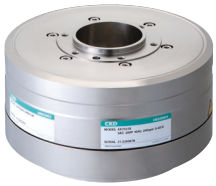
CKD

New Products

New product

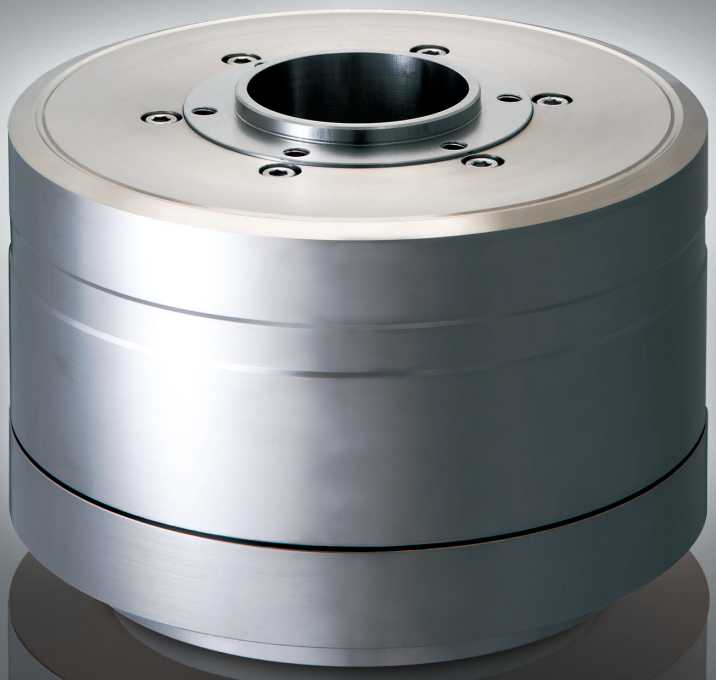
Direct drive actuator
ABSODEX high precision type
AX7000X series



DIRECT DRIVE ACTUATOR, HIGH PRECISION TYPE, AX7000X SERIES

High performance
User friendly

Precise positioning



CKD Corporation

CC-1238A 1

MACHINE HUMAN

High-performing yet user-friendly

Outstanding positioning performance

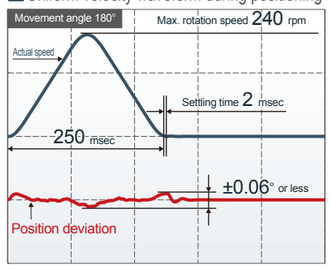
Equipped with one of the best high-resolution encoder

Resolution	4,194,304 Pulse/rev
Repeatability	±2 sec.

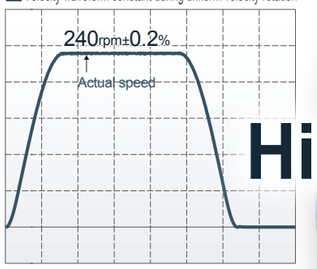
Features "high precision & high response" positioning

In addition to high precision positioning, significantly improved stability of responsiveness and constant velocity.

■Uniform velocity waveform during positioning



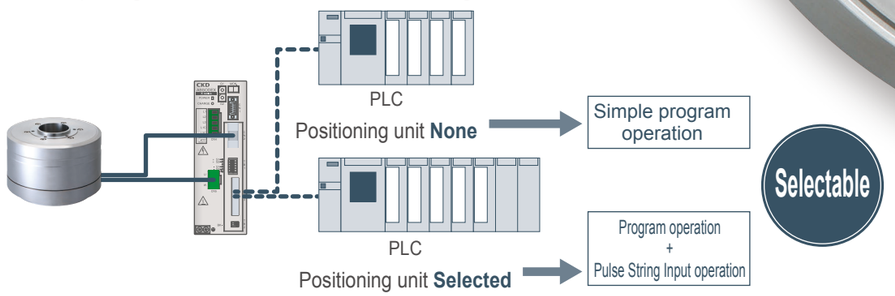
■Velocity waveform constant during uniform velocity rotation



* The value above is a reference value and is not a guaranteed value. Value varies depending on load conditions, etc.

Flexible positioning is available

Compatible with multi-function ABSODEX driver (XS type)
Equipped with a "flexible programming function" for easy implementation of complex behavior and "industry's largest input and output signal" for ease of interaction with high-end devices!



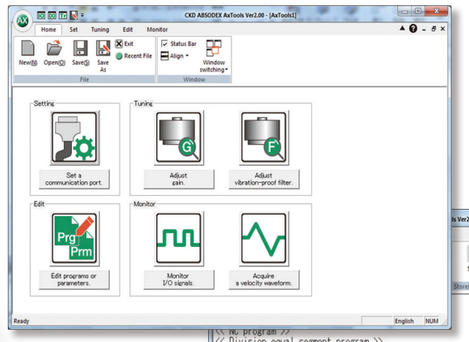
Direct drive actuator ABSODEX high precision type

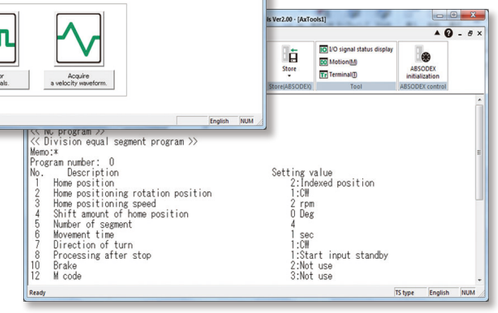
AX7000X series

Now easier to use with "connect-and-move" function

AX Tools that are easier to use for first time users as well as seasoned users

Intuitive simple interface.





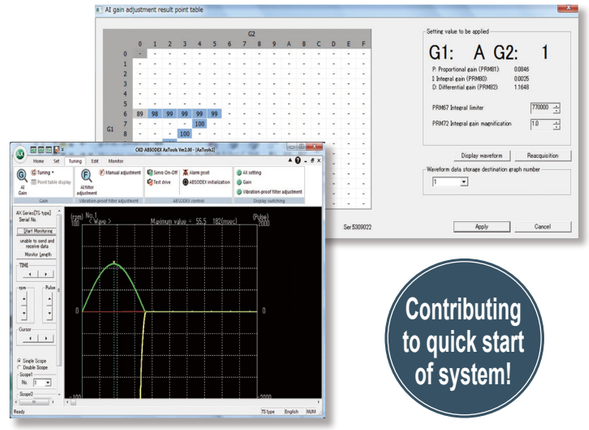
An intuitive setting is available!

The industry's first! Equipped with an AI (artificial intelligence) adjustment function

To support product start up, it is equipped with AI (artificial intelligence) adjustment function.
Even first time users can perform adjustments like a pro

Equipped with an AI (artificial intelligence) function that supports adjustment

- Automatically acquires data and advises on the best tuning
- Reduces risk behavior with the alarm check function
- Adjustment results are automatically assigned a score, optimum gain value while checking the score and the operation waveform displayed list can be set



Conventionally...

- Manual tuning by skilled hands
- Overseas launch not reliable
- Determining the quality of adjustment results is not easy

Contributing to quick start of system!

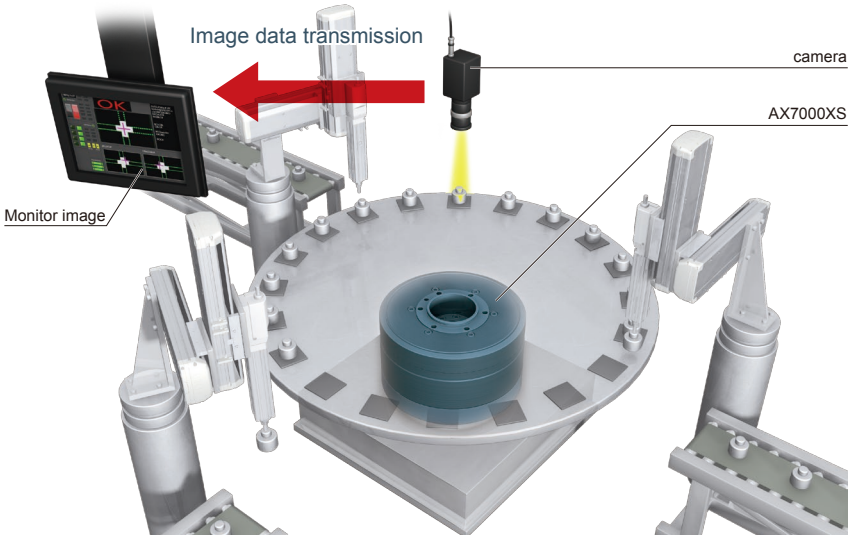
* Compatible with ABSODEX AX series for all models(TS/TH/MU/XS)

APPLICATIONS

Inspection machine of electric parts

Check the appearance of the workpiece with the camera.

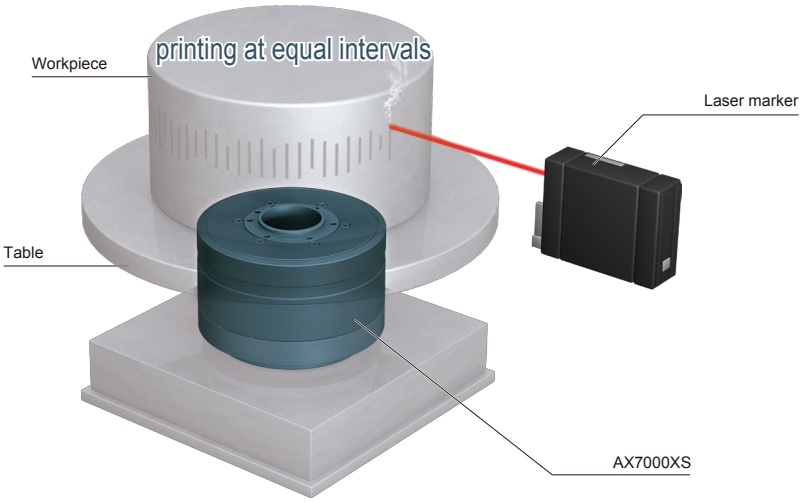
high precision



Laser printer of workpiece

While rotating a work at constant speed, print the side of the workpiece with a laser marker

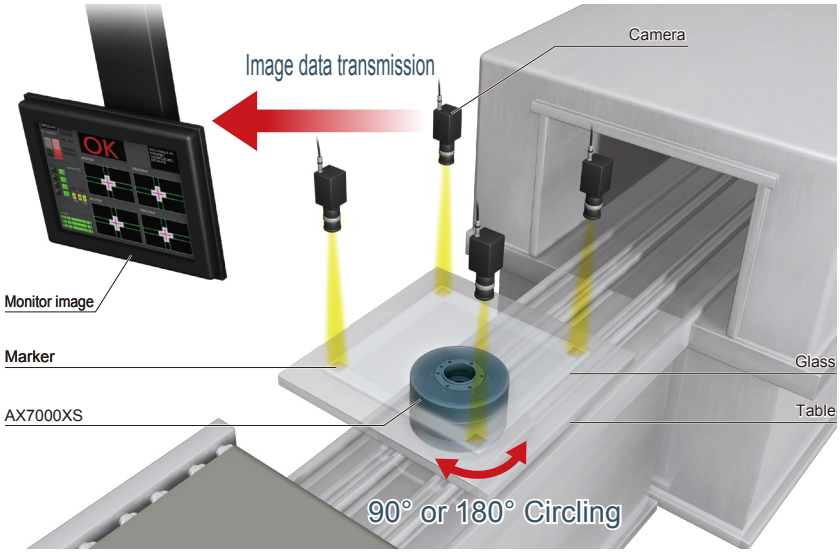
Quick response



Alignment of glass board

After confirming the marker with the camera, alignment operation carried out

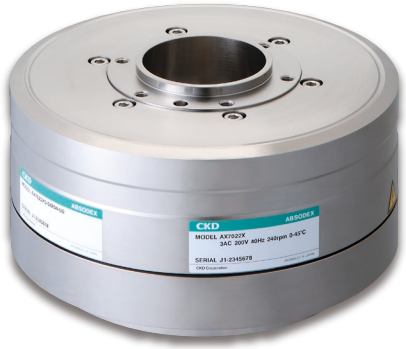
Flexible



Choose from CKD ABSODEX range according to the application

Take advantage of high positioning preciseness

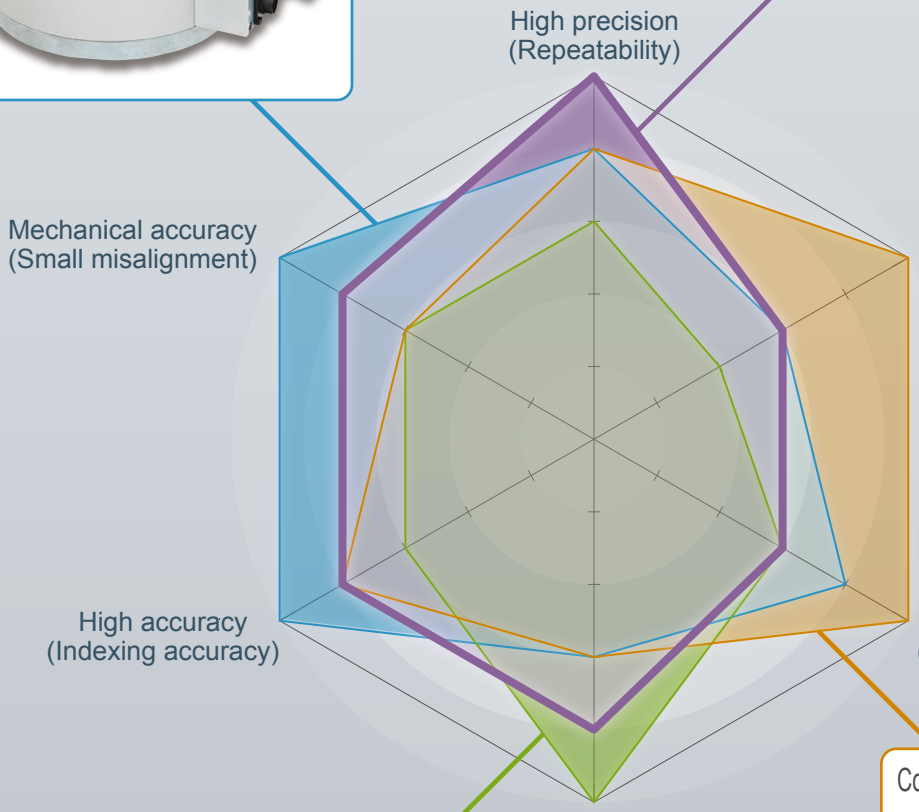
AX7000X Series



New

Ideal for Indexing table applications!

AX1000T Series

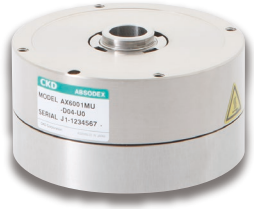


Compatible with wide range of needs

AX4000T Series

Industry's minimum size

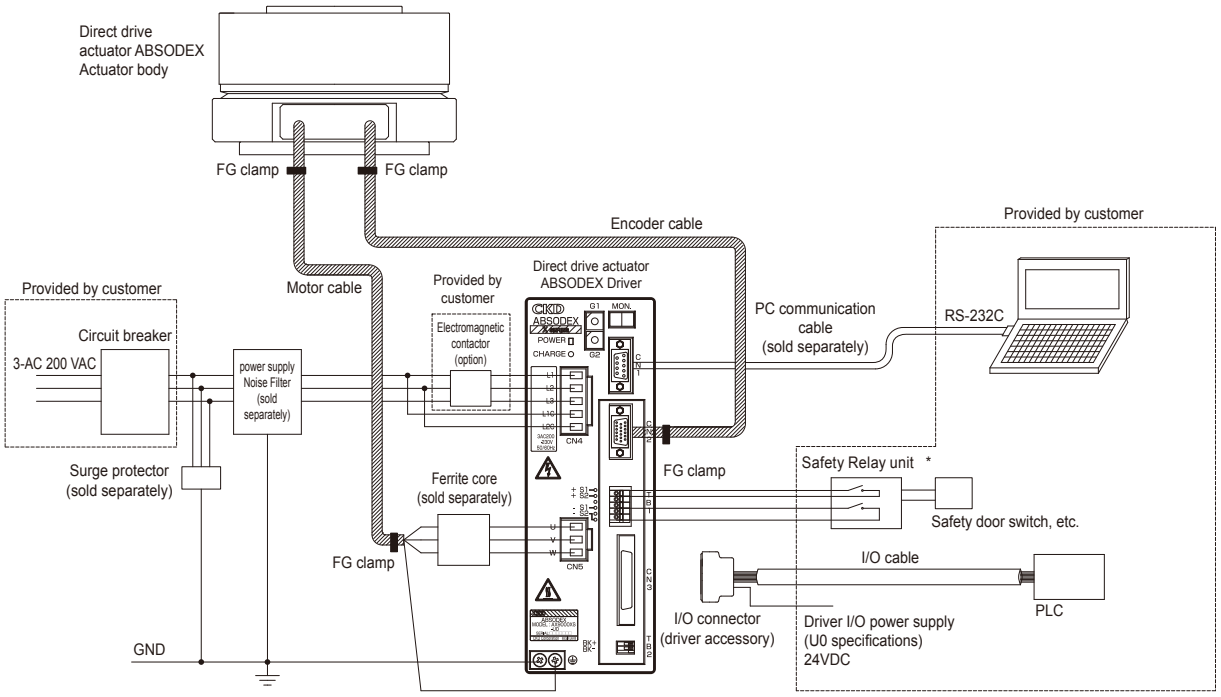
AX6000M Series



System Configuration

● Basic setting items
1. Input the program from a personal computer.
2. Required parameters are input in the same way.
3. Gain is adequately set.

● Basic drive methods
1. A program to be executed is selected at the PLC.
2. Start signal is input at the PLC.
3. After driving is started, the driver outputs a positioning completion signal.



* Safety features of this product (TB1) are not compliant with certification for safety standards compliance.

Configuration (set model no. selection)

	Name	Quantity
Standard configuration	Actuator body	1
	Driver (with controller)	1
	Motor cable, encoder cable	1 each

Accessories: I/O connector, power supply connector, motor cable connector

Programming tool

• Starting adjustment support tool "AX Tools" is available. (Windows version, free)
Absodex programs are created, parameters set, and operation commands, etc., issued from the personal computer.
The PC communication cable(model no.: AX-RS232C-9P) is required.

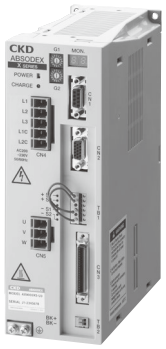
Note) The PC communication cable is designed specifically for Absodex. You cannot use a cable available on the market as it is. If you do, the driver or PC may be damaged.

Note) Connect the PC only when adjusting. Remove the PC communication cable from CN1 during normal operation.

Note) When the PC recovers from sleep mode, the USB-serial conversion cable may not be recognized, leading to communication errors.

Note) Download the latest version of the Starting adjustment support tool "AX Tools" from our website.

Direct drive actuator ABSODEX high precision type AX7000X series variation

	Torque (N・m)		Index precision (sec.)	Repeatability (sec.)	Page
	22	45			
Actuator			±30	±2	1
Compatible driver			Drivers can be commonly used. The controller function enables the actuator's rotation angle, movement time and timer, etc., to be set as desired with an NC program. M code output, encoder output, etc. can be used to connect to an external PLC, motion controller, etc.		5

Direct drive actuator ABSODEX

AX7000X Series

High-end models with high resolution encoder
Compatible function with free combinations of driver, actuator, and cable

- Max. torque: 22·45 N·m
- Compatible driver: XS Type Driver

RoHS

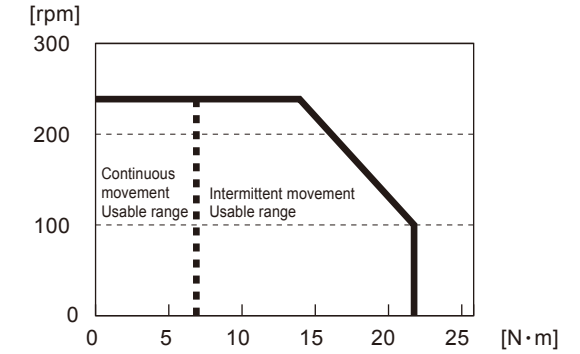
Actuator specifications

Descriptions		AX7022X	AX7045X
Max. output torque	N·m	22	45
Continuous output torque	N·m	7	15
Max. rotation speed	rpm	240 (Note 1)	
Allowable axial load	N	400	
Allowable moment load	N·m	20	
Output shaft's moment of inertia	kg·m^2	0.0182	0.0254
Allowable load moment of inertia	kg·m^2	0.60	0.90
Index precision (Note 2)	sec.	±30	
Repeatability (Note 2)	sec.	±2	
Output shaft friction torque	N·m	2.5	
Resolution	P/rev	4,194,304	
Motor insulation class		F	
Motor withstand voltage		1500VAC 1 minute	
Motor insulation resistance		10MΩ and over 500VDC	
Ambient temperature		0 to 40ºC	
Ambient humidity		20 to 85% RH No freezing	
Storage ambient temperature		-20 to 80ºC	
Storage ambient humidity		20 to 90%RH No freezing	
Free of environment		No corrosive and explosive gases and dust	
Weight	kg	10	13
Run out of output shaft (Note 2)	mm	0.03	
Surface run out of output shaft (Note 2)	mm	0.03	
Degree of protection		IP20	

Note 1: Use at 80 rpm or less during continuous rotary operation.
Note 2: For details on index precision, repeatability, run out of output shaft, and surface run out of output shaft, refer to "Terminology" on page 10.

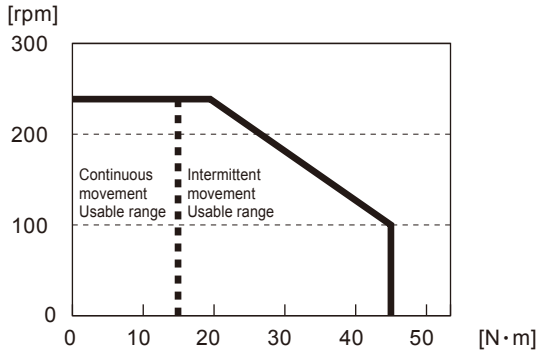
Speed and max. torque characteristics

● AX7022XS



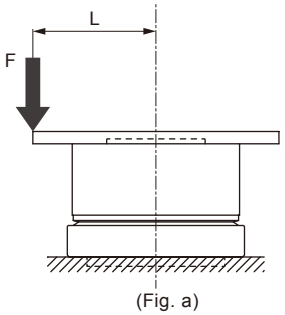
* Fig. This graph shows the characteristics for 3-phase 200 VAC.

● AX7045XS



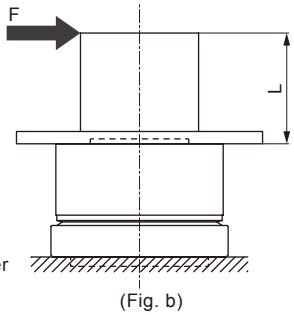
* Fig. This graph shows the characteristics for 3-phase 200 VAC.

(Note) Moment load



(Fig. a)

M (N·m)=F (N)×L (m)
M : Moment load
F : Load
L : Distance from output shaft center



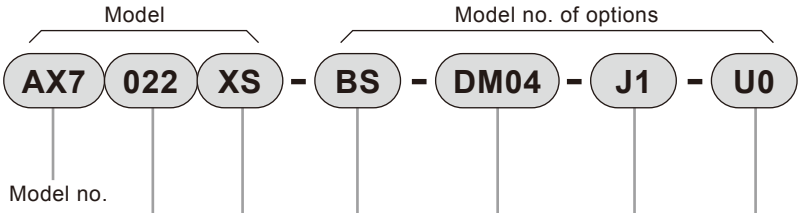
(Fig. b)

M (N·m)=F(N)×(L+0.02) (m)
M : Moment load
F : Load
L : Distance from output shaft flange

Read Precautions on page 17 to 21 before use.

How to order

●Set model no. (actuator, driver, and cable)



Ⓐ Size (max. torque)

Symbol	Descriptions
022	22 N·m
045	45 N·m

Ⓑ Driver type

Symbol	Descriptions
XS	With XS type driver

Ⓒ Mounting base

Symbol	Descriptions
Blank	Standard (without mounting base)
BS	Electroless nickel plating

Ⓓ Cable length Note 1

Symbol	Descriptions
DM02	2m
DM04	4m
DM06	6m
DM08	8m
DM10	10m
DM15	15m
DM20	20m

Ⓔ Driver power supply voltage

Symbol	Descriptions
Blank	1-phase/3-phase 200VAC to 230VAC
J1	1-phase 100VAC to 115VAC

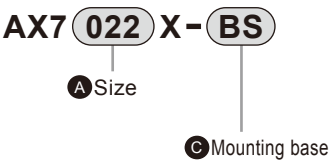
Ⓕ Interface specifications

Symbol	Descriptions
U0	Parallel I/O (NPN specifications)

Note on model no. selection

Note 1: The cable is a movable cable.
Refer to page 8 for cable dimensions.
The lead cables are not movable cables.

● Actuator model no.



● Driver model no.

• 200VAC to 230VAC
AX9000XS -U0

• 100VAC to 115VAC
AX9000XS-J1-U0

Ⓕ Interface specifications

● Cable model no.

• Motor cable
AX-CBLM6-DM04

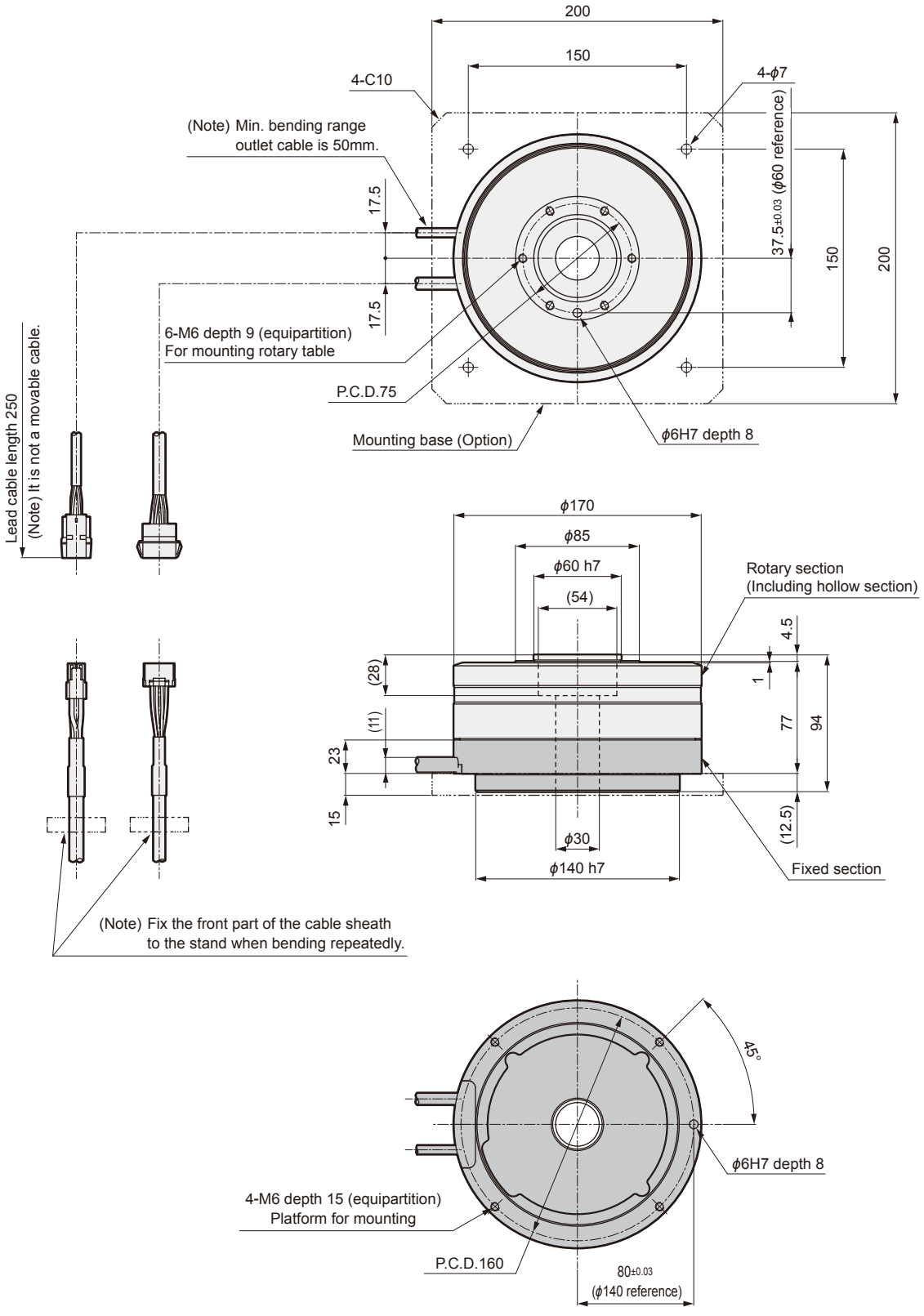
• Encoder cable
AX-CBLR10-DM04

Ⓓ Cable length
(Note : "DM04" if the cable length is 4m.)

* Custom order models will not support RoHS. Consult with CKD for details.

Dimensions

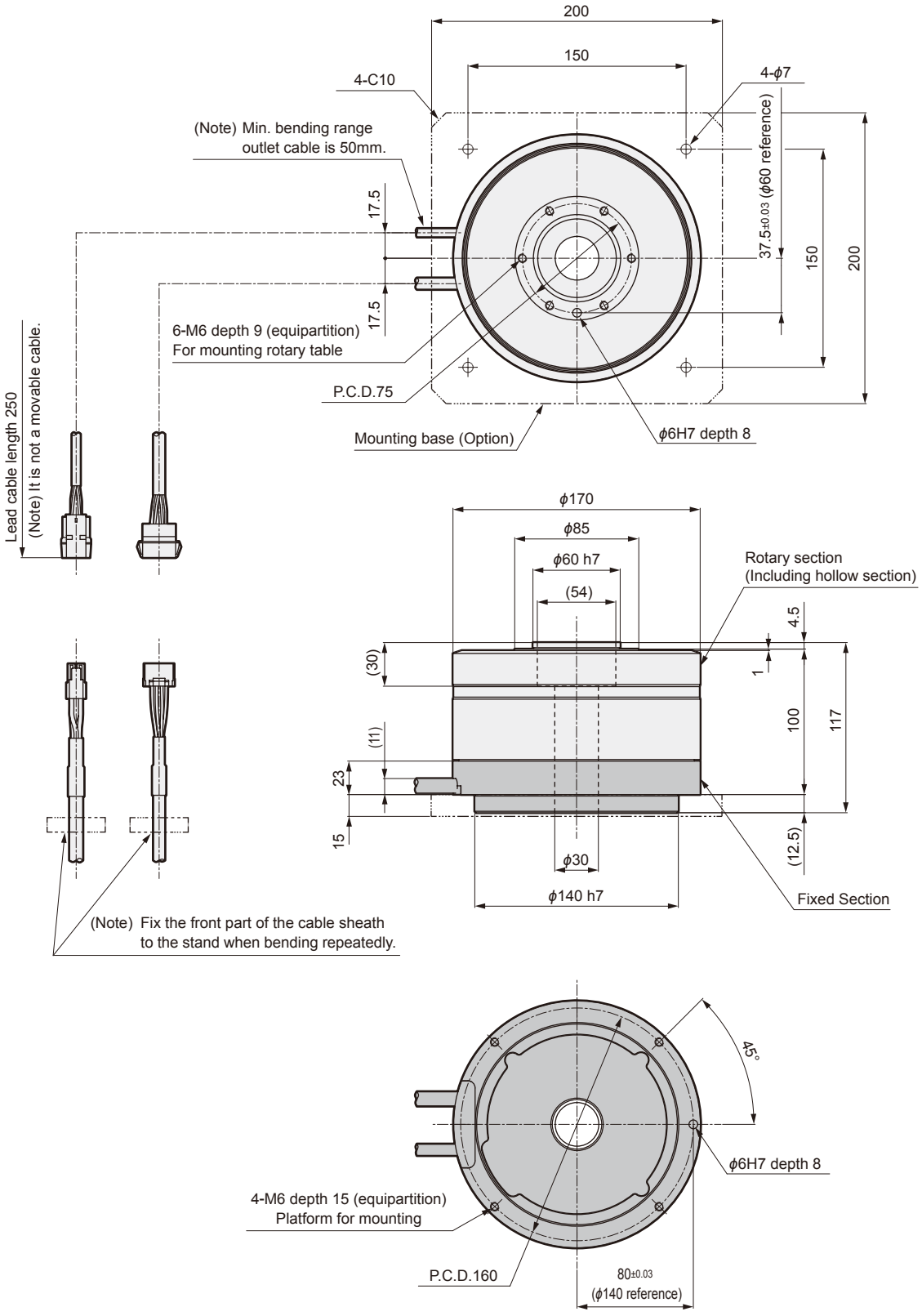
●AX7022X



Note 1) The actuator's origin may differ from that in the dimensional drawing.
The origin offset feature enables you to set the origin at any position.

Dimensions

●AX7045X



Note 1) The actuator's origin may differ from that in the dimensional drawing.
The origin offset feature enables you to set the origin at any position.

Direct drive actuator ABSODEX

XS Type Driver

Interface specifications: Parallel I/O (NPN specifications)

RoHS

Features

- Power supply separated into main power supply and control power supply
- Compact and light (resin body)
- 7 segment LED2-digit display
- Compatible with encoder output

How to order

• 200VAC to 230VAC

AX9000XS -U0

• 100VAC to 115VAC

AX9000XS-J1-U0

Interface specifications
U0 : Parallel I/O (NPN)

Common specifications

Descriptions		Model XS Type Driver AX9000XS
Power voltage	Main power supply	3-phase, 1-phase 200VAC±10% to 230VAC±10% 100VAC±10% to 115VAC±10% (J1 Option) (Note 1)
	Control power supply	200VAC±10% to 230VAC±10% 100VAC±10% to 115VAC±10% (J1 Option) (Note 1)
Power frequency		50/60 Hz
Rated input current		200VAC: 1.8A 100VAC: 2.4A
Rated output current		1.9A
Construction		Driver and controller (open type)
Ambient temperature		0 to 50ºC
Ambient humidity		20 to 90%RH (No freezing)
Storage ambient temperature		-20 to 65ºC
Storage ambient humidity		20 to 90%RH (No freezing)
No environment		Corrosive gases or powder dust
Noise resistance		1000 V (P-P), pulse width 1μsec, rising edge 1nsec impulse noise test, induction noise (capacitive coupling)
Vibration resistance		4.9m/s^2
Weight		Approx. 1.6kg
Degree of protection		IP2X (excluding CN4, CN5)

Note 1) If you connect 200 VAC to 230 VAC to a driver with 100 VAC to 115 VAC power supply voltage specification (-J1 option), the driver's internal circuitry will be damaged.
Note 2) If the main power supply is turned off while the actuator is rotating, the rotation may continue due to momentum.
Note 3) After the main power is turned off, the motor may drive due to the voltage remaining in the driver.

Performance Specifications

Descriptions	Descriptions
Control shafts	1 shaft, 4,194,304 pulses/1 rotation
Angle setting unit	° (degrees), pulses, index numbers
Min. angle setting unit	0.001°, 1 pulse
Speed setting unit	sec. rpm
Speed setting range	0.01 to 100 sec/ 0.11 to 240 rpm
Equal divisions	1 to 255
Max. command value	8-digit number input ±99,999,999
Timer	0.01 s to 99.99 s
Program language	NC language
Programming method	Data can be set with an interactive terminal or personal computer, etc., using the RS232C port.
Operation Mode	Auto, MDI, job, single block, servo OFF, pulse string input
Coordinates	Absolute, incremental
Acceleration curve	<5 types> Modified sine (MS), modified constant velocity (MC, MC2), modified trapezoidal (MT), and trapecloid (TR)
Status display	LED power display
Operating indications	Display by 7-segments LED (2 digits)
Communication interface	RS-232C compliant
I/O signals	Refer to the relevant interface specifications page.
Program size	Approx. 6000 characters (256 lines)
Electronic thermal	Actuator overheat protection

Breaker capacity

Actuator Model	Driver Model	Inrush current (A)		Breaker capacity
		1-phase 100 V	1-phase, 3-phase 200 V	Rated current (A)
AX7022X, AX7045X	AX9000XS	16 (Note 1)	56 (Note 1)	10

Note 1) The inrush current values are typical values for AC115 V and AC230 V.

Parallel I/O (NPN specifications)

CN3 Input signal

Pin no.	Signal Name	Logic	Decision
1 to 2	External power supply input +24V±10%		
3 to 4	External power supply input GND		
5	Program number selection input (bit 0)	Positive	Level
6	Program number selection input (bit 1)	Positive	Level
7	Program number selection input (bit 2)	Positive	Level
8	Program number selection input (bit 3)	Positive	Level
9	Program number selection input 2nd digit/ program number selection input (bit 4)	Positive	Edge Level
10	Program number selection input 1st digit/ program number selection input (bit 5)	Positive	Edge Level
11	Reset input	Positive	Edge
12	Origin Return Instruction Input	Positive	Edge
13	Start input	Positive	Edge
14	Servo ON input/program stop input	Positive	Level Edge
15	Ready return/continuous rotation stop input	Positive	Edge
16	Answer input/position deviation counter reset input	Positive	Edge
17	Emergency Stop Input	Negative	Level
18	Brake Release Input	Positive	Level

CN3 output signal

Pin no.	Signal Name	Logic
33	M code output (bit 0)	Positive
34	M code output (bit 1)	Positive
35	M code output (bit 2)	Positive
36	M code output (bit 3)	Positive
37	M code output (bit 4)	Positive
38	M code output (bit 5)	Positive
39	M code output (bit 6)	Positive
40	M code output (bit 7)	Positive
41	In-position output	Positive
42	Positioning completion output	Positive
43	Start input waiting output	Positive
44	Alarm output 1	Negative
45	Alarm output 2	Negative
46	Intermediate index output 1/origin output	Positive
47	Intermediate index output 2/servo state output	Positive
48	Ready output	Positive
49	Segment position strobe output	Positive
50	M code strobe output	Positive

CN3 pulse string input signal

Pin no.	Signal Name
19	PULSE/UP/ A phase
20	-PULSE/-UP/-A phase
21	DIR/ DOWN/ B phase
22	-DIR/-DOWN/-B phase

CN3 encoder output signal (incremental)

Pin no.	Signal Name
23	A phase (line driver output)
24	-A phase (line driver output)
25	B phase (line driver output)
26	-B phase (line driver output)
27	Z phase (line driver output)
28	-Z phase (line driver output)

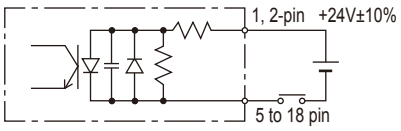
I/O circuit specifications

Descriptions	1 circuit current (mA)	Max. points (circuit)	Max. current (mA)	Max. current consumption (mA)
Input circuit	4	14	56	1106
Output circuit	50	18	900	
Brake output (BK+,BK-)	75	2	150	

* The max. number of simultaneous output points for the output circuits is 14 out of 18.

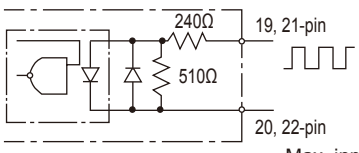
CN3 I/O circuit specifications

● Input circuit



Rated voltage 24V±10%
Rated current 4mA (at 24VDC)

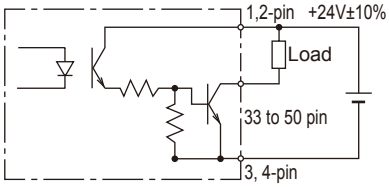
● Pulse string input circuit



Rated voltage 5V±10%

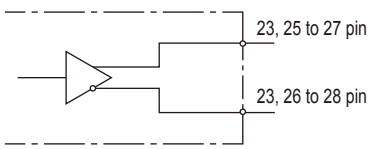
Max. input frequency
Line driver 1Mpps
Open collector 250Kpps

● Output circuit



Rated voltage 24V±10%
Rated current 50mA (Max.)

● Encoder output circuit



Output type: line driver
Line driver to be used: DS26C31

Items provided with driver

Model No.	Specification	CN3 connector	Power connector (CN4)	Motor cable connector (CN5)
AX9000XS-U0	Parallel I/O (NPN)	10150-3000PE (Plug) 10350-52A0-008 (Shell) Sumitomo 3M	PC4/5-ST-7.62 Phoenix Contact	PC4/3-ST-7.62 Phoenix Contact

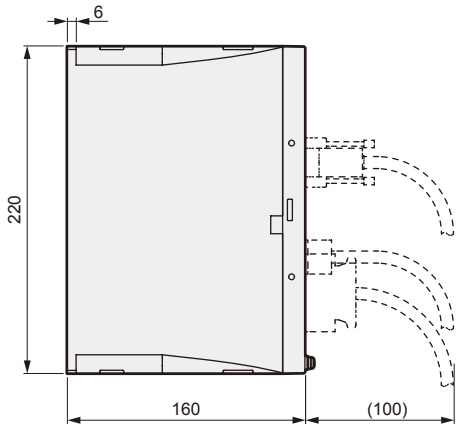
Refer to the part model number table when ordering additional parts.

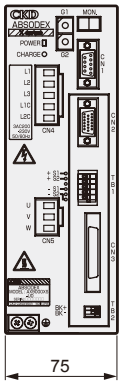
⚠ Read Precautions on page 17 to 21 before use.

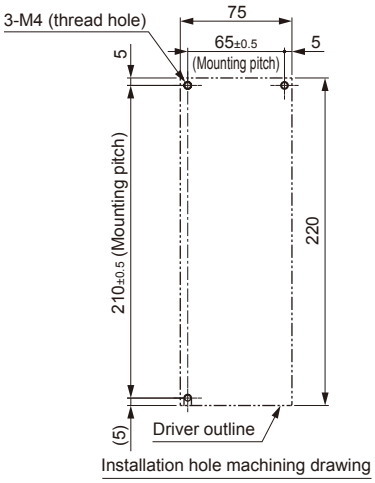
* Custom order models will not support RoHS.

XS type driver

Dimensions

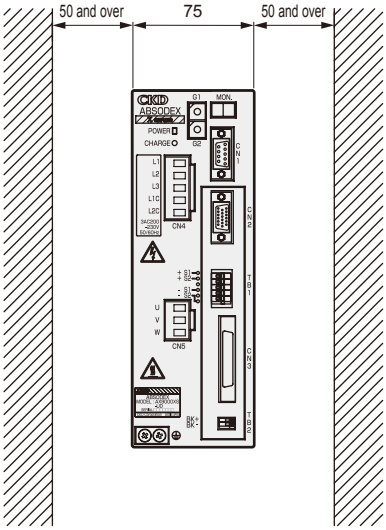


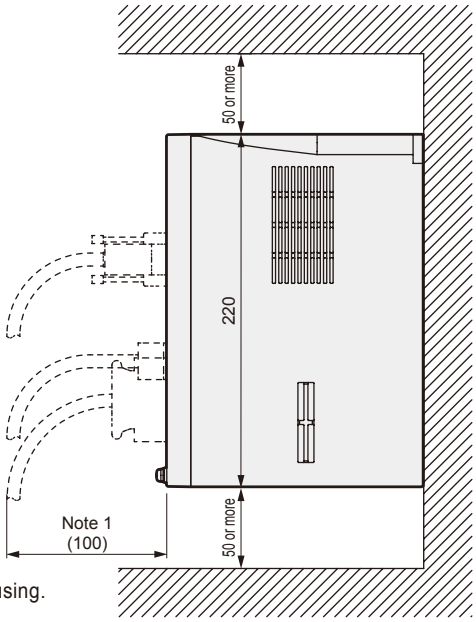




Installation hole machining drawing

Installation dimensions



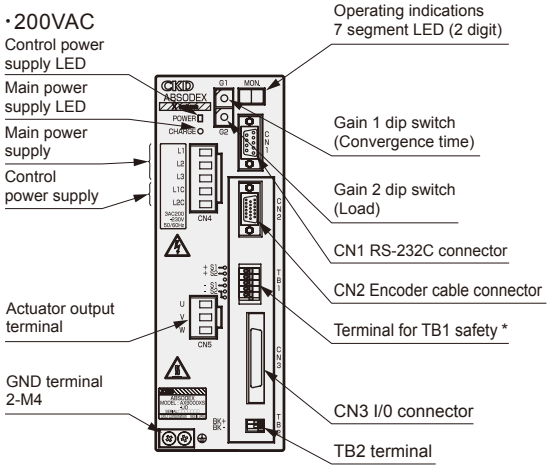


Note 1) Determine a dimension that is sufficient for the cable that you are using.

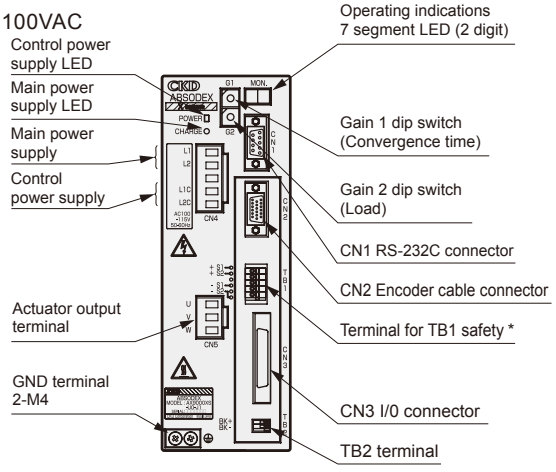
Panel description

- Parallel I/O (NPN specifications)

・200VAC



・100VAC



* Safety features of this product (TB1) are not compliant with certification for safety standards compliance.

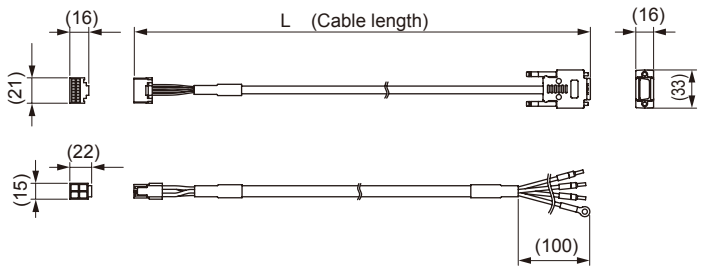
Safety precautions

- The Absodex driver is not dustproof or waterproof.
  Protect the driver so that dust, water, oil, etc. do not enter the driver.
- When mounting the Absodex driver, keep a 50 mm or more distance in every direction from walls, other equipment, etc.
  If other drivers or equipment generate heat, make sure that the ambient temperature of the product is less than 50°C.

Cable specifications

Cable dimensions

●AX7000X



Encoder cable	60mm
Motor cable	110mm

Min. cable bending radius

Safety precautions

- When connecting the motor cable and driver, check that the cable's mark tubes and the driver's indications are correct.
- When the cable needs to be bent repeatedly, fix the cable sheath near the actuator connector.
- The lead cables are not movable cables. Be sure to fix the cables at the connectors so that they do not move. Do not lift up the body by the cable or apply excessive force to the cable as the cable may break.
- When connecting the cable, insert the connector securely to the back. Firmly tighten the connector's set screws and fixing screws.
- Do not modify the cable by cutting or extending it. Failure to observe this could result in faults or malfunctions.
- For cable length L, refer to the cable lengths in "How to order".

How to order Absodex related parts

● Related parts

Part name	Applicable model	Model no.
PC communication cable	AX Series	AX-RS232C-9P

Note) Starting adjustment support tool "AX Tools" (Windows version) is provided for free. Download the latest version from our website.
http://www.ckd.co.jp/english/kiki/caddata/ax_t.htm

● Mounting base

Part name	Applicable model	Model no.
Mounting base	AX7022X, AX7045X	AX-AX7000-BASE-BS

● Noise filter

Part name	Applicable model	Model no.
Noise filter for power supply (three-phase 10A)	AX Series	AX-NSF-3SUP-EF10-ER-6
Noise filter for power supply (single-phase 15A)	AX Series	AX-NSF-NF2015A-OD
Surge protector	AX Series	AX-NSF-RAV-781BXZ-4
Ferrite core for power supply	AX Series	AX-NSF-RC5060

● Other components

Part name	Applicable model	Model no.
Power connector(CN4)	AX Series	AX-CONNECTOR-PC45
Motor cable connector(CN5)	AX Series	AX-CONNECTOR-PC43
Housing(cover) (CN4: Power connector)	AX Series	AX-COVER-KGG-PC45
Connector housing (cover) (CN5: motor cable)	AX Series	AX-COVER-KGG-PC43
I/O connector (CN3: for parallel I/O)	AX Series (-U0)	AX-CONNECTOR-MDR

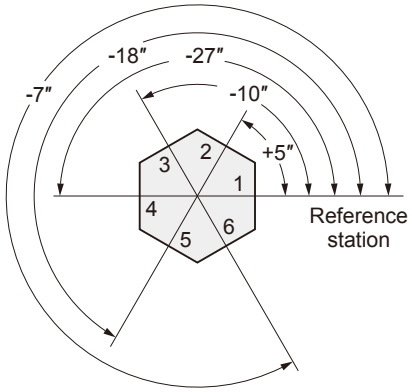
* The parts listed on this page are available from CKD for purchase.

Glossary

Index precision

The Absodex index precision is the difference between the target position set by an NC program and the actual stop position.
The target position is an angle (s) from the reference station (origin return position).
As shown in the diagram on the right, the index precision is calculated from the maximum and minimum values of the differences between the target positions and the actual stop positions. Measurement is expressed in terms of the width using positive and negative seconds, as shown on the right.
A high precision encoder is used for the angular measurement.

Example of index accuracy measurement



Measuring position	Value measured
1	0
2	+5″
3	-10″
4	-27″
5	-18″
6	-7″

Index precision ±16

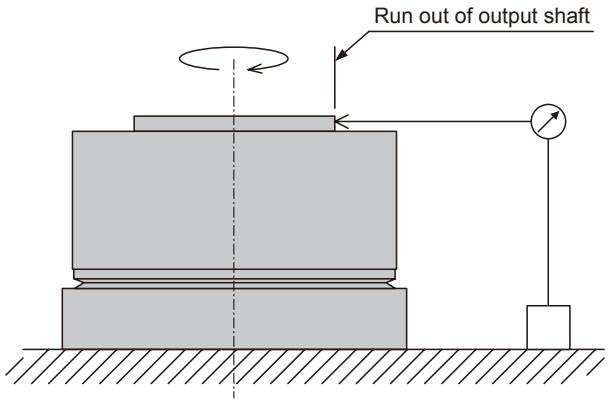
Repeatability

Repeatability accuracy implies invoking reciprocating motion at a given target position at the same conditions, displaying the maximum value of the angle of variation (seconds) of the stop position of repeatability. Depending on the precision characteristics that the machine requires, repeatability and index precision must be used separately.

* sec. A unit used to express angles (degrees, minutes, and seconds)
1 degree = 60 minutes = 3600 seconds

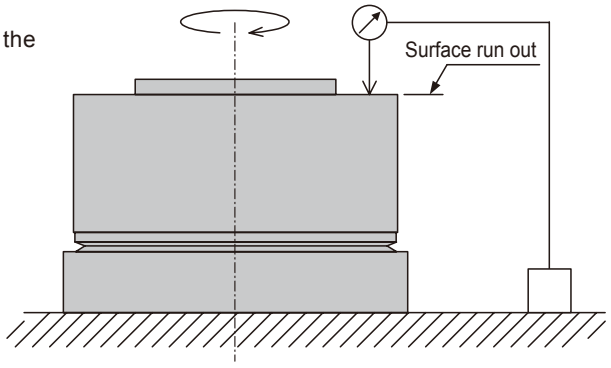
Run out of output shaft

The run out accuracy of the spigot side of the table installation surface.



Surface run out of output shaft

The run out accuracy of the table installation surface.
* Measure the outer periphery of the screw holes for table mounting



Selection guide

Units and symbols for operation condition specifications	
Load moment of inertia (kg·m²)	J
Movement angle (°)	ψ
Movement time (s)	t_1
Cycle time (s)	t_0
Load friction torque (N·m)	T_F
Work torque (N·m)	T_W
Cam curve	Select from (MS, MC, MT, and TR)

1. Load moment of inertia

Calculate the load moment of inertia, and temporarily select an actuator that handles moment of inertia.

2. Rotation speed

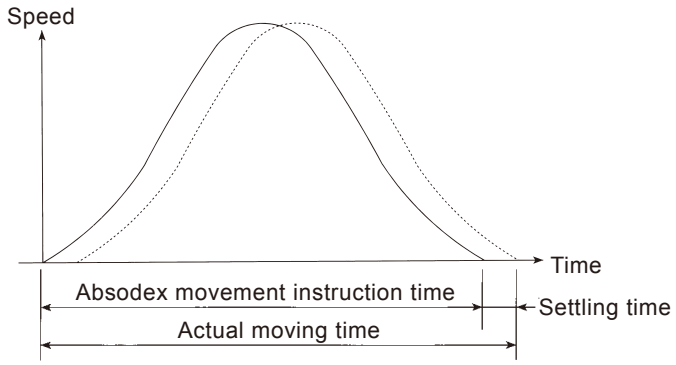
The max. rotation speed Nmax is determined by where ψ(°) is the movement angle and t_1(s) is the movement time.

$$N_{max}=V_m \cdot \frac{\psi}{6 \cdot t_1} \quad \text{(rpm)}$$

V_m is a constant that is determined by the cam curve.

Confirm that Nmax does not exceed the actuator's specified max. rotation speed.

<Cautions>
The actual movement time is the result of adding the settling time to the Absodex movement instruction time.



The settling time differs according to the working condition, but generally is between 0.025 and 0.2 s.
Use the Absodex movement instruction time for the movement time t1 in model selection. In addition, use the Absodex movement instruction time for the designation of the movement time in an NC program.

(Note) Frictional torque is applied to the output shaft due to the bearing or sliding surface or other friction. Friction torque is calculated with a relational formula.

$Tf = \mu \cdot Ff \cdot Rf$ (N·m)

$Ff = m \cdot g$

But, μ : Coefficient of friction

Rolling friction	Sliding friction
μ=0.03 to 0.05	μ=0.1 to 0.3

Ff : Force applied to rolling surface and bearings, etc. (N)
Rf : Average friction radius (m)
m : Weight (kg)
g : Gravitational acceleration (m/s²)

3. Load torque

a) The maximum load torque is obtained with the following formula.

$$T_m=[A_m \cdot (J + J_M) \cdot \frac{\psi \cdot \pi}{180 \cdot t_1^2} + T_F + T_W] \cdot fc + T_{MF}$$

b) The effective value of the load torque is obtained with the following formula.

$$T_{rms}=\sqrt{\frac{t_1}{t_0} \cdot [r \cdot A_m \cdot (J+J_M) \cdot \frac{\psi \cdot \pi}{180 \cdot t_1^2} \cdot fc]^2 + (T_F \cdot fc + T_W \cdot fc + T_{MF})^2}$$

Here, use the values in the following table for Vm, Am, and r.

Cam curve	V_m	A_m	r
MS	1.76	5.53	0.707
MC	1.28	8.01	0.500
MT	2.00	4.89	0.866
TR	2.18	6.17	0.773

J_M, T_{MF}, and fc are as follows:

J_M : Output shaft's moment of inertia (kg·m²)
T_{MF} : Output shaft friction torque (N·m)
fc : Usage factor (fc = 1.5 under normal use)

Regarding the actuator selected temporarily
Max. load torque < Max. output torque
If either of the conditions of Max. load torque < Max. output torque above is not met, increase the actuator size, and recalculate the load torque.

Note) There is a torque limit area where the max. torque is reduced during high-speed rotation. When using the actuator in the torque limit area, use the model selection software to check whether the actuator can be used.

(Note) The working torque expresses, with a torque value, the external load, etc., applied on the output shaft as a load.

Calculate the work torque Tw using the following formula.

$T_W=F_W \times R_W$ (N·m)

F_W (N) : Force required for work
R_W (m) : Work radius

(e.g.)
If the actuator is installed horizontally (the output shaft is horizontal), table, work, and jig, etc. are the work torque.

4. Regenerative power

For AX9000XS type drivers, use the following simplified formula to calculate the regenerative power and determine whether the drivers can be used.

- AX9000XS type driver

  AX9000XS type driver does not have a built-in regenerative resistor.
  Therefore, check that the energy that can be charged with the capacitor (table below) does not exceed the regenerative energy value determined using the simplified formula below.

$$E=\left(\frac{V_m \cdot \psi \cdot \pi}{t_1 \cdot 180}\right)^2 \cdot \frac{(J+J_M)}{2}(J)$$

Power specifications	Processable regenerative energy (J)	Note
200VAC	17.2	When the input voltage to the main voltage supply is 200 VAC
100VAC (-J1)	17.2	When the input voltage to the main voltage supply is 100 VAC

If this condition does not be met, consult with CKD.

<Usage conditions>
Table radius : R=0.25 (m)
Table weight : Wt=10.6 (kg)
Jig rotational radius : Re=0.2 (m)
Jig weight : Wj=2 (kg/piece)
(includes the work weight)
Number of jigs : N=4

<Operating conditions>
Movement angle : ψ=90(°)
Movement time : t_1=0.5(s)
Cycle time : t_0=4(s)
Load friction torque : T_F=0(N·m)
Work torque : T_W=0(N·m)
Output shaft friction torque : T_{MF}(N·m) depends on the actuator specifications
Cam curve : MS (modified sine)

STEP 1 Calculation of moment of inertia

a) Table $J_1=\frac{W_t\times R_2}{2}=\frac{10.6\times 0.25^2}{2}=0.331$ (kg·m²)

b) Jig and workpiece $J_2=N\times W_j\times R_e^2=4\times 2\times 0.2^2=0.32$ (kg·m²)

c) Total sum of moment of inertia $J=J_1+J_2=0.331+0.32=0.651$ (kg·m²)

STEP 2 Max. rotation speed

$N_{max}=V_m\cdot\frac{\psi}{6\cdot t_1}=1.76\times\frac{90}{6\times 0.5}=52.8$ (rpm)

Confirm that N_{max} does not exceed the Absodex's maximum rotation speed.

STEP 3 Load torque

Calculate the smallest model that can tolerate the load moment of inertia.
The AX7045X allowable moment of inertia is 0.90 (kg.m2) or over, so this load is allowable.
Max. load torque

$$T_m=[A_m\cdot(J+J_M)\cdot\frac{\psi\cdot\pi}{180\cdot t_1^2}+T_F+T_W]\cdot fc+T_{MF}$$

$$=[5.53\times(0.651+0.0254)\times\frac{90\times\pi}{180\cdot 0.5^2}+0+0]\times 1.5+2.5$$

$$=37.8\ (N\cdot m)$$

Effective load torque

$$T_{rms}=\sqrt{\frac{t_1}{t_0}\cdot[r\cdot A_m\cdot(J+J_M)\cdot\frac{\psi\cdot\pi}{180\cdot t_1^2}\cdot fc]^2+(T_F\cdot fc+T_W\cdot fc+T_{MF})^2}$$

$$T_{rms}=\sqrt{\frac{0.5}{4}\times[0.707\times 5.53\times 0.6767\times\frac{90\times\pi}{180\cdot 0.5^2}\times 1.5]^2+(0\times 1.5+0\times 1.5+2.5)^2}$$

$$=9.2\ (N\cdot m)$$

STEP 4 Regenerative power

$$E=\left(\frac{V_m\cdot\psi\cdot\pi}{t_1\cdot 180}\right)^2\cdot\frac{(J+J_M)}{2}\ (J)$$

$$=\left(\frac{1.76\times 90\times\pi}{0.5\times 180}\right)^2\times\frac{0.6767}{2}=10.3\ (J)$$

$E\leqq 17.2$ (J)

STEP 5 Selection guide

Determine if the selected AX7045X can be used.

Total sum of load moment of inertia	0.651≦0.90	(kg·m²)
Max. rotation speed	52.8≦240	(rpm)
Max. load torque	37.8≦45	(N·m)
Effective load torque	9.2≦15	(N·m)
Regenerative power	10.3≦17.2	(J)

Thus, AX7045X can be used.

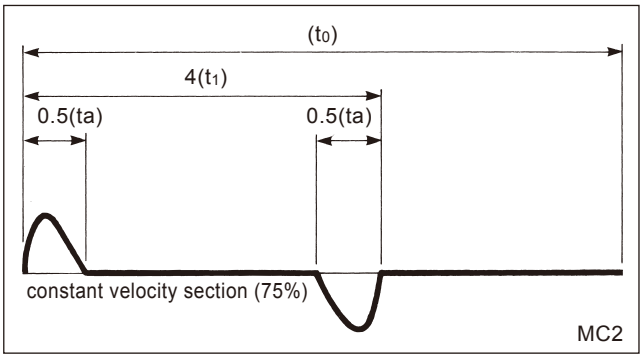
When selecting a model for "MC2 curve"

What is the MC2 curve?

The MC2 curve has a constant velocity in movement the same as the MC (modified constant velocity) curve, but by setting an acceleration/deceleration time, the constant velocity is set freely.
With the MC (general name: MCV50) curve, the constant velocity section is 50%.

Note. Acceleration/deceleration time is set to one-half or less of movement time. If acceleration/deceleration time setting exceeds one-half of movement time, the cam curve is automatically changed to an MS (modified sine wave) curve.

In the example, acceleration/deceleration time (ta) is set to 0.5 sec. for movement time (t1): 4 sec., a speed pattern that sets the constant velocity to 75% is created.



Selection procedure

With the MC2 curve, the model is selected using the following formula:

Movement angle	: ψ(°)
Cycle time	: t_0 (s)
Movement time	: t_1 (s)
Acceleration/deceleration time	: ta (s)
Load moment of inertia	: J (kg·m^2)
Output shaft's moment of inertia	: J_M (kg·m^2)
Friction torque	: Tf (N·m)
Work torque	: T_W (N·m)
Output shaft friction torque	: T_{MF} (N·m)

Max. rotation speed: Nmax (rpm)

$$Nmax = \frac{\psi}{6(t_1 - 0.863ta)}$$

Max. load torque : T_m (N·m)

$$Tm = \left[5.53(J + J_M) \cdot \frac{\psi \cdot \left(1 - \frac{t_1 - 2ta}{t_1 - 0.863ta}\right) \cdot \pi}{720 \cdot ta^2} + Tf + T_W \right] \cdot fc + T_{MF}$$

Effective load torque : Trms (N·m)

$$Trms = \sqrt{\frac{2ta}{t_0} \cdot \left[3.91(J + J_M) \cdot \frac{\psi \cdot \left(1 - \frac{t_1 - 2ta}{t_1 - 0.863ta}\right) \cdot \pi}{720 \cdot ta^2} \cdot fc \right]^2 + [(Tf + T_W) \cdot fc + T_{MF}]^2}$$

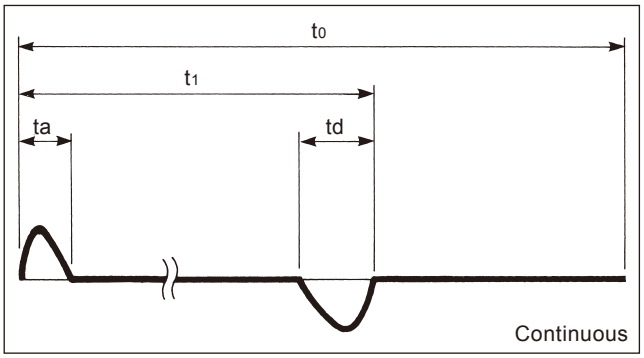
When selecting a model for "continuous rotation"

What is continuous rotation?

Continuous rotation has the following features.

1. Continuous Rotation : To continuously rotates at a set speed until the continuous rotation stop signal is input.
2. Equal division position stop : To stop at an equal division when the continuous rotation stop signal is input if used with equal division designation.

In the example, the shaft accelerates at acceleration time: ta to set speed N, and when a continuous rotation stop is input, stops with deceleration time: td.



Selection procedure

With continuous rotation, the model is selected using the following formula:

Rotation speed	: N (rpm)
Cycle time	: t_0 (s)
Acceleration time	: ta (s)
Deceleration time	: td (s)
Load moment of inertia	: J (kg·m^2)
Output shaft's moment of inertia	: J_M (kg·m^2)
Friction torque	: Tf (N·m)
Work torque	: T_W (N·m)
Output shaft friction torque	: T_{MF} (N·m)

Max. rotation speed: Nmax (rpm) (Note 1)

$$Nmax = N$$

Max. load torque: Tm (N·m)

$$Tm = \left[5.53\ (J + J_M) \cdot \frac{6.82N \cdot ta \cdot \pi}{720 \cdot ta^2} + Tf + T_W \right] \cdot fc + T_{MF}$$

Effective load torque : Trms(N·m)

$$Trms = \sqrt{\frac{2ta}{t_0} \cdot \left[3.91\ (J + J_M) \cdot \frac{6.82N \cdot ta \cdot \pi}{720 \cdot ta^2} \cdot fc \right]^2 + [(Tf + T_W) \cdot fc + T_{MF}]^2}$$

The above formula applies for ta≦td. If ta>td, then replace ta with td, and select.

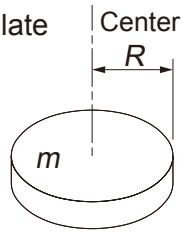
Note 1) When continuous rotation is used, the max. speed is limited. Follow the actuator specifications.

Inertia moment formulas

[m: Weight of object (kg)]

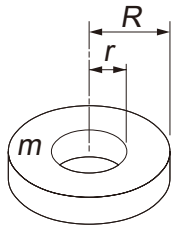
● A When rotation center is own shaft

1. Circular plate (cylinder)



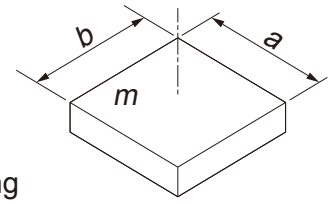
$$J=\frac{mR^2}{2}$$

2. Hollow circular plate (hollow cylinder)



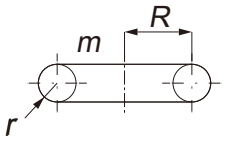
$$J=\frac{m\,(R^2+r^2)}{2}$$

3. Cuboid



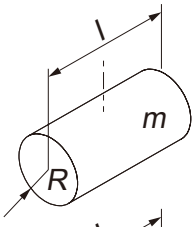
$$J=\frac{m\,(a^2+b^2)}{12}$$

4. Ring



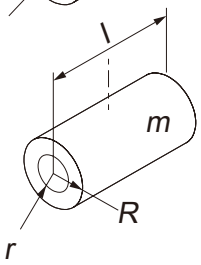
$$J=\frac{m\,(4R^2+3r^2)}{4}$$

5. Cylinder



$$J=\frac{m\,(3R^2+l^2)}{12}$$

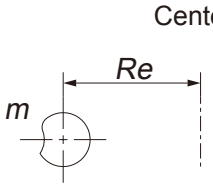
6. Hollow cylinder



$$J=\frac{m\,(R^2+r^2+l^2/3)}{4}$$

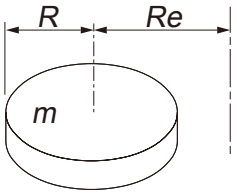
● B When rotation center differs from own shaft

1. Any shape (if sufficiently small)



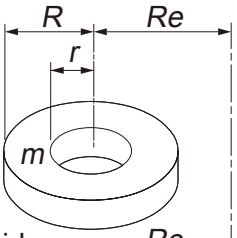
$$J=mRe^2$$

2. Circular plate (cylinder)



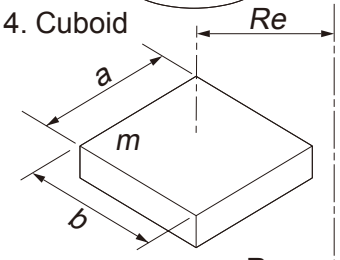
$$J=m\left(\frac{R^2}{2}+Re^2\right)$$

3. Hollow circular plate (hollow cylinder)



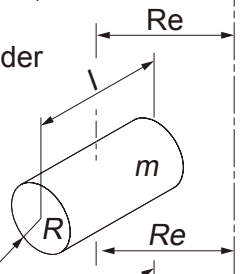
$$J=m\left(\frac{R^2+r^2}{2}+Re^2\right)$$

4. Cuboid



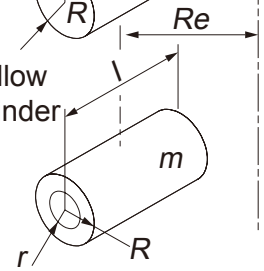
$$J=m\left(\frac{a^2+b^2}{12}+Re^2\right)$$

5. Cylinder



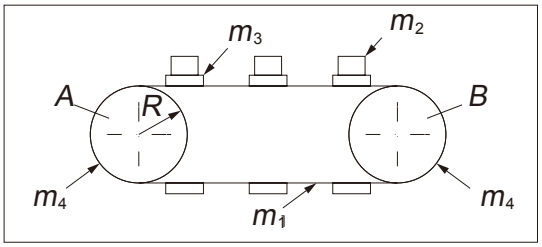
$$J=m\left(\frac{3R^2+l^2}{12}+Re^2\right)$$

6. Hollow cylinder



$$J=m\left(\frac{R^2+r^2+l^2/3}{4}+Re^2\right)$$

● For conveyor



m_1 : Chain weight
m_2 : Workpiece total weight
m_3 : Jig (pallet) total weight
m_4 : Sprocket A (drive) + B total weight
R : Drive side sprocket radius

$$J=(m_1+m_2+m_3+\frac{m_4}{2})\cdot R^2$$

Absodex selection guide specifications check sheet Table direct drive		(Note) Contact CKD for chain drive and gear drive.	
Your company name		Your name	
Division			
TEL		FAX	

■ Operating conditions

1. Index 2. Oscillator			
Movement angle Ψ (°)		or no. of indexes	
Movement time t1 (sec.)			
Cycle time t0 (sec.)		cycle time=moving time+dwelling time	

(Note) Index time is movement time + settling time.
The settling time differs according to the working condition, but generally is between 0.025 and 0.2 s.

■ Load conditions

Table

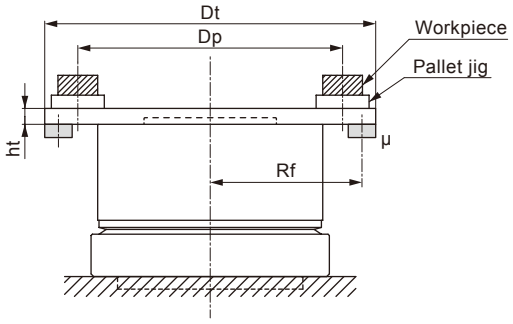
Material 1. Steel 2. Aluminum		
Outline	Dt (mm)	
Plate thickness	ht (mm)	
Weight	m1 (kg)	

Workpiece

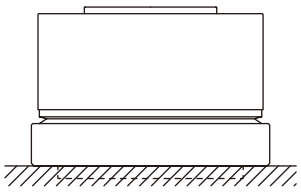
Quantity	nw (pc.)	
Max. weight	mw (kg/pc.)	
Installation center	Dp (mm)	

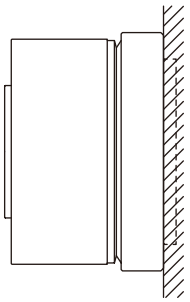
Pallet jig

Quantity	np (pc.)	
Max. weight	mp (kg/pc.)	



(Fig. 1) Load conditions


(Fig. 2) Installation orientation: Horizontal


(Fig. 3) Installation orientation: Vertical

■ Others

Installation orientation

1. Horizontal (Fig. 2) 2. Vertical (Fig. 3)		

External work

1. None 2. Yes		

(Note) Eccentric load caused by gravity from vertical installation, external load caused by caulking work.

Dial plate support form bottom

1. None 2. Yes		
Coefficient of friction	μ	
Work radius	Rf (mm)	

Device rigidity

1. High 2. Low (Note)		

(Note) When using a spline, when unit cannot be fixed directly onto the device (Fig. 4), when there is a mechanism such as a chuck on the table.

Extension with table shaft

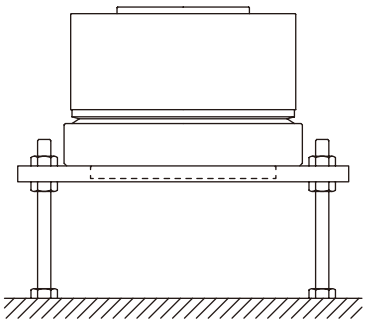
1. None 2. Yes (Fig. 5)		

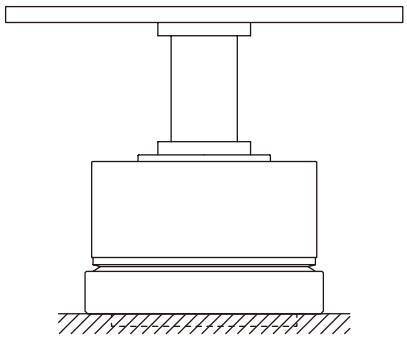
Actuator movement

1. None 2. Yes		

(Note) When actuator is mounted on X-Y table or vertical mechanism, etc., and mounted actuator moves.

(Note) If 2 is selected for any item, contact CKD.


(Fig. 4) Installation rigidity: Low


(Fig. 5) Extension with shaft

(Note) We recommend to attach system outline and reference drawings so that the optimal model can be selected.

Safety precautions

Be sure to read the instructions before use

When designing and manufacturing devices using Absodex, the manufacturer has an obligation to manufacture a safe device, and to check that the safety of the device's mechanical mechanism and the system operated by the electrical control that controls the device is secured.
Product selection, its usage and handling, as well as adequate maintenance management are important in order to safely use CKD products.
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 in handling.

2 Use within the product's specification range.

This product must be used within its stated specifications. Do not attempt to modify or additionally machine the product.
This product is intended for use as a general-purpose industrial device or part. It is not intended for use outdoors or for use under the following conditions or environment.
(If you consult CKD upon adoption and consent to CKD product specification, it will be applicable, however, safeguards should be adopted that will circumvent dangers in the event of failure.)

❶ Use for special applications including nuclear energy, railway, aircraft, marine vessel, vehicle, medical equipment, equipment, or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
❷ Use for applications where life or assets could be adversely affected, and special safety measures are required.

3 Observe corporate standards and regulations, etc., related to the safety of device design.

4 Do not remove devices until safety is confirmed.

❶ Inspect and service the machine and devices after securing the safety of the system, such as by turning off the peripheral devices and other devices connected to this product.
❷ Exercise caution when inspecting, maintaining, and handling the product, as high temperature and charged parts can be present even when operation is stopped.
❸ Before starting device inspection or maintenance, turn off device power and other power to related devices, release compressed air, and check leakage current.

5 Observe warnings and cautions in the instruction manual of each product.

❶ Do not rotate the actuator outputs shaft by 30 rpm or more while power is off.
The driver could fail or electrical shock result from actuator power generation.
❷ If the servomotor is turned off (including emergency stop or alarm) or brakes are turned off while a rotational force, such as gravity, is applied, the output shaft may rotate by rotational force.
Conduct these operations in a balanced condition where rotational force is not applied, or confirm safety before starting.
❸ Unexpected movement may occur during gain adjustment or test operation, so keep hands, etc., away from the outputs shaft. When conducting operations with the actuator not visible, confirm before starting that it is safe even if the outputs shaft turns.
❹ The brake built-in actuator series do not completely clamp the output axis in all cases.
If safety must be ensured, such as in maintenance with an application that rotates the output shaft in unbalanced mode, or when stopping the machine for a long time, it may not be sufficient to stop the shaft with brakes alone.
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 To prevent electric shock, observe warnings and cautions.

❶ High voltage is supplied to the terminal block at the driver's front panel and the actuator output terminal. For a terminal block, be sure to install the supplied terminal cover before operation. Do not touch the terminal block while power is on. Do not touch the terminal block while power is on.
Even after the power is turned off, a high voltage is applied until the charge accumulated in the internal capacitor is discharged. Wait at least five minutes after turning the power off before touching these sections.
❷ In work with side cover off, such as for maintenance and inspection or changing driver switches, turn power off and wait at least five minutes before starting work because a risk of electrical shock from high voltage exists.
❸ Do not connect or disconnect connectors while power is on. Misoperation, faults, or electrical shock may occur.

7 Before restarting a machine or system, check that measures are taken so that parts do not come off.

8 Set up the overcurrent protection device.

In accordance with "JIS B 9960-1:2008 Safety of machinery - Electrical equipment of machines - Part 1: General requirements," install over-current protective devices (circuit breakers, etc.) for the main power and control power and I/O power (connector number CN3-DC24V).

(Excerpt from JIS B9960-1 7.2.1 General Requirements)
Overcurrent protection shall be provided where the current in a machine circuit can exceed either the rating of any component or the allowable current capacity of the conductors,whichever is the lesser value.

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

■ The safety cautions 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, or when there is a high degree of emergency to a warning.

⚠ Warning : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

⚠ 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. In any case, important information that must be observed is explained.

About warranty

Terms of warranty

Conditions related to the warranty term and scope are as follows.

1. Warranty period

"Warranty Period" of this product is one (1) year from the first delivery to the customer. (One year after delivery, where one day's operation shall be within eight hours. If durability is reached within one year, the warranty term shall be terminated at that point.)

2. Scope of warranty

If any faults found to be the responsibility of the CKD occur during the above warranty term, the part shall be repaired immediately by CKD free of charge.
Note that the following faults are excluded from the warranty:

① Operation under the conditions or in the environment derailing from those specified in the product specifications.
② Failure caused by lack of attention or erroneous control.
③ Failure caused by other than the delivered product.
④ Failure caused by operation derailing from the purposes for which the product is designed.
⑤ Failure caused by modification in the structure, performance, specification or other features made by other than us after delivery, or failure caused by repairs done by other than our designated contractor.
⑥ Loss in our product assembled to your machine or equipment, which would be avoided if your machine or equipment were provided with general functions, structures or other features common in the industry.
⑦ Failure caused by reason that is unforeseeable with technology put into practical use at the time of delivery.
⑧ Failure caused by fire, earthquake, flood, lightning, or other majeure, earth shock, pollution, salt hazard, gas Intoxication, excessive voltage, or other external causes.

The warranty mentioned here covers the discrete delivered product. Only the scope of warranty shall not cover losses induced by the failure of the delivered product.

3. Warranty for exported products

(1) Products returned to the CKD factory or to a company or factory designated by CKD shall be repaired. Work and cost necessary for transportation shall not be compensated for.
(2) The repaired product shall be returned to a designated place in Japan with domestic packaging specifications.

This warranty specifies basic conditions. If warranty details in individual specification drawings or specifications differ from these warranty conditions, specification drawings or specifications shall take priority.

4. Compatibility confirmation

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

1 Actuators and the drivers are not water-proof type. Provide waterproofing when using this where water or oil enters.

2 Current leakage and faults could occur if swarf or dust get onto the actuator or driver. Check that these do not come in contact with devices.

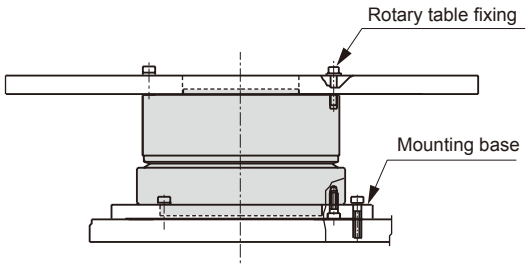
3 Frequent repetition of power-on and -off can cause damage to the elements inside the driver.

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 Actuators and drivers do not guarantee rustproofing. Give careful consideration to storage, installation, and environment.

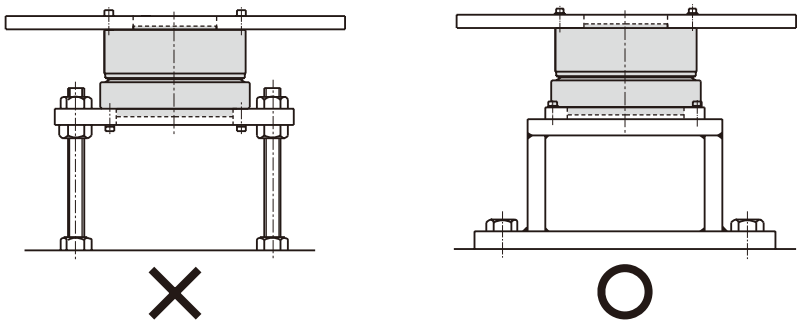
6 Equipment in which Absodexes are installed should have sufficient rigidity to realize full Absodex performance. If the load equipment or frame's mechanical unique vibration is relatively low (200 to 300 Hz or less), resonance could occur in the Absodex and load equipment or frame. Secure the rotary 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 is not directly installed, it should be installed on a highly rigid frame. [Fig. 2]

[Fig. 2] Actuator attachment



7 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 out shaft's diameter guideline

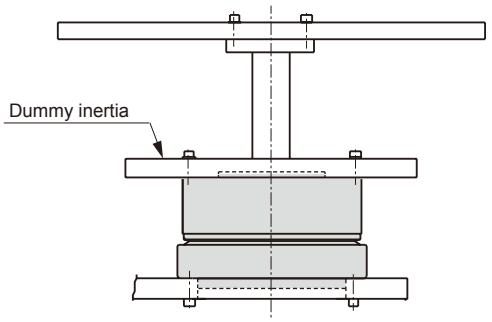
Max. torque	Shaft extension (mm)				
[N・m]	50	100	200	300	500
22	ϕ45	ϕ55	ϕ65	ϕ70	ϕ80
45	ϕ55	ϕ65	ϕ75	ϕ85	ϕ95

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.

8 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]

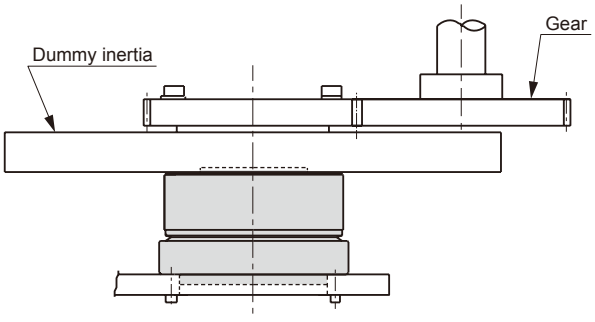
[Fig. 3] Dummy inertia installation example 1



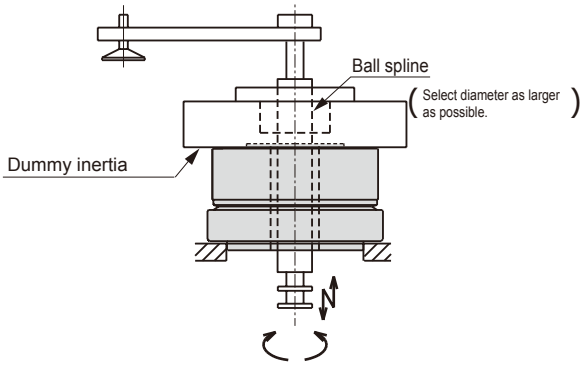
- When coupling with a belt, gears, or spline, or when joining with a key, dummy inertia should be [load inertia] × (0.5 to 2).
- If speed changes with belts or gears, use load inertia as the actuator output shaft conversion value, and install dummy inertia on the actuator. [Fig. 4] [Fig. 5]

(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



9 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.

10 We recommend that you install a surge protector if there is a possibility that the device may fail due to indirect lightning stroke surges.

11 For additional notes, please refer to the instruction manual.

Safety precautions

Labor saving mechanisms: cautions

Be sure to read the instructions before use

Caution Installation & Adjustment

1. Use the dedicating cable only for connecting the driver to the actuator and then install. Changing the length or the material of the dedicating cable should not be done as performance function may be lost or malfunction may be caused.
2. Connect the correct power supply. Connecting a nondesignated power supply could cause faults. If it is inserted again after you shut off the power, confirm that the output shaft of the actuator is stopped, and please leave it for more than 10 seconds after the power is cut.
3. Securely fix the Absodex to the machine, and securely install loads such as the table before adjusting gain. Confirm that no interference occurs and that the state is safe even when flexible sections are rotated.
4. Do not tap the output shaft with a hammer, nor assemble it forcibly. Failure to observe this would prevent the expected accuracy or functions, and could cause faults.
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, etc., 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, etc. 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 actuator or moving parts, such as rotary table attached to the actuator.
10. About combination between the actuator and driver?
    - If the actuator and driver are combined mistakenly 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 differ 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 is input (after parameter setting), malfunctions could occur or equipment be damaged.
    - When changing the cable length, order the cable separately.
    - If other than the compatible driver is connected, the actuator may be burned.
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 to the origin offset.
13. The cables for the AX7000X Series are not movable cables. Be sure to fix the cables at the connectors so that they do not move. Do not lift up the body by the cable or apply excessive force to the cable as the cable may break.
14. For additional notes, please refer to the instruction manual.
15. Strongly pull actuator; when cable, connector part is strongly drawn, drawer cable shield braided wire may be exposed.

Caution During Use & Maintenance

1. During use and maintenance, do not pull strongly, apply excessive force on or damage the cable.
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 withstand voltage of the machine or equipment containing the Absodex, disconnect the main power cable to the Absodex driver and check that the voltage is not applied to the driver. Doing so could prevent a failure.
4. If alarm "4" (actuator overload: electronic thermal) is generated, wait for the actuator temperature to drop 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, 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. In the additional notes, with respect to troubleshooting for the alarm display, please refer to the instruction manual.

MEMO

Related products

ABSODEX Compact type AX6000M Series

Catalog No.CC-1148A

- **Space saving**
  In addition to industry's minimum dimensions, for the concentric shape (the fixed axis and the rotation axis are the same), compact machine design that saves space available.
- **Flexible**
  Operation can be realized as imagined because it has abundant program creation functions.
  Furthermore, it corresponds to simple operation setting such as automatic creation of point specified program.
- **High reliable and maintenance free**
  Because of the direct-drive system (gearless), there is no need to worry about gear damage or accuracy changes through wear of the gear unit.

Direct drive actuator ABSODEX quick response type AX1000T, AX2000T, AX4000T Series

Catalog No.CC-995A

- **Plenty actuator**
  12 types of actuators are available from 6 to 1000N・m
- **5 options for interface**
  5 types(Parallel I/O(NPN,PNP), CC-Link, DeviceNet, PROFIBUS-DP) are available for driver interface.

Electric actuator Motorless type

Catalog No.CC-1165A, CC-1216A, CC-1217A

- **Ballscrew drive ETS Series**
  - Motor size: 8 types, Lead: 7 types, Motor installation direction: 5 types
  - Installation of familiar motor is available.
  - For origin sensor limit sensor, various mounting specifications can be selected
  - Stroke can be selected from 100 to 1500mm (50mm pitch).
  - Max. payload is 150kg, max. speed is 2000mm/s and it accommodates a wide range of applications
- **Ballscrew drive Low dust generation specifications ECS Series**
  - Low dust generation achieved by ETS Series based full-cover structure and the suction port .
  - Motor size: 7 types, Lead: 7 types, Motor installation direction: 5 types
  - Installation of familiar motor is available.
  - For origin sensor limit sensor, various mounting specifications can be selected
  - Stroke can be selected from 100 to 1500mm (50mm pitch).
  - Max. payload is 150kg, max. speed is 2000mm/s and it accommodates a wide range of applications
- **Belt drive EETV Series**
  - ETS Series based belt drive type.
  - Design features stroke selectable up to 100 to 3500m (50mm pitch), and max. speed of 2000m/s, long stroke and high speed.
  - Motor size: 6 types, Motor installation direction: 6 types
  - Installation of familiar motor is available.

Electric actuator ERL2/ESD2 Series

Catalog No.CC-1219A

- **Number of positioning points**
  The versatile "63 point positioning" added to the conventional "7 point positioning"
- **Easy setting tool**
  Easy PC setting software (E Tools) added to teaching pendant (ETP2)
- **Fully compatible**
  "Full Compatibility" that features free combination of actuator and controller

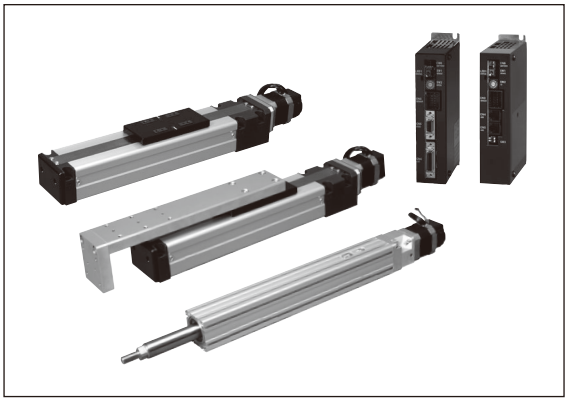
Electric actuator ESSD/ELCR Series

Catalog No.CC-1002A

- **Space saving**
  Wiring and installation space for the controller is no longer required.
- **Design pneumatically**
  Shaped, used, operated like pneumatic cylinder.
- **Flexible motion control**
  Three control modes, speed & acceleration control and positioning completion width (imposition) can be set
- **Easy teaching**
  Easy setting with 5 buttons. Direct configuration is available.

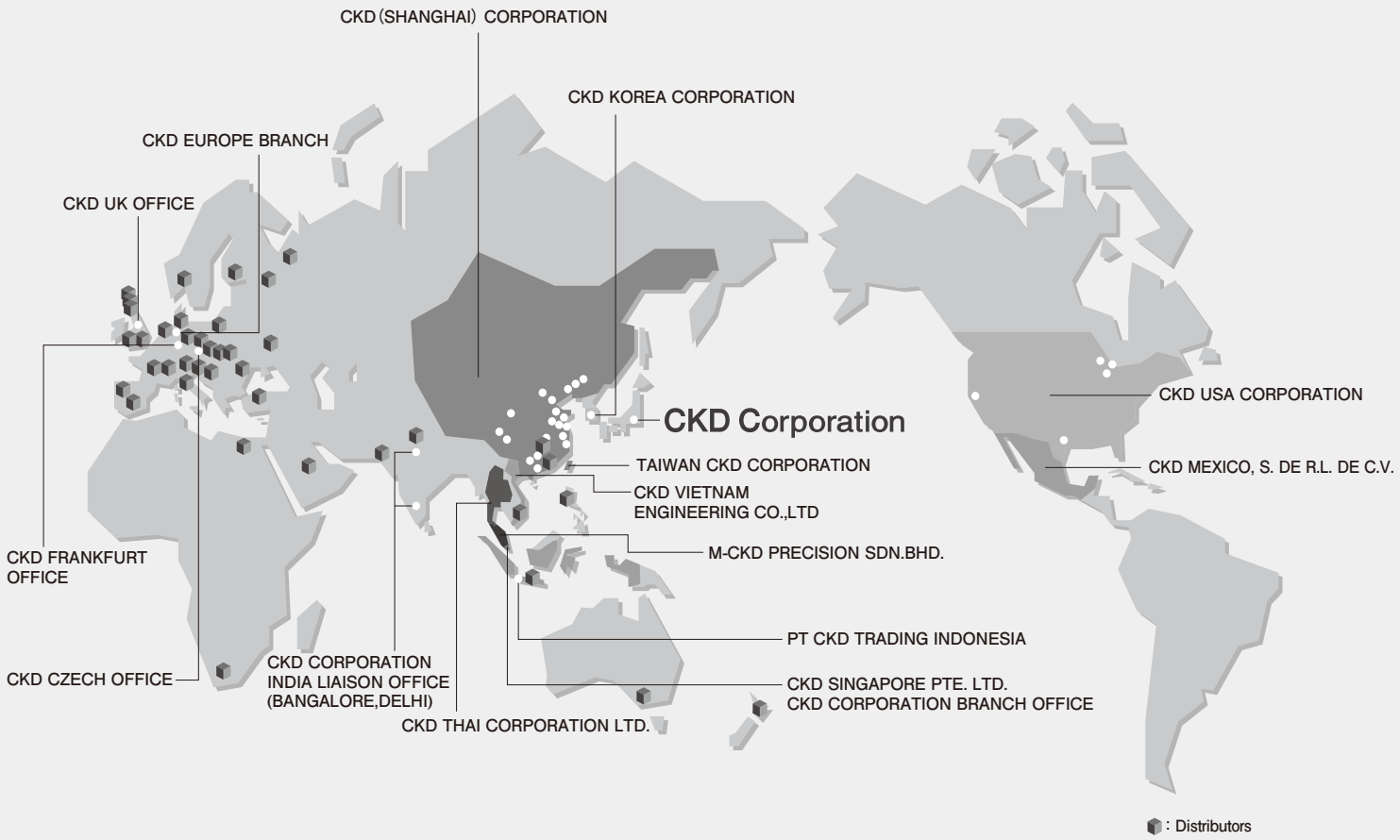
Electric actuator KBZ Series

Catalog No.CC-1102A



- **High speed operation**
  Max. operation speed of 800mm/s possible
- **Servo motor**
  Servo motor for a compact shaft. Allow to high-speed operation, quick acceleration and deceleration, and high load capacity.
- **Absolute specifications**
  No need for home position return routine.
- **Compact controller**
  Drastic downsizing

WORLD-NETWORK



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