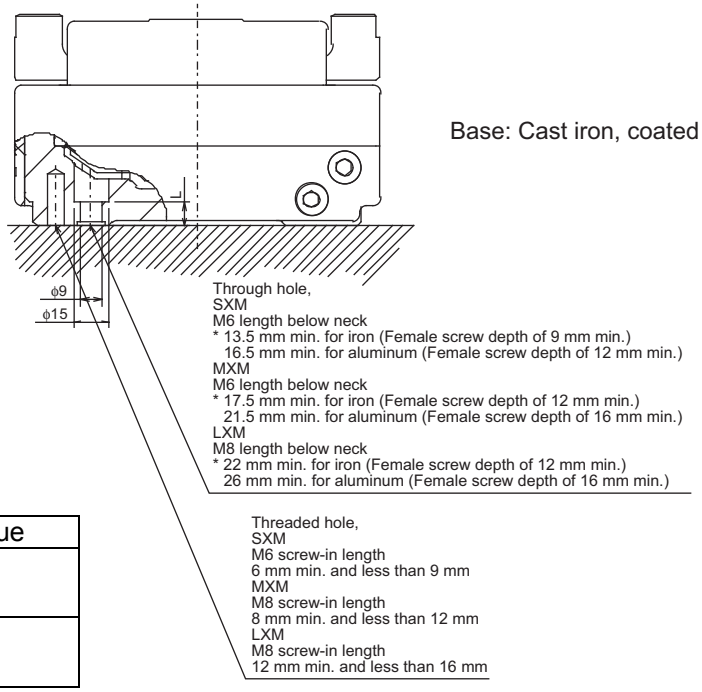
Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M8	30.0 N·m	11.5 N·m



⚠ Warning: The threaded holes are not through, so exercise caution when selecting the bolt length. Use of inappropriate bolts may damage the threaded holes or result in insufficient mounting strength of the actuator, leading to a lower precision or unexpected accident.

● SSPA

The installation method is shown by a section view.



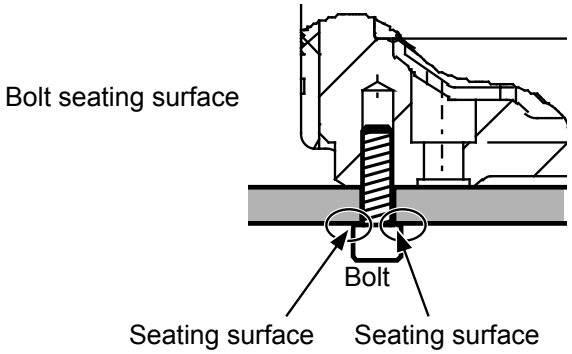
	L [mm]
SXM	6
MXM	8
LXM	10

[Through hole]

Installation bolt	Tightening torque
M6	5.4 N•m
M8	11.5 N•m

[Threaded hole]

Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M6	12.3 N•m	5.4 N•m
M8	30.0 N•m	11.5 N•m

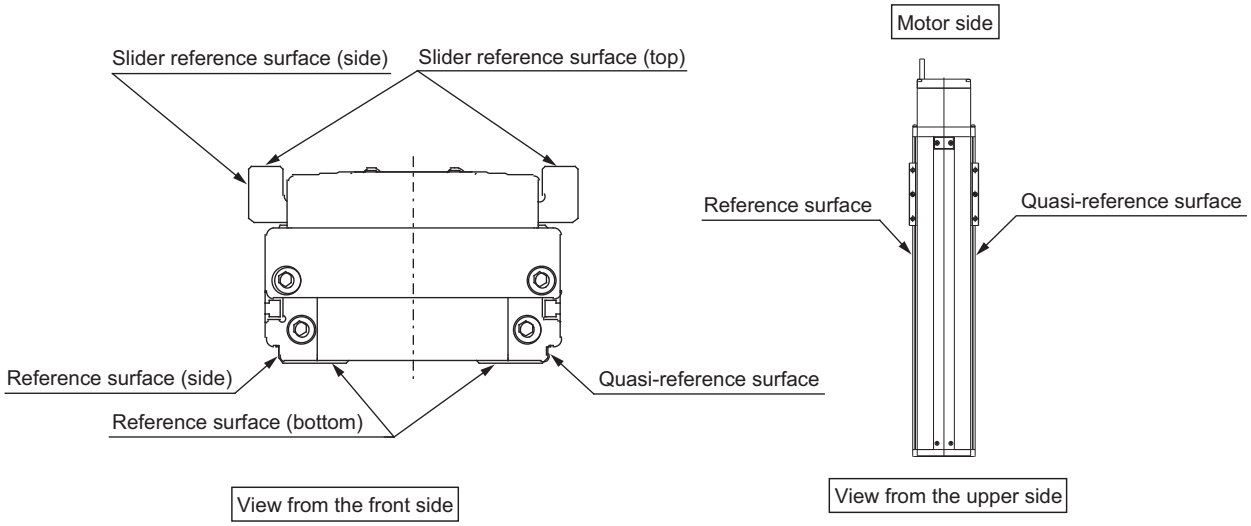


⚠ Warning: The threaded holes are not through, so exercise caution when selecting the bolt length. Use of inappropriate bolts may damage the threaded holes or result in insufficient mounting strength of the actuator, leading to a lower precision or unexpected accident.

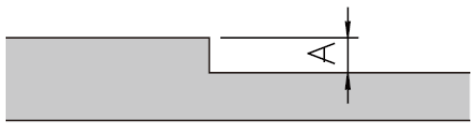
6.2.2 Precision of the Installation Surface

- The frame on which the actuator is installed shall have sufficient structural rigidity to remain free from vibration, etc.
- The basis of measurement of the running accuracy of the slider is from the lower side and motor side to right side.
  If accuracy for its run is required, use these surfaces as a datum of the installation.
  In view of the motor side, the parallelism of the quasi-reference surface of left side to the reference surface is 0.1mm or less.
- The surface where the actuator, excluding the high-precision straightness specification (model number: ST (optional)), 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/m. If the installation surface is rough, abnormal noise or other problems may occur due to poor contact of the actuator.
- Install the actuator, excluding the high-precision straightness specification (model number: ST (optional)), after removing any dirt on the base surface on a flat surface with a precision of the flatness of 0.02 mm/m.
  [For the high-precision straightness specification (model number: ST (optional)), refer to 10.8, “High-Precision Straightness Specification.”]
- Provide enough space around the actuator so that maintenance work can be carried out.

● ISB, ISPB: Small type SXM/SXL, Medium type MXM/MXL/MXMX, Large type LXM/LXL/LXMX/LXUWX



- When using the base or slider reference surface (side), provide a contact surface of the following dimension.

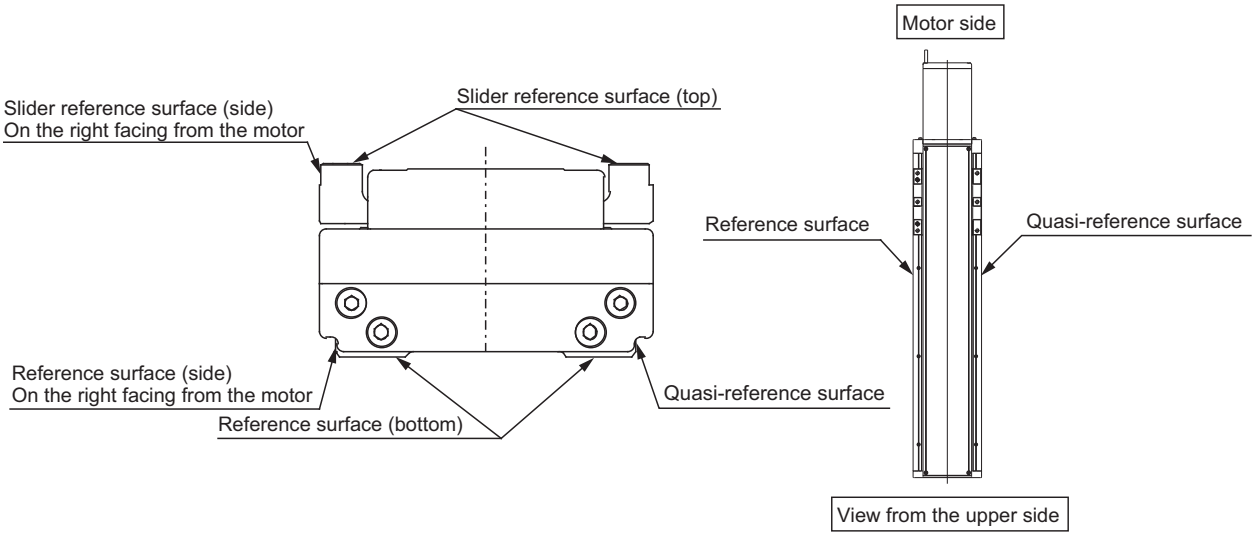


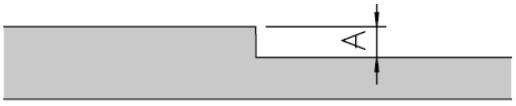
Dimension of the contact surface to the reference surface

Size	Reference Surface	Dimension A
S	Slider reference surface (side)	2 to 9
	Base reference surface (side)	3 to 5
M	Slider reference surface (side)	2 to 9
	Base reference surface (side)	3 to 7.5
L	Slider reference surface (side)	2 to 9
	Base reference surface (side)	3 to 8

- SSPA

Unless it is the optional rust-proof model (model code: MD), there is no rust-proof treatment (plating or paint coating) conducted on the base datum surface (bottom surface and datum side surface) nor slider datum surface (top surface and datum side surface).
Before installing the actuator and the work part, remove any dirt or oil from the reference surface with a waste cloth soaked with alcohol and grease, wipe it off again with a dry waste cloth, and brush paint it with anti-corrosion oil.
(JIS K 2246 NP-3-1 or equivalent anti-corrosion oil is applied when shipped from IAI.)





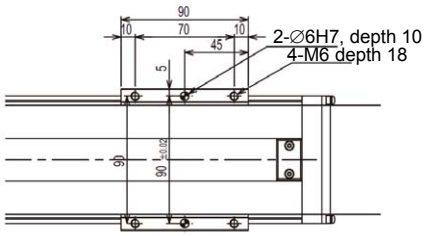
Shoulder dimensions to the base and slider reference surfaces (side)

Type	A
Slider reference surface (side)	2 to 9
Base reference surface (side)	3 to 8

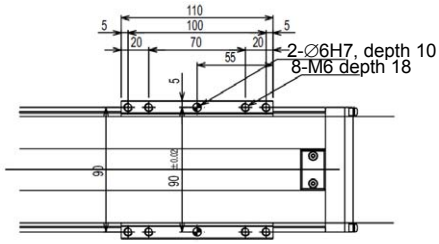
6.3 Installing the Load on the Slider

- The slider has threaded holes, so affix the load using these holes. The affixing method shall conform to the method for installing the actuator.
- Similarly when the slider is affixed and actuator is moved, install the slider using these threaded holes on the slider.
- The slider has two reamed holes. If repeatability is required after removal/re-installation, use positioning pins. If squareness is required, use one positioning pin and make installation adjustment.
- After removal/re-installation, repeatability can also be ensured by pushing the reference surface on the side of the base.
- Use high-tension bolts conforming to ISO 10.9 or higher.
- When the threaded holes are used, determine the required thread length as specified below:
  - ISB, ISPB
    Depth of threaded hole > Thread engagement length > Nominal thread size x 1.8
  - SSPA
    Depth of threaded hole > Thread engagement length > Nominal thread size

● ISB, ISPB: Small type SXM/SXL



SXM slider

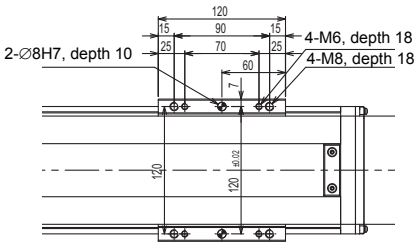


SXL slider

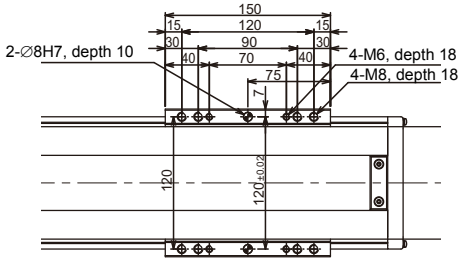
Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M6	12.3 N•m	5.4 N•m

(Note) When using positioning holes, use pins with an engagement tolerance of h7 or equivalent.

● ISB, ISPB: Medium type MXM/MXL/MXMX



MXM/MXMX slider

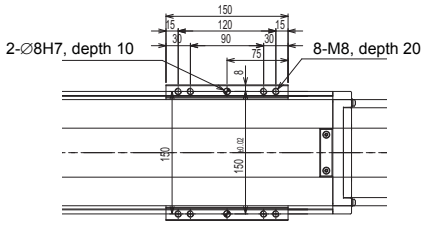


MXL slider

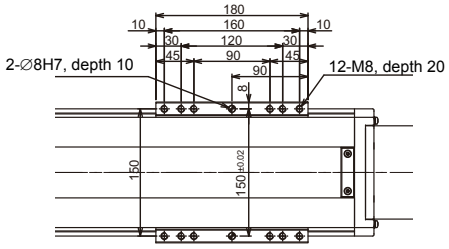
Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M6	12.3 N·m	5.4 N·m
M8	30.0 N·m	11.5 N·m

(Note) When using positioning holes, use pins with an engagement tolerance of h7 or equivalent.

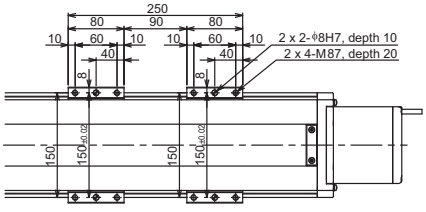
● ISB, ISPB: Large type LXM/LXL/LXMX/LXUWX



LXM/LXMX slider



LXL slider

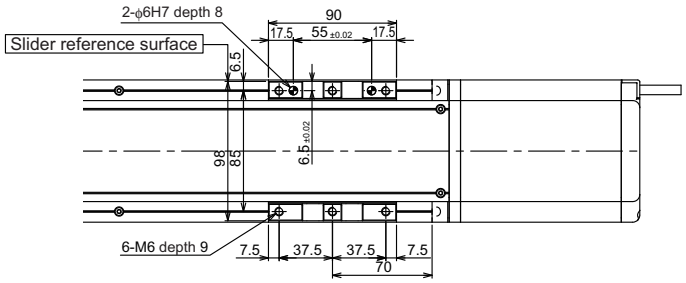


LXUWX slider

Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M8	30.0 N·m	11.5 N·m

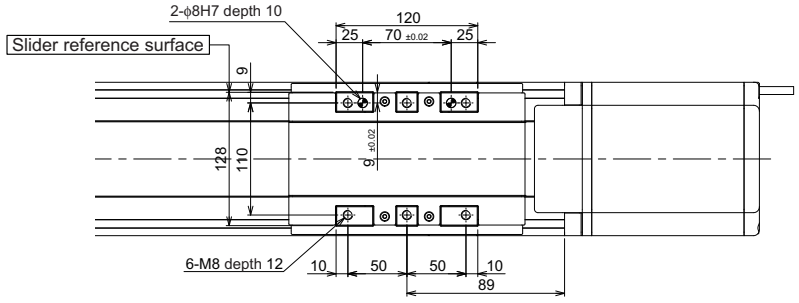
(Note) When using positioning holes, use pins with an engagement tolerance of h7 or equivalent.

- SSPA: Small type SXM



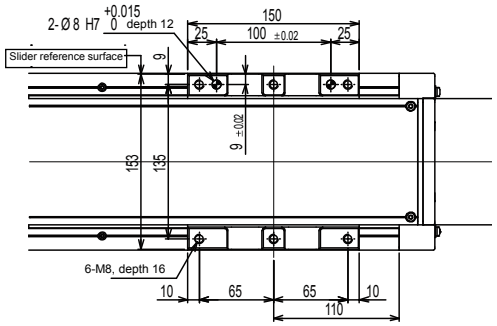
Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M6	12.3 N·m	5.4 N·m

- SSPA: Medium type MXM



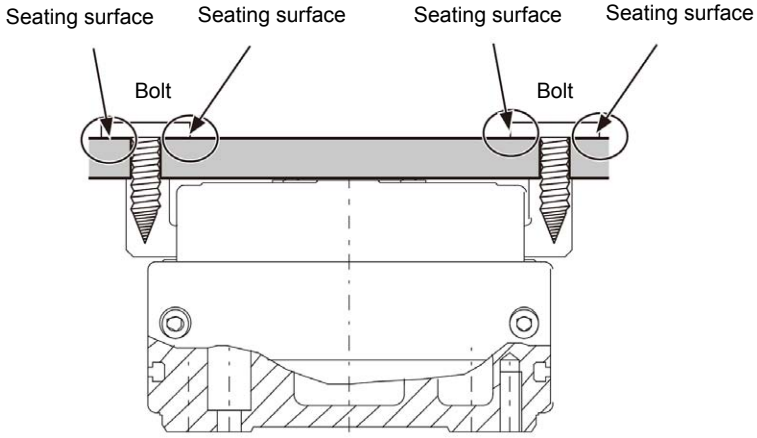
Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M8	30.0 N·m	11.5 N·m

● SSPA: Large type LXM



Installation bolt	Tightening torque	
	Bolt seating surface is steel	Bolt seating surface is aluminum
M8	30.0 N•m	11.5 N•m

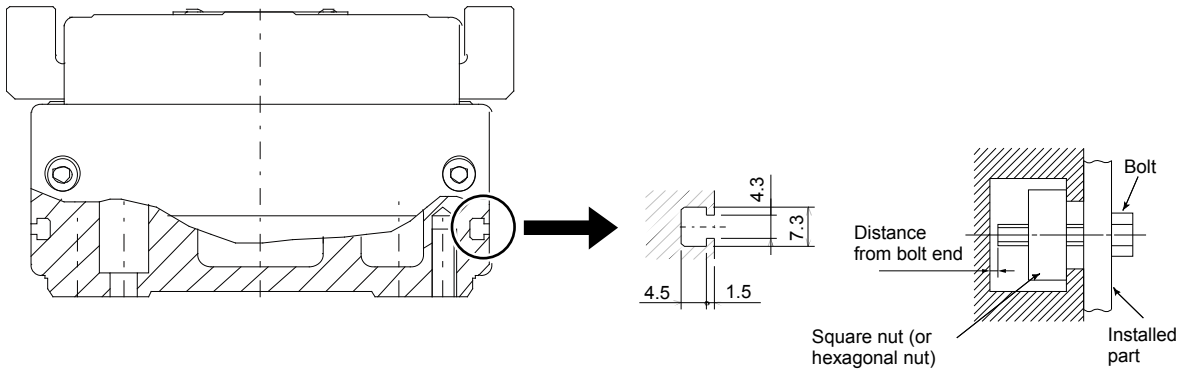
(Note) When using two positioning holes, use a pin with a hole of h7 or equivalent and another with a hole of g6.



Bolt seating surface

6.4 Using T-slots

M4 T-slots for installing the connector box, etc. are provided on the side face of the base of ISB or ISPB, when configuring the orthogonal axes. (See the figure below.)
You can also use these T-slots freely for installing sensors, securing wires or for other purposes as necessary.

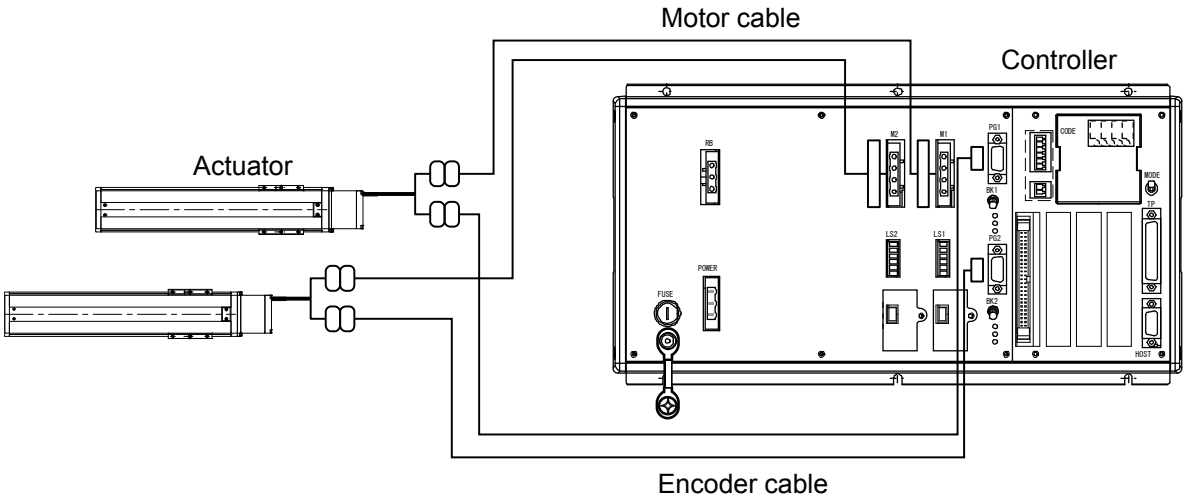


⚠ Caution: Square nuts are recommended for use with T-slots, but general hexagonal nuts can also be used. When installing blots in T-slots, pay attention to the length of each bolt to prevent the bolt end from contacting the bottom of the T-slot.

7. Connecting the Controller

7.1 Wiring

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

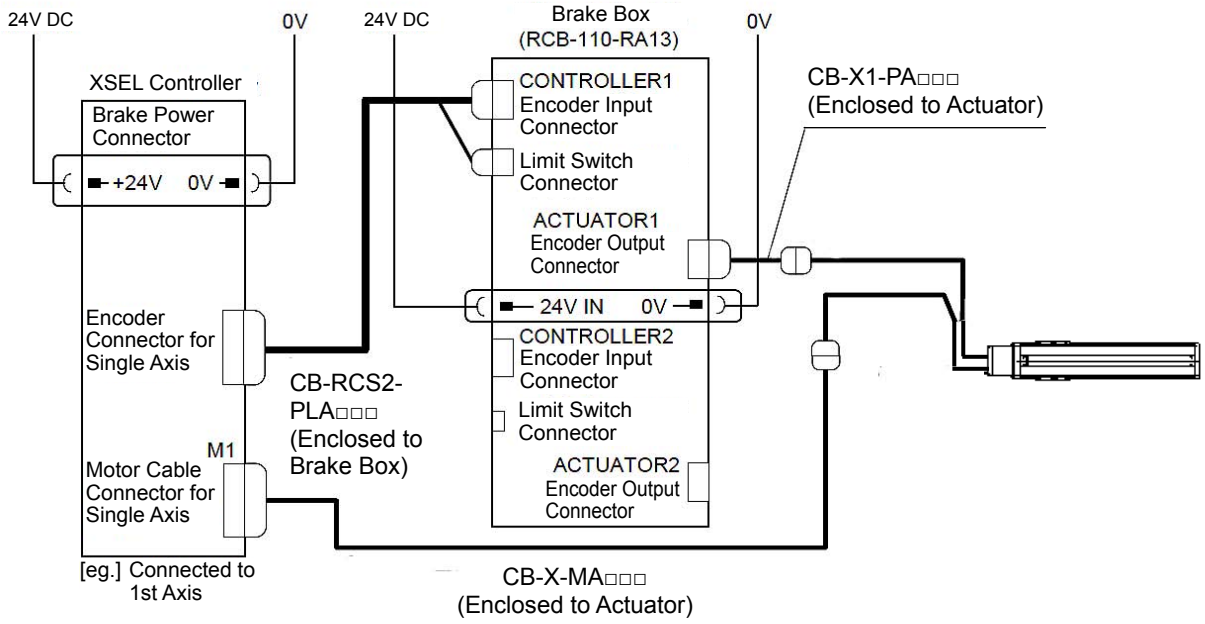


Example of connection with XSEL Controller

[For details on extension cables, refer to 11, “Motor/Encoder Cables.”]

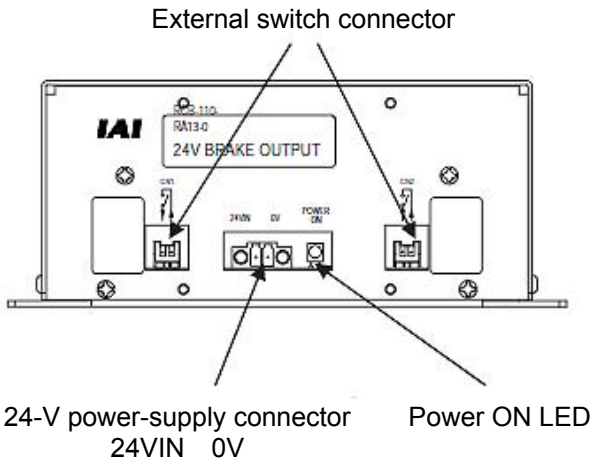
In case of a special-ordered uint, there could be a case that a motor equipped with a brake with 24V DC brake operation voltage. In such a case, it is necessary to have a brake box.
(If it is a standard unit, it should have a motor equipped with a brake with 45V DC brake operation voltage mounted, thus there is no need of a brake box.)

- Link a brake box between an actuator and the controller as the wiring diagram below shows.
  Refer to the next page for the linkable connectors.
- Supply +24V power to the 24V power connector on the brake box.

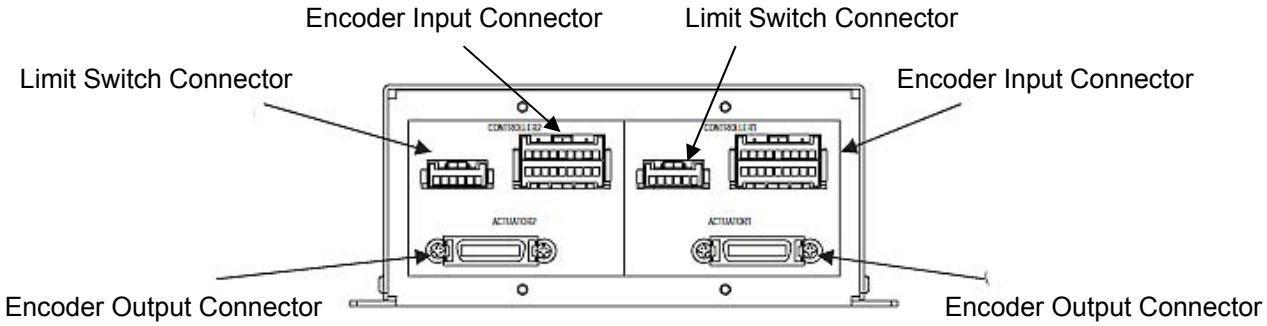


◎Brake Box (RCB-110-RA13)

[Front view]

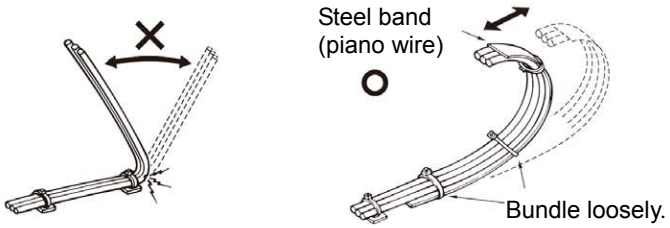


[Rear view]

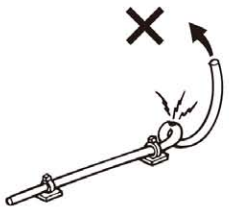


When designing an application system, incorrect wiring or connection of each cable may cause unexpected problems such as a disconnected cable or poor contact. The following explains examples of prohibited handling of cables.

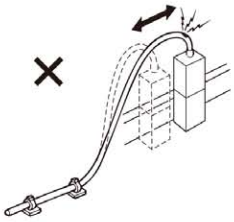
- Do not cut and reconnect the cable to extend or shorten the cable.
- Use a robot cable for any section where the cable will flex. [For the bending radius, refer to 11, “Motor/Encoder Cable.”]
- Provide a sufficient bending radius and prevent the cable from bending at the same point.



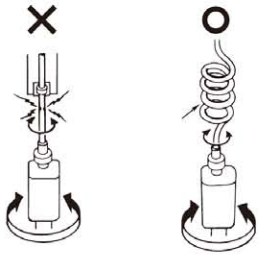
- Do not let the cable bend, kink or twist.



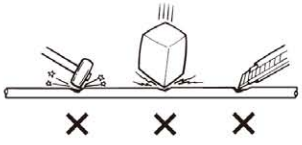
- Do not pull the cable with a strong force



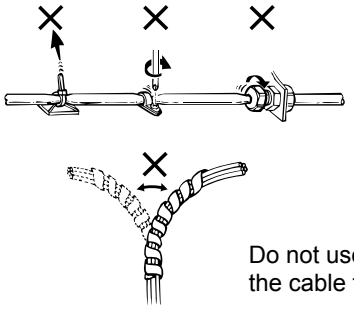
- Do not let the cable receive a turning force at a single point.



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

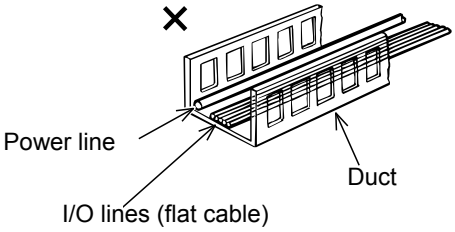


- When fixing the cable, provide a moderate slack and do not tension it too tight.



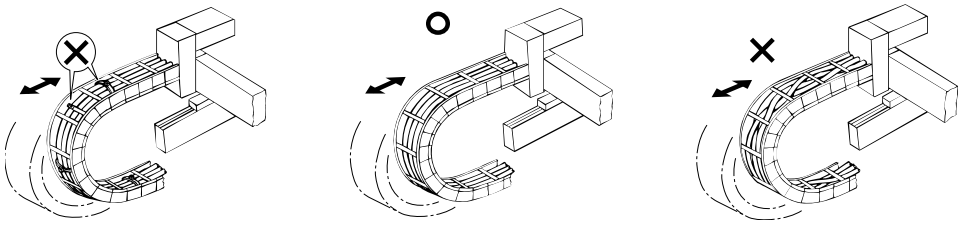
Do not use a spiral tube where the cable flexes frequently.

- Separate the I/O and communication lines from the power and drive lines. Do not wire them together in the same duct.



Follow the instructions below when using a cable track.

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



⚠ Warning:

- Always turn off the controller power before connecting/disconnecting cables. If cables are connected/ disconnected while the power is still supplied, the actuator may malfunction and serious injury or equipment damage may occur.
- Loose connectors may cause the actuator to malfunction and create a dangerous situation.
  Be sure to confirm that all connectors are securely connected.

8. Operating Conditions

8.1 Duty Ratio during Continuous Operation

Operate at duty ratios equal to or less than the allowable value.
"Duty ratio" refers to a utilization ratio indicating the percentage of the time during which the actuator is operating in one cycle.

> ⚠ Caution: If an overload error occurs, increase the standstill time to lower the duty or decrease the acceleration/deceleration.

[How to Calculate Duty]

Calculate the load factor and acceleration/deceleration time ratio and find an applicable duty ratio on a graph of calculated values.
If the load factor is less than 50%, the actuator can be operated at a duty ratio of 100% (continuous operation).

[1] Load factor LF

The maximum payload capacity at rated acceleration, and rated acceleration/deceleration, are specified in 2, "Specifications."

[When commanded acceleration speed is lower than the rated acceleration speed]		
Load factor	: LF = M × α / Mr × αr	[%]
Maximum payload capacity at rated acceleration	: Mr	[kg]
Rated acceleration/deceleration	: αr	[G]
Transfer weight during operation	: M	[kg]
Acceleration/deceleration during operation	: α	[G]

[When commanded acceleration speed is higher than the rated acceleration speed]		
Load factor	: LF = M × α / M_d × α = M / M_d	[%]
Transportable weight in commanded acceleration	: M_d	[kg]
Transfer weight during operation	: M	[kg]
Acceleration/deceleration during operation	: α	[G]

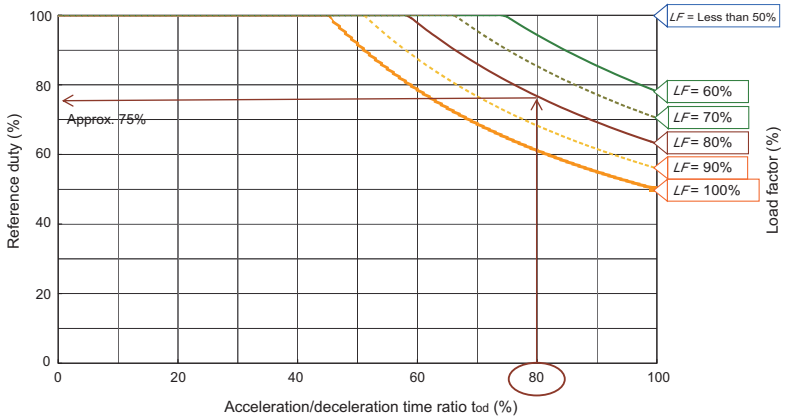
[2] Calculate the acceleration/deceleration time ratio t_{od} using the calculation formula below:

Acceleration/deceleration time ratio t_{od} =
Acceleration time during operation + Deceleration time during operation / Operating time (%)

Acceleration time = Operating speed [mm/s] / Acceleration during operation [mm/s^2] (sec.)
Acceleration (mm/s^2) = Acceleration (G) x 9,800 mm/s^2

Deceleration time = Operating speed [mm/s] / Deceleration during operation [mm/s^2] (sec.)
Deceleration (mm/s^2) = Deceleration (G) x 9,800 mm/s^2

[3] Find the applicable duty ratio on the graph based on each load factor LF for which the duty ratio has been calculated, and the acceleration/deceleration time ratio t_{od}.
Example) If the load factor LF is 80% and acceleration/deceleration time ratio t_{od} is 80%, a reference duty is approx. 75%.



9. Setting the Home Position

9.1 Home Return

Home return involves the operation explained below:

[1] When a home return command is issued, the actuator moves (in the direction set by the applicable parameter).
[2] The software detects the mechanical end in the return operation. If option L (home limit switch) is installed, the mechanical end is detected by a sensor.
[3] The slider reverses its direction when the mechanical end or home limit switch is detected, after which the Z-phase signal is detected and the position where this signal has been detected becomes the reference point.
[4] The slider travels further by the offset amount set by the parameter, and this position becomes home.

9.2 Factory-set Home Position

How much the motor would turn after the mechanical end or home limit switch is detected until the Z-phase signal is generated has been adjusted prior to shipment.
The standard distance travelled by each slider after it reverses its direction upon detection of the mechanical end or home limit switch, until stopping at the home position, is shown in the table below.

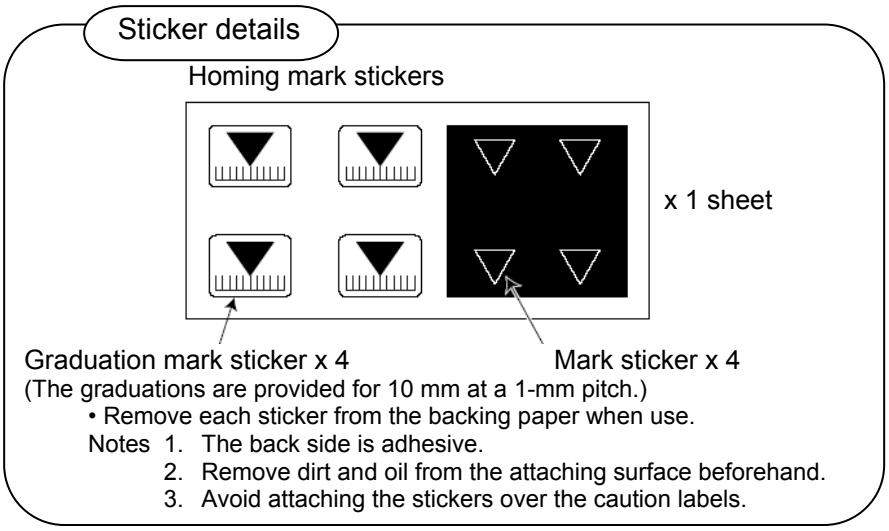
Model name	Home position from mechanical stopper or home sensor (approx. in mm)
ISB, ISPB Small type SXM/SXL Medium type MXM/MXL/MXMX Large type LXM/LXL/LXMX/LXUMX	5 mm
SSPA Small type SXM Medium type MXM	5 mm
SSPA Large type LXM	10 mm

9.3 Changing the Home Direction

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

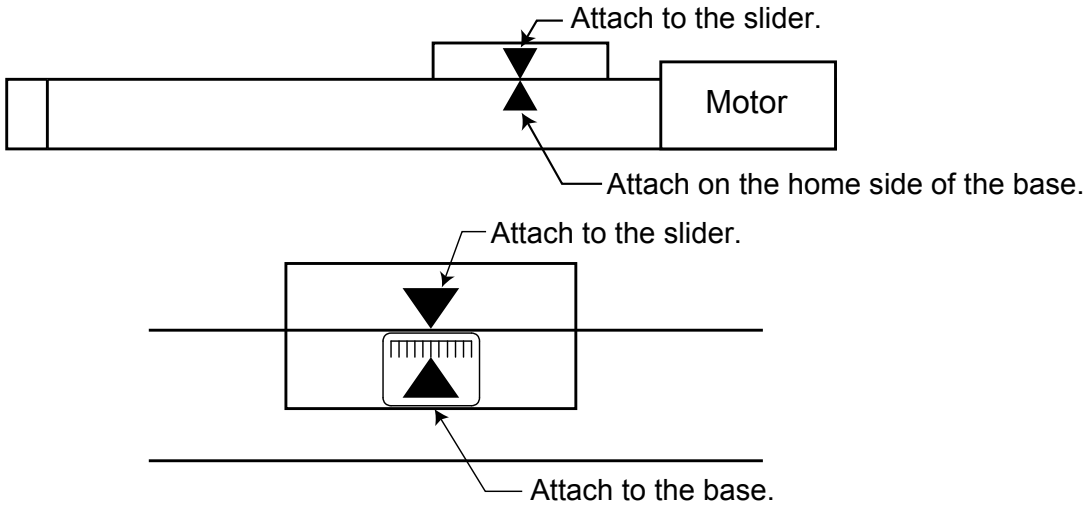
9.4 How to Use the Homing Mark Stickers

◆ The following stickers are supplied with the actuator. Use these stickers, as necessary, to mark the home position of the actuator, etc.



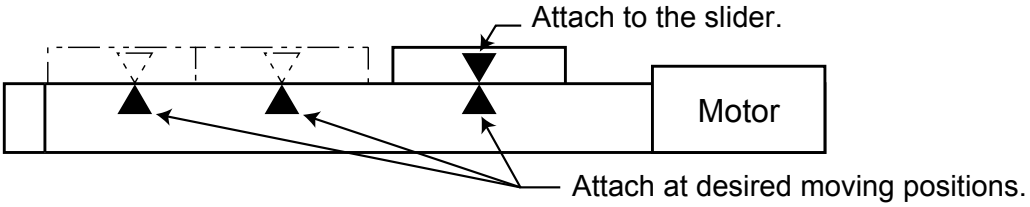
Examples of use

[1] For marking the home position of the actuator



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

[2] As positioning marks



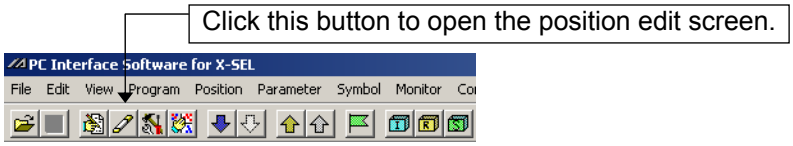
These marks can be used to check for position deviation, etc.

9.5 Fine-tuning the Home Position

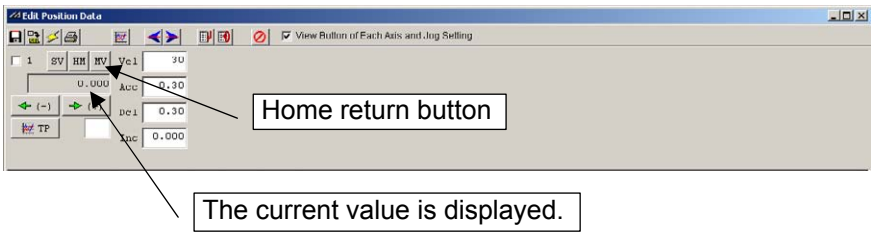
Correct the position deviation by changing the parameter for home preset in the case of an X-SEL or SSEL controller, or by changing the parameter for home return offset in the case of a SCON, MSCON controller. How to set these parameters is explained below.

9.5.1 X-SEL 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.

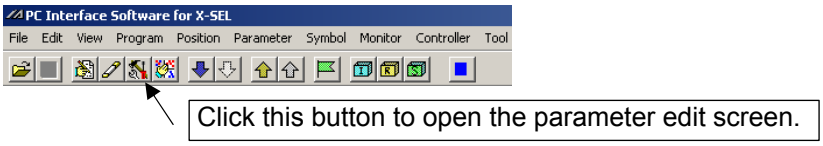


Click the home return button to perform home return.

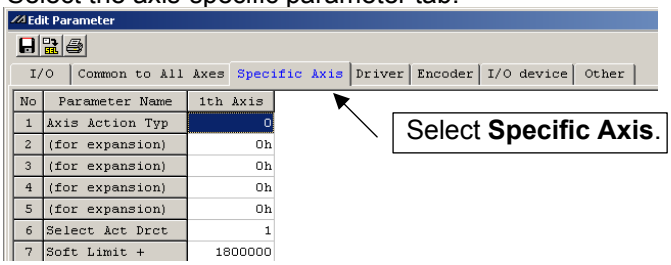


(2) Turn OFF the servo and move the slider to the home position by hand.
If the slider cannot be moved by hand, move the slider in the jog or inching mode.
Check the current value being displayed, and record the position deviation.

(3) Open the parameter screen.

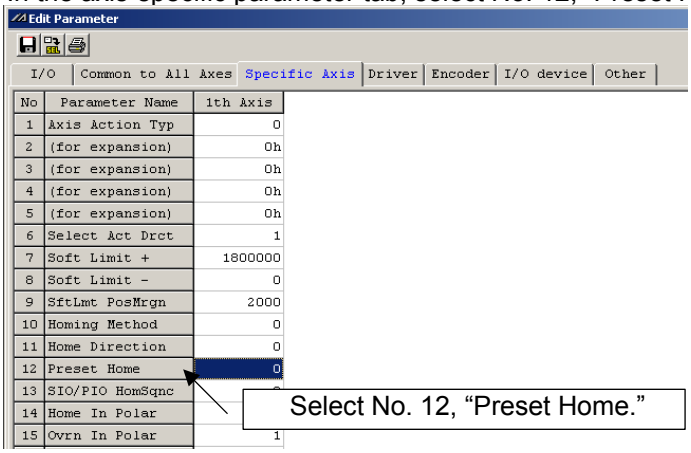


(4) Select the axis-specific parameter tab.



No	Parameter Name	1th Axis
1	Axis Action Typ	0
2	(for expansion)	0h
3	(for expansion)	0h
4	(for expansion)	0h
5	(for expansion)	0h
6	Select Act Drct	1
7	Soft Limit +	1800000

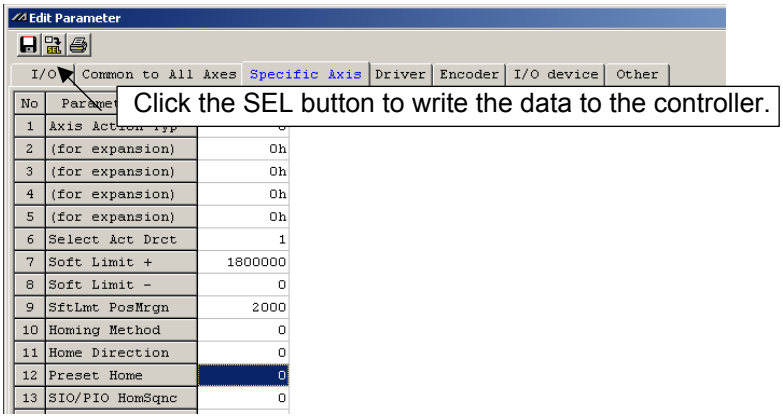
(5) In the axis-specific parameter tab, select No. 12, “Preset Home.”



No	Parameter Name	1th Axis
1	Axis Action Typ	0
2	(for expansion)	0h
3	(for expansion)	0h
4	(for expansion)	0h
5	(for expansion)	0h
6	Select Act Drct	1
7	Soft Limit +	1800000
8	Soft Limit -	0
9	SftLmt PosMrgn	2000
10	Homing Method	0
11	Home Direction	0
12	Preset Home	0
13	SIO/PIO HomSqnc	
14	Home In Polar	
15	Ovrn In Polar	1

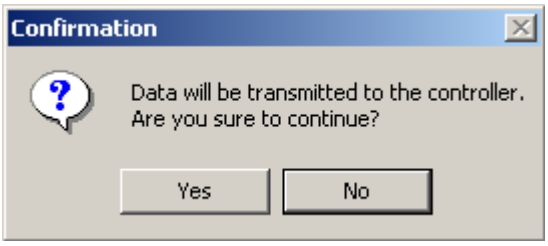
(6) Change the setting of axis-specific parameter No. 12 (Preset Home).
Add or subtract the value measured in (2) to/from the value currently input.
The setting unit is 0.001 mm.
Example: When subtracting 1 mm
Current preset value = Current setting – 1000

(7) Write the new data.



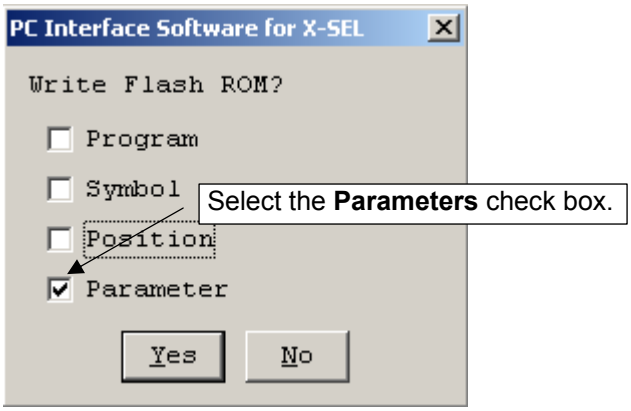
No	Parameter Name	1th Axis
1	Axis Action Typ	
2	(for expansion)	0h
3	(for expansion)	0h
4	(for expansion)	0h
5	(for expansion)	0h
6	Select Act Drct	1
7	Soft Limit +	1800000
8	Soft Limit -	0
9	SftLmt PosMrgn	2000
10	Homing Method	0
11	Home Direction	0
12	Preset Home	0
13	SIO/PIO HomSqnc	0

(8) Transfer the data to the controller.

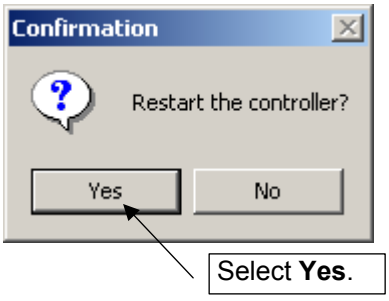


(9) Click **OK**.

(10) Write the data to the flash ROM.

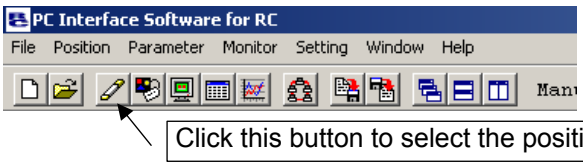


(11) Restart the controller.

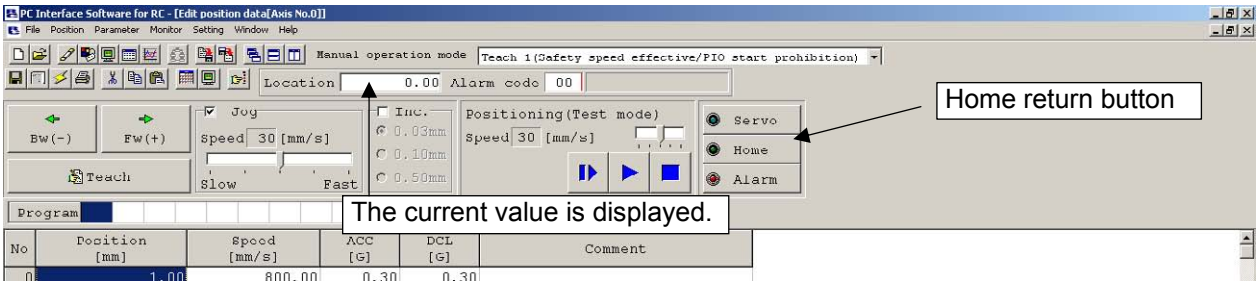


9.5.2 ECON, SCON and MSCON Controllers

(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.

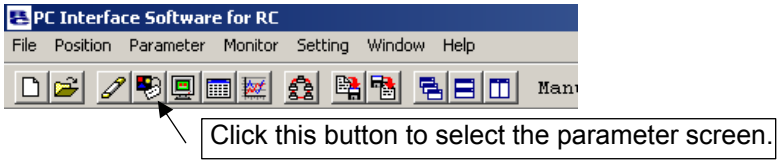


Click the home return button to perform home return.

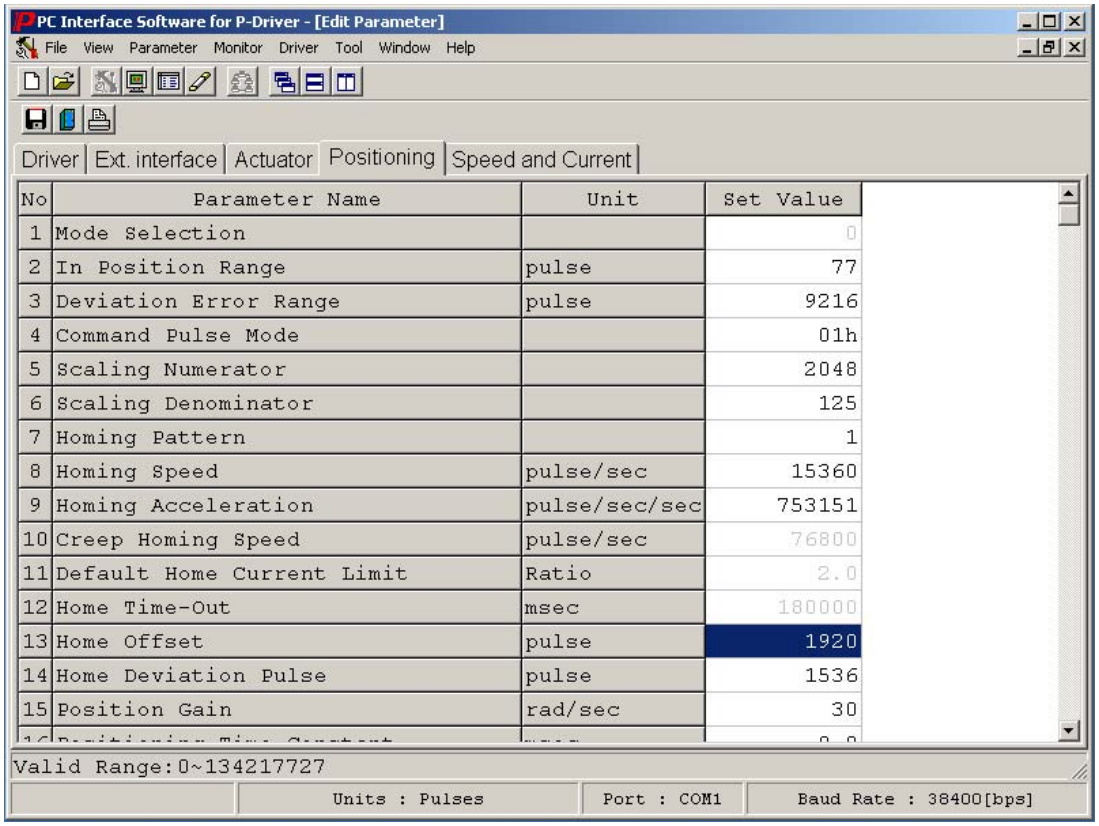


(2) Turn OFF the servo and move the slider to the home position by hand.
If the slider cannot be moved by hand, move the slider in the jog or inching mode.
Check the current value being displayed, and record the position deviation.

(3) Open the parameter screen.



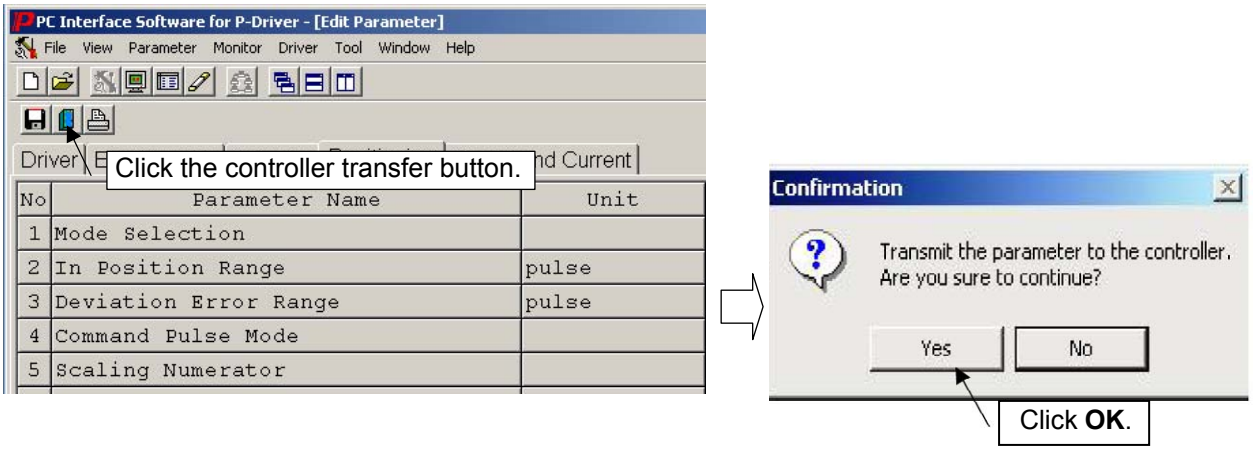
(4) The user parameter screen appears.



No	Parameter Name	Unit	Set Value
1	Mode Selection		0
2	In Position Range	pulse	77
3	Deviation Error Range	pulse	9216
4	Command Pulse Mode		01h
5	Scaling Numerator		2048
6	Scaling Denominator		125
7	Homing Pattern		1
8	Homing Speed	pulse/sec	15360
9	Homing Acceleration	pulse/sec/sec	753151
10	Creep Homing Speed	pulse/sec	76800
11	Default Home Current Limit	Ratio	2.0
12	Home Time-Out	msec	180000
13	Home Offset	pulse	1920
14	Home Deviation Pulse	pulse	1536
15	Position Gain	rad/sec	30

(5) Change user parameter No. 22 (home 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.



9.6 Absolute Reset Method (Absolute Specification)

If the battery has been replaced or encoder cable unplugged following an absolute encoder battery voltage error, etc., absolute reset must be performed.
For the method to perform absolute reset, check 1.2, “Related Operation Manuals for Each Controller Supported by This Product” in the operation manual of your controller.

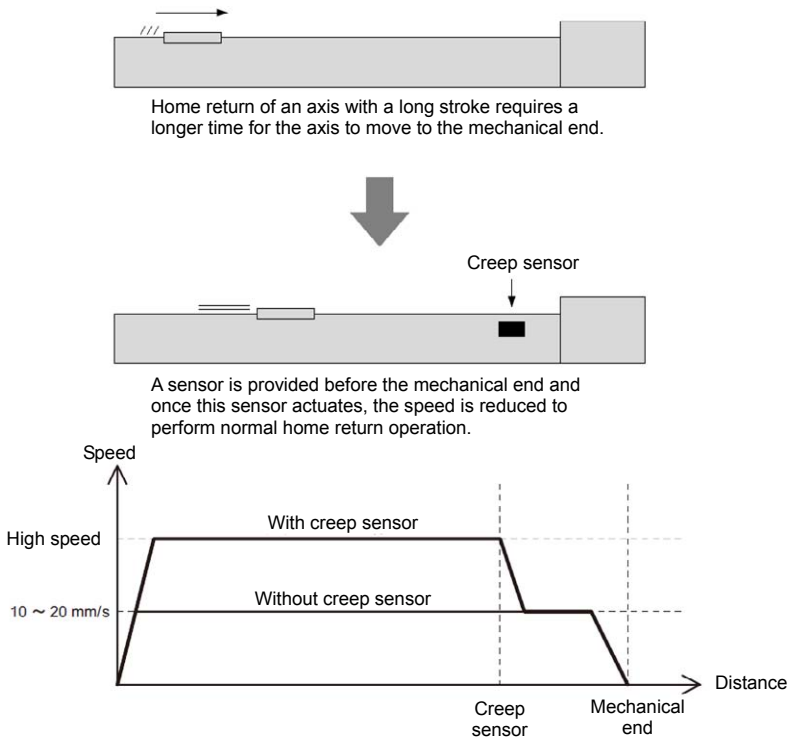
10. Options

10.1 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.

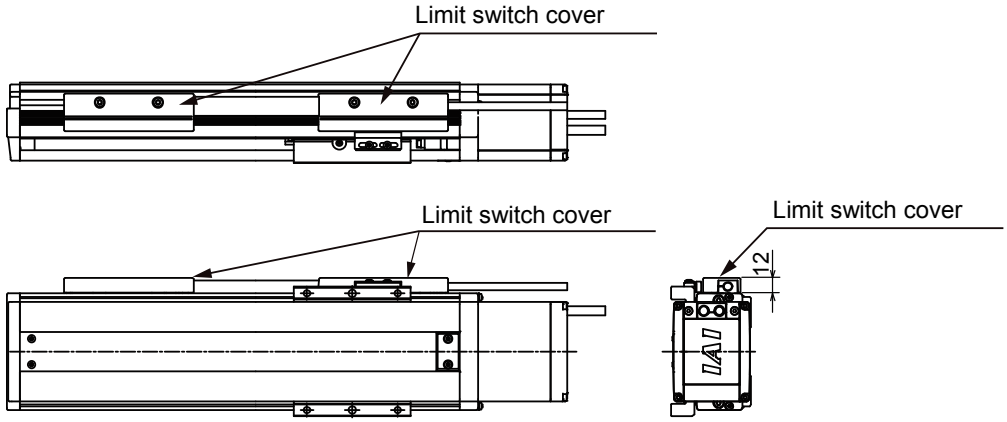
10.2 Creep Sensor

This sensor is used to perform home return at high speed. Normally home return is implemented with the slider contacting the stopper at the stroke end on the motor side and then reversing its direction. To support this "stopper method," the home return speed is kept to a range of 10 to 20 mm/s. This means that sliders of long strokes require a longer time to complete the home return. The creep sensor is a proximity sensor that allows the slider to move at high speed until halfway and then reduce its speed to the normal home return speed before the home, in order to shorten the time required for home return. The standard installation position of this sensor is on the right side of the actuator as viewed from the motor, represented by the option model number "C." A cover similar to the one used for limit switches is provided on the outside of the sensor. If both the creep sensor and limit switches are installed, the same cover is used for each. If you want to have the creep sensor on the left side, specify the option model number "CL." Check the figure of cover installation in 10.3, "Limit Switch."



10.3 Limit Switch

Normal home return operation uses the “stopper method” wherein the slider contacts the stopper and reverses, after which the Z-phase is detected and defined as the home. The home limit switch (L) is an option which is designed to perform this reversing operation using a proximity sensor, not a stopper. Use the home limit switch if you want to increase the reliability of home return by, for example, preventing a false detection of mechanical end due to contact with other device, etc.
If this option is selected, three proximity sensors are installed, including the home detection sensor (HOME), overtravel sensor on front side (+OT) and overtravel sensor on motor side (-OT). (HOME and -OT are integrated as twin sensors.) Take note that moving the home sensor significantly may shorten the stroke.
The standard installation position of the home limit switch and cover is on the right side of the actuator as viewed from the motor, represented by the option model number “L.” If you want to have the limit switch on the right side, specify the option model number “LL.”

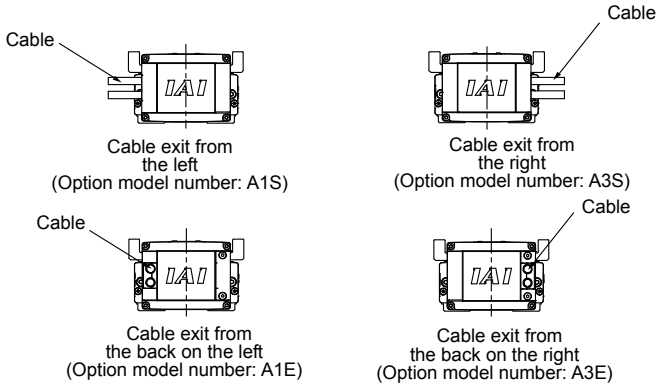


10.4 Reversed-home Specification

In the reversed-home specification, the home is located on the front 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.

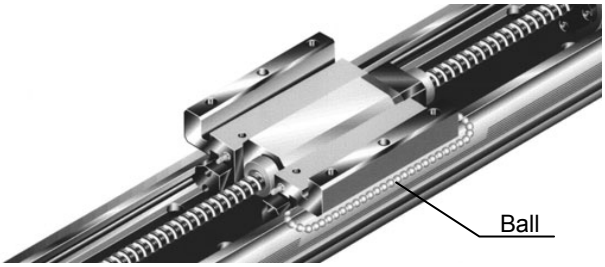
10.5 Cable Exit Direction

The cable should exit in one of the following four

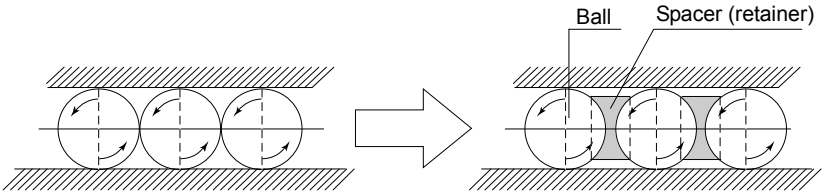


10.6 Guide with Ball Retention Mechanism

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.

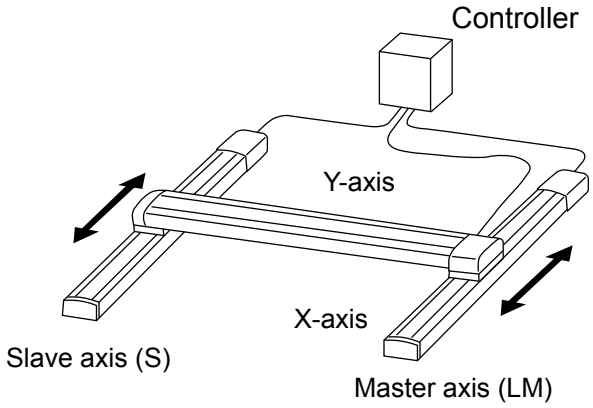


There is no longer metal noise generated by colliding balls and thus noise is reduced. Since balls are aligned by retainers, annoying noise decreases. Wear caused by friction between balls decreases, oil no longer runs out due to contact, and lubricating oil collects at the retainers. Accordingly, operation becomes smooth.



10.7 Master Axis/Slave Axis Specification for Synchronized Operation

If the “synchronized operation function” is used, where two actuator axes are operated with the XSEL controller or SSEL controller, one axis is designated as the master axis, while the other axis is designated as the slave axis. The actuators serving as the master axis and slave axis must be of the same specification.
The master axis comes with the home limit switch, represented by the option model number “LM.”
The standard installation position of the home limit switch and cover is on the right side of the actuator as viewed from the motor. If you want to have the limit switch on the right side, specify the option model number “LLM.”



10.8 High-Precision Straightness Specification

The high-precision straightness specification type is a precision actuator with high-level settings of parallelism and straightness, which is the base and slider travel accuracies. The models are expressed with ST.

・ Aluminum-based ISB/ISPB

	Parallelism	Straightness
With no High-precision straightness specification	0.05 mm/m Max. (However, the stroke less 500mm is 0.025mm uniformed.)	0.05 mm/m Max. (However, the stroke less 500mm is 0.025mm uniformed.)
With High-precision straightness specification	0.03 mm/m Max. (However, the stroke less 500mm is 0.015mm uniformed.)	0.02 mm/m Max. (However, the stroke less 500mm is 0.015mm uniformed.)

・ Iron-based SSPA

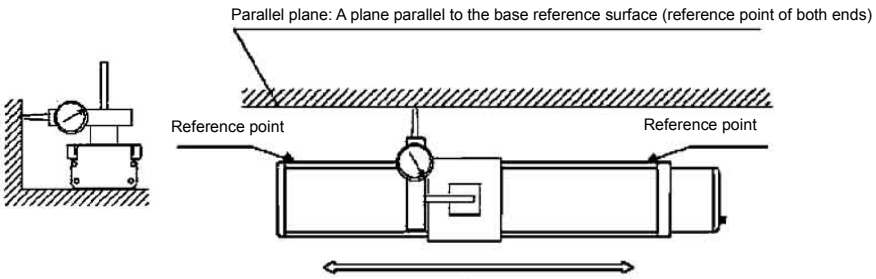
	Parallelism	Straightness
With no High-precision straightness specification	0.05 mm/m Max. (However, the stroke less 500mm is 0.025mm uniformed.)	0.05 mm/m Max. (However, the stroke less 500mm is 0.025mm uniformed.)
With High-precision straightness specification	0.03 mm/m Max. (However, the stroke less 500mm is 0.015mm uniformed.)	0.015 mm/m Max. (However, the stroke less 500mm is 0.008mm uniformed.)

- The values for the high-precision straightness specification are based on measurement at a temperature of 20 ± 3°C using a precision stone surface plate of grade 00 and 6.5 μm in flatness.
- The values for the standard specification and high-precision specification are based on measurement at a temperature of 20 ± 3°C using a surface plate of 0.05 mm or less in flatness.
- The parallelism and the straightness of the chart are the standard value of 1m.
  Standard value (mm/m) × stroke (m) will be straightness or flatness of the all stroke.

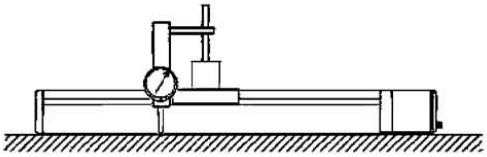
(Reference)

[Measurement Method]

[1] Parallelism (horizontal) between the base reference surface and the slider (reference surface)
Affix the base on the surface plate and, with the indicator on the slider contacting a surface running parallel with the two points at both edges of the base reference surface, move the slider over its entire stroke to perform measurement.

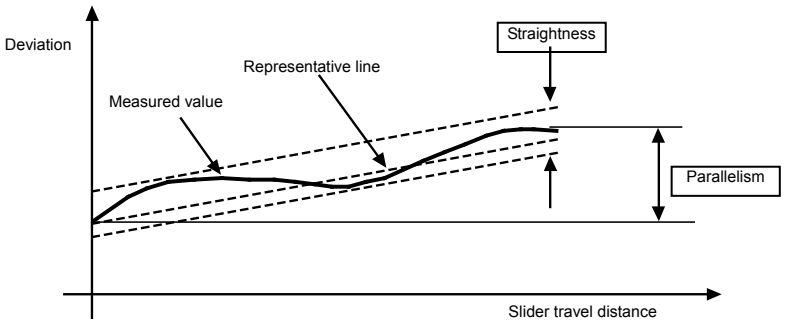


[2] Parallelism (vertical) between the base mounting surface and the slider (work part mounting surface)
With the base affixed on the surface plate and indicator on the slider also contacting the surface plate, move the slider over its entire stroke to perform measurement.



[Parallelism and Straightness]

Parallelism is represented by the maximum value on a graph of indicator changes measured by moving the slider over its entire stroke.
Straightness, or degree of being straight, is represented by the maximum value among all measured results of parallelism expressed by intervals between two straight lines.



10.9 Rust prevention film processing

The rust prevention film processing is the one that the rust prevention processing (electrolysis rust prevention black film processing) was given to the base reference surface (bottom and the side reference surface) and the slider reference surface (top and the side reference surface). Used to suppress rusts and dusts. Option of SSPA. It is used to suppress the environment. The models are expressed with MD.

10.10 Metal Connector Type

The connectors on the motor cable and encoder cable to connect to the actuator change from plastic connectors to metal connectors.
The model code is shown as EU.

11. Motor/Encoder Cables

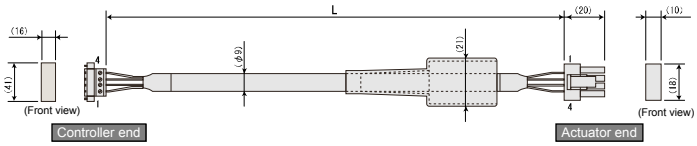
11.1 Standard

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

Correspondence table of controllers and motor/encoder cables

Controller	XSEL-J/K		XSEL-P/Q/R/S/RA/SA		SSEL		SCON/MSCON	
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□□□

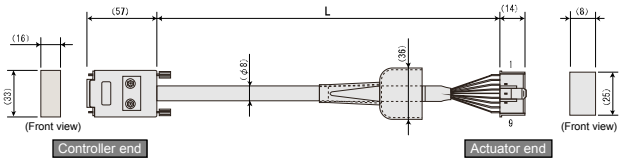


* □□□ indicates the cable length (L). Up to 30 m can be specified.
Example) 080 = 8 m
[Minimum bending radius]
Movable: 51 mm
Fixed: 34 mm

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

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

[2] Encoder cable CB-X-PA□□□



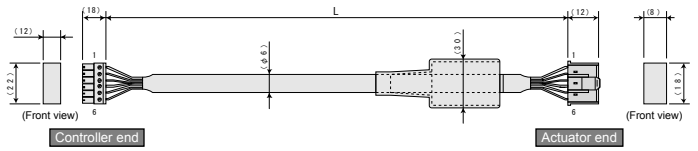
* □□□ indicates the cable length (L). Up to 30 m can be specified.
Example) 080 = 8 m
[Minimum bending radius]
Movable: 44 mm
Fixed: 29 mm

Wiring	Color	Signal	No.
0.15 sq (crimped)	—	—	1
	—	—	2
	—	—	3
	—	—	4
	—	—	5
	—	—	6
	Blue	SD	7
	Orange	SD	8
	Black	BAT-	9
	Yellow	BAT-	10
	Green	VCC	11
	Brown	GND	12
	Gray	BK-	13
	Red	BK+	14
	—	—	15
The shield is clamped to the hood.			

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

Ground wire and braided shield wires

[3] Limit switch cable CB-X-LC□□□



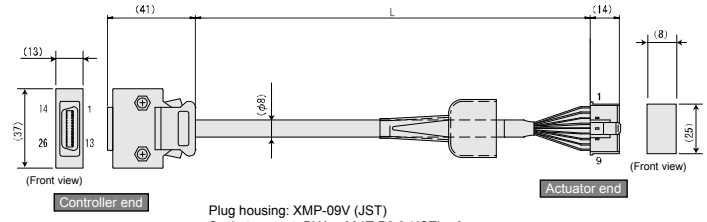
* □□□ indicates the cable length (L). Up to 30 m can be specified.
Example) 080 = 8 m
[Minimum bending radius]
Movable: 33 mm
Fixed: 22 mm

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

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

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

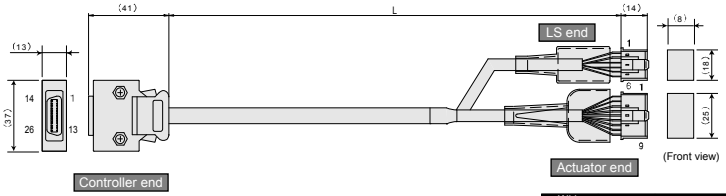
Wiring	Color	Signal	No.
AWG26 (soldered)	—	—	10
	—	—	11
	—	E24V	12
	—	0V	26
	—	LS	25
	—	CLEEP	24
	—	OT	23
	—	RSV	9
	—	—	18
	—	—	19
	—	A+	1
	—	A−	2
	—	B+	3
	—	B−	4
	—	Z+	5
	—	Z−	6
	Orange	SRD+	7
	Green	SRD−	8
	Purple	BAT+	14
	Gray	BAT−	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR−	20
	Yellow	BKR+	21
	—	—	22

The shield is clamped to the hood.

No.	Signal	Color	Wiring
1	BAT+	Black	AWG26 (crimped)
2	BAT−	Yellow	
3	SD	Blue	
4	SD	Orange	
5	VCC	Green	
6	GND	Brown	
7	FG	Ground	
8	BK−	Gray	
9	BK+	Red	

Ground wire and braided shield wires

[5] Encoder cable with LS CB-X1-PLA□□□



* □□□ indicates the cable length (L). Up to 30 m can be specified.
Example) 080 = 8 m
[Minimum bending radius]
Movable: 54 mm
Fixed: 36 mm

Wiring	Color	Signal	No.
AWG26 (soldered)	—	—	10
	—	—	11
	White/blue	E24V	12
	White/yellow	0V	13
	White/red	LS	26
	White/black	CLEEP	25
	White/purple	OT	24
	White/gray	RSV	23
	—	—	9
	—	—	18
	—	—	19
	—	A+	1
	—	A−	2
	—	B+	3
	—	B−	4
	—	Z+	5
	—	Z−	6
	Orange	SRD+	7
	Green	SRD−	8
	Purple	BAT+	14
	Gray	BAT−	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR−	20
	Yellow	BKR+	21
	—	—	22

The shield is clamped to the hood.

No.	Signal	Color	Wiring
1	E24V	White/blue	AWG26 (crimped)
2	0V	White/yellow	
3	LS	White/red	
4	CLEEP	White/black	
5	OT	White/purple	
6	RSV	White/gray	

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

Ground wire and braided shield wires

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

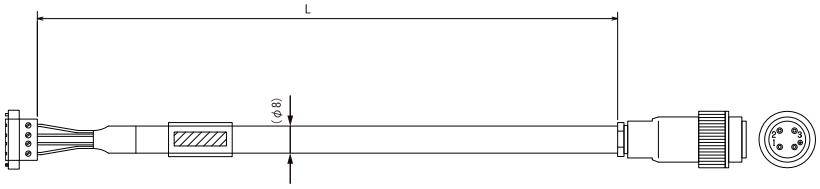
11.2 Metal Connector Type (Option: Model EU)

The same cables are used regardless of the actuator model. The applicable cables vary depending on the models without LS, with LS.

Correspondence table of controllers and motor/encoder cables

Controller	XSEL-P/Q/R/S/RA/SA, SSEL, SCON, MSCON	
LS	Without LS	With LS
Applicable cables	[1], [2]	[1], [3]

[1] Motor cable CB-XEU-MA□□□

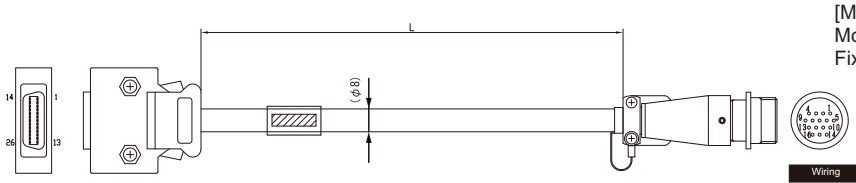


* □□□indicates the cable length (L). Up to 30m can be specified.
Example) 080 = 8m

[Minimum bending radius]
Movable: 48 mm
Fixed: 48 mm

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

[2] Encoder cable CB-XEU1-PA□□□



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

[Minimum bending radius]
Movable: 44 mm
Fixed: 29 mm

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

No.	Signal	Color	Wiring
1	SD	Orange	AWG26 (soldered)
2	SD	Green	
3	—	—	
4	—	—	
5	—	—	
6	—	—	
7	—	—	
8	—	—	
9	—	—	
10	VCC	Red	
11	GND	Black	
12	BAT+	Purple	
13	BAT−	Gray	
14			
15	BKR−	Blue	
16	BKR+	Yellow	
The shield is connected to the earth sleeve.			

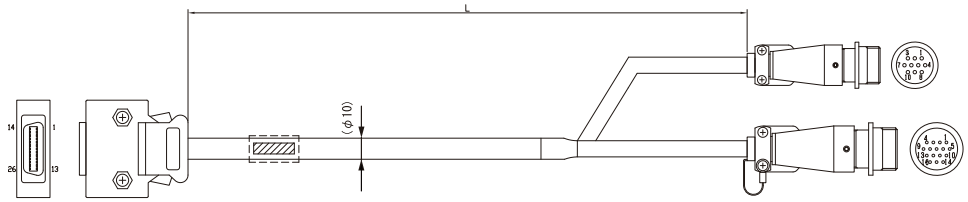
Drain wire and braided shield wires

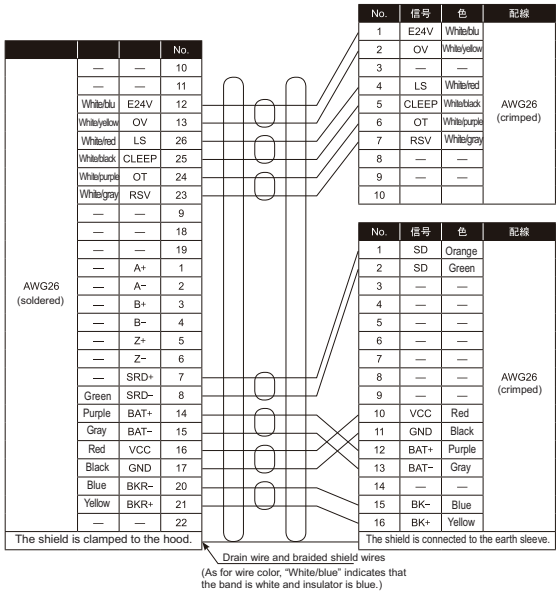
(As for wire color, "White/blue" indicates that the band is white and insulator is blue.)

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

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

[Minimum bending radius]
Movable: 58 mm
Fixed: 33 mm





			No.
	—	—	10
	—	—	11
White/blu	E24V		12
White/yellow	OV		13
White/red	LS		26
White/black	CLEEP		25
White/purple	OT		24
White/gray	RSV		23
	—	—	9
	—	—	18
	—	—	19
	—	A+	1
	—	A−	2
	—	B+	3
	—	B−	4
	—	Z+	5
	—	Z−	6
	—	SRD+	7
Green		SRD−	8
Purple		BAT+	14
Gray		BAT−	15
Red		VCC	16
Black		GND	17
Blue		BKR−	20
Yellow		BKR+	21
	—	—	22

No.	信号	色	配線
1	E24V	White/blu	AWG26 (crimped)
2	OV	White/yellow	
3	—	—	
4	LS	White/red	
5	CLEEP	White/black	
6	OT	White/purple	
7	RSV	White/gray	
8	—	—	
9	—	—	
10			

No.	信号	色	配線
1	SD	Orange	AWG26 (crimped)
2	SD	Green	
3	—	—	
4	—	—	
5	—	—	
6	—	—	
7	—	—	
8	—	—	
9	—	—	
10	VCC	Red	
11	GND	Black	
12	BAT+	Purple	
13	BAT−	Gray	
14	—	—	
15	BK−	Blue	
16	BK+	Yellow	

12. Maintenance/Inspection

12.1 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.

Period	Visual inspection of machine exterior	Interior check	Grease Supply (Note 1)
At start of operation	○		
After 1 month of operation	○		
After 3 month of operation			○
After 3 month of operation thereafter			Period of Grease Supply (reference)
After 6 month of operation	○	○ (Note 2)	
Every 6 months thereafter	○	○ (Note 2)	

(Note 1) 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.
(Note 2) Check the condition of grease and wipe it off in case it is extremely dirty before supplying new grease.

[Period of Grease Supply (reference)]
Supply grease in the earlier timing of either the operation distance or months described in the table below.

Max. Velocity of Use [mm/s]	Period of Grease Supply (reference)	
	Operation Distance	Months
0 to 750 or less	1,250 km	12 months
750 to 1500 or less	2,500 km	
1500 to 2500 or less	5,000 km	

For the actuators with the guide equipped with the ball retainer (option code RT), implement grease supply in the frequency of the period of grease supply (reference) described in the table below.

Max. Velocity of Use [mm/s]	Period of Grease Supply (reference)	
	Operation Distance	Months
0 to 750 or less	625 km	6 months
750 to 1500 or less	1,250 km	
1500 to 2500 or less	2,500 km	

⚠ Caution:
- The grease may be degraded if the actuator has got stored for 6 months or more. Supply grease before starting to use. [Reference to 12.5 Grease Supply]
- The speed of grease degradation differs depending on the environment of use (temperature, humidity and ambient environment).
  It is recommended to shorten the period of grease supply in case of use in bad environment with high temperature, high humidity, high rate of dust and so on. Also, it is recommended to improve the environment in case the color of the grease changes remarkably due to bad environmental condition.

12.2 Visual Inspection of the Machine Exterior

Check the following items visually.

Main body and work part	Loose mounting bolts, etc.
Cables	Damage to cables, connection of connectors
General	Noise, vibration

12.3 External Cleaning

- Clean the exterior surfaces from time to time.
- Wipe off dirt with a soft cloth.
- Depending on the situation, base oil of grease may ooze out to the actuator surface. If oil has oozed out, wipe it off using a soft cloth, etc.
- To prevent dust from entering the actuator through gaps and openings, do not clean the actuator by blowing highly compressed air onto it.
- 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.

12.4 Interior Check

Turn off the power, remove the screw cover and visually inspect the interior.

For the interior inspection, check the following items.

Actuator	Loosening of actuator mounting bolts, intrusion of dust and other foreign matters
Guide	Lubrication condition, soiling, wear, flaking
Ball screw	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] Remove the screw cover using an Allen wrench of 2.5 mm across flats for ISB and ISPB-SXM, or 3 mm across flats for all other models.
[2] Check the interior.
[3] When the inspection is complete, tighten the mounting screws for the screw cover.

[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.
- To prevent dust from entering the actuator through gaps and openings, do not clean the actuator by blowing highly compressed air onto it.
- 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.

⚠ Warning:
- 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.
- An encoder is built into the encoder cover. The encoder not only detects the rotation angle and home signal, but it also performs a critical function in the AC control and the encoder and motor phases have been adjusted precisely. Never touch the encoder.

⚠ Caution: Do not forcibly bend or damage the stainless sheet when checking the interior.
Any changes to the installation condition cause the sheet to be placed disproportionately on one side and affect the life of the product. In such a case, please contact the IAI Sales Engineering Section.
In addition, be sure to wear gloves, etc. when working because the edges of the stainless sheet may cause an injury.

12.5 Grease Supply

12.5.1 Applicable Grease

[1] For Those other than Lead 36mm of SXM/SXL and Lead 48mm of MXM/MXL/MXMX

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

Type	Parts	Factor-set grease	Manufacturer
ISB, ISPB SXM/SXL MXM/MXL/MXMX LXM/LXL/LXMX/LXUWX	Guide, ball screw	Daphne Grease MP No. 2	Idemitsu Kosan
SSPA	Guide, ball screw	Daphne Grease MP No. 2	Idemitsu Kosan
ISB, ISPB LXM/LXMX/LXUWX	Intermediate support	Daphne Grease MP No. 2 (Note 1)	Idemitsu Kosan

Note 1 Multemp LRL No. 3 (Kyodo Yushi) can also be applied.

⚠ Warning: Never use fluorine grease. Fluorine grease will chemically react with lithium grease and damage the machine.

[2] For Lead 36mm of SXM/SXL and Lead 48mm of MXM/MXL/MXMX

Urea based grease is used at the delivery from our factory

Type	Parts	Factor-set grease	Manufacturer
ISB SXM/SXL: Lead 36mm MXM/MXL/MXMX: Lead 48mm	Guide, ball screw	Multemp ET-R	Kyodo Yushi

⚠ Warning: Never use lithium grease and fluorine grease. Lithium grease and fluorine grease will chemically react with urea grease and damage the machine.

12.5.2 Grease Application Method

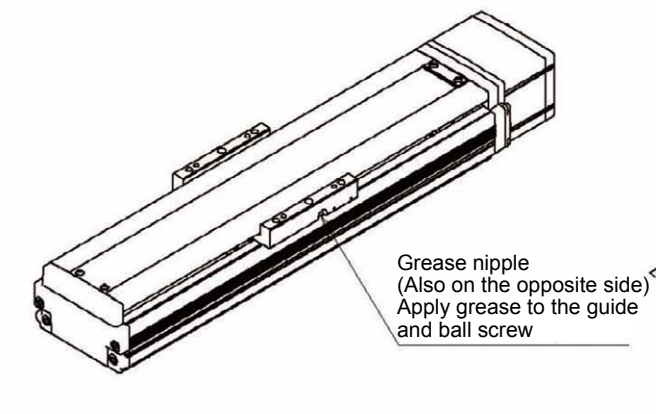
(Note) In case supplying grease from the grease nipple is not possible, follow (2) to supply grease.

(1) Grease supply to the guide and ball screw from the grease nipple
A grease nipple is provided on the side of the slider. Grease supply to the guide and ball screw through here. The grease nipple on the right facing from the motor is to grease supply to the guide and ball screw on the right side.
The grease nipple on the left facing from the motor is to grease supply to the guide and ball screw on the left. (Grease can be added to the ball screw from either side of the grease nipples.)
[1] Apply grease from the left or right grease nipple using a grease gun.

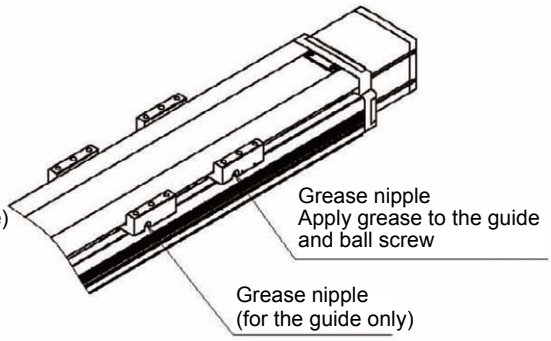
Model		Grease Supply (reference)
ISB ISPB	SXM/SXL	1.5 cc to 2 cc
	MXM/MXMX/MXL	3.5 cc to 4 cc
	LXM/LXMX/LXL	4.5 cc to 5 cc
	LXUWX	2 cc to 2.5 cc
SSPA	S	2 cc to 2.5 cc
	M	5 cc to 5.5 cc
	L	5 cc to 5.5 cc

[2] Rotate the slider several times manually to spread out the grease evenly.
Confirm that the ball tracks on the ball screw and guide look glossy with oil of grease. Supply grease again if it is not spread enough.
[3] Wipe off any excess grease.

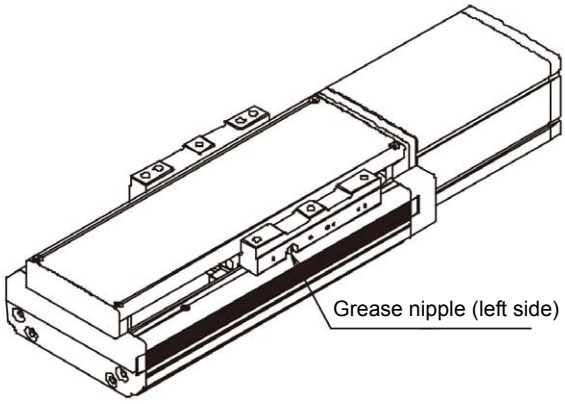
⚠ Caution:
- Charging too much grease may increase the agitation resistance and cause the ball screw to generate heat easily or allow excess grease on the ball screw to scatter around and dirty the surroundings as the screw turns. Be sure to wipe off excess grease.
- It is difficult to move actuators 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.



Standard grease application opening



LXUWX grease application opening



(Note) Follow the grease nipple diameter shown in the list below when preparing a grease gun.

Model	Nipple diameter (mm)
ISB, ISPB-S	ϕ3.5
ISB, ISPB-M	ϕ6.0
ISB, ISPB-L	ϕ6.0
SSPA-S	ϕ3.5
SSPA-M	ϕ6.0
SSPA-L	ϕ6.0

Grease Gun Attachment Screw R1/8	Maker
(Example) GC-57K	Yamada Corporation

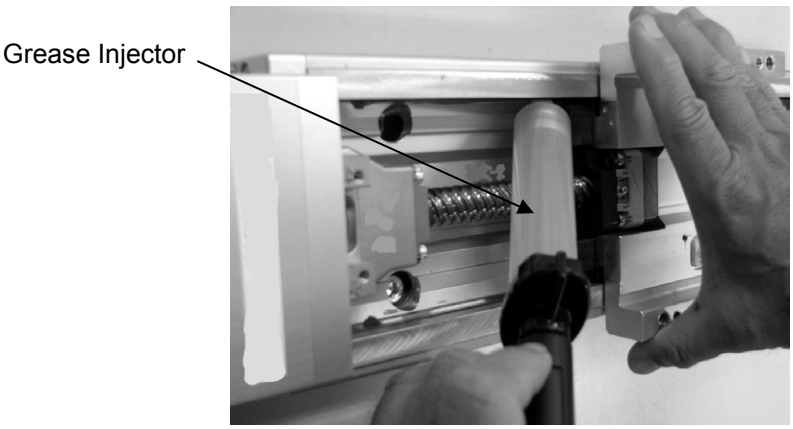
Nozzle	Maker
N type + Dedicated Nozzle U Type N type  Dedicated Nozzle U Type  ◎ Connect N type to the tip of the dedicated nozzle U type and attach a grease gun to use.  N type Dedicated Nozzle U Type Attachment Screw R1/8 on Grease Gun Attachment Side	THK

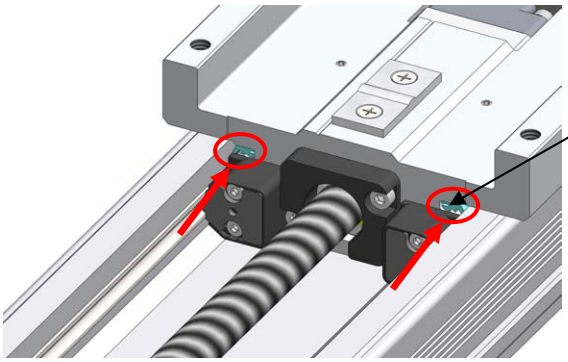
⚠ Caution: In case the grease got into your eye, immediately go to see the doctor to get an appropriate care. After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

(2) Grease supply to the guide and ball screw in case grease cannot be supplied from grease nipple

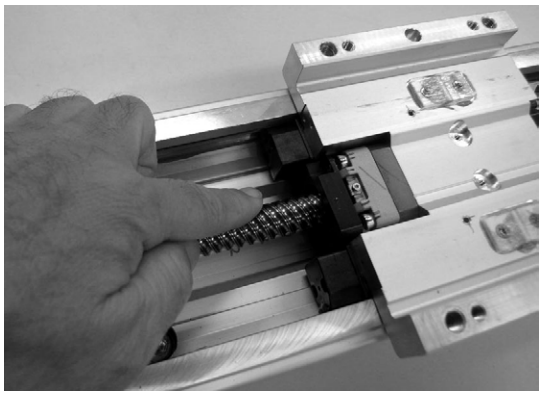
[1] Remove the screw cover with using 2.5mm-sized hex wrench for ISB and ISPB-SXM, and 3mm-sized one for other models.

[2] For the guide part, apply grease to the ball sliding area from the gap on the side seal indicated with an arrow with using a grease injector while sliding the slider back and forth to spread the grease. Supply the grease to the guides on both sides.
Wipe away the excess grease at last.





[3] Apply the grease on the ball screw with hand after cleaning it, and move the slider back and forth to spread the grease.
Wipe away the excess grease at last.

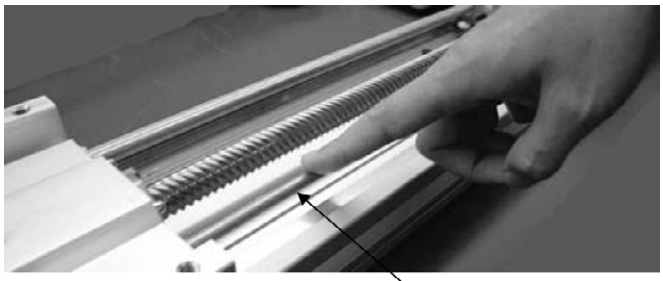


[4] Once the grease supply is finished, attach the screw cover and tighten the screw.

⚠ Caution:
- Charging too much grease may increase the agitation resistance and cause the ball screw to generate heat easily or allow excess grease on the ball screw to scatter around and dirty the surroundings as the screw turns. Be sure to wipe off excess grease.
- 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.
- 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.

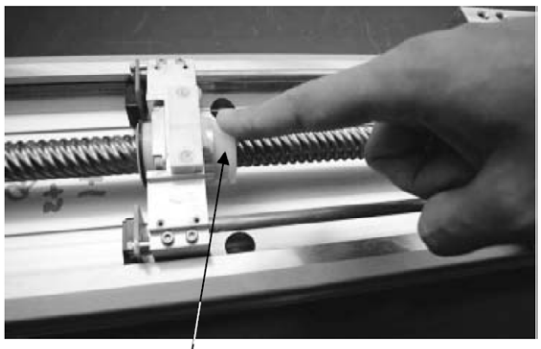
(3) Grease supply to the intermediate support
Applicable models: ISB, ISPB MXMX/LXMX/LXUWX

[Connecting rods]
After cleaning the two connecting rods at the intermediate support, apply grease to the rods using a finger. Thereafter, move the slider back and forth to let the grease spread evenly.



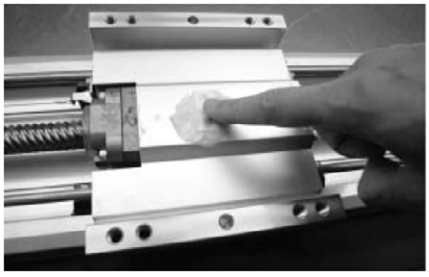
Connecting rod

[Support bushes]
After cleaning the support bushes at both ends of the intermediate support, apply grease to the areas around the bushes using a finger while turning each support bush. Thereafter, move the slider back and forth to let the grease spread evenly.



Support bush

[Top of slider and intermediate support]
After cleaning the top of the slider and top of the intermediate support at both ends, apply grease to these areas using a finger. This is to protect the top of the slider and intermediate support against contact with the screw cover.



Top of slider

Top of intermediate support

⚠ 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.

13. Replacing Intermediate Support

If the intermmediate support needs to be replaced, please contact IAI because it cannot be replaced by a customer.

14. Motor Replacement Procedures

The following explains the procedure to replace the motor in the event of coil breakage, etc.
Prepare a storage box, etc., and keep in this box, etc., all screws and other parts you have removed to replace the motor, because they will be needed during the reassembly.

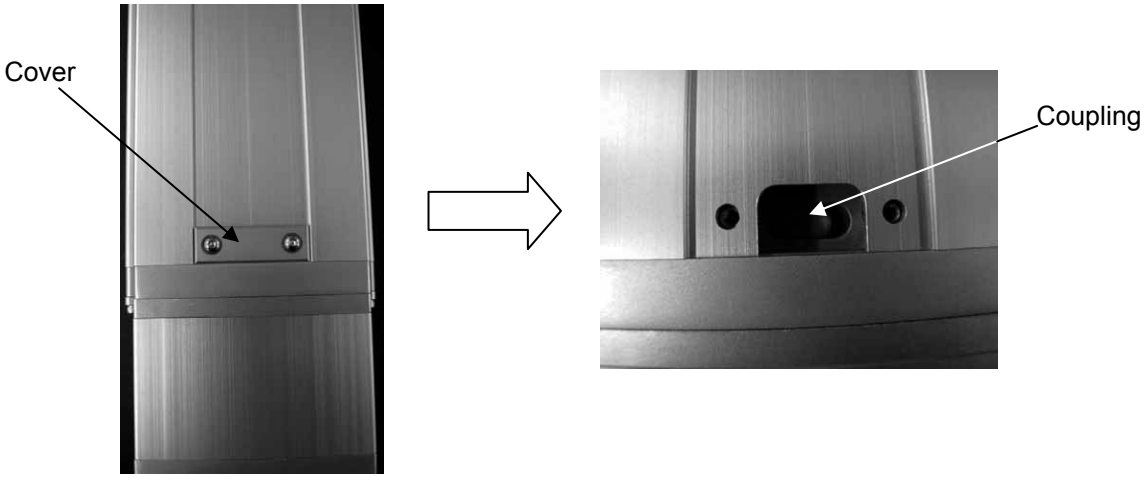
⚠ Caution: When replacing the motor, you must turn on/off the power and servo to perform the following tasks:
[1] Position the coupling on the motor alone
[2] Install the motor
[3] Operate the brake
Exercise due caution when carrying out each task with the power being supplied.

The purpose of [1] and [2] is to correlate the motor/encoder and actuator positions. If these tasks are not performed, home return may not be implemented normally.
[3] is performed because the brake, which is a non-excitation brake, cannot be released (the slider cannot be moved) without excitation.

14.1 Removing the Motor Unit

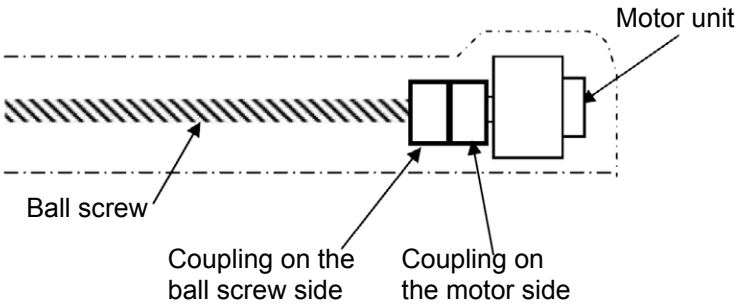
(1) Removing the coupling cover

Turn off the power supply to the controller, and then disconnect the motor cable and encoder cable.
Remove the two screws used to secure the cover on the motor side using an Allen wrench of 2.5 mm across flats for ISB and ISPB-SXM/SXL, or 3 mm across flats for all other models.
The coupling will be visible.



Move the slider to a position where the coupling bolt can be loosened.
If the actuator is equipped with a brake, connect the encoder cable and apply power to the controller to release the brake. Then move the slider so that the coupling bolts on the ball screw side can be removed. After moving the slider, deactivate the brake release, turn off the power to the controller and disconnect the encoder cable.

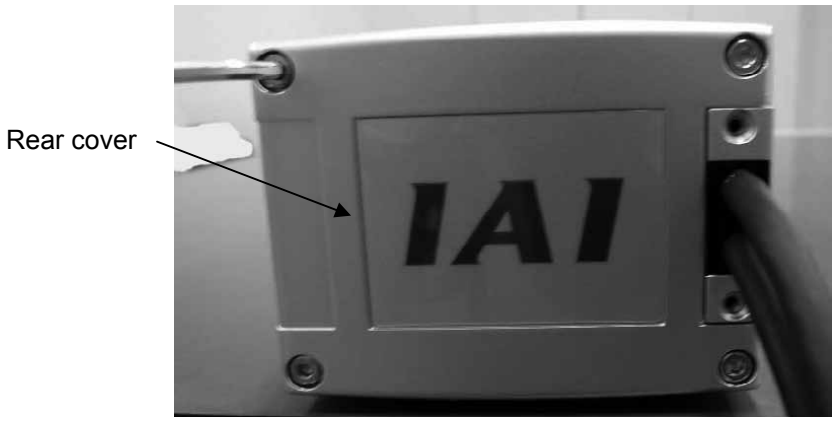
⚠ Caution:
- When the actuator is vertically installed, exercise due caution so that the slider does not fall when the brake is released. Be sure to support the slider externally to prevent it (work part) from falling.
- If you attempt to move the slider with the motor cable connected, the slider movement will become heavy due to regenerative braking. Disconnect the motor cable before moving the slider.



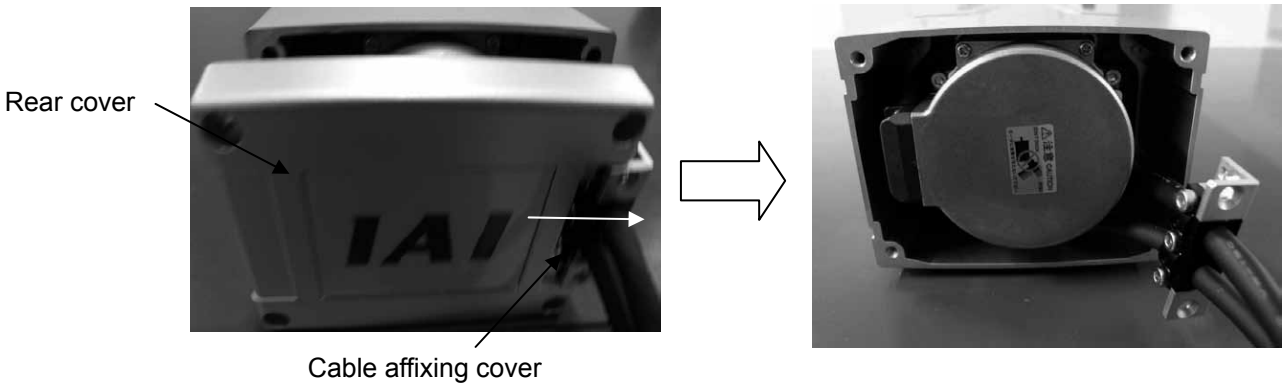
(2) Removing the rear cover

[1] Remove the screws used to secure the cable mounting cover using an Allen wrench of 2 mm across flats.

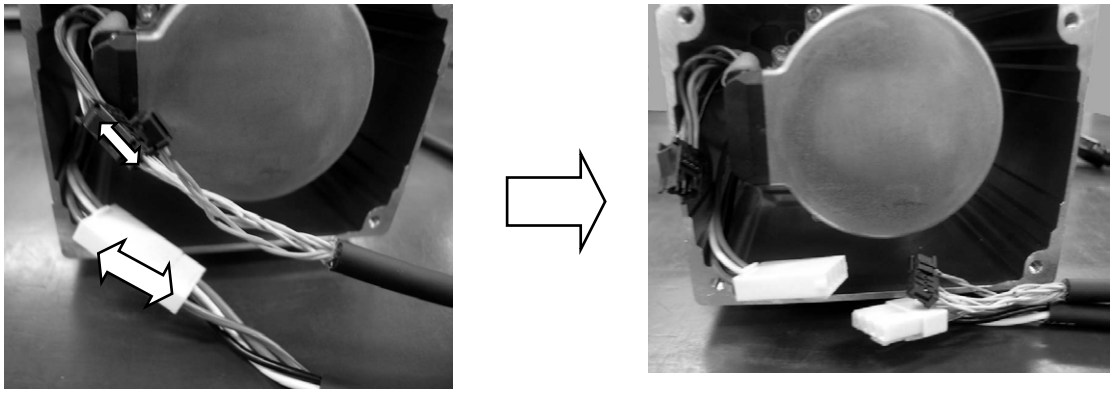
[2] Remove the four bolts used to secure the rear cover using an Allen wrench of 2.5 mm across flats for ISB and ISPB-SXM/SXL, or 3 mm across flats for all other models.



[3] Slide the cable affixing cover to remove it from the rear cover.



(3) Connector Disconnection inside Motor Cover
There are motor cables and actuator cables joined with a connector inside the motor cover. Disconnect the connectors.
Proceed to Step (4) for those not connected with a connector.



Before disconnecting connectors

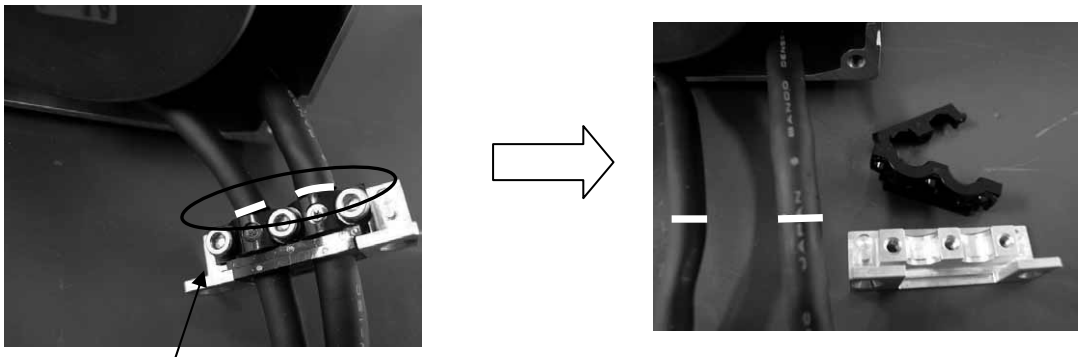
After disconnecting connectors

(4) Removing the cable mounting cover

(Note) It is not necessary to have this work process for the motor equipped with a brake connected with a connector inside the motor cover. Do not detach the cable fixing cover.

Remove the three bolts used to secure the cable mounting cover to the cable using an Allen wrench of 2.5 mm across flats.

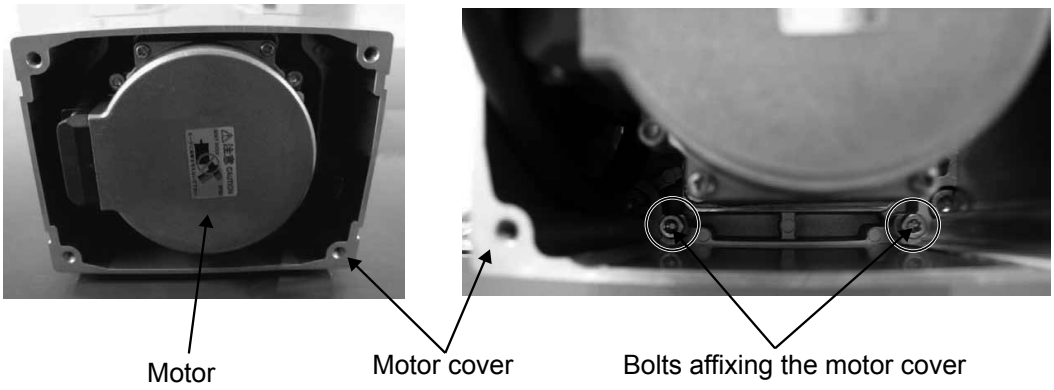
(Note) After the motor is replaced, the motor cables must be installed on the cable affixing cover. Before removing the affixing cover, mark the cables so that their installation positions can be checked later on.



Cable mounting cover

(5) Removing the motor cover

Remove the two bolts used to secure the motor cover using an Allen wrench of 2.5 mm across flats for ISB and ISPB-SXM/SXL, or 3 mm across flats for all other models
Two of these bolts are found below the motor at locations further back in the motor cover.



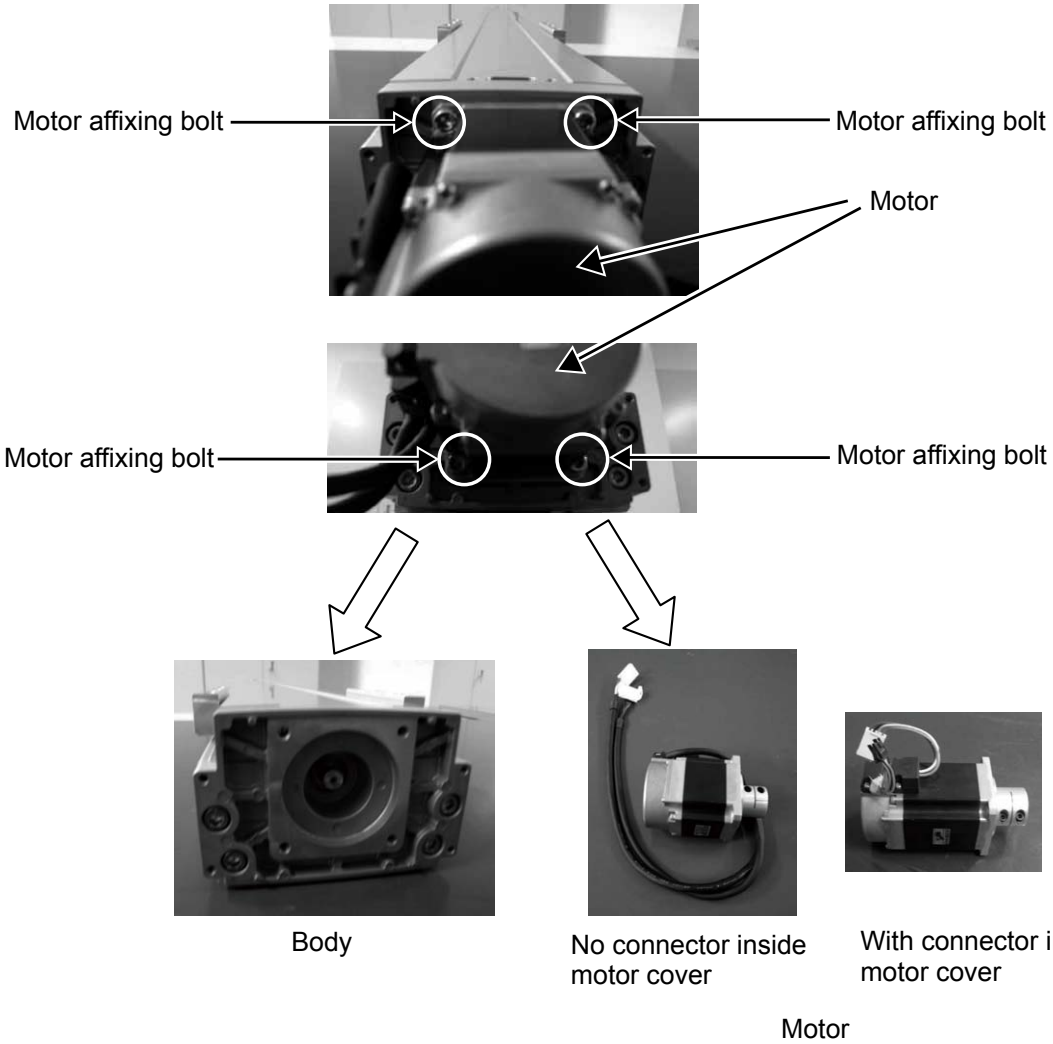
The unit will look like below after the motor cover is removed.

(6) Removing the motor unit

[1] Loosen the coupling tightening bolt.

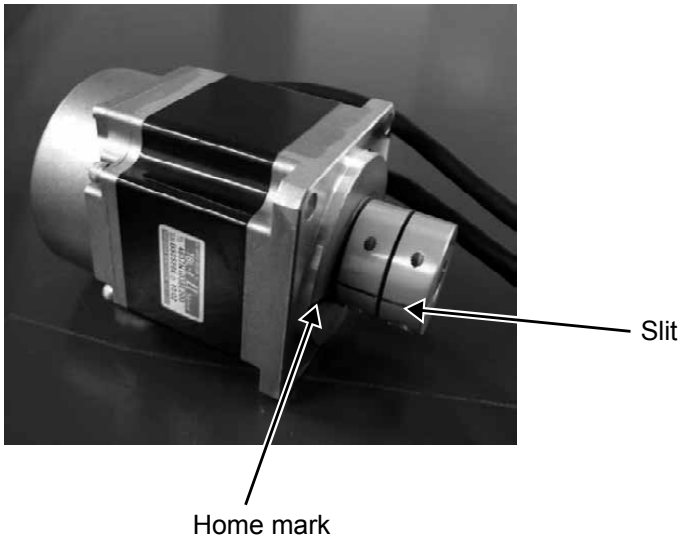
⚠Caution: If the actuator is installed vertically, exercise due caution not to let the slider drop.
Hold the slider (work part) from the outside to prevent it from dropping, and then loosen the coupling bolt.

Remove the bolts used to secure the motor using an Allen wrench of 4 mm across flats, and pull out the motor unit and coupling from the motor housing.



14.2 Installing a Replacement Motor

(1) Replacement Motor Unit
The replacement motor will be supplied together with the coupling installed as shown below.



⚠ Caution: The motor actuator cable exit direction varies depending on the actuator cable exit direction. The cable exit direction must be the same for the motor to be removed and replacement motor to be installed.
If the cable exit direction is different on the installed motor, deviation of the home position will occur.
Align the home mark on the motor with the slit position on the coupling, and then install the motor/coupling into the actuator.
Never loosen the coupling on the motor side.
The slit in the coupling is provided to help correlate the actuator and encoder positions.
If the coupling is loosened, home return may not achieve a normal home position.

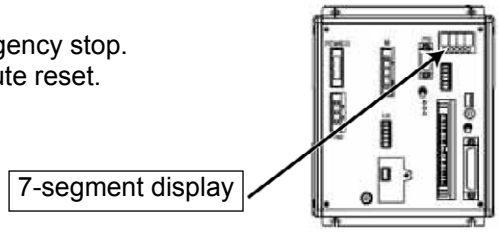
(2) Aligning the slider position

[1] Use extension cables (motor/encoder cables) to connect the motor cable and the encoder cable of the motor unit to the controller.

[2] Action to be taken upon error

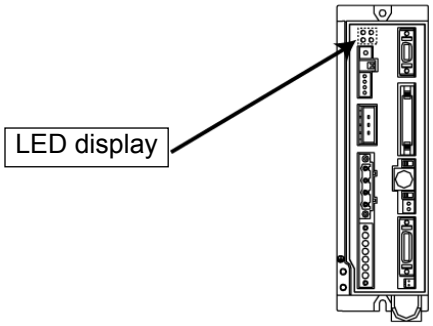
- With XSEL or SSEL controller, if the 7-segment display on the front face of the controller does not show “rdy” or “Ardy” but indicates an alarm after turning on the power, reset the alarm by checking the operation manual. If the problem cannot be resolved, contact IAI.

The 7-segment display shows “Erg”: Cancel the emergency stop.
The 7-segment display shows “ECA1”: Perform absolute reset.



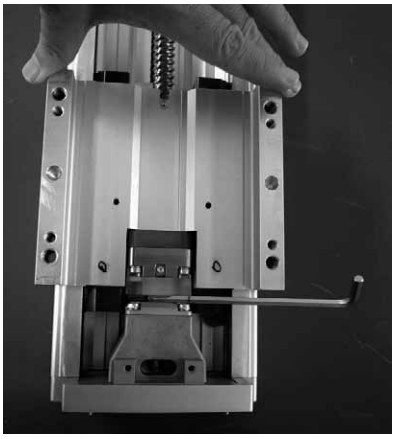
- With the SCON controller, if the PWR LED indicator on the front panel of the controller does not come on, but the ALM indicator comes on instead, after turning on the power, connect the PC or teaching pendant to check the nature of the alarm. Reset the alarm by checking the operation manual. If the problem cannot be resolved, contact IAI.

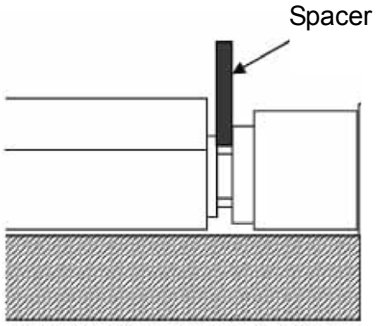
Alarm code “0EE”: Perform absolute reset.



[3] Adjusting the slider position
Place a spacer (jig or block gauge) having a specified thickness between the mechanical end of the home position and the slider, and then press them firmly against one another so as not to allow for gaps.
If the actuator is equipped with a brake, apply power to the controller to release the brake before moving the slider.
After moving the slider, deactivate the brake release, turn off the power to the controller and disconnect the brake lead line connector.
The thickness of the spacer will differ according to the home offset distance, the SE (stroke end) to ME (mechanical end) distance and the actuator type. (See Attachment 1 on Page 83.)
If the actuator is of reversed home specification, see Attachment 2 on Page 84.

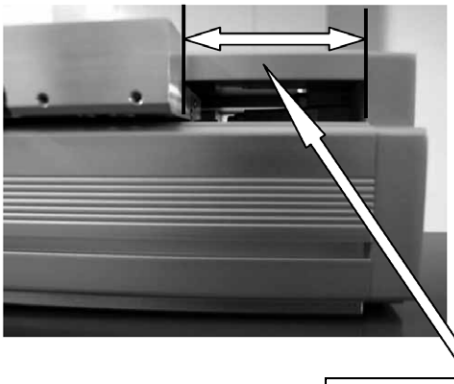
■ Standard home specification
[When the slider jigs, etc., can be removed]
Remove the screw cover.





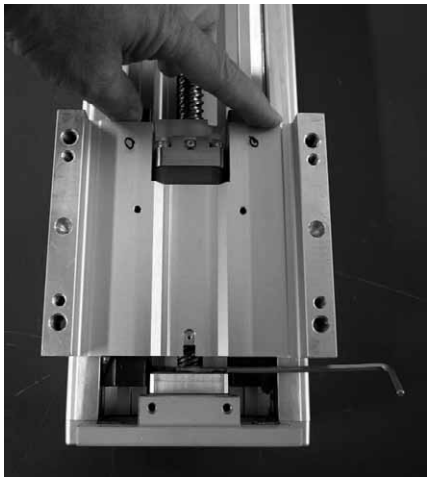
See Attachment 1 on Page 83 for the distance.

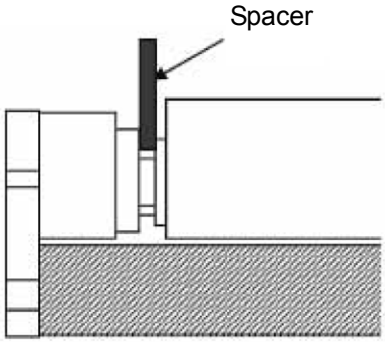
[If a slider jig, etc. cannot be removed]
(Note) Apply this method for SSPA since the spacer cannot be put.



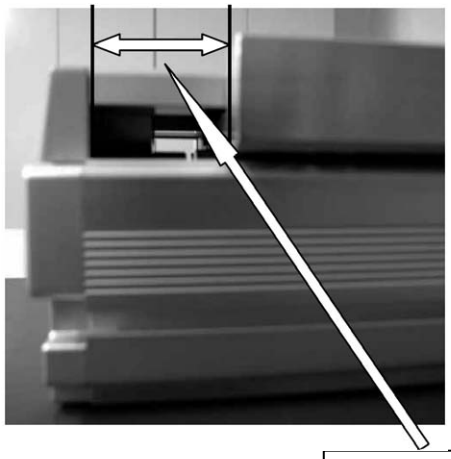
Set this part based on Attachment 2 on Page 84.
The use of a block gauge is recommended also in this case.

■ Reversed home specification
[When the jigs on the slider can be removed]
Remove the screw cover.





[If a slider jig, etc. cannot be removed]
(Note) Apply this method for SSPA since the spacer cannot be put.



Set this part based on Attachment 2 on Page 84.
The use of a block gauge is recommended also in this case.

(Table 1) Spacer Thickness by Model

~ Thickness of Spacer Used When Installing the Motor ~

The thickness of the spacer differs according to the actuator type and ball screw lead. Prepare a spacer (hexagonal wrench) by referring to the charts below.
To determine the actuator type and ball screw lead length, check the model number indicated on the label affixed to the actuator.

[How to Read the Model Number and Select a Spacer]

If the model number includes the LXM type and 20 mm lead, a spacer of 4.0 mm in thickness should be used.

Type	Lead	Standard	Equipped with a limit switch = Equipped with a home sensor
ISB, ISPB SXM/SXL	4	2	4
	8・16・36	4	4
ISB, ISPB MXM/MXL	5	2	4
	10・20・30・48	4	4
ISB, ISPB MXMX	20・30・48	4	4
ISB, ISPB LXM/LXL	10・20・40	4	4
ISB, ISPB LXMX	20・40	4	4
ISB, ISPB LXUWM	20・40	4	4

(Note) The above charts also apply to the models in which the home position is set on the opposite side of the motor.

(Table 2) Dimension Table by Model

Standard home specification

Type	Lead	Adjust dimension to: [mm]	
		Standard	Equipped with a limit switch = Equipped with a home sensor
ISB, ISPB SXM/SXL	4	35	37
	8・16・36	37	37
ISB, ISPB MXM/MXL	5	49	51
	10・20・30・48	51	51
ISB, ISPB MXMX	20・30・48	99	99
ISB, ISPB LXM/LXL	10・20・40	54	54
ISB, ISPB LXMX	20・40	106	106
ISB, ISPB LXUWM	20・40	106	106
SSPA SXM	10・20・30	24	24
SSPA MXM	10・20・40	28	28
SSPA LXM	25・50	32	32

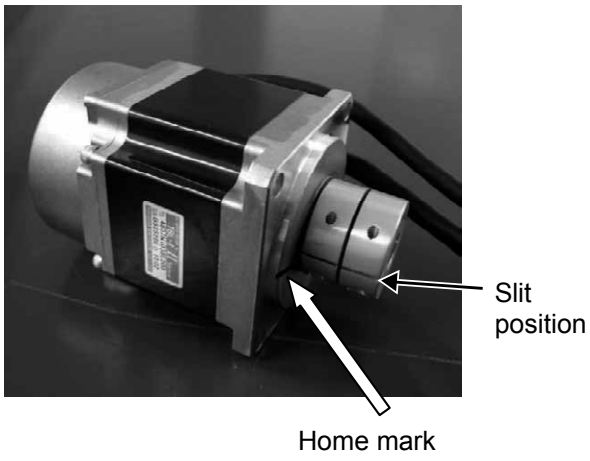
Reversed home specification

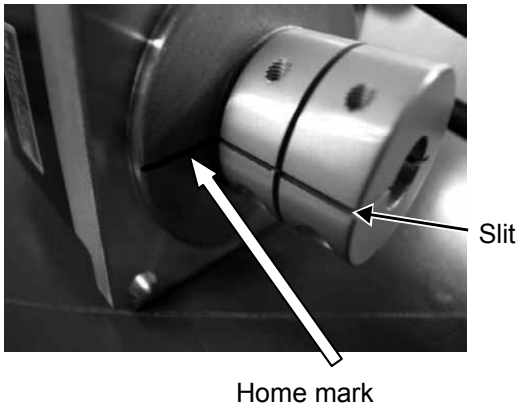
Type	Lead	Adjust dimension to: [mm]	
		Standard	Equipped with a limit switch = Equipped with a home sensor
ISB, ISPB SXM	4	20	22
	8・16・36	22	22
ISB, ISPB MXM	5	29	31
	10・20・30・48	31	31
ISB, ISPB MXMX	20・30・48	79	79
ISB, ISPB LXM	10・20・40	32	32
ISB, ISPB LXMX	20・40	78	78
ISB, ISPB LXUWM	20・40	78	78
SSPA SXM	10・20・30	24	24
SSPA MXM	10・20・40	28	28
SSPA LXM	25・50	32	32

(3) Aligning the motor position

Apply power to the controller, and then run the motor with the jog control using the PC software or teaching pendant to align the home mark on the motor with the slit position on the coupling.
(Jog at 1 mm per second (minimum speed).)

* In certain situations such as when the controller is away from the motor, you can turn on the servo after aligning the coupling and slit positions by hand.

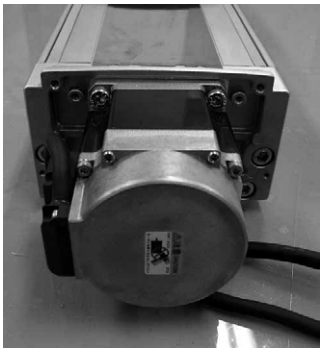




⚠ Caution: Align the home mark on the motor with the slit position on the coupling, and then install the motor/coupling into the actuator.
Never loosen the coupling on the motor side.
The slit in the coupling is provided to help correlate the actuator and encoder positions.
If the coupling is loosened, home return may not achieve a normal home position.

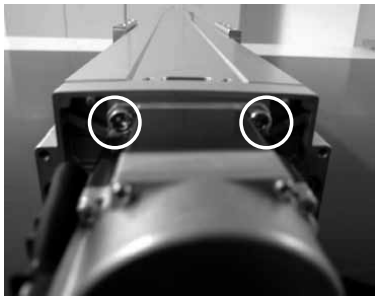
(4) Installing the motor temporarily

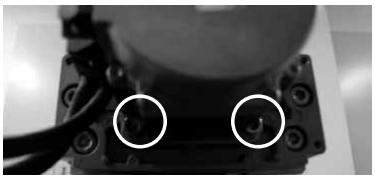
[1] With the servo kept on in the replacement motor, fit the coupling on the motor unit to the groove on the ball screw axis, and temporarily tighten the motor housing and replacement motor. (Tighten manually for this temporary purpose.)
When fastening the replacement motor and motor housing temporarily, be sure to place them next to each other with no gaps or play.
If the cable exits from the right, install the motor as shown in the photograph below so that the motor cable is positioned on the left side. If the cable exits from the left, install the replacement motor in the position opposite of the photograph.



⚠ Caution: The cable exit direction must be the same for the motor to be removed and replacement motor to be installed.
If the cable exit direction is different on the installed motor, deviation of the home position will occur.

Type	Bolt used
ISB, ISPB SXM/SXL	M4 x 12
ISB, ISPB MXM/MXL/ MXMX LXM/LXL/LXMX/ LXUWM	M5 x 15
SSPA SXM	M5 x 15
SSPA MXM	M5 x 15
SSPA LXM	M6 x 20





Four bolts used to secure the motor

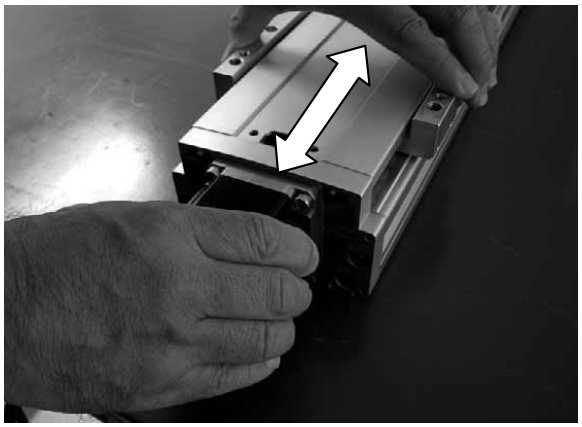
[2] With the motor fastened temporarily, tighten the coupling bolts on the ball screw side.

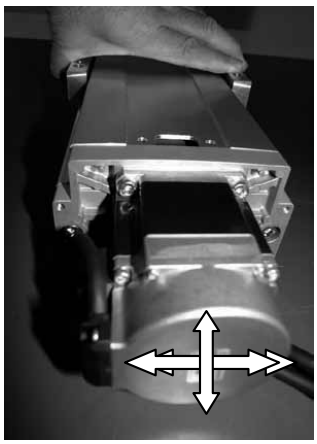
[3] Turn off the power to the controller, disconnect all connectors (including the motor cable and encoder cable connectors), but this time tighten the bolts in place to the specified torque.

<Tightening torques by coupling bolt type>

Type	Tightening torque
ISB, ISPB SXM/SXL	2.0 N•m
ISB, ISPB MXM/MXL/ MXMX	2.0 N•m
ISB, ISPB LXM/LXL/LXMX/ LXUWM	4.0 N•m
SSPA SXM	2.0 N•m
SSPA MXM	4.0 N•m
SSPA LXM	7.0 N•m

(5) Centering and securing the motor unit
Loosen the motor affixing screws you have tightened only loosely in an earlier step, move the slider back and forth by hand for three to four cycles (over as long an operation stroke as possible) and eventually move the slider to near the mechanical end on the motor side and find a position at which the motor vibration becomes the smallest. Affix the motor unit in the motor housing at this position.



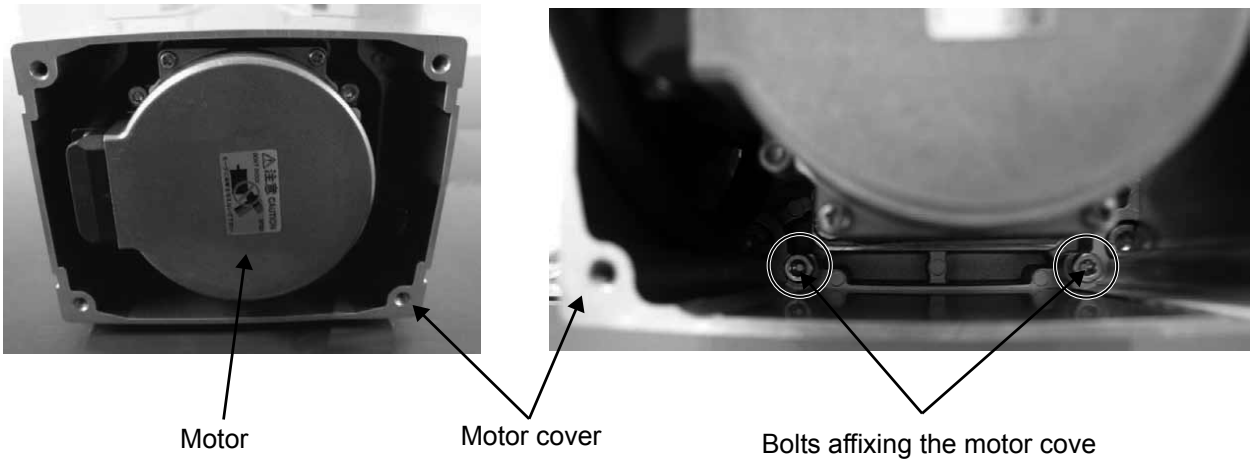


<Tightening torque of the bolt when motor is affixed>

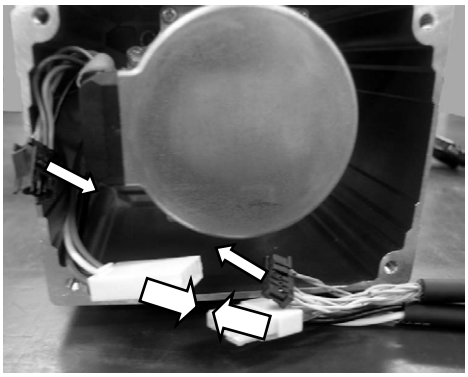
Type	Bolt used	Tightening torque
ISB, ISPB SXM/SXL	M4 x 12	176 N·cm
ISB, ISPB MXM/MXL/ MXMX LXM/LXL/LXMX/ LXUWM	M5 x 15	342 N·cm
SSPA SXM	M5 x 15	342 N·cm
SSPA MXM	M5 x 15	342 N·cm
SSPA LXM	M6 x 20	536 N·cm

(Note) If the actuator is equipped with a brake, connect the encoder cable of the motor unit to the controller using the extension cables (motor and encoder cables), and apply power to the controller. Then release the brake and move the slider.
For safety reasons, after securing the motor unit, deactivate the brake release, turn off the power to the controller and disconnect the cable connectors from the motor unit.

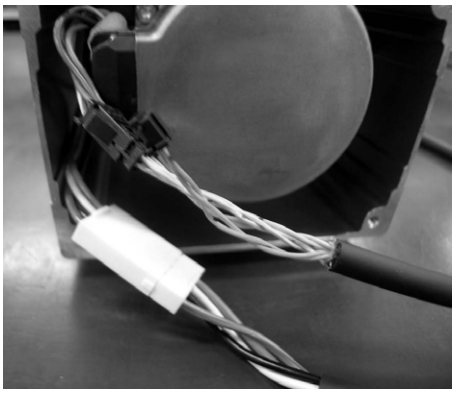
(6) Installing the motor cover
Tighten the two bolts to install the motor cover using an Allen wrench of 2.5 mm across flats for ISB and ISPB-SXM/SXL, or 3 mm across flats for all other models.
Two of these bolts are found below the motor at locations further back in the motor cover.



(7) Connection of Connectors inside Motor Cover
For the motor with a connector inside the motor cover, connect to the actuator cables with a connector.
For other process, proceed to Step (8).

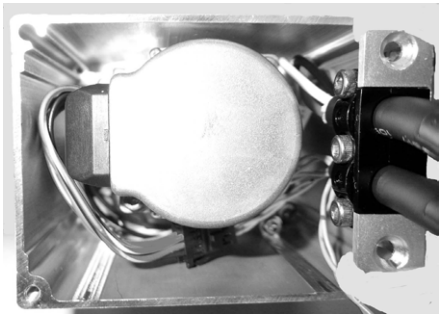


Before disconnecting connectors

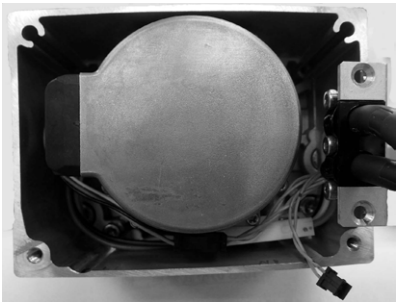


After disconnecting connectors

Store the connector in the motor cover as shown in the figure below. Pay attention not to pinch the cables on the motor cover or end cover when storing the cables.



ISB-S



ISB-M

ISB-L

SSPA-S

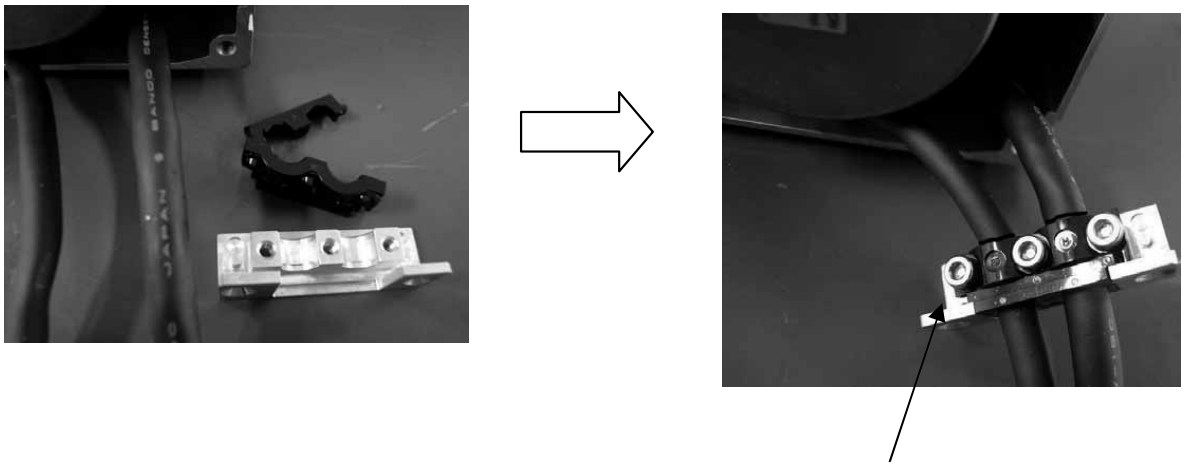
(8) Installing the cable mounting cover

(Note) It is not necessary to have this work process when the connection is made with connectors inside the motor cover.

Tighten the three bolts using an Allen wrench of 2.5 mm across flats to install the cable mounting cover to the cable. Install the cable mounting cover in roughly the same position as the area marked on the motor that has been removed.

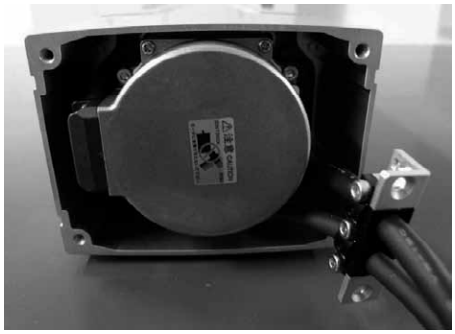
The cable mounting cover is imprinted with M and PG. Clamp the motor cable to the M side, and the encoder cable to the PG side.

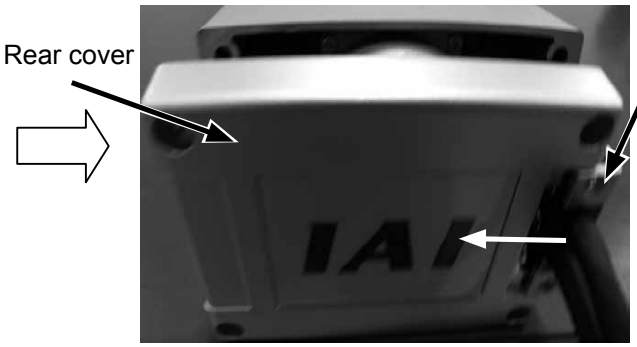
(Note) After the motor is replaced, install the cable mounting cover in roughly the same position as the replaced motor. Mark the cable for the motor to be replaced so that the installation position can be identified.



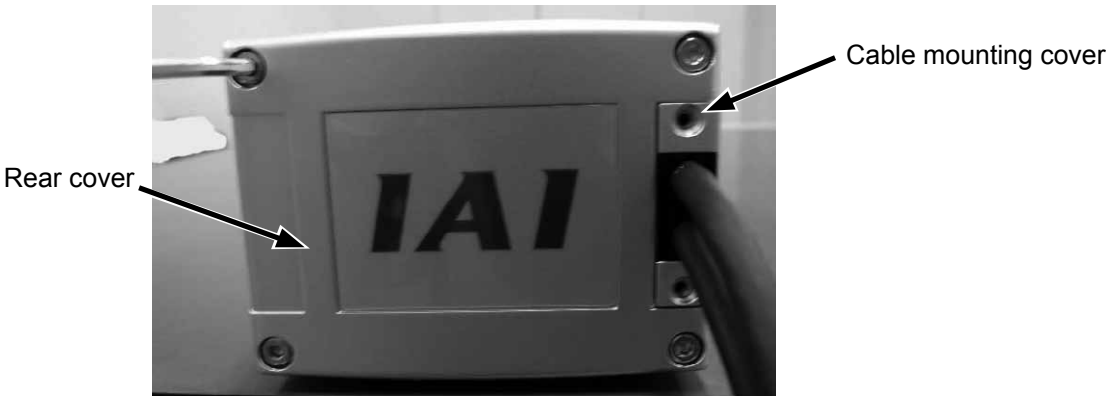
(9) Installing the rear cover

[1] Slide the rear cover and insert it into the cable mounting cover.

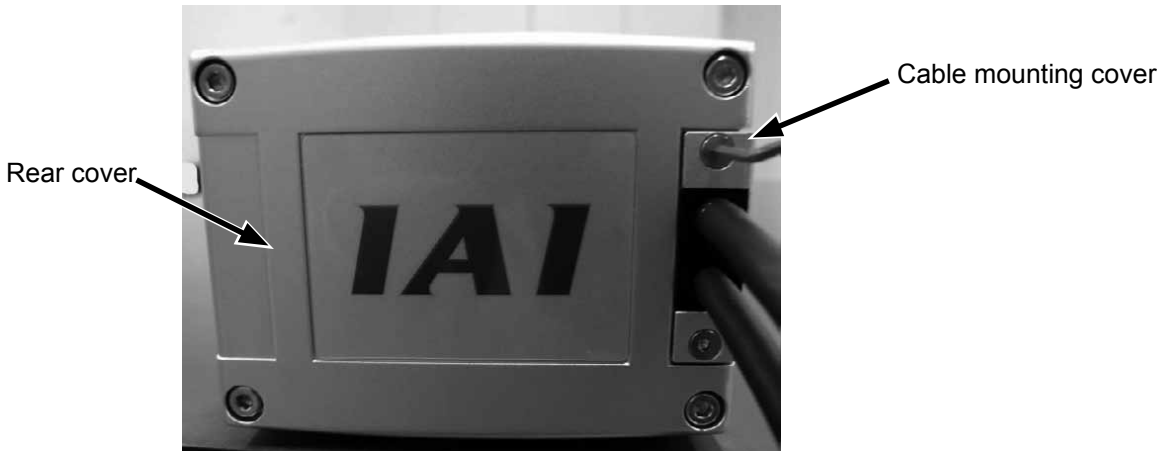




[2] Tighten the four bolts to install the rear cover using an Allen wrench of 2.5 mm across flats for ISB and ISPB-SXM/SXL, or 3 mm across flats for all other models.

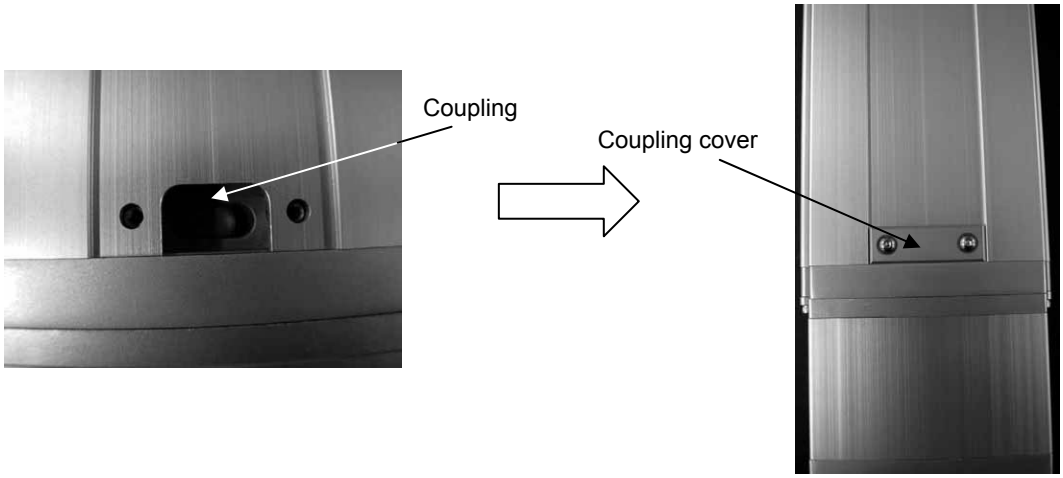


[3] Tighten the screws with an Allen wrench of 2 mm across flats to attach the screws for the cable mounting cover.



(10) Installing the coupling cover

Tighten the two screws to install the cover on the motor side using an Allen wrench of 2.5 mm across flats for ISB and ISPB-SXM/SXL, or 3 mm across flats for all other models.



14.3 Correcting for Position Deviation

(1) Connect the motor cable and encoder cable and turn on the controller power.

(2) 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.
(If the actuator is of absolute specification, perform an absolute reset.)

(3) 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.

(4) Reflect the deviation in the home preset parameter in the case of an X-SEL/SSEL controller, or in the home return offset parameter in the case of an SCON, MSCON controller. [For the setting method, refer to 9.5, “Fine-tuning the Home Position.”]

* 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 unit again by following the procedure described in this manual.
When the motor unit was installed, a wrong spacer size may have been used or the slider may have moved instead of remaining stationary at the mechanical end.

14.4 Operation Check after Replacing the Motor

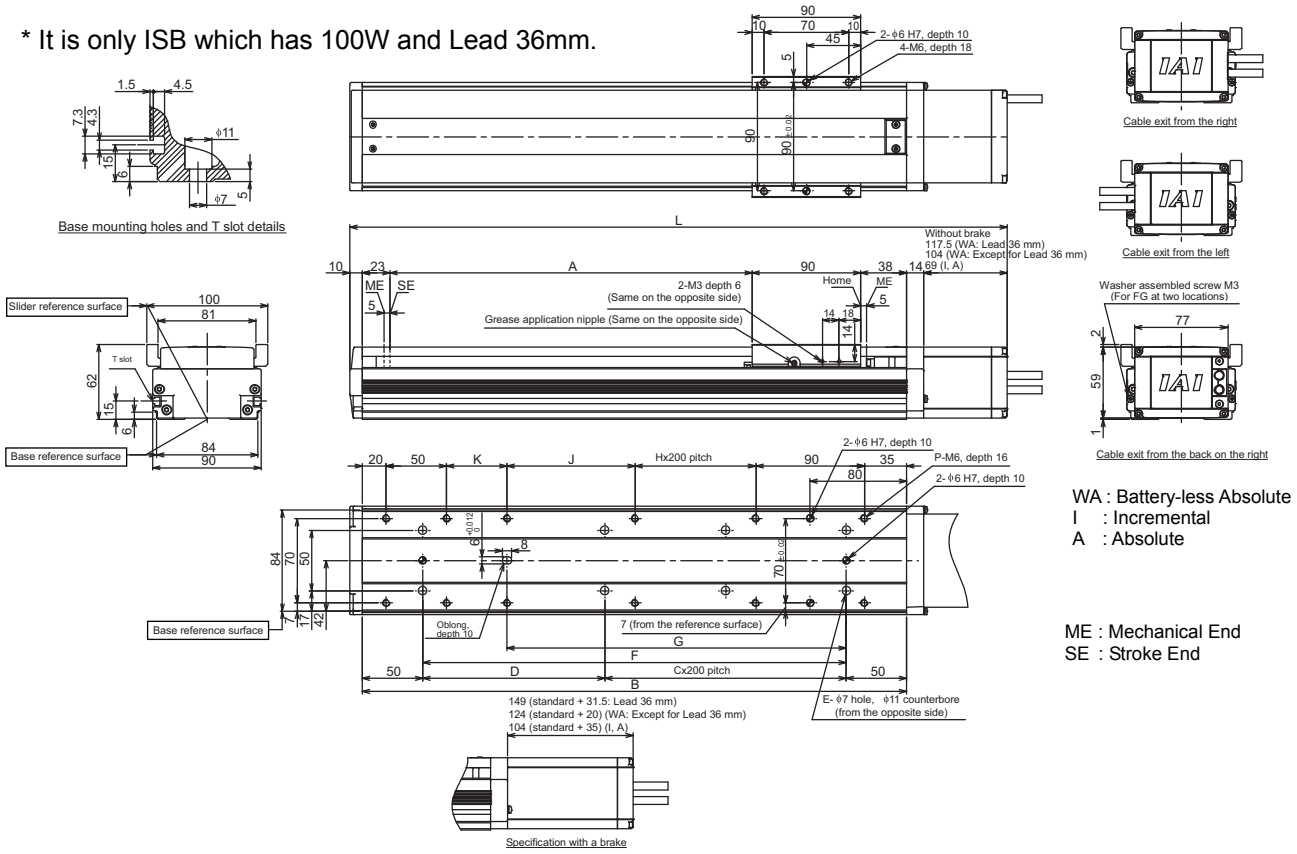
After replacing the motor, perform continuous operation to confirm absence of vibration or abnormal noise.

15. Appendix

15.1 External Dimensions

15.1.1 ISB, ISPB-SXM

* It is only ISB which has 100W and Lead 36mm.



WA : Battery-less Absolute
I : Incremental
A : Absolute

ME : Mechanical End
SE : Stroke End

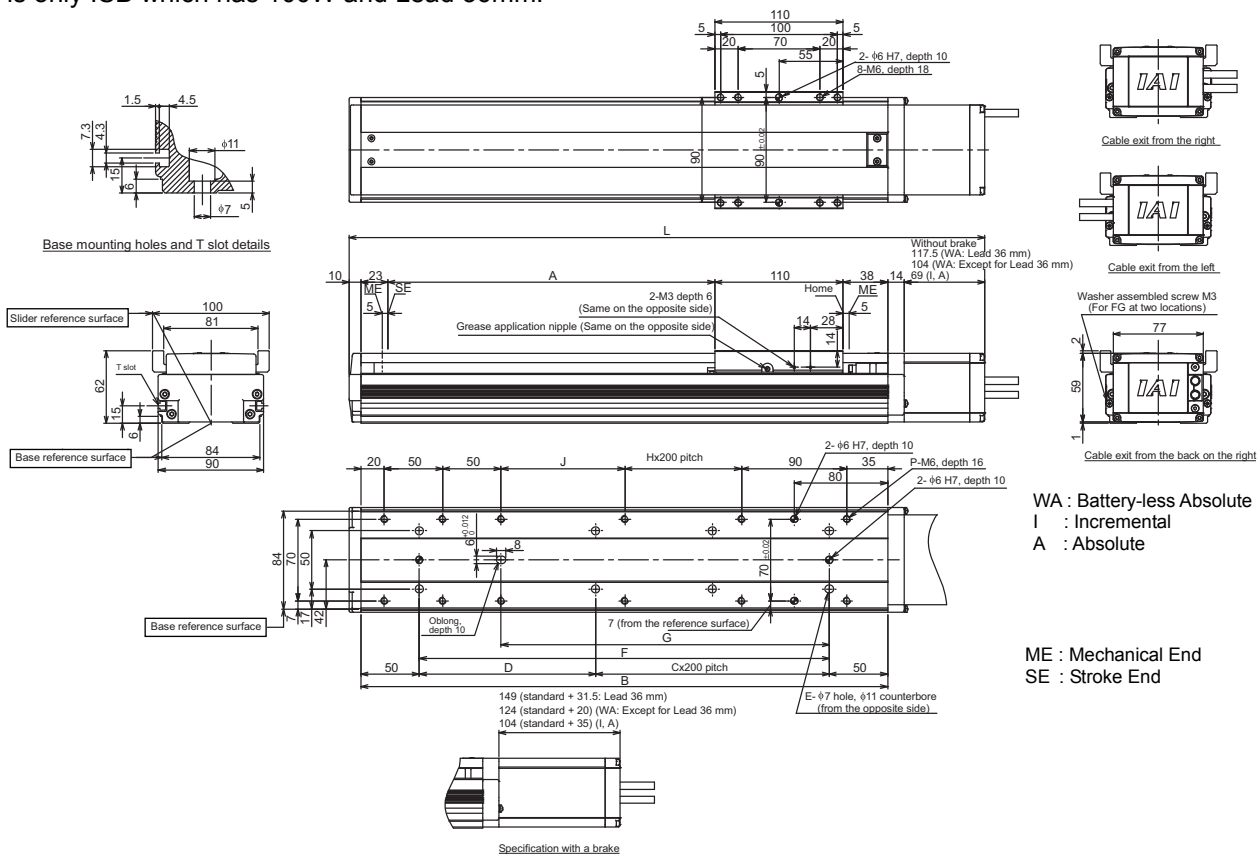
Stroke	L						A	B	C	D	E	F	G	H	J	K	P	Mass [kg]			
	Incremental Absolute		Battery-less Absolute																		
			Except for Lead 36mm		Lead 36mm													Except for Lead 36mm		Lead 36mm	
	Stand-ard	with Brake	Stand-ard	with Brake	Stand-ard	with Brake												Stand-ard	with Brake	Stand-ard	with Brake
100	344	379	379	399	392.5	424	100	251	0	151	4	151	131	0	56	0	8	3.0	3.3	3.2	3.5
150	394	429	429	449	442.5	474	150	301	0	201	4	201	131	0	56	50	10	3.4	3.7	3.6	3.9
200	444	479	479	499	492.5	524	200	351	0	251	4	251	181	0	106	50	10	3.8	4.1	4.0	4.3
250	494	529	529	549	542.5	574	250	401	1	101	6	301	231	0	156	50	10	4.2	4.5	4.3	4.6
300	544	579	579	599	592.5	624	300	451	1	151	6	351	281	0	206	50	10	4.5	4.8	4.7	5.0
350	594	629	629	649	642.5	674	350	501	1	201	6	401	331	0	256	50	10	4.9	5.2	5.0	5.3
400	644	679	679	699	692.5	724	400	551	1	251	6	451	381	1	106	50	12	5.2	5.5	5.4	5.7
450	694	729	729	749	742.5	774	450	601	2	101	8	501	431	1	156	50	12	5.6	5.9	5.7	6.0
500	744	779	779	799	792.5	824	500	651	2	151	8	551	481	1	206	50	12	5.9	6.2	6.1	6.4
550	794	829	829	849	842.5	874	550	701	2	201	8	601	531	1	256	50	12	6.3	6.6	6.5	6.8
600	844	879	879	899	892.5	924	600	751	2	251	8	651	581	2	106	50	14	6.6	6.9	6.8	7.1
650	894	929	929	949	942.5	974	650	801	3	101	10	701	631	2	156	50	14	7.0	7.3	7.2	7.5
700	944	979	979	999	992.5	1024	700	851	3	151	10	751	681	2	206	50	14	7.3	7.6	7.5	7.8
750	994	1029	1029	1049	1042.5	1074	750	901	3	201	10	801	731	2	256	50	14	7.7	8.0	7.9	8.2
800	1044	1079	1079	1099	1092.5	1124	800	951	3	251	10	851	781	3	106	50	16	8.0	8.3	8.2	8.5
850	1094	1129	1129	1149	1142.5	1174	850	1001	4	101	12	901	831	3	156	50	16	8.4	8.7	8.6	8.9
900	1144	1179	1179	1199	1192.5	1224	900	1051	4	151	12	951	881	3	206	50	16	8.7	9.0	8.9	9.2

Stroke can be indicated from 950 to 1100 for Lead 36mm.

Stroke	L		A	B	C	D	E	F	G	H	J	K	P	Mass [kg]	
	Battery-less Absolute														
	Lead 36mm													Lead 36mm	
	Stand-ard	with Brake												Stand-ard	with Brake
950	1242.5	1274	950	1101	4	201	12	1001	931	3	256	50	16	9.3	9.6
1000	1292.5	1324	1000	1151	4	251	12	1051	981	4	106	50	18	9.7	10.0
1050	1342.5	1374	1050	1201	5	101	14	1101	1031	4	156	50	18	10.0	10.3
1100	1392.5	1424	1100	1251	5	151	14	1151	1081	4	206	50	18	10.4	10.7

15.1.2 ISB, ISPB-SXL

* It is only ISB which has 100W and Lead 36mm.



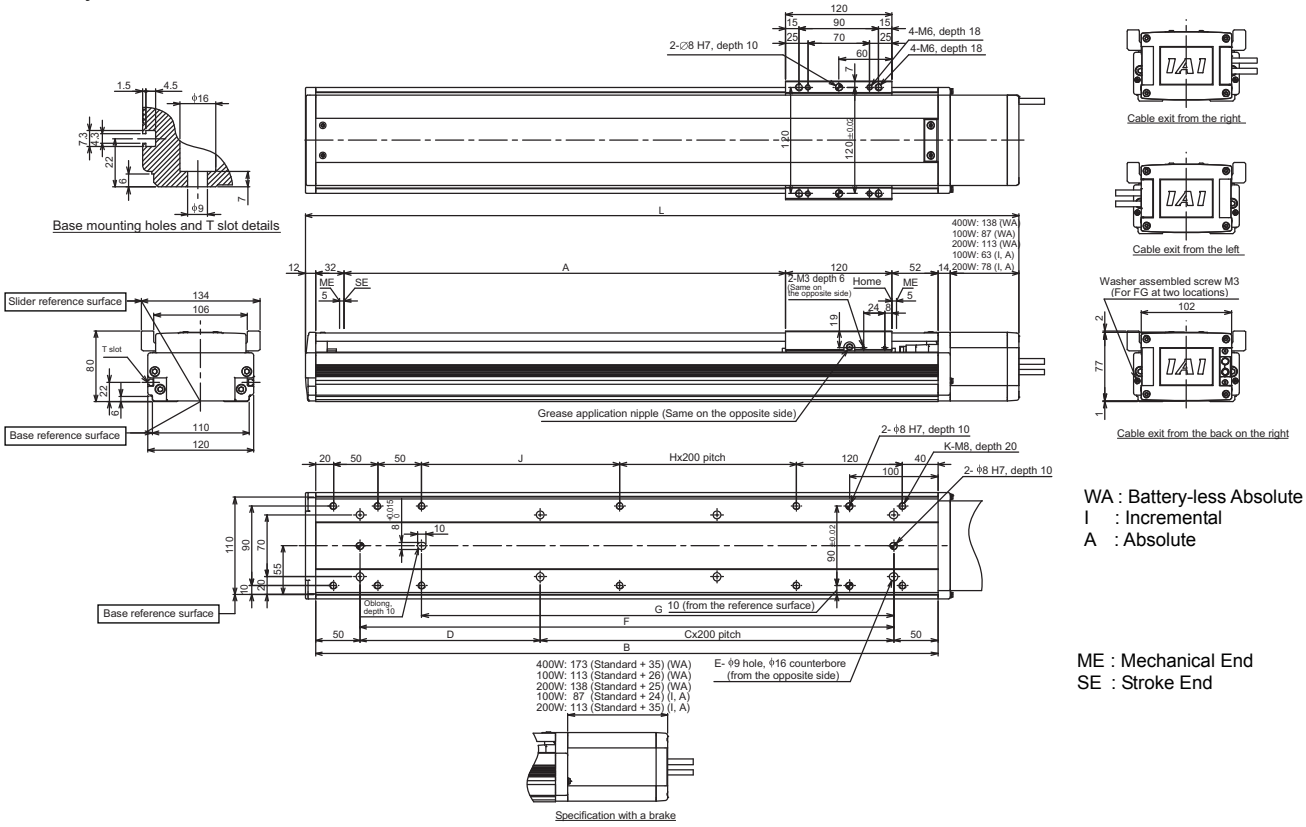
Stroke	L						A	B	C	D	E	F	G	H	J	P	Mass [kg]			
	Incremental Absolute		Battery-less Absolute																	
			Except for Lead 36mm		Lead 36mm												Except for Lead 36mm		Lead 36mm	
	Stand-ard	with Brake	Stand-ard	with Brake	Stand-ard	with Brake											Stand-ard	with Brake	Stand-ard	with Brake
130	394	429	429	449	442.5	474	130	301	0	201	4	201	131	0	56	10	3.1	3.4	3.7	4.0
180	444	479	479	499	492.5	524	180	351	0	251	4	251	181	0	106	10	3.5	3.8	4.1	4.4
230	494	529	529	549	542.5	574	230	401	1	101	6	301	231	0	156	10	3.9	4.2	4.4	4.7
280	544	579	579	599	592.5	624	280	451	1	151	6	351	281	0	206	10	4.3	4.5	4.8	5.1
330	594	629	629	649	642.5	674	330	501	1	201	6	401	331	0	256	10	4.6	4.9	5.1	5.4
380	644	679	679	699	692.5	724	380	551	1	251	6	451	381	1	106	12	5.0	5.3	5.5	5.8
430	694	729	729	749	742.5	774	430	601	2	101	8	501	431	1	156	12	5.3	5.6	5.8	6.1
480	744	779	779	799	792.5	824	480	651	2	151	8	551	481	1	206	12	5.7	6.0	6.2	6.5
530	794	829	829	849	842.5	874	530	701	2	201	8	601	531	1	256	12	6.0	6.3	6.6	6.9
580	844	879	879	899	892.5	924	580	751	2	251	8	651	581	2	106	14	6.4	6.7	6.9	7.2
630	894	929	929	949	942.5	974	630	801	3	101	10	701	631	2	156	14	6.7	7.0	7.3	7.6
680	944	979	979	999	992.5	1024	680	851	3	151	10	751	681	2	206	14	7.1	7.4	7.6	7.9
730	994	1029	1029	1049	1042.5	1074	730	901	3	201	10	801	731	2	256	14	7.4	7.7	8.0	8.3
780	1044	1079	1079	1099	1092.5	1124	780	951	3	251	10	851	781	3	106	16	7.8	8.1	8.3	8.6
830	1094	1129	1129	1149	1142.5	1174	830	1001	4	101	12	901	831	3	156	16	8.1	8.4	8.7	9.0
880	1144	1179	1179	1199	1192.5	1224	880	1051	4	151	12	951	881	3	206	16	8.5	8.8	9.0	9.3

Stroke can be indicated from 930 to 1080 for Lead 36mm.

Stroke	L		A	B	C	D	E	F	G	H	J	P	Mass [kg]	
	Battery-less Absolute													
	Lead 36mm												Lead 36mm	
	Stand-ard	with Brake											Stand-ard	with Brake
930	1242.5	1274	930	1101	4	201	12	1001	931	3	256	16	9.4	9.7
980	1292.5	1324	980	1151	4	251	12	1051	981	4	106	18	9.8	10.1
1030	1342.5	1374	1030	1201	5	101	14	1101	1031	4	156	18	10.1	10.4
1080	1392.5	1424	1080	1251	5	151	14	1151	1081	4	206	18	10.5	10.8

15.1.3 ISB, ISPB-MXM

* It is only ISB which has 400W and Lead 48mm.



WA : Battery-less Absolute
I : Incremental
A : Absolute

ME : Mechanical End
SE : Stroke End

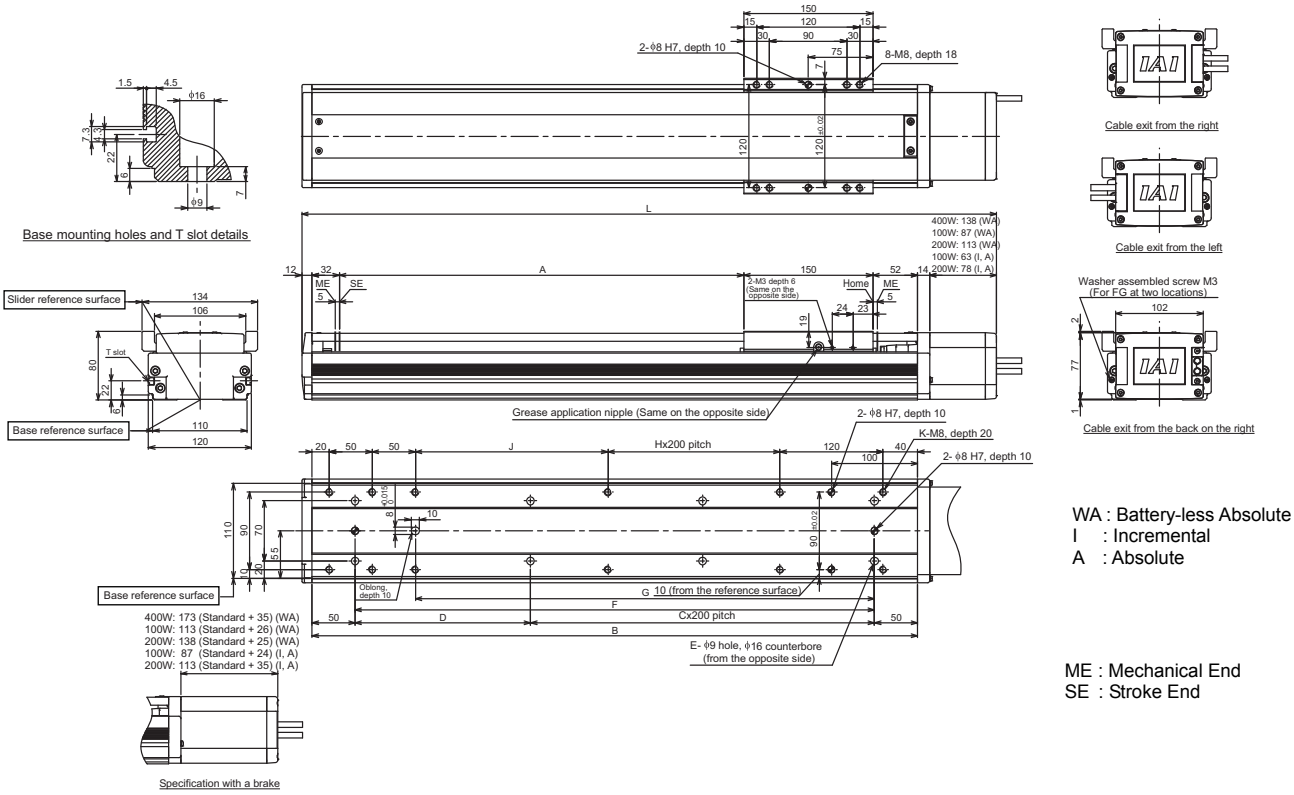
Stroke	L					A	B	C	D	E	F	G	H	J	K	Mass [kg]					
	Incremental Absolute		Battery-less Absolute													100W		200W		400W	
	Standard																				
	100W	200W	100W	200W	400W											Stand-ard	with Brake	Stand-ard	with Brake	Stand-ard	with Brake
100	393	408	417	443	468	100	304	0	204	4	204	134	0	24	10	6.0	6.5	6.4	7.0	7.0	7.6
150	443	458	467	493	518	150	354	0	254	4	254	184	0	74	10	6.6	7.1	7.1	7.7	7.6	8.2
200	493	508	517	543	568	200	404	1	104	6	304	234	0	124	10	7.2	7.7	7.7	8.3	8.3	8.9
250	543	558	567	593	618	250	454	1	154	6	354	284	0	174	10	7.9	8.4	8.4	9.0	8.9	9.5
300	593	608	617	643	668	300	504	1	204	6	404	334	0	224	10	8.5	9.0	9.0	9.6	9.5	10.1
350	643	658	667	693	718	350	554	1	254	6	454	384	0	274	10	9.2	9.7	9.6	10.2	10.2	10.8
400	693	708	717	743	768	400	604	2	104	8	504	434	1	124	12	9.8	10.3	10.2	10.8	10.8	11.4
450	743	758	767	793	818	450	654	2	154	8	554	484	1	174	12	10.4	10.9	10.9	11.5	11.4	12.0
500	793	808	817	843	868	500	704	2	204	8	604	534	1	224	12	11.0	11.5	11.5	12.1	12.1	12.7
550	843	858	867	893	918	550	754	2	254	8	654	584	1	274	12	11.7	12.2	12.2	12.8	12.7	13.3
600	893	908	917	943	968	600	804	3	104	10	704	634	2	124	14	12.3	12.8	12.8	13.4	13.3	13.9
650	943	958	967	993	1018	650	854	3	154	10	754	684	2	174	14	13.0	13.5	13.4	14.0	14.0	14.6
700	993	1008	1017	1043	1068	700	904	3	204	10	804	734	2	224	14	13.6	14.1	14.0	14.6	14.6	15.2
750	1043	1058	1067	1093	1118	750	954	3	254	10	854	784	2	274	14	14.2	14.7	14.7	15.3	15.2	15.8
800	1093	1108	1117	1143	1168	800	1004	4	104	12	904	834	3	124	16	14.8	15.3	15.3	15.9	15.9	16.5
850	1143	1158	1167	1193	1218	850	1054	4	154	12	954	884	3	174	16	15.5	16.0	16.0	16.6	16.5	17.1
900	1193	1208	1217	1243	1268	900	1104	4	204	12	1004	934	3	224	16	16.1	16.6	16.6	17.2	17.2	17.7
950	1243	1258	1267	1293	1318	950	1154	4	254	12	1054	984	3	274	16	16.8	17.3	17.3	17.9	17.8	18.4
1000	1293	1308	1317	1343	1368	1000	1204	5	104	14	1104	1034	4	124	18	17.4	17.9	17.9	18.5	18.4	19.0
1050	1343	1358	1367	1393	1418	1050	1254	5	154	14	1154	1084	4	174	18	18.1	18.6	18.5	19.1	19.1	19.6
1100	1393	1408	1417	1443	1468	1100	1304	5	204	14	1204	1134	4	224	18	18.7	19.2	19.1	19.7	19.7	20.3

Stroke can be indicated from 1150 to 1300 for 400W, Lead 48mm.

Stroke	L	A	B	C	D	E	F	G	H	J	K	Mass [kg]	
	Battery-less Absolute											400W	
	Standard											Stand-ard	with Brake
	400W												
1150	1518	1150	1354	5	254	14	1254	1184	4	274	18	20.3	20.9
1200	1568	1200	1404	6	104	16	1304	1234	5	124	20	21.0	21.6
1250	1618	1250	1454	6	154	16	1354	1284	5	174	20	21.6	22.2
1300	1668	1300	1504	6	204	16	1404	1334	5	224	20	22.2	22.8

15.1.4 ISB, ISPB-MXL

* It is only ISB which has 400W and Lead 48mm.



WA : Battery-less Absolute
I : Incremental
A : Absolute

ME : Mechanical End
SE : Stroke End

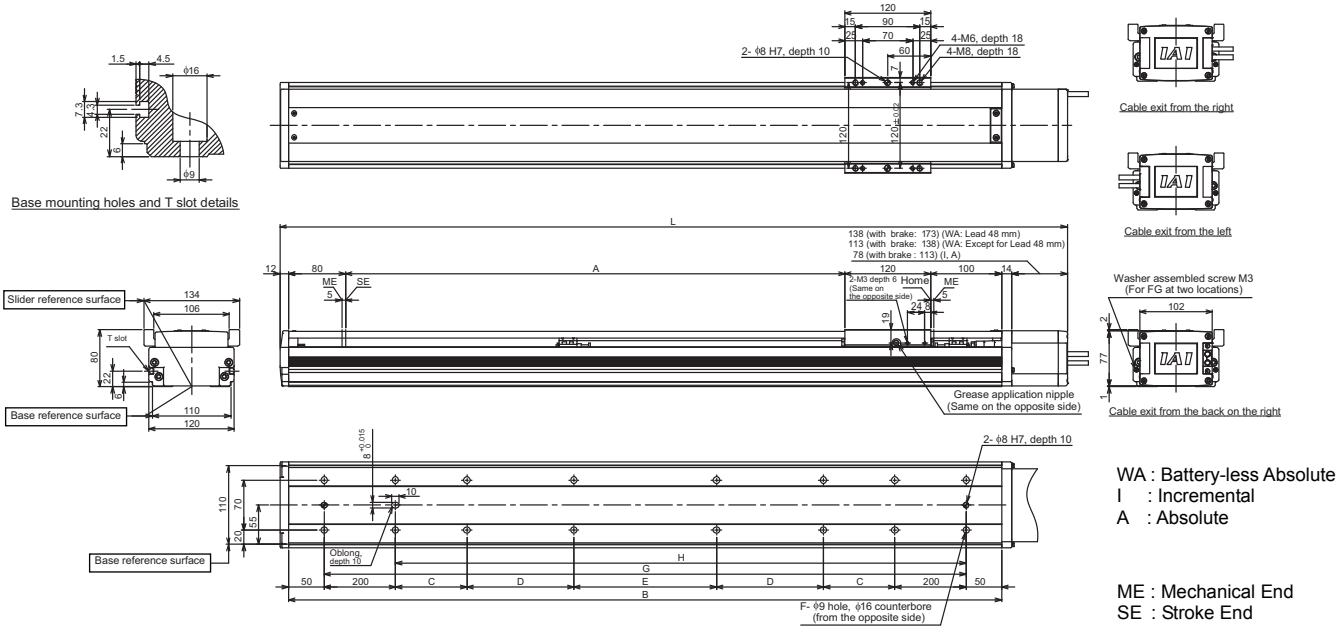
Stroke	L					A	B	C	D	E	F	G	H	J	K	Mass [kg]					
	Incremental Absolute		Battery-less Absolute													100W		200W		400W	
	Standard																				
	100W	200W	100W	200W	400W											Stand-ard	with Brake	Stand-ard	with Brake	Stand-ard	with Brake
120	443	458	467	493	518	120	354	0	254	4	254	184	0	74	10	6.3	6.8	6.7	7.3	7.9	8.5
170	493	508	517	543	568	170	404	1	104	6	304	234	0	124	10	6.9	7.4	7.4	8.0	8.6	9.2
220	543	558	567	593	618	220	454	1	154	6	354	284	0	174	10	7.5	8.0	8.0	8.6	9.2	9.8
270	593	608	617	643	668	270	504	1	204	6	404	334	0	224	10	8.2	8.7	8.7	9.3	9.8	10.4
320	643	658	667	693	718	320	554	1	254	6	454	384	0	274	10	8.8	9.3	9.3	9.9	10.5	11.1
370	693	708	717	743	768	370	604	2	104	8	504	434	1	124	12	9.5	10.0	9.9	10.5	11.1	11.7
420	743	758	767	793	818	420	654	2	154	8	554	484	1	174	12	10.1	10.6	10.5	11.1	11.7	12.3
470	793	808	817	843	868	470	704	2	204	8	604	534	1	224	12	10.7	11.2	11.2	11.8	12.4	13.0
520	843	858	867	893	918	520	754	2	254	8	654	584	1	274	12	11.3	11.8	11.8	12.4	13.0	13.6
570	893	908	917	943	968	570	804	3	104	10	704	634	2	124	14	12.0	12.5	12.5	13.1	13.6	14.2
620	943	958	967	993	1018	620	854	3	154	10	754	684	2	174	14	12.6	13.1	13.1	13.7	14.3	14.9
670	993	1008	1017	1043	1068	670	904	3	204	10	804	734	2	224	14	13.3	13.8	13.7	14.3	14.9	15.5
720	1043	1058	1067	1093	1118	720	954	3	254	10	854	784	2	274	14	13.9	14.4	14.3	14.9	15.5	16.1
770	1093	1108	1117	1143	1168	770	1004	4	104	12	904	834	3	124	16	14.5	15.0	15.0	15.6	16.2	16.8
820	1143	1158	1167	1193	1218	820	1054	4	154	12	954	884	3	174	16	15.1	15.6	15.6	16.2	16.8	17.4
870	1193	1208	1217	1243	1268	870	1104	4	204	12	1004	934	3	224	16	15.8	16.3	16.3	16.9	17.5	18.0
920	1243	1258	1267	1293	1318	920	1154	4	254	12	1054	984	3	274	16	16.4	16.9	16.9	17.5	18.1	18.7
970	1293	1308	1317	1343	1368	970	1204	5	104	14	1104	1034	4	124	18	17.1	17.6	17.6	18.2	18.7	19.3
1020	1343	1358	1367	1393	1418	1020	1254	5	154	14	1154	1084	4	174	18	17.7	18.2	18.2	18.8	19.4	19.9
1070	1393	1408	1417	1443	1468	1070	1304	5	204	14	1204	1134	4	224	18	18.4	18.9	18.9	19.5	20.0	20.6

Stroke can be indicated from 1120 to 1270 for 400W, Lead 48mm.

Stroke	L	A	B	C	D	E	F	G	H	J	K	Mass [kg]	
	Battery-less Absolute											400W	
	Standard												
	400W											Stand-ard	with Brake
1120	1518	1120	1354	5	254	14	1254	1184	4	274	18	20.6	21.2
1170	1568	1170	1404	6	104	16	1304	1234	5	124	20	21.3	21.9
1220	1618	1220	1454	6	154	16	1354	1284	5	174	20	21.9	22.5
1270	1668	1270	1504	6	204	16	1404	1334	5	224	20	22.5	23.1

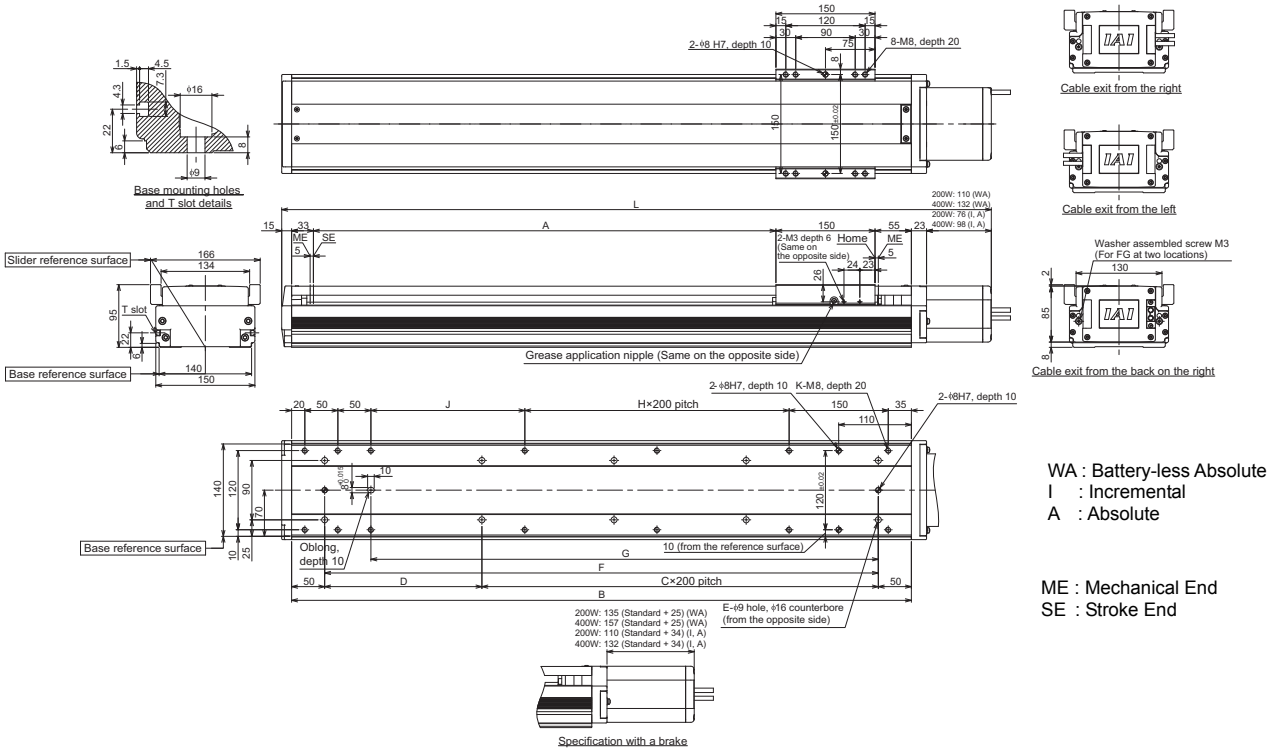
15.1.5 ISB, ISPB-MXMX

* It is only ISB which has 400W and Lead 48mm.



Stroke	L						A	B	C	D	E	F	G	H	Mass [kg]			
	Incremental Absolute		Battery-less Absolute															
			Except for Lead 48mm		Lead 48mm										Except for Lead 48mm		Lead 48mm	
	Stand-ard	with Brake	Stand-ard	with Brake	Stand-ard	with Brake									Stand-ard	with Brake	Stand-ard	with Brake
800	1204	1239	1239	1264	1264	1299	800	1100	200	0	200	12	1000	800	16.5	17.1	17.1	17.7
900	1304	1339	1339	1364	1364	1399	900	1200	200	0	300	12	1100	900	17.8	18.4	18.4	19.0
1000	1404	1439	1439	1464	1464	1499	1000	1300	200	0	400	12	1200	1000	19.1	19.7	19.6	20.2
1100	1504	1539	1539	1564	1564	1599	1100	1400	250	0	400	12	1300	1100	20.3	20.9	20.9	21.5
1200	1604	1639	1639	1664	1664	1699	1200	1500	300	0	400	12	1400	1200	21.6	22.2	22.2	22.8
1300	1704	1739	1739	1764	1764	1799	1300	1600	350	0	400	12	1500	1300	22.9	23.5	23.4	24.0
1400	1804	1839	1839	1864	1864	1899	1400	1700	400	0	400	12	1600	1400	24.1	24.7	24.7	25.3
1500	1904	1939	1939	1964	1964	1999	1500	1800	450	0	400	12	1700	1500	25.4	26.0	26.0	26.6
1600	2004	2039	2039	2064	2064	2099	1600	1900	500	0	400	12	1800	1600	26.7	27.3	27.3	27.8
1700	2104	2139	2139	2164	2164	2199	1700	2000	550	0	400	12	1900	1700	28.0	28.6	28.5	29.1
1800	2204	2239	2239	2264	2264	2299	1800	2100	200	400	400	16	2000	1800	29.2	29.8	29.8	30.4
1900	2304	2339	2339	2364	2364	2399	1900	2200	200	450	400	16	2100	1900	30.5	31.1	31.1	31.7
2000	2404	2439	2439	2464	2464	2499	2000	2300	200	500	400	16	2200	2000	31.8	32.4	32.3	32.9

15.1.6 ISB, ISPB-LXM

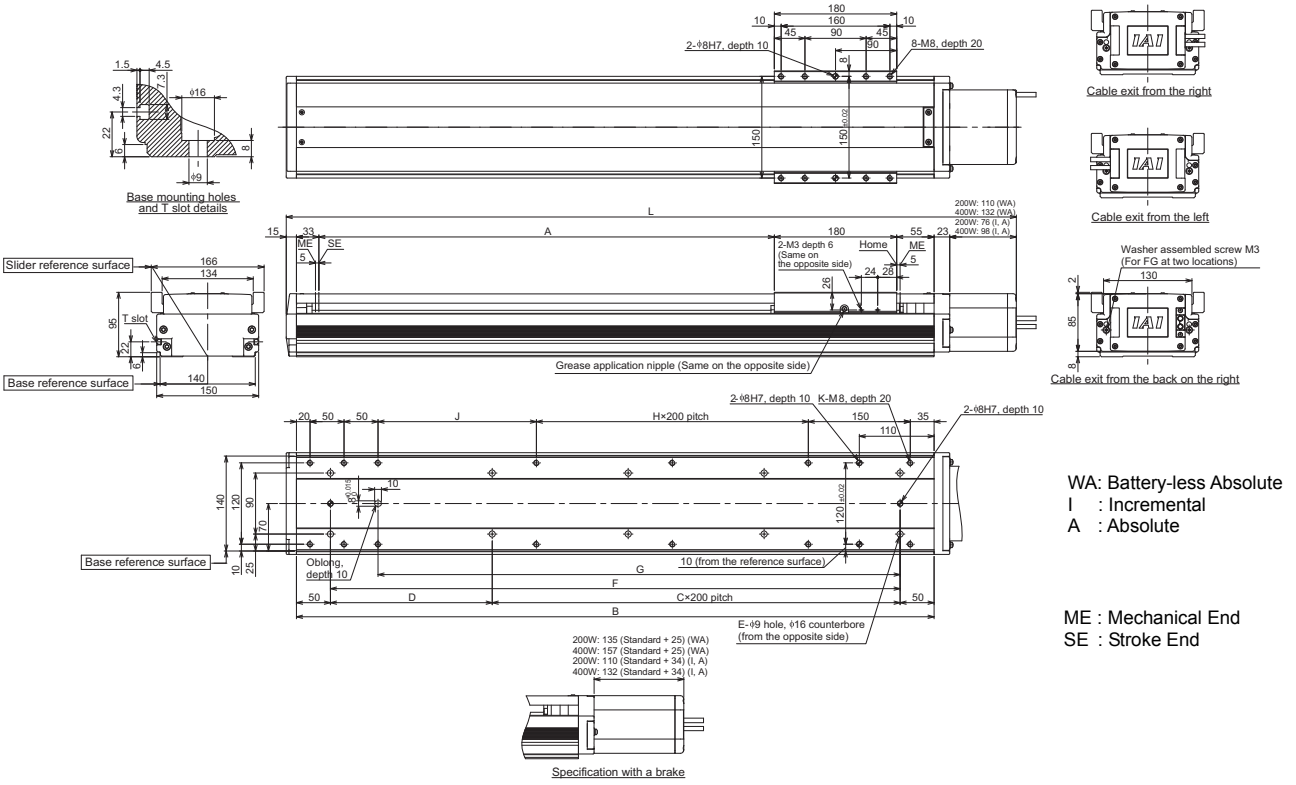


WA : Battery-less Absolute
I : Incremental
A : Absolute

ME : Mechanical End
SE : Stroke End

Stroke	L				A	B	C	D	E	F	G	H	J	K	Mass [kg]			
	Incremental Absolute		Battery-less Absolute												200W Standard		400W Standard	
	Standard																	
	200W	400W	200W	400W											Standard	With brake	Standard	With brake
100	452	474	486	508	100	338	1	238	4	238	168	0	33	10	9.4	10.0	9.8	10.4
150	502	524	536	558	150	388	0	288	4	288	218	0	83	10	10.3	10.9	10.7	11.3
200	552	574	586	608	200	438	1	138	6	338	268	0	133	10	11.1	11.7	11.6	12.2
250	602	624	636	658	250	488	1	188	6	388	318	0	183	10	12.0	12.6	12.5	13.1
300	652	674	686	708	300	538	1	238	6	438	368	0	233	10	12.8	13.4	13.3	13.9
350	702	724	736	758	350	588	1	288	6	488	418	0	283	10	13.7	14.3	14.2	14.8
400	752	774	786	808	400	638	2	138	8	538	468	1	133	12	14.6	15.2	15.0	15.6
450	802	824	836	858	450	688	2	188	8	588	518	1	183	12	15.5	16.1	15.9	16.5
500	852	874	886	908	500	738	2	238	8	638	568	1	233	12	16.3	16.9	16.8	17.4
550	902	924	936	958	550	788	2	288	8	688	618	1	283	12	17.2	17.8	17.7	18.3
600	952	974	986	1008	600	838	3	138	10	738	668	2	133	14	18.0	18.6	18.5	19.1
650	1002	1024	1036	1058	650	888	3	188	10	788	718	2	183	14	18.9	19.5	19.4	20.0
700	1052	1074	1086	1108	700	938	3	238	10	838	768	2	233	14	19.8	20.4	20.2	20.8
750	1102	1124	1136	1158	750	988	3	288	10	888	818	2	283	14	20.7	21.3	21.1	21.7
800	1152	1174	1186	1208	800	1038	4	138	12	938	868	3	133	16	21.5	22.1	22.0	22.6
850	1202	1224	1236	1258	850	1088	4	188	12	988	918	3	183	16	22.4	23.0	22.9	23.5
900	1252	1274	1286	1308	900	1138	4	238	12	1038	968	3	233	16	23.2	23.8	23.7	24.3
950	1302	1324	1336	1358	950	1188	4	288	12	1088	1018	3	183	16	24.1	24.7	24.6	25.2
1000	1352	1374	1386	1408	1000	1238	5	138	14	1138	1068	4	133	18	25.0	25.6	25.4	26.0
1050	1402	1424	1436	1458	1050	1288	5	188	14	1188	1118	4	183	18	25.9	26.5	26.3	26.9
1100	1452	1474	1486	1508	1100	1338	5	238	14	1238	1168	4	233	18	26.7	27.3	27.2	27.8
1150	1502	1524	1536	1558	1150	1388	5	288	14	1288	1218	4	283	18	27.6	28.2	28.1	28.7
1200	1552	1574	1586	1608	1200	1438	6	138	16	1338	1268	5	133	20	28.4	29.0	28.9	29.5
1250	1602	1624	1636	1658	1250	1488	6	188	16	1388	1318	5	183	20	29.3	29.9	29.8	30.2
1300	1652	1674	1686	1708	1300	1538	6	238	16	1438	1368	5	233	20	30.2	30.8	30.6	31.2

15.1.7 ISB, ISPB-LXL

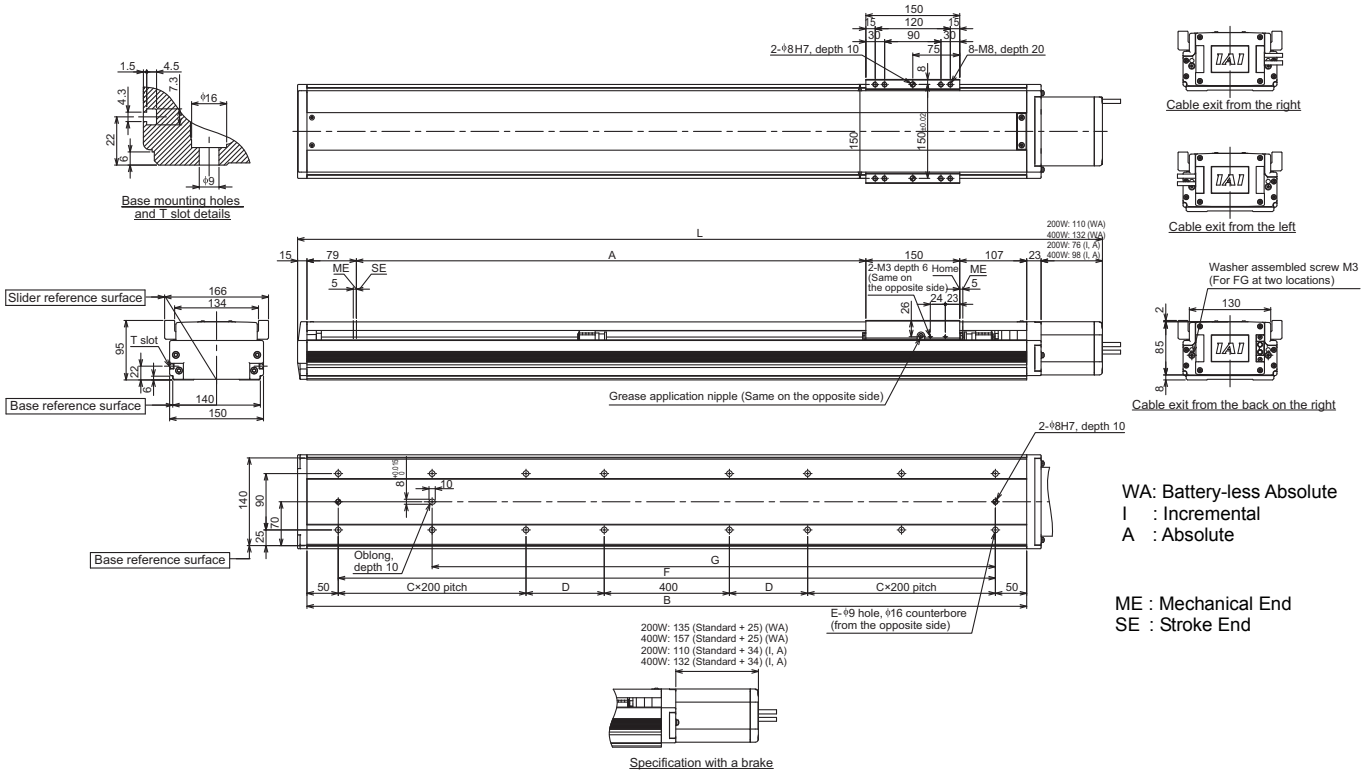


WA: Battery-less Absolute
I : Incremental
A : Absolute

ME : Mechanical End
SE : Stroke End

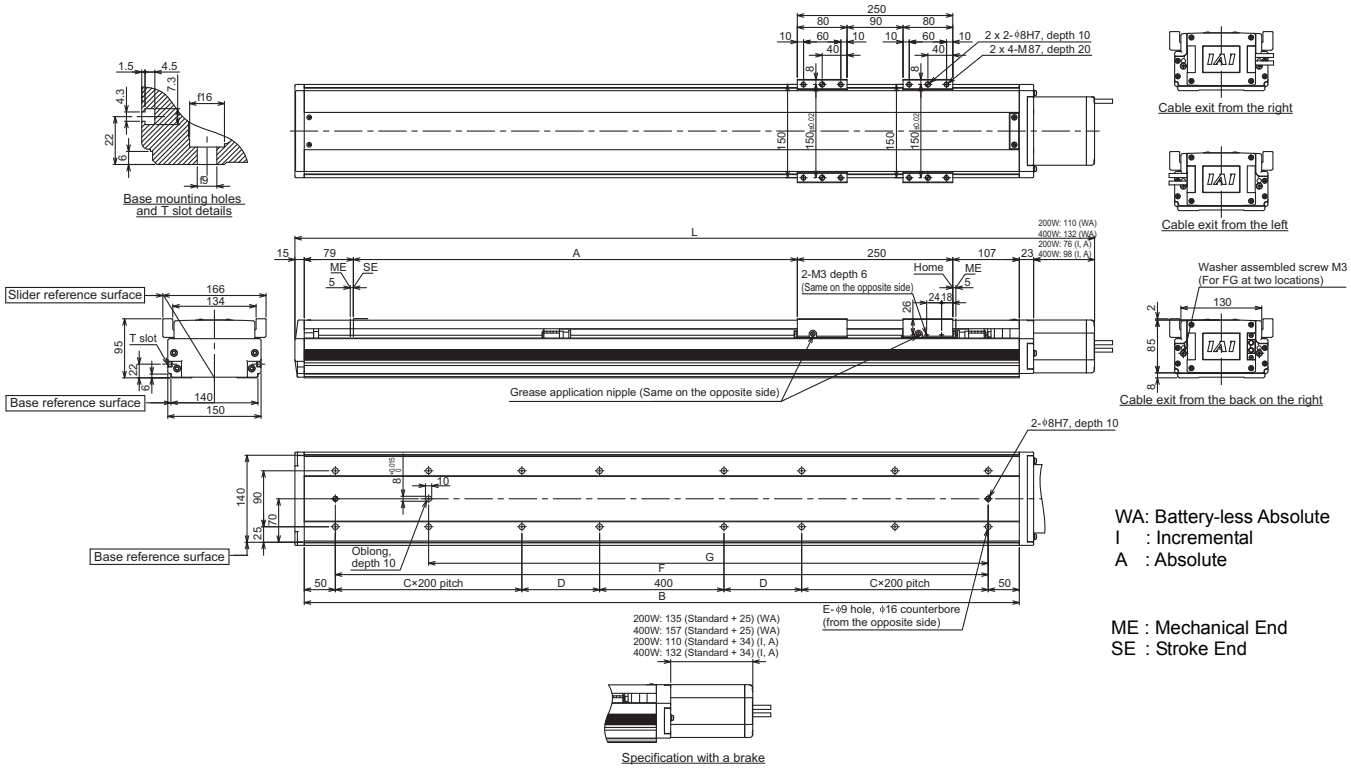
Stroke	L				A	B	C	D	E	F	G	H	J	K	Mass [kg]			
	Incremental Absolute		Battery-less Absolute												200W Standard		400W Standard	
	Standard																	
	200W	400W	200W	400W											Standard	With brake	Standard	With brake
120	502	524	536	558	120	388	0	288	4	288	218	0	83	10	9.8	10.4	10.2	10.8
170	552	574	586	608	170	438	1	138	6	338	268	0	133	10	10.7	11.3	11.1	11.7
220	602	624	636	658	220	488	1	188	6	388	318	0	183	10	11.5	12.1	12.0	12.6
270	652	674	686	708	270	538	1	238	6	438	368	0	233	10	12.4	13.0	12.9	13.5
320	702	724	736	758	320	588	1	288	6	488	418	0	283	10	13.2	13.8	13.7	14.3
370	752	774	786	808	370	638	2	138	8	538	468	1	133	12	14.1	14.7	14.6	15.2
420	802	824	836	858	420	688	2	188	8	588	518	1	183	12	15.0	15.6	15.4	16.0
470	852	874	886	908	470	738	2	238	8	638	568	1	233	12	15.9	16.5	16.3	16.9
520	902	924	936	958	520	788	2	288	8	688	618	1	283	12	16.7	17.3	17.2	17.8
570	952	974	986	1008	570	838	3	138	10	738	668	2	133	14	17.6	18.2	18.1	18.7
620	1002	1024	1036	1058	620	888	3	188	10	788	718	2	183	14	18.4	19.0	18.9	19.5
670	1052	1074	1086	1108	670	938	3	238	10	838	768	2	233	14	19.3	19.9	19.8	20.4
720	1102	1124	1136	1158	720	988	3	288	10	888	818	2	283	14	20.2	20.8	20.6	21.2
770	1152	1174	1186	1208	770	1038	4	138	12	938	868	3	133	16	21.1	21.7	21.5	22.1
820	1202	1224	1236	1258	820	1088	4	188	12	988	918	3	183	16	21.9	22.5	22.4	23.0
870	1252	1274	1286	1308	870	1138	4	238	12	1038	968	3	233	16	22.8	23.4	23.3	23.9
920	1302	1324	1336	1358	920	1188	4	288	12	1088	1018	3	183	16	23.6	24.2	24.1	24.7
970	1352	1374	1386	1408	970	1238	5	138	14	1138	1068	4	133	18	24.5	25.1	25.0	25.6
1020	1402	1424	1436	1458	1020	1288	5	188	14	1188	1118	4	183	18	25.4	26.0	25.8	26.4
1070	1452	1474	1486	1508	1070	1338	5	238	14	1238	1168	4	233	18	26.3	26.9	26.7	27.3
1120	1502	1524	1536	1558	1120	1388	5	288	14	1288	1218	4	283	18	27.1	27.7	27.6	28.2
1170	1552	1574	1586	1608	1170	1438	6	138	16	1338	1268	5	133	20	28.0	28.6	28.5	29.1
1220	1602	1624	1636	1658	1220	1488	6	188	16	1388	1318	5	183	20	28.8	29.4	29.3	29.9
1270	1652	1674	1686	1708	1270	1538	6	238	16	1438	1368	5	233	20	29.7	30.3	30.2	30.8

15.1.8 ISB, ISPB-LXMX



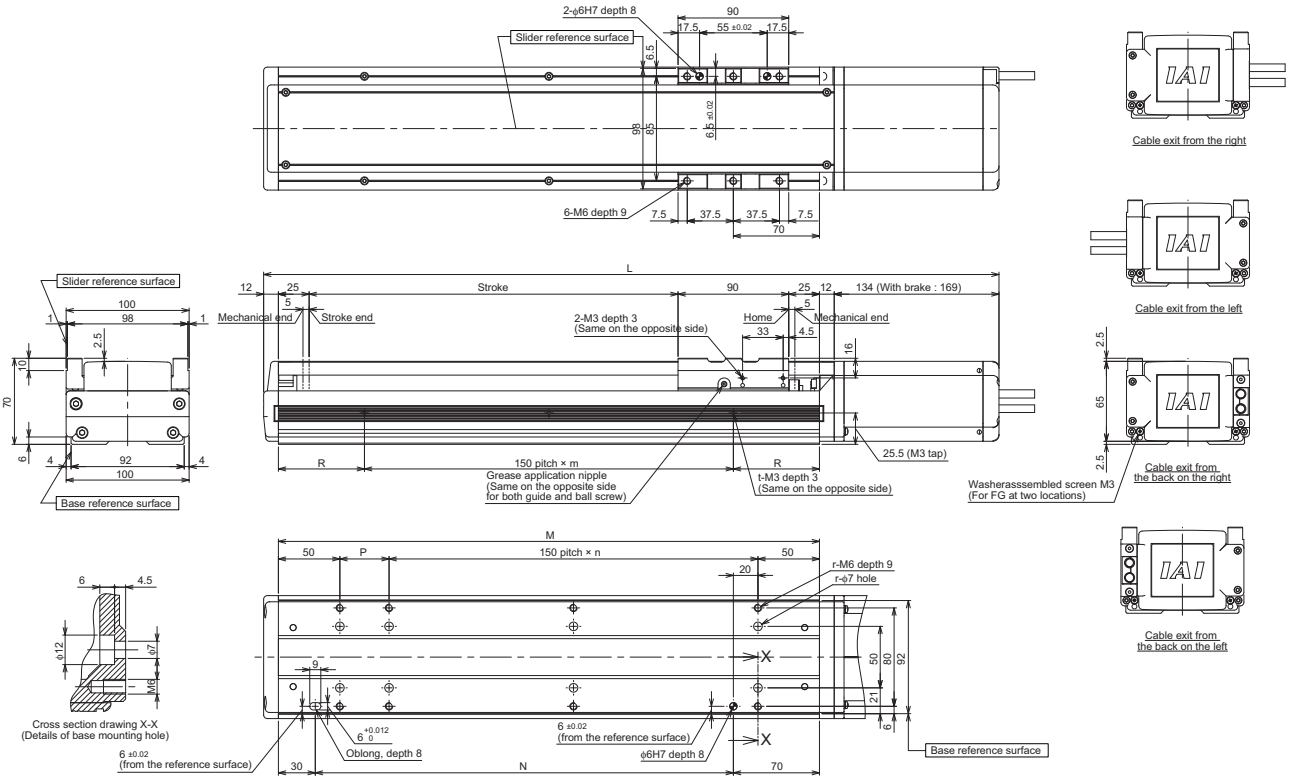
Stroke	L				A	B	C	D	E	F	G	Mass [kg]			
	Incremental Absolute		Battery-less Absolute									200W Standard		400W Standard	
	Standard														
	200W	400W	200W	400W								Standard	With brake	Standard	With brake
1000	1464	1486	1498	1520	1014	1350	1	225	12	1250	1050	27.3	27.9	27.7	28.3
1100	1564	1586	1598	1620	1114	1450	1	275	12	1350	1150	29.0	29.6	29.5	30.1
1200	1664	1686	1698	1720	1214	1550	1	325	12	1450	1250	30.8	31.4	31.3	31.9
1300	1764	1786	1798	1820	1314	1650	1	375	12	1550	1350	32.5	33.1	33.0	33.6
1400	1864	1886	1898	1920	1414	1750	1	425	12	1650	1450	34.3	34.9	34.8	35.4
1500	1964	1986	1998	2020	1514	1850	1	475	12	1750	1550	36.1	36.7	36.5	37.1
1600	2064	2086	2098	2120	1614	1950	1	525	12	1850	1650	37.8	38.4	38.3	38.9
1700	2164	2186	2198	2220	1714	2050	1	575	12	1950	1750	39.6	40.2	40.0	40.6
1800	2264	2286	2298	2320	1814	2150	2	425	16	2050	1850	41.3	41.9	41.8	42.4
1900	2364	2386	2398	2420	1914	2250	2	475	16	2150	1950	43.1	43.7	43.5	44.1
2000	2464	2486	2498	2520	2014	2350	2	525	16	2250	2050	44.8	45.4	45.3	45.9
2100	2564	2586	2598	2620	2114	2450	2	575	16	2350	2150	46.6	47.2	47.0	47.6
2200	2664	2686	2698	2720	2214	2550	3	425	20	2450	2250	48.3	48.9	48.8	49.4
2300	2764	2786	2798	2820	2314	2650	3	475	20	2550	2350	50.1	50.7	50.6	51.2
2400	2864	2886	2898	2920	2414	2750	3	525	20	2650	2450	51.8	52.4	52.3	52.9
2500	2964	2986	2998	3020	2514	2850	3	575	20	2750	2550	53.6	54.2	54.1	54.7

15.1.9 ISB, ISPB-LXUWX



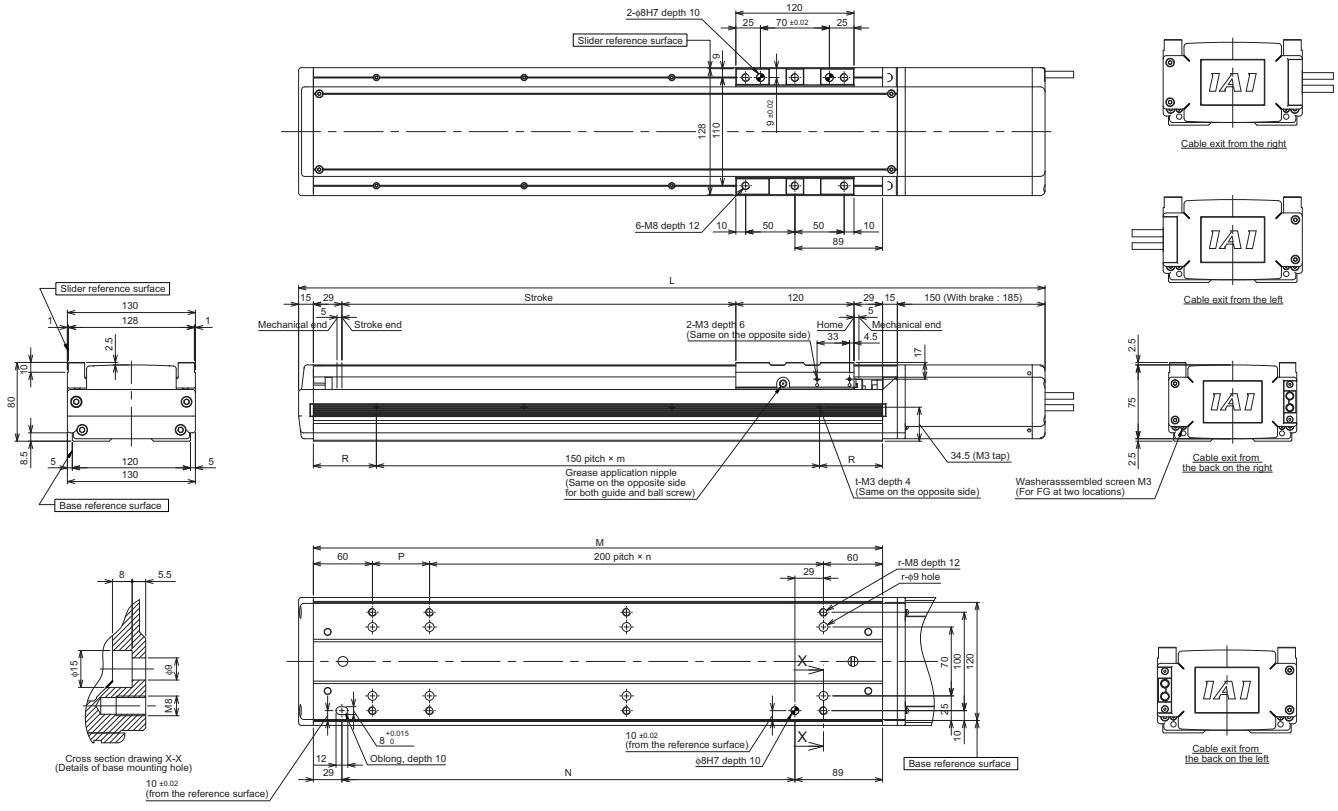
Stroke	L				A	B	C	D	E	F	G	Mass [kg]			
	Incremental Absolute		Battery-less Absolute									200W Standard		400W Standard	
	Standard														
	200W	400W	200W	400W								Standard	With brake	Standard	With brake
1000	1564	1586	1598	1620	1014	1450	1	275	12	1350	1150	30.4	31.0	30.8	31.4
1100	1664	1686	1698	1720	1114	1550	1	325	12	1450	1250	32.1	32.7	32.6	33.2
1200	1764	1786	1798	1820	1214	1650	1	375	12	1550	1350	33.9	34.5	34.3	34.9
1300	1864	1886	1898	1920	1314	1750	1	425	12	1650	1450	35.6	36.2	36.1	36.7
1400	1964	1986	1998	2020	1414	1850	1	475	12	1750	1550	37.4	38.0	37.8	38.4
1500	2064	2086	2098	2120	1514	1950	1	525	12	1850	1650	39.1	39.7	39.6	40.2
1600	2164	2186	2198	2220	1614	2050	1	575	12	1950	1750	40.9	41.5	41.4	42.0
1700	2264	2286	2298	2320	1714	2150	2	425	16	2050	1850	42.6	43.2	43.1	43.7
1800	2364	2386	2398	2420	1814	2250	2	475	16	2150	1950	44.4	45.0	44.9	45.5
1900	2464	2486	2498	2520	1914	2350	2	525	16	2250	2050	46.1	46.7	46.6	47.2
2000	2564	2586	2598	2620	2014	2450	2	575	16	2350	2150	47.9	48.5	48.4	49.0
2100	2664	2686	2698	2720	2114	2550	3	425	20	2450	2250	49.7	50.3	50.1	50.7
2200	2764	2786	2798	2820	2214	2650	3	475	20	2550	2350	51.4	52.0	51.9	60.5
2300	2864	2886	2898	2920	2314	2750	3	525	20	2650	2450	53.2	53.8	53.6	54.2
2400	2964	2986	2998	3020	2414	2850	3	575	20	2750	2550	54.9	55.5	55.4	56.0
2500	3064	3086	3098	3120	2514	2950	3	625	20	2850	2650	56.7	57.3	57.1	57.7

15.1.10 SSPA-SXM



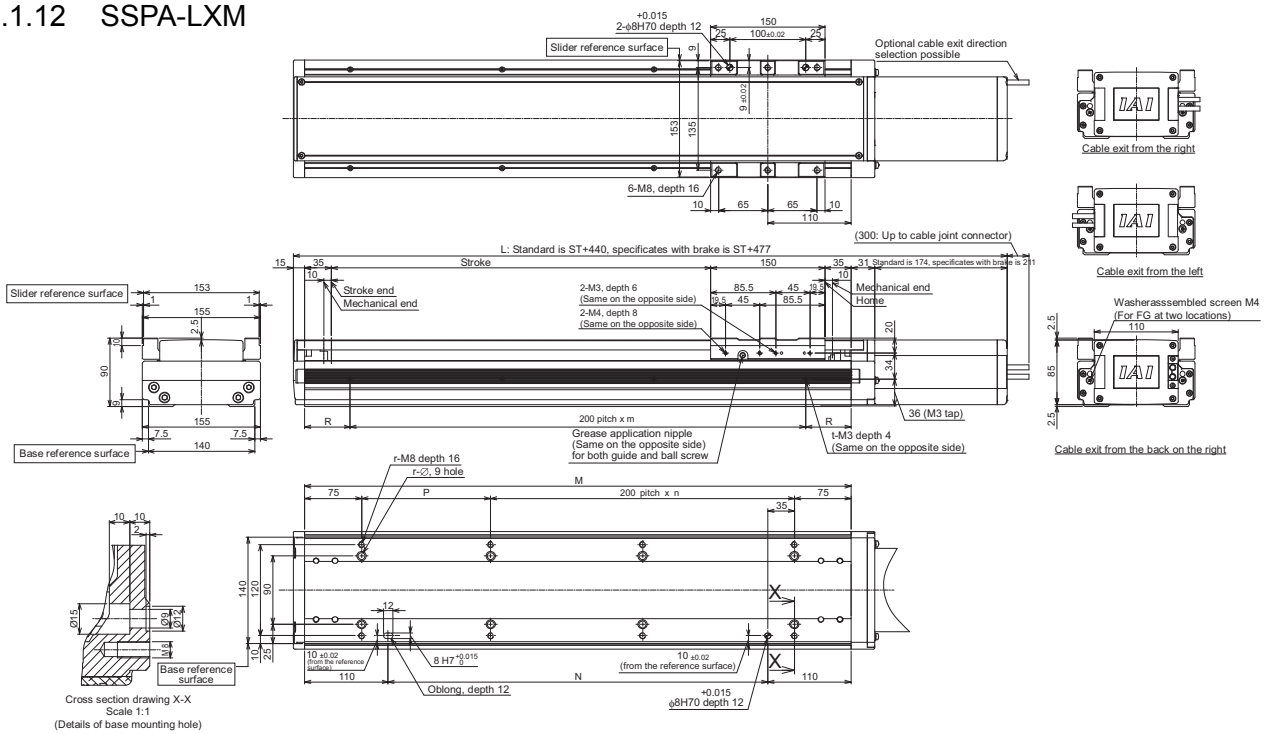
Stroke	L		M	N	P	R	m	n	r	t	Mass [kg]	
	Standard	With brake									Standard	With brake
100	398	433	240	140	140	45	1	0	4	2	6.8	7.4
150	448	483	290	190	40	70	1	1	6	2	7.4	8.0
200	498	533	340	240	90	20	2	1	6	3	8.1	8.7
250	548	583	390	290	140	45	2	1	6	3	8.7	9.3
300	598	633	440	340	40	70	2	2	8	3	9.3	9.9
350	648	683	490	390	90	20	3	2	8	4	10.0	10.6
400	698	733	540	440	140	45	3	2	8	4	10.6	11.2
450	748	783	590	490	40	70	3	3	10	4	11.2	11.8
500	798	833	640	540	90	20	4	3	10	5	11.9	12.5
550	848	883	690	590	140	45	4	3	10	5	12.5	13.1
600	898	933	740	640	40	70	4	4	12	5	13.1	13.7
650	948	983	790	690	90	20	5	4	12	6	13.8	14.4
700	998	1033	840	740	140	45	5	4	12	6	14.4	15.0
750	1048	1083	890	790	40	70	5	5	14	6	15.0	15.6
800	1098	1133	940	840	90	20	6	5	14	7	15.6	16.2
850	1148	1183	990	890	140	45	6	5	14	7	16.3	16.9
900	1198	1233	1040	940	40	70	6	6	16	7	16.9	17.5
950	1248	1283	1090	990	90	20	7	6	16	8	17.5	18.1
1000	1298	1333	1140	1040	140	45	7	6	16	8	18.2	18.8
1050	1348	1383	1190	1090	40	70	7	7	18	8	18.8	19.4
1100	1398	1433	1240	1140	90	20	8	7	18	9	19.4	20.0

15.1.11 SSPA-MXM



Stroke	L		M	N	P	R	m	n	r	t	Mass [kg]	
	Standard	With brake									Standard	With brake
100	458	493	278	160	158	64	1	0	4	2	12.4	13.0
150	508	543	328	210	208	14	2	0	4	3	13.5	14.1
200	558	593	378	260	58	39	2	1	6	3	14.6	15.2
250	608	643	428	310	108	64	2	1	6	3	15.7	16.3
300	658	693	478	360	158	14	3	1	6	4	16.7	17.3
350	708	743	528	410	208	39	3	1	6	4	17.8	18.4
400	758	793	578	460	58	64	3	2	8	4	18.9	19.5
450	808	843	628	510	108	14	4	2	8	5	20.0	20.6
500	858	893	678	560	158	39	4	2	8	5	21.1	21.7
550	908	943	728	610	208	64	4	2	8	5	22.2	22.8
600	958	993	778	660	58	14	5	3	10	6	23.2	23.8
650	1008	1043	828	710	108	39	5	3	10	6	24.3	24.9
700	1058	1093	878	760	158	64	5	3	10	6	25.4	26.0
750	1108	1143	928	810	208	14	6	3	10	7	26.5	27.1
800	1158	1193	978	860	58	39	6	4	12	7	27.6	28.2
850	1208	1243	1028	910	108	64	6	4	12	7	28.7	29.3
900	1258	1293	1078	960	158	14	7	4	12	8	29.7	30.3
950	1308	1343	1128	1010	208	39	7	4	12	8	30.8	31.4
1000	1358	1393	1178	1060	58	64	7	5	14	8	31.9	32.5
1050	1408	1443	1228	1110	108	14	8	5	14	9	33.0	33.6
1100	1458	1493	1278	1160	158	39	8	5	14	9	34.1	34.7
1150	1508	1543	1328	1210	208	64	8	5	14	9	35.2	35.8
1200	1558	1593	1378	1260	58	14	9	6	16	10	36.2	36.8
1250	1608	1643	1428	1310	108	39	9	6	16	10	37.3	37.9
1300	1658	1693	1478	1360	158	64	9	6	16	10	38.4	39.0

15.1.12 SSPA-LXM



Stroke	L		M	N	P	R	m	n	r	t	Mass [kg]	
	Standard	With brake									Standard	With brake
100	540	577	320	100	170	60	1	0	4	2	21.0	22.0
150	590	627	370	150	220	85	1	0	4	2	23.0	24.0
200	640	677	420	200	70	10	2	1	6	3	25.0	26.0
250	690	727	470	250	120	35	2	1	6	3	26.5	27.5
300	740	777	520	300	170	60	2	1	6	3	28.0	29.0
350	790	827	570	350	220	85	2	1	6	3	29.5	30.5
400	840	877	620	400	70	10	3	2	8	4	31.0	32.0
450	890	927	670	450	120	35	3	2	8	4	33.0	34.0
500	940	927	720	500	170	60	3	2	8	4	35.0	36.0
550	990	1027	770	550	220	85	3	2	8	4	36.5	37.5
600	1040	1077	820	600	70	10	4	3	10	5	38.0	39.0
650	1090	1127	870	650	120	35	4	3	10	5	39.5	40.5
700	1140	1177	920	700	170	60	4	3	10	5	41.0	42.0
750	1190	1227	970	750	220	85	4	3	10	5	43.0	44.0
800	1240	1277	1020	800	70	10	5	4	12	6	45.0	46.0
850	1290	1327	1070	850	120	35	5	4	12	6	46.5	47.5
900	1340	1377	1120	900	170	60	5	4	12	6	48.0	49.0
950	1390	1427	1170	950	220	85	5	4	12	6	49.5	50.5
1000	1440	1477	1220	1000	70	10	6	5	14	7	51.0	52.0
1050	1490	1527	1270	1050	120	35	6	5	14	7	52.5	53.5
1100	1540	1577	1320	1100	170	60	6	5	14	7	54.0	55.0
1150	1590	1627	1370	1150	220	85	6	5	14	7	56.0	57.0
1200	1640	1677	1420	1200	70	10	7	6	16	8	58.0	59.0
1250	1690	1727	1470	1250	120	35	7	6	16	8	59.5	60.5
1300	1740	1777	1520	1300	170	60	7	6	16	8	61.0	62.0
1350	1790	1827	1570	1350	220	85	7	6	16	8	62.5	63.5
1400	1840	1877	1620	1400	70	10	8	7	18	9	64.0	65.0
1450	1890	1927	1670	1452	120	35	8	7	18	9	66.0	67.0
1500	1940	1977	1720	1500	170	60	8	7	18	9	68.0	69.0

16. Warranty

16.1 Warranty Period

One of the following periods, whichever is shorter:
- 18 months after shipment from our company
- 12 months after delivery to the specified location
- 2,500 hours of operation

16.2 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.

16.3 Honoring the Warranty

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

16.4 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.

16.5 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.

16.6 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

Change History

Revision Date	Description of Revision
July 2011	First edition
November 2011	Second edition Contents changed in Safety Guide Caution notes added for when working with two or more persons SSPA-SXM, MXM added
March 2012	Third edition Pg. 31, 37 ISP and ISPB Note changed to 1.8 times more of the nominal diameter for the length of thread engagement Pg. 59 “This is an option limited to the high-precision specifications (ISPB/SSPA).” deleted Note added to tell the straightness is 0.025mm for all with stroke 500mm or less unless the model is the high-precision specifications one.
March 2012	Fourth edition Pg. 1 to 7 Contents added and changed in Safety Guide Pg. 8 Note “Make sure to attach the actuator properly by following this operation manual.” added in Caution in Handling Pg. 69 Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care. Pg. 90 to 101 Weight added to appearance drawing
November 2012	Fifrth edition Pg. 45 Line of LF = 100% added in graph.
January 2013	Sixrth edition Pg. 29 Note changed to available to mount less than 1300mm for stroke for ceiling mount of ISB, SIPB-MXMX/LXMX/LXUWX Pg. 44 Correction made to some area in items to be prohibited in handling of cables Pg. 45 Calculation formula added for when commanded acceleration speed is higher than rated acceleration speed
March 2013	Seventh edition Pg. 35 The unit of flatness changed 0.05 mm → 0.05 mm/m 0.02 mm → 0.02 mm/m

Revision Date	Description of Revision
June 2013	Eighth edition Pg. 67 Grease before factory at intermediate support changed to Daphne Eponex Grease No. 2
December 2013	Ninth edition Pg. 69 Information added for when grease supply from grease nipple is not possible Pg. 87 Note corrected In table N•m → N•cm
May 2014	Tenth edition Change partly made to “14. Motor Replacement Procedures” in accord with change of replacement motor
November 2014	10C edition Pg. 65 Joint deleted from the table
December 2014	Eleventh edition Pg. 64 Change made to grease supply period Pg. 68 to 69 Recommended grease gun at grease supply added
April 2015	Twelfth edition Pg. 11, 12 Touch panel teahing TB-01 added Pg. 12, 13, 49, 52, 63, 98 Dedicated controller added Pg. 13, 62, 65, 66 Option EU (Metal connector type) added Pg. 21, 23 Dynamic allowable moment value changed Pg. 24 Change made about life
July 2015	12B edition Pg. 63 Wiring table of CB-X-MA□□□ Correction made of mechanical side
October 2015	12C edition Pg. 67 Period of grease supply (reference) added for actuators with guide equipped with ball retainer Pg. 39, 102, 105 Four tapped holes added on top surface of slider for MXL and LXL
April 2016	Thirteenth edition Contents added for Battery-less Absolute

Revision Date	Description of Revision
April 2016	13B edition Pg. 73 Grease gun and nozzle changed
September 2016	13C edition Pg. 39 LXUWX slider drawings added
September 2016	Fourteen edition Contents added for Lead 36mm of ISB-SXM and SXL and Lead 48mm of ISB-MXM, MXL and MXMX
November 2016	14B edition Pg. 16, 17 “Acceleration/deceleration” and “creep phenomenon or slipped coupling” deleted Pg. 18 to 23 Caution note added for interpolated operation of two or more orthogonal axes
February 2018	14C edition Pg. 76 Correction made to model of grease Multemp ET-R No.2 → Multemp ET-R
June 2018	14D edition Pg. 16 Change made to maximum velocity for LXMX Stroke 2200 and LXUWX Stroke 2300 In order for prevention of abnormal noise due to ball screw resonance Pg. 54 Explanation added for how to connect brake box for special-ordered unit equipped with brake
September 2019	14E edition Pg. 87 Grease changed from Daphne Eponex Grease No. 2 to Daphne Grease MP No. 2 Pg. 88 Note added stating SSPA-L grease supply volume (reference) from 5cc to 5.5cc

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