



Safety Precautions

Always read this section before use.

When designing equipment using ABSODEX, the manufacturer is obligated to ensure that the safety of the mechanism and the system that runs by the electrical controls are secured.

It is important to select, use, handle and maintain the product appropriately to ensure that the CKD product is used safely. Observe warnings and precautions to ensure device safety.

Check that device safety is ensured, and manufacture a safe device.

WARNING

- 1** This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience.
- 2** Use the product within specifications range.

This product must be used within its stated specifications. In addition, never modify or additionally machine this product.

This product is intended for use as a device or part for general-purpose industrial machinery. It is not intended for use outdoors or for use under the following conditions or environment.
(Note that this product can be used when CKD is consulted prior to use and the customer consents to CKD product specifications. The customer must provide safety measures to avoid risks in the event of problems.)

 - ❶ Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency operation (cutoff, release, etc.) circuits, press machines, brake circuits, or safety devices or applications.
 - ❷ Use for applications where life or assets could be adversely affected, and special safety measures are required.
- 3** Observe organization standards and regulations, etc., related to the safety of the device design.
- 4** Do not remove devices before confirming safety.
 - ❶ Inspect and service the machine and devices after confirming the safety of the system by for instance turning off the nearby devices and connected devices.
 - ❷ Note that there may be hot or charged sections even after operation is stopped. Be careful when handling devices at the time of inspection and servicing.
 - ❸ When inspecting or servicing the device, turn off the device and the power to the facility. Discharge any compressed air from the system, and pay close attention to possible water leakage and leakage of electricity during inspection and servicing.
- 5** Observe the instructions and cautions of each product to prevent accidents.
 - ❶ When the device is off, do not turn the output shaft of the actuator to a speed exceeding 30 rpm. The power generation of the actuator may damage the driver or may cause electrical shock.
 - ❷ Servo off (including emergency stop and alarm) or brake off with rotational force being applied, e.g. by gravity, may cause the output shaft to rotate due to turning force.
Operate the actuator in the balanced condition so that no rotational force is applied for these operations or after safety is confirmed.
 - ❸ Keep hands away from the output shaft, as sudden motion may take place during gain adjustments or trial run. When operating the actuator from a position in which motion cannot be confirmed, make sure that safety is assured when the output shaft is rotated beforehand.
 - ❹ The brake built-in actuators do not completely clamp the output shaft in all cases.
The built-in brake alone is not enough to secure safety when performing maintenance in applications in which the output axis may rotate due to an unbalanced load, or when the machine is stopped for an extended period of time. Be sure that the equipment is in a balanced state or provide a mechanical locking mechanism.
 - ❺ It may take several seconds to stop in an emergency depending on rotation speed and load.
- 6** Observe the following precautions to prevent electric shock.
 - ❶ The power terminals on the front side of the driver and the motor cable connection terminals are high voltage parts. For the terminal blocks, make sure to install the attached terminal cover. Do not touch the actuator and the driver while the power supply is on.
Immediately after the power is turned off, high voltage is applied, so also do not touch them for 5 minutes or more, until the electrical charge accumulated in the capacitor inside the driver is released.
 - ❷ For operations with the side cover removed, such as maintenance and inspection or change of the switch inside the driver, make sure to turn off the actuator and release the electrical charge for 5 minutes or more before work; otherwise, an electric shock may occur from the high-voltage device.
 - ❸ Do not attach or remove any connectors with the power supply on. Doing so may cause malfunction, failure, or electric shock.
- 7** Before restarting the machine and devices, confirm that measures are taken to prevent the loaded objects from being removed.


8 Install an overcurrent protective device.


The wiring to the driver should be in accordance with JIS B 9960-1:2008 Safety of Machinery - Electrical Equipment of Machines - Part 1: General Requirements. Install an overcurrent protector (a circuit protector or a shutoff mechanism for wiring) for the main power supply, control power supply, and power supply for I/O. (Excerpt from JIS B 9960-1 7.2.1 General matters)


If the circuit current inside the machine (electric apparatus) may exceed the rated value of the components or the allowable current of the conductor, whichever is the smaller, overcurrent protection must be implemented. 7.2.10 defines the rated value or set value that should be selected.

9 Observe the precautions on the following pages to prevent accidents.

■ The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

 **DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, and when there is a high degree of emergency to a warning.

 **WARNING:** If handled incorrectly, a dangerous situation may occur, resulting in death or serious injury.

 **CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. Every item provides important information and must be observed.

Warranty

Terms of warranty

The warranty period and the scope of warranty are described below.

1. Warranty period

The warranty of this product is valid for one (1) year after delivery to the customer's designated site. (However, the period assumes eight hours of operation per day. As well, if the durability limit is reached within one year, the period to the durability limit is the warranty period.)

2. Scope of warranty

If failure is caused in the above warranty period due to poor workmanship of our product, we will repair the product free of charge without delay.

This Limited Warranty will not apply to:

- ① Operation under the conditions or in the environment deviating from those specified in the product specifications.
- ② Failure caused by lack of attention or erroneous control.
- ③ Failure resulting from factors other than the delivered product.
- ④ Failure caused by improper use of the product.
- ⑤ Failure caused by modification in the structure, performance, specification, or failure caused by repairs done by other than our designated contractor.
- ⑥ Losses which would have been avoided if your machine or equipment to which the ABSODEX product is assembled were provided with general functions, structures or other features common in the industry.
- ⑦ Failure caused by matters that could not be predicted with the technologies in practice when the product was delivered.
- ⑧ Failure caused by fire, earthquake, flood, lightning, or other natural disasters, earth shock, pollution, salt hazard, gas intoxication, excessive voltage, or other external causes.

The warranty covers the actual delivered product, as a single unit, and does not cover any losses induced by failure of the delivered product.

3. Warranty of product exported outside Japan

- (1) We will repair products sent back to our factory or a company or factory designated by us. Work and cost necessary for transportation shall not be compensated for.
- (2) The repaired product will be packed according to the domestic packing specifications and delivered to a designated site inside Japan.

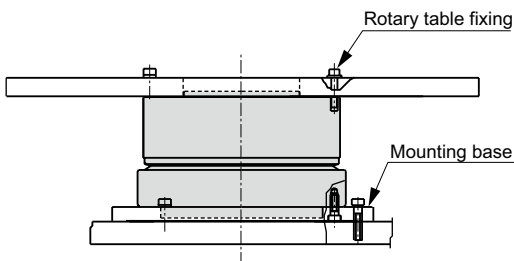
These are the basic terms of warranty. Priority will be given to specification drawings and specification sheets if the warranty description given on such specification drawings or specification sheets is different from the warranty terms given herein.

4. Compatibility confirmation

The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

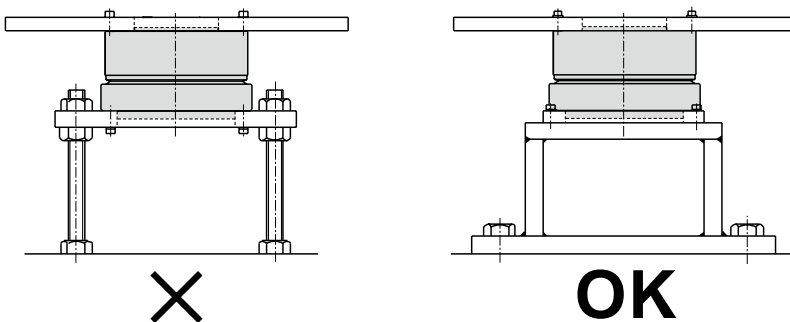
- 1** The actuators and drivers are not waterproof. Provide waterproofing when using them where they may come in contact with water or oil.
- 2** Dust and cuttings gathered on the actuator or driver may cause earth leakage or failure. Check that these do not come in contact with the product.
- 3** Repeatedly turning power on and off may cause damage to the elements inside the driver.
- 4** If power is turned off and servomotor turnoff is executed while the servomotor is on (holding), the output shaft may move from the held position even without external force.
- 5** The optional electromagnetic brake is provided to increase the holding rigidity when stopping the output shaft. Do not use it to brake or stop the rotating output shaft.
- 6** Actuators and drivers do not guarantee rustproofing. Give careful consideration to storage, installation, and environment.
- 7** Equipment with ABSODEX products installed should have sufficient rigidity to realize full ABSODEX performance. If the load equipment or frame's mechanical unique vibration is relatively low (approx. 200 to 300 Hz or less depending on the equipment), resonance could occur in the ABSODEX product and load equipment or frame. Secure the rotary table and main unit installation bolts, and ensure sufficient rigidity without loosening, etc. [Fig. 1]

[Fig. 1] Actuator installation



Gain must be adjusted based on load table size, etc. Even when the ABSODEX product is not directly installed, it should be installed on a highly rigid frame. [Fig. 2]

[Fig. 2] Actuator attachment



- 8** When extending the output shaft, refer to the references given in Table 1 for the extended shaft's diameter and length. In addition, add dummy inertia by using Fig. 3 as a reference.

[Table 1] Extended output shaft's diameter guideline

Max. torque [N·m]	Shaft extension (mm)					TS/TH/XS
	50	100	200	300	500	
6	φ35	φ40	φ46	φ50	φ60	
9, 12	φ40	φ46	φ55	φ60	φ70	
18, 22	φ45	φ55	φ65	φ70	φ80	
45	φ55	φ65	φ75	φ85	φ95	
75	φ62	φ75	φ90	φ95	φ110	
150	φ75	φ90	φ110	φ115	φ130	
210	φ80	φ95	φ115	φ125	φ140	
300	φ90	φ105	φ125	φ140	φ155	
500	φ100	φ120	φ145	φ160	φ180	
1000	φ120	φ140	φ170	φ185	φ210	

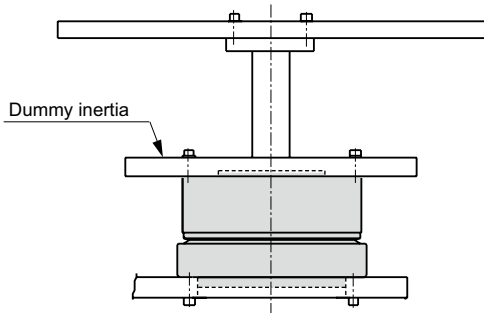
Max. torque [N·m]	Shaft extension (mm)		MU
	50	100	
1.2	φ35	φ40	
3	φ35	φ40	

Note) The figures in the above table are extended output shaft's diameter references for steel materials (solid shafts). Contact CKD for references for other materials and hollow shafts.

9 If sufficient rigidity cannot be attained, machine resonance is suppressed to some degree by installing dummy inertia as close to the actuator as possible. Examples of adding dummy inertia are shown below.

- As a reference, dummy inertia is [load inertia] × (0.2 to 1). [Fig. 3]

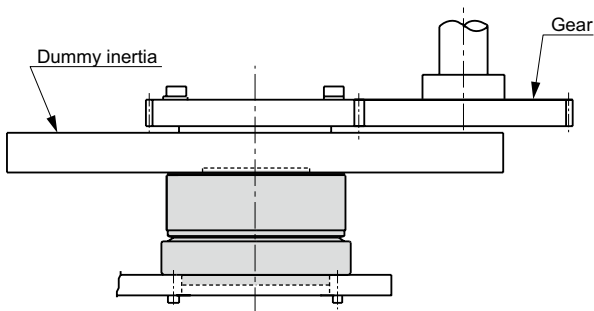
[Fig. 3] Dummy inertia installation example 1



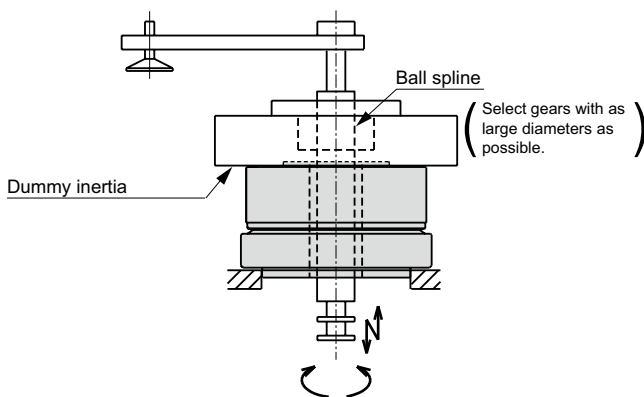
- When coupling with a belt, gears, or spline, or when joining with a key, dummy inertia should be [load inertia] × (0.5 to 2).
- If speed changes with belts or gears, use load inertia as the actuator output shaft conversion value, and install dummy inertia on the actuator. [Fig. 4] [Fig. 5]

(CAUTION) Install dummy inertia as large as possible within the actuator's capacity. (Use steel that has a large specific gravity.)

[Fig. 4] Dummy inertia installation example 2



[Fig. 5] Dummy inertia installation example 3



10 A resolver (magnetic position detector) is built into the ABSODEX product.

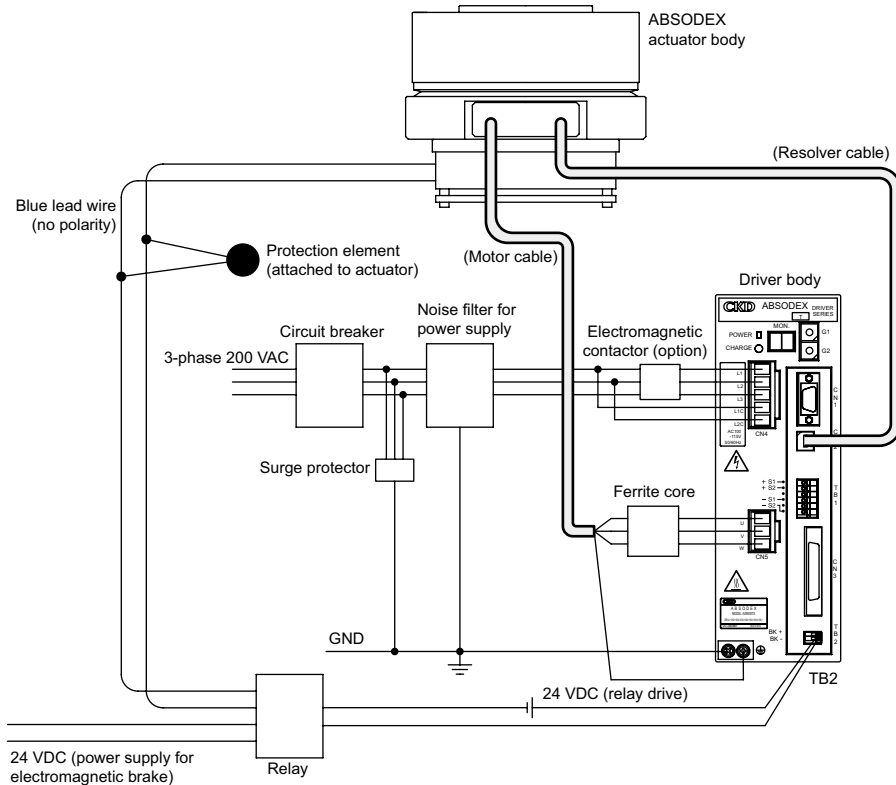
Do not place strong magnetic fields such as rare earth magnets near the actuator. Do not pass high-current wiring through the hollow hole. If you do, the full performance may not be achieved, and malfunction or fault may result.

11 We recommend that you install a surge protector if there is a possibility that the device may fail due to lightning-induced surges.

For other precautions, check the materials below.

1. On the Internet
AX_T Data Download
<http://catalog-search.ckd.co.jp/>
• Instruction manuals, supplementary explanations
2. Please request the following materials:
ABSODEX AX Series TS/TH/XS Type Technical Data
ABSODEX AX Series MU Type Technical Data

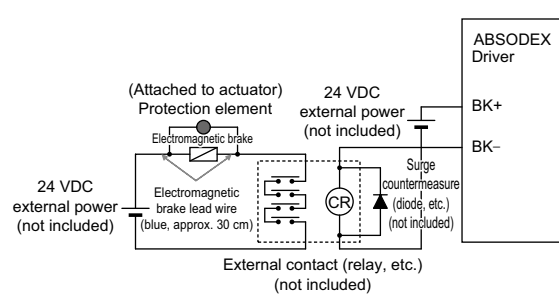
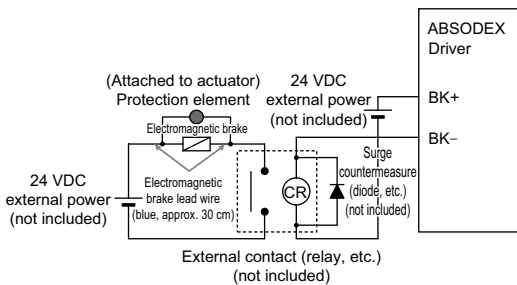
12 Electromagnetic brake connection
AX4000T-EB



- 1) Do not use the electromagnetic brake to brake or stop the rotating output shaft.
- 2) Connecting the BK+ or BK- of the driver directly with the electromagnetic brake damages the driver.
- 3) To connect induction loads such as the relay shown below to the external contact, use ones with a rated coil voltage of 24 VDC and a rated current within 100 mA, and take a surge suppression measure.

Recommended circuit for electromagnetic brake

• For serial connection to relay contacts



● Operating method

1. Control by the NC program (M68/M69)
When the "M68" code is executed, the current is stopped (brake activated) across BK+ and BK-, and when the "M69" code is executed, the current flows (brake released).
 2. Control by brake release input (I/O connector, 18 pin)
With the brake activated, when brake release is input, the current flows (brake released) across BK+ and BK-.
- When the electromagnetic brake is operated frequently (number times turned on/off), use a solid state relays (SSR) for the external contact.
Recommended model G3NA-D210B DC5-24 (OMRON)
Read the instruction manual of SSR before use.

- Use a relay with the contact capacity of 10 times or more the rated current. For relays with less capacity than the above, use a multi-polar relay for two or more relay contacts to be serially connected. Connection in this way can extend the lifetime of the contact of the relay having contacts.

13 To pass a shaft through the hollow of the model equipped with an electromagnetic brake, use a non-magnetic material (such as SUS303). If a magnetic material (such as S45C) is used, the shaft will be magnetized, causing stuck iron powder on the equipment or giving magnetic effects on peripheral devices.

14 Note that the magnetic force of the electromagnetic brake may cause stuck iron powder or effects on measuring instruments, sensors or other devices.

15 For other precautions, refer to the instruction manual (technical data).



Safety precautions for Labor saving mechanisms

Always read this section before use.

CAUTION Mounting, installation and adjustment

- 1** Use the dedicated cable for connecting the driver to the actuator. Changing the length or the material of the dedicated cable may deteriorate or damage the function.
- 2** Connect the correct power supply. Connecting a non-designated power supply could cause failure. When reconnecting the power, wait more than 10 seconds after the power is turned off (first confirm that the motor output shaft has stopped).
- 3** Securely fix the ABSODEX product to the machine and securely install loads such as the table before adjusting gain. Confirm that no interference occurs and the movable parts are in a safe state when are rotated.
- 4** Do not tap the output shaft with a hammer, or assemble it forcibly. Doing this would prevent the expected accuracy or functions, and could cause failure.
- 5** Do not place strong magnetic fields such as rare earth magnets near the actuator. It may not be able to maintain expected accuracy.
- 6** The actuator may become hot depending on operating conditions. Provide a cover so that it will not be touched by accident.
- 7** The driver surface may become hot depending on operating conditions. Put it inside the switchboard so that it cannot be touched.
- 8** Do not drill holes into the actuator. Contact CKD when machining is required.
- 9** Please do not perform maintenance work on the actuator, the rotary table attached to the actuator or other moving parts.
- 10** About combining the actuator and driver
 - If the actuator and driver are not combined correctly after program input (parameter setting), alarm 3 will be generated. Check the actuator and driver combination. (Note) Alarm 3 occurs to prevent malfunction if the actuator and driver combination differs from when the program was input. Alarm 3 is reset when the program and parameters are input again.
 - If operation is started with an incorrect actuator and driver combination after the program input (after parameter setting), malfunction could occur or equipment be damaged.
 - When changing the cable length, order the cable separately.
 - If a driver other than the compatible driver is connected, the actuator may burnout.
- 11** When using a circuit breaker, select one that has higher frequency measures for inverter use.
- 12** The position of the output shaft in the actuator dimension drawing does not indicate the actuator's origin. When using it at the output shaft shown in dimension drawings, the origin must be adjusted by the origin offset function.
- 13** The cables for the AX4009T, AX2000T, AX6000M Series, and AX7000X Series are not movable cables. Make sure to fix the cable in the connector section to prevent the cable from moving. Do not pull the lead-out cable to lift the unit or do not apply an excessive force to the cable. Otherwise, malfunction, an alarm, damage of the connector part, or disconnection may result.
- 14** For additional notes and conditions of compatibility with international standards, please refer to the technical data (ABSODEX AX Series TS/TH/XS Type Technical Data, ABSODEX AX Series MU Type Technical Data).
- 15** When the lead-put cable or connector of the actuator is pulled forcibly, the drawer cable shield braided wire may be exposed.

CAUTION During Use & maintenance

- 1** Do not pull the cable forcibly, apply excessive force to it, or damage it.
- 2** Do not overhaul the actuator unit, as original functions may not be restored. In particular, taking apart the rotational position detection unit may cause malfunction or accuracy degradation.
- 3** When testing the withstand voltage of the machine or equipment incorporating an ABSODEX product, disconnect the main power cable from the ABSODEX driver and check that the voltage is not applied to the driver. Otherwise, failure may occur.
- 4** If alarm "4" (actuator overload: electronic thermal) is generated, wait for the actuator to sufficiently cool down before restarting. Alarm "4" could occur in the cases below. Remove the cause before resuming use.
 - Resonance or vibration: Ensure sufficient installation rigidity.
 - Tact or speed: Increase movement time or stopping time.
 - Structure that locks the output shaft: Add M68 and M69 commands.
- 5** Actuator coordinates are recognized after power is turned on, so check that the output shaft does not move for several seconds after power is turned on.
- 6** For additional notes and troubleshooting for the alarm display, please refer to the technical data (ABSODEX AX Series TS/TH Type Technical Data, ABSODEX AX Series MU Type Technical Data).

For other precautions, check the materials below.

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