Precautions in Handling

1. Handling of Robot

1.1 Handling of the Packaged Product

- Do not damage or drop the package. The package is not supplied with any special treatment that enables it to resist an impact caused by a drop or crush.
- Transport a heavy package with at least more than two operators. Consider an appropriate method for transportation.
- If the shipping box is to be left standing or transporting, it should be in a horizontal position. Follow the instruction if there is any for the packaging condition.
- Do not get on the package.
- Do not put any bolt that may cause a deformation or breakage of the package.

1.2 Handling of Robot without Package

- Do not carry the actuator by holding the cable, or do not move it by pulling the cable.
- Hold the body base when transporting the actuator.
- When carrying the actuator, exercise caution not to bump it against nearby objects or structures.
- Do not give any excessive force to any of the sections in the actuator.
- In the case of the high-precision dimension 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.

- There are 4 eyebolts attached on the unit. Use these to transport it.
- The appearance of the unit as is shown before it is unpackaged.

2. Handling of Multi-Axes Type

2.1 Handling of the Packed Product

- Do not hold the motor cover when transporting the unit. Doing so may damage the motor cover with the actuator weight and the unit may drop.
- The motor cover is allowed to be held only when changing the orientation of the installation and removing the motor components provided for transportation.
- Do not carry the actuator by holding the cable, or do not move it by pulling the cable.
- When carrying the actuator exercise caution not to bump it against nearby objects or structures.
- Do not give any excessive force to any of the sections in the actuator.
- In the case of the high-precision dimension 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.

2.2 Handling of Robot without Package

- 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 impact 0.3G or more.
- In the case that the actuator needs to be carried up with ropes or another method, be sure to use an appropriate cushioning to avoid the robot being deformed or put on an excessive pressure. And also, be sure to keep the robot in a stable and horizontal posture. Utilize the tapped holes on the bottom of the base to attach a belt to suspend the package if necessary.
- Be careful not to apply a load on any of the actuator brackets or covers or on the connector box. Avoid, the cables being pinched or caused an excessive deformation.

3. Handling of Robot Mounted on Mechanical Equipment (System)

In this section, explain how to handle the actuator when transporting it in the whole mechanical equipment (system) that the actuator is installed to.

- Secure the sliders to prevent sudden movement during transport.
- If the actuator assembly is transported without the ends being secured, do not impact 0.3G or more.
- When suspending the mechanical equipment (system) with ropes, avoid applying force to actuator, connector box, etc. Also, avoid the cables being pinched or caused an excessive deformation.

Environmental Installations, Storage and Preservation

1. Installation Environment

- Please avoid installing the product to such places as listed below.
- It generally the environment in which a worker can work without any protection gear.
- Place where exposed to radiant heat from a huge heat source such as heat treatment
- Place where the ambient temperature goes out of the applicable range from 0 to 40°C
- Place where condensation would occur due to sudden temperature change
- Place where the relative humidity exceeds 85% RH
- Place where exposed to the direct sunlight
- Place where corrosive gas or flammable gas exist
- Place where it contains a lot of dust, salt or spray (Outside of an ordinary assembly plant)
- Place where water, oil (includes oil mist and cutting fluid) or chemical is splashed
- Place where the product main body receives vibration or hit impact

Make sure to have a treatment for blocking when using in the following conditions:

- Place where noise is generated by such facts as static electricity
- Place where exposed to the influence of strong electric or magnetic field
- Place where exposed to the influence of ultraviolet or radiant rays

2. Storage and Preservation Environment

The storage and preservation environment should comply with the same standards as those for the installation environment. In particular, when the machine is to be stored for a long time, pay close attention to environmental conditions so that no degradation forms.

- If the product is placed in a clean, dust-free environment, the product will be better protected.
- If the product is placed in an environment where dust cannot be eliminated, follow the precautions for the storage environment.
- The appearance of the unit is as shown before it is unpackaged.

Notes

- The product should be kept in a horizontal orientation while in storage and preservation. In the case it is stored in the packaged condition, follow the posture instruction if any displayed on the package.

Names of the Parts

- Screw Cover
- Actuator Cable
- Top Cover
- Motor Cover
Separate the I/O line, communication line and power line from each other. Do not store in the same duct.

Move freely and do not tie them up. (Avoid tension being applied when the cables are oscillating.)

Dedicated Connection Cable (Connect actuator with the dedicated controller)

[Connection to the XSEL-P/Q/R/S/RA/SA, SSEL, SCON and MCON controller]

Note:

1. Installation
   - ISB and MMAX/LMAX/LUX/LUX i & SPP cannot be mounted vertically, horizontally oriented on the wall or on the ceiling.
   - Avoid using an actuator with no brake in the vertical orientation.
   - The base has to have a structure with sufficient rigidity to prevent oscillation.
   - 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.
   - View of the motor side, the parallelism of the quasi-reference surface of left side and reference surface is 0.1mm or less.

2. Attachment Surface
   - Except for High Straightness Precision Type (Model Name: ST (Option)), the actuator mounting surface and other surfaces that are used as a datum should be flat enough with an accuracy of machining or equivalent treatment, and the flatness of the mounting surface needs to be 0.05mm or less.
   - For High Straightness Precision Type (Model Name: ST (Option)), the actuator should be mounted on a surface that has the flatness of 0.025mm or less after any dust is removed.
   - Secure the space where maintenance work can be performed.

3. Bolts to be used
   - For the bolts to be used, a high-tensile bolt complying with ISO-10.9 or more is recommended.
   - If the tapped holes, use screws with the thread length dimension being less than the effective depth of the holes.
   - In case the tapped hole is a through hole, be careful so the screw tip does not exceed the surface of the tapped hole.
   - For the actuator mounting, use a bolt with the dimension of its effective mating length to the tapped hole as stated below. If tapped hole in steel → thread length same as nominal diameter, if tapped hole in aluminum → thread length 2 times longer than nominal diameter.
   - When using a base for installation to a platform or equivalent, in order to protect the foot base, apply washers dedicated for high-tensile bolt if using bolts of M8 or larger. No washer is needed for M6 or smaller bolts. Also, do not use a normal washer.

4. Tightening Torque
   - Please follow the specification values stated in the Instruction Manual (DVD) for the tightening torque. Failure to do so may cause an operation problem.

5. Load Moment and Overhung length
   - Please follow the specification values stated in the Instruction Manual (DVD) for the load moment and the overhung length. Failure to do so may cause abnormal vibration or noise, and also may remarkably shorten the product life.

**Wiring**

For the controller, only the dedicated controller manufactured by our company can be used.

For the connection between the actuator and controller, use the attached dedicated connection cable.

[Connection to the X-SEL J/K controller]

Dedicated Connection Cable (Connect actuator with the dedicated controller)

- Motor Cable CB-X-MA□□□
- Encoder Cable CB-X1-PL□□□
- Limit Switch Cable CB-X-LS□□□
- Encoder Cable CB-X1-PLA□□□ shows the cable length.
  - The max. length should be 30m. Example) 080 = 8m

- Robotic Cable CB-X1-PR□□□
- Encoder Cable CB-X1-PL□□□
- Encoder Cable with LS CB-X1-PLA□□□ shows the cable length.
  - The max. length should be 30m. Example) 080 = 8m

[Prohibited Items in the Cable Processing]

- Do not pull or bend forcibly the cable so as not to give any extra load or tension to the cable.
- Do not let the cable bend, kink or twist.
- Do not pull the cable with a strong force.
- Do not let the cable bend, kink or twist.
- 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.

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 twisted or tangled 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.

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