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 shift 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 9960-1:2019 (IEC 60204-1:2016) Safety of Machinery - Electrical Equipment of Machines - Part 1: General Requirements. Install an overcurrent protector (a circuit breaker or circuit protector for wiring) on the main power, control power, and I/O power.

(Reference: JIS B 9960-1 7.2.1 General description)
If there is a possibility the circuit current may exceed the rated value of the component or the allowable current of the conductor, an overcurrent protection must be provided. The details of the ratings or set values to be selected shall be provided in 7.2.10.

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

1 Warranty period

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.

2 Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
3) Failure not caused by the product.
4) Failure caused by use not intended for the product.
5) Failure caused by modifications/alterations or repairs not carried out by CKD.
6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
7) Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.
Note: For details on the durability and consumable parts, contact your nearest CKD sales office.

3 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 If chips or dusts adhere to the actuator or driver, it may cause leakage of electricity 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.

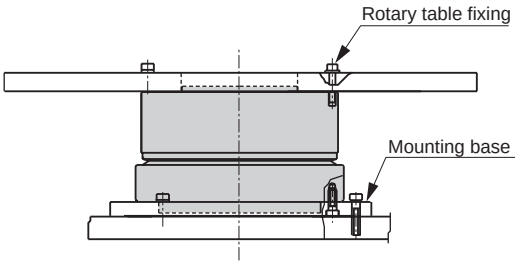
4 From the servo-ON state (holding state), when power is turned OFF or servo-OFF, the output axis may move from the holding position without external force being applied.

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.

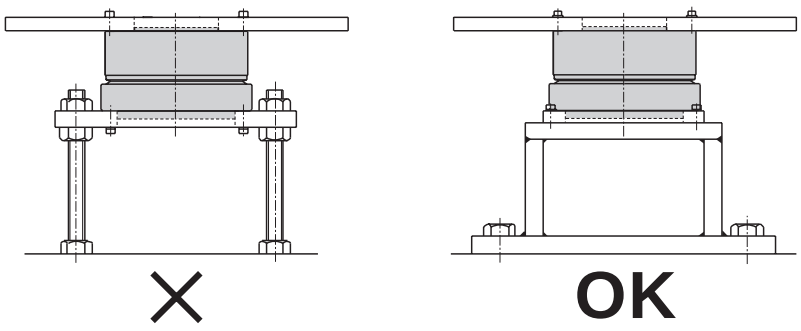
7 Equipment with ABSODEX products installed should have sufficient rigidity to realize full ABSODEX performance. If the load equipment or frame's mechanical unique vibration is relatively low (approx. 200 to 300 Hz or less depending on the equipment), resonance could occur in the ABSODEX product and 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 frame having the highest rigidity possible. [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	Shaft extension (mm) TS/TH/XS				
[N·m]	50	100	200	300	500
6	ø35	ø40	ø46	ø50	ø60
9, 12	ø40	ø46	ø55	ø60	ø70
18, 22	ø45	ø55	ø65	ø70	ø80
45	ø55	ø65	ø75	ø85	ø95
75	ø62	ø75	ø90	ø95	ø110
150	ø75	ø90	ø110	ø115	ø130
210	ø80	ø95	ø115	ø125	ø140
300	ø90	ø105	ø125	ø140	ø155
500	ø100	ø120	ø145	ø160	ø180
1000	ø120	ø140	ø170	ø185	ø210

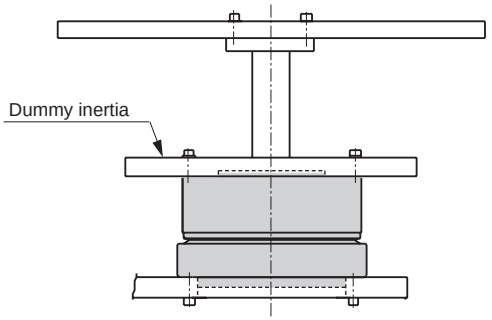
Max. torque	Shaft extension (mm) MU	
[N·m]	50	100
1.2	ø35	ø40
3	ø35	ø40

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]

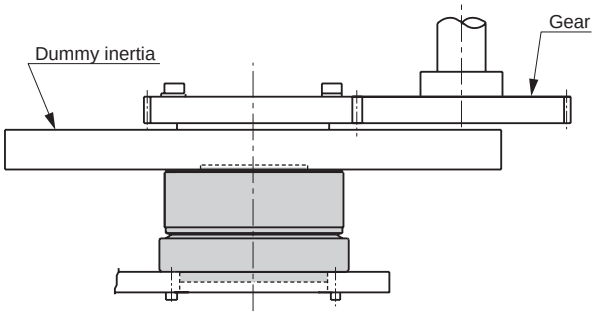
[Fig. 3] Dummy inertia installation example 1



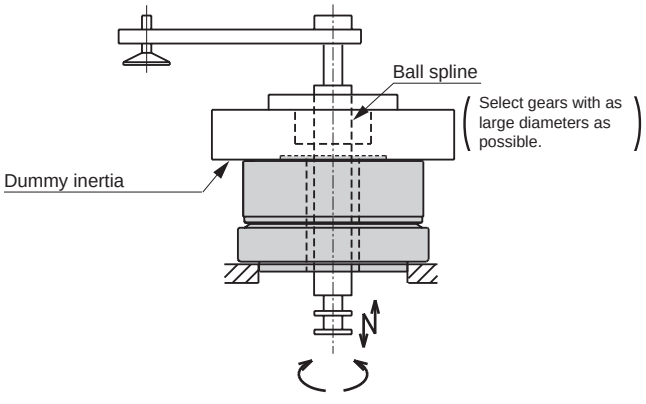
- When coupling with a belt, gears, or spline, or when joining with a key, dummy inertia should be [load inertia] × (0.5 to 2).
- If speed changes with belts or gears, use load inertia as the actuator output shaft conversion value, and install dummy inertia on the actuator. [Fig. 4] [Fig. 5]

(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.

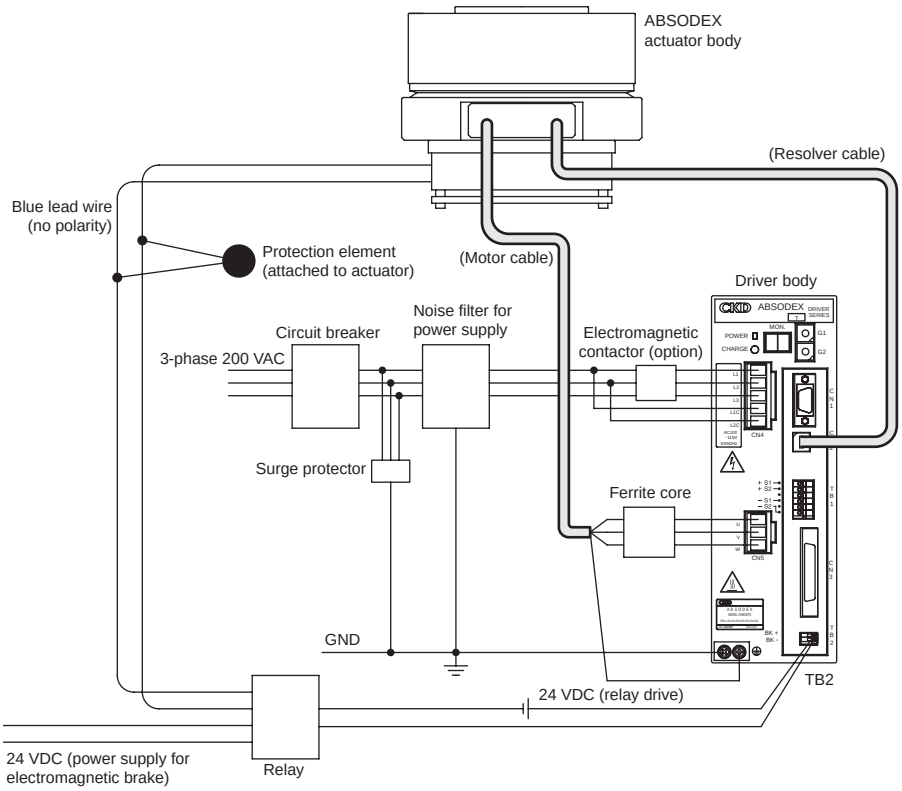
For other precautions, check the materials below.

1. On the Internet
   CKD Component Products Website
   https://www.ckd.co.jp/kiki/en/
   • Instruction manuals

2. Please request the following materials:
   ABSODEX AX Series TS/TH Type Technical Data
   ABSODEX AX Series MU Type Technical Data

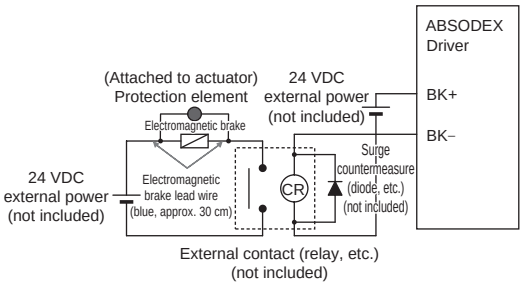
12 Electromagnetic brake connection

AX4000T-EB

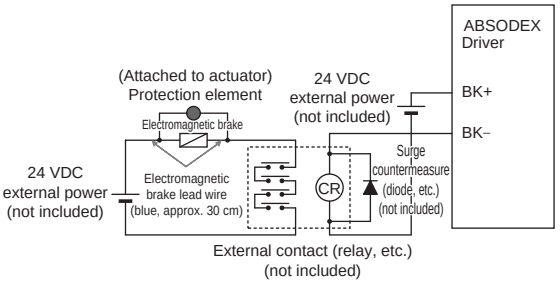


1) Do not use the electromagnetic brake to brake or stop the rotating output shaft.
2) Connecting the BK+ or BK- of the driver directly with the electromagnetic brake damages the driver.
3) To connect induction loads such as the relay shown below to the external contact, use ones with a rated coil voltage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

Recommended circuit for electromagnetic brake



- For reed relay serial connection



● 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-UTU 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

Labor saving components: Warnings and Cautions

Be sure to read this section before use.

⚠ CAUTION Mounting, installation and adjustment

1. Make sure to use the dedicated cable for connecting between the actuator and driver. Do not modify the length or material of the dedicated cable, as it could cause malfunction or failure.
2. Make sure to connect the proper power supply. Connecting a non-designated power supply could cause failure. When turning ON the power supply after it has been turned OFF, check that the actuator output shaft has stopped. Wait at least 10 seconds after turning OFF the power supply.
3. Before adjusting the gain, securely install the ABSODEX in the machine and securely mount the loads such as the table. Confirm that no interference occurs and that safety is ensured when movable parts are rotated.
4. Do not tap the output shaft with a hammer or apply excessive force during assembly. Doing so could prevent the achievement of full accuracy and performance, or cause failure.
5. Do not place objects that produce strong magnetic fields, such as rare earth magnets, near the actuator. It may not be possible to maintain the original accuracy.
6. The actuator may become hot, depending on the working conditions. Provide a cover or other means to prevent the actuator from being touched.
7. The driver surface may become hot, depending on the working conditions. Place it inside the switchboard or take other measures to prevent it from being touched.
8. Do not drill holes into the actuator. Contact CKD if 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 combined mistakenly after program input (after parameter settings are configured), alarm 3 is activated. 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 settings are configured), malfunction could occur or equipment be damaged.
    - Order a separate cable when the length of the cable needs to be changed.
    - If a driver other than the compatible type is connected, it could cause the actuator to burn out.
11. When using a circuit breaker, select one that incorporates high-frequency measures for inverter use.
12. The position of the output shaft on the actuator dimensions does not represent the actuator's origin position. When using it at the output shaft shown in dimension drawings, the origin must be adjusted by the origin offset function.
13. The lead-out cable for the AX4009T, AX2000T Series, and AX6000M Series is not movable. Make sure to secure the cable at the connector so that it does not move. Do not lift up the body by the lead-out cable or apply excessive force to the cable. Doing so may activate the malfunction alarm or cause the connector to break or become disconnected.
14. For additional notes and conditions of compliance to international standards, please refer to the technical data (ABSODEX AX Series TS/TH Type Technical Data, ABSODEX AX Series MU Type Technical Data).
15. Do not pull strongly on the actuator lead-out cable or connector part, as it could cause the lead-out cable shield braid to become exposed.

⚠ CAUTION Use/maintenance

1. Do not pull the cable forcibly, apply excessive force to it, or damage it.
2. If the actuator body is disassembled, the original performance cannot be restored. In particular, disassembly of the rotary position detection unit may cause malfunctions and degradation of accuracy.
3. When performing withstand voltage test on the machine with the ABSODEX installed, disconnect the main power cable to the ABSODEX driver and ensure that no voltage is applied to the driver. This may lead to failure.
4. If alarm 4 (actuator overload: electronic thermal) is activated, wait for the actuator temperature to drop before restarting.
   Alarm "4" may be activated in the cases described below. Remove the cause before resuming use.
   - If caused by resonance/vibration→Sufficiently secure mounting rigidity.
   - If tact/speed → Increase travel time/stop time.
   - When the structure constrains the output shaft, add →M68 and M69 commands.
5. The actuator coordinates are recognized after the power is turned ON. Make sure that the output shaft does not move for several seconds after the 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.

1. CKD website
   https://www.ckd.co.jp/kiki/en/
   - Instruction manual

2. Request the materials below.
   ABSODEX AX Series TS/TH Type Technical Data
   ABSODEX AX Series MU technical data