U.S. PATENTED

IKO

Precision Elevating Table

TZ

CAT-57179

IKO *Clean Lubrication*

C-Lube

Friendly to Maintenance
Gentle to the Earth

June 2010 IKO Overseas Dept.

Compact Precision Elevating Table

High-Precision & High-Rigidity Type Newly Released

- Compact size due to unique wedge mechanism
- Table dimensions: 120mm-square and 200mm-square series
- Series of two wedge reduction ratios can be selected according to the application.

IKO Precision Elevating Table TZ

U.S. PATENT 7234675B2

X-series

High-precision and high-rigidity type incorporating a linear motion rolling guides of roller type

IKO Clean Lubrication C-Lube Friendly to Maintenance Gentle to the Earth

TZ200X

H-series

High cost performance standard type

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TZ200H

TZ120

TZ120X

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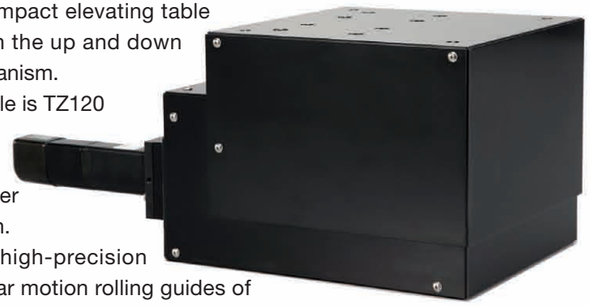
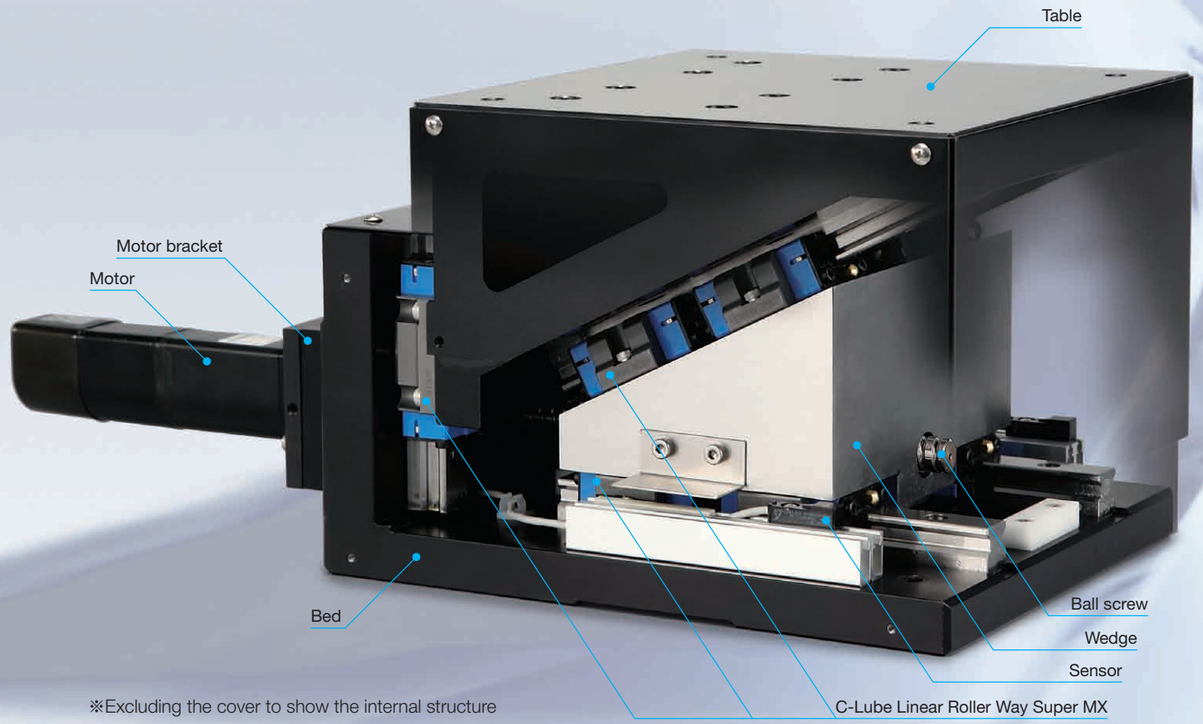
※ The above TZ120X and TZ200X is without outer and inner covers to show the internal structure of the table.

IKO Precision Elevating Table TZ



IKO Precision Elevating Table TZ is a compact elevating table that performs high precision positioning in the up and down directions by using the unique wedge mechanism.
The lineup of IKO Precision Elevating Table is TZ120 (120mm-square table) and TZ200 (200mm-square table). Each series has two kinds of wedge reduction ratios so that the customer can be selected according to the application.
Particularly, the TZ200 series contains a high-precision high-rigidity type "TZ200X" adopting a linear motion rolling guides of roller type (C-Lube Linear Roller Way Super MX). The TZ200 can be equipped with an optional linear encoder. This series is fit for works which require higher positioning performance.
Precision Elevating Table TZ is optimally applicable to semiconductor and liquid crystal manufacturing equipment and optical equipment which require an elevating positioning mechanism.

Structure of Precision Elevating Table TZ



※Excluding the cover to show the internal structure

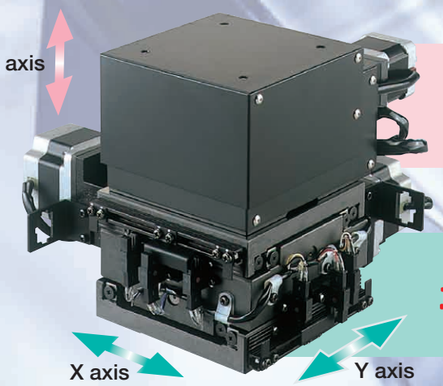
Features of High-Precision High-Rigidity Type TZ···X

High precision and high rigidity	Arranges two linear motion rolling guides of roller type (C-Lube Linear Roller Way Super MX) parallel as the guides of the wedge mechanism to accomplish high-precision positioning and a higher rigidity.
High positioning accuracy	Accomplishes higher positioning accuracy due to full-closed loop control by a linear encoder.
Maintenance free	Maintenance-free for 5 years or 20,000 km by using C-lube lubricating system for the linear motion rolling guides and the ball screw
Series of two reduction ratios	Two types with a wedge reduction ratio 1:2 and 1:4 are available as new series. A suitable stroke length and resolution for each application can be selected. Further, this enables positioning in the up and down direction of up to 24mm of stroke.
Equipped with a sensor in the standard specification	In the standard specification, a limit sensor, origin sensor, and pre-origin sensor are equipped. These sensors are incorporated in the main body in compact form. This facilitates mounting in the machines and equipment.

Variations of Precision Elevating Table TZ

Name	Table size	Guide type	Wedge reduction ratio	Model number
Precision Elevating Table TZ	120mm × 120mm	Ball type	1 : 2	TZ120-2
			1 : 4	TZ120-4
		Roller type	1 : 2	TZ120X-2 NEW
			1 : 4	TZ120X-4 NEW
	200mm × 200mm	Ball type	1 : 2	TZ200H-2
			1 : 4	TZ200H-4
		Roller type	1 : 2	TZ200X-2
			1 : 4	TZ200X-4

Structural example of an XYZ-axis positioning equipment using Precision Elevating Table



IKO Precision Elevating Table TZ

plus

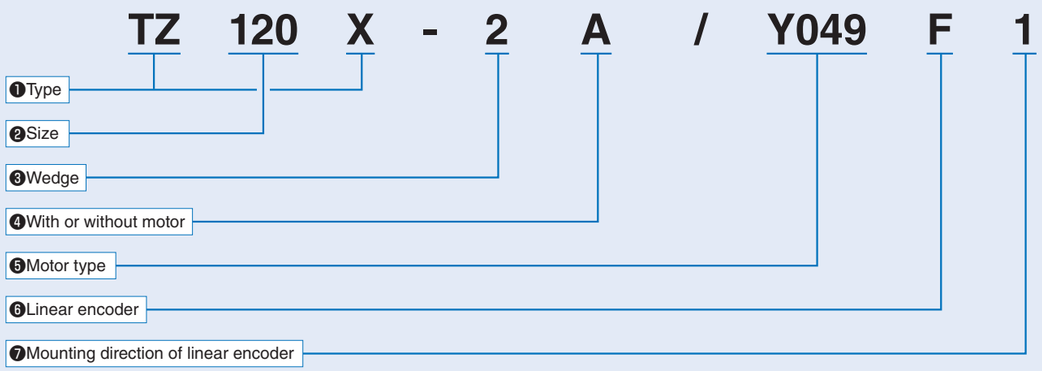
IKO Precision Positioning Table CT

Example : TZ120 and CT125/125

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Identification Number

Example of identification number



❶Type	TZ ：Precision Elevating Table (applicable to Size 120) TZ···H：Precision Elevating Table (applicable to Size 200) TZ···X：Precision Elevating Table, high precision and high rigidity type
❷Size	120：Table size 120mm×120mm 200：Table size 200mm×200mm
❸Wedge	2：Wedge reduction ratio 1：2 4：Wedge reduction ratio 1：4

This ratio indicates the reduction ratio of vertical travel amount to the ball screw feed amount.

❹With or without motor	No symbol：Without motor A：With motor

When the motor is prepared on the customer side, specify “without motor” (no symbol).

❺Motor type	Specify a motor shown in Table 1.

If “without motor” (no symbol) is specified in “❹ With or without motor,” the motor attachment and coupling for each motor will be mounted.

❻With or without linear encoder	No symbol：Without linear encoder F：With linear encoder (applicable to TZ···H and TZ···X)

“with linear encoder” is only applicable to “with motor” specification. See Table 1 for applicable product types and motors.

❼Mounting direction of linear encoder and wiring	No symbol：(on the right as viewed from the side opposite the motor) 1：(on the left as viewed from the side opposite the motor)

Applicable to TZ···H and TZ···X

Table 1 Motor type

Model	Motor types	With or without brake	Motor code	Model number	Remark
TZ120	AC servo motor	Without brake	Y027	SGMAH-A5AAA21-E	Yaskawa Electric Corporation
			P001	MSMA5AZA1A	Panasonic Corporation
			J001	HC-KFS053	Mitsubishi Electric Corporation
		With brake	Y032	SGMAH-A5AAA2C-E	Yaskawa Electric Corporation
			P006	MSMA5AZA1B	Panasonic Corporation
			J006	HC-KFS053B	Mitsubishi Electric Corporation
	Stepper motor	Without brake	V017	PK545BW	Oriental Motor Co., Ltd.
		With brake	V006	PK545AWM	
TZ120X	AC servo motor	Without brake	Y027	SGMAH-A5AAA21-E	Yaskawa Electric Corporation
			Y047	SGMJV-A5A3A21 (1)	
			P001	MSMA5AZA1A	Panasonic Corporation
			P011	MSMD5AZS1A (1)	
			J001	HC-KFS053	Mitsubishi Electric Corporation
			J011	HF-KP053 (1)	
		With brake	Y032	SGMAH-A5AAA2C-E	Yaskawa Electric Corporation
			Y049	SGMJV-A5A3A2C (1)	
			P006	MSMA5AZA1B	Panasonic Corporation
			P016	MSMD5AZS1B (1)	
			J006	HC-KFS053B	Mitsubishi Electric Corporation
			J016	HF-KP053B (1)	
	Stepper motor	Without brake	V017	PK545BW	Oriental Motor Co., Ltd.
		With brake	V006	PK545AWM	
TZ200H **TZ200X**	AC servo motor	Without brake	Y028	SGMAH-01AAA21-E	Yaskawa Electric Corporation
			Y048	SGMJV-01A3A21 (1)	
			P002	MSMA012A1A	Panasonic Corporation
			P012	MSMD012S1A (1)	
			J002	HC-KFS13	Mitsubishi Electric Corporation
			J012	HF-KP13 (1)	
		With brake	Y033	SGMAH-01AAA2C-E	Yaskawa Electric Corporation
			Y050	SGMJV-01A3A2C (1)	
			P007	MSMA012A1B	Panasonic Corporation
			P017	MSMD012S1B (1)	
			J007	HC-KFS13B	Mitsubishi Electric Corporation
			J017	HF-KP13B (1)	
	Stepper motor	Without brake	V018	PK564BE	Oriental Motor Co., Ltd.
		With brake	V008	PK564AEM	

Note(1) Applicable to a product with linear encoder

Remark: For more information of motors, see “Specifications of motor and driver” on Page 17 to Page 20.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Specification of Table

Table 2 Characteristic

Model and Size	Wedge reduction ratio	Ball screw type	Ball screw lead mm	Resolution(1) μm/pulse	Stroke length mm	Allowable load(2) N
TZ120-2	1 : 2	Ground	4	2	10	200
TZ120-4	1 : 4			1	5	
TZ120X-2	1 : 2			2.0 (0.1)	10	
TZ120X-4	1 : 4			1.0 (0.1)	5	
TZ200H-2	1 : 2		5	2.5 (0.1)	24	400
TZ200H-4	1 : 4			1.25 (0.1)	12	
TZ200X-2	1 : 2			2.5 (0.1)	24	
TZ200X-4	1 : 4			1.25 (0.1)	12	

Note(1) The resolution indicates a value when the number of motor divisions is 1000 pulses/rev.
(2) The allowable load indicates the maximum load with which the table can be operated without causing any functional or performance trouble. The load that can guarantee the accuracy is about 1/2 of this value.
Remark: The values in parentheses are applicable to the Full Closed Loop Control mode.

Table 3 Accuracy unit mm

Model and Size	Wedge reduction ratio	Positioning accuracy(1)	Repeatability	Lost motion	Parallelism in table elevating	Straightness in vertical Straightness in horizontal
TZ120-2	1 : 2	—	±0.001	—	—	—
TZ120-4	1 : 4					
TZ120X-2	1 : 2	— (0.005)	±0.001	0.001	0.010	0.010
TZ120X-4	1 : 4					
TZ200H-2	1 : 2	— (0.005)	±0.001	—	—	—
TZ200H-4	1 : 4					
TZ200X-2	1 : 2	— (0.005)	±0.001	0.001	0.010	0.010
TZ200X-4	1 : 4					

Note(1) The values in parentheses are applicable to the Full Closed Loop Control mode.

Table 4 Maximum speed

Model and Size	Wedge reduction ratio	Ball screw lead mm	Maximum speed mm/s	
			AC servo motor	Stepping motor
TZ120-2	1 : 2	4	100	60
TZ120-4	1 : 4		50	30
TZ120X-2	1 : 2		100	60
TZ120X-4	1 : 4		50	30
TZ200H-2	1 : 2	5	125	75
TZ200H-4	1 : 4		62.5	37.5
TZ200X-2	1 : 2		125	75
TZ200X-4	1 : 4		62.5	37.5

Table 5 Table inertia and starting torque

Model and Size	Wedge reduction ratio	Table inertia J_T $\times 10^{-5}$kg·m^2	Starting torque T_0 N·m
TZ120-2	1 : 2	0.076	0.03
TZ120-4	1 : 4	0.061	0.02
TZ120X-2	1 : 2	0.076	0.03
TZ120X-4	1 : 4	0.064	0.02
TZ200H-2	1 : 2	0.581	0.07
TZ200H-4	1 : 4	0.473	0.06
TZ200X-2	1 : 2	0.581	0.07
TZ200X-4	1 : 4	0.473	0.06

Sensor Specification

Table 6 Specification of sensors

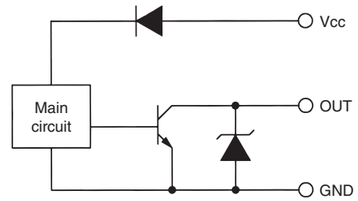
Model and Size	TZ120, TZ200H, TZ200X		TZ120X	
sensor	Limit, pre-origin sensors	Origin sensor	Limit, pre-origin sensors	Origin sensor
Type	Proximity sensor (NPN type)		Proximity sensor (NPN type)	
Power supply voltage	DC12~24V ±10%		DC12~24V ±10%	
Current consumption	10mA or less		13mA or less	
Output	Open corrector ・Maximum current : 100mA ・Applied voltage : DC30V or less ・Residual voltage : 1.0V or less at 100mA in-flow current 0.4V or less at 16mA		Open corrector ・Maximum current : 50mA ・Applied voltage : DC30V or less ・Residual voltage : 1.0V or less at 50mA in-flow current	
Output operation	When approaching : OFF	When approaching : ON	When approaching : OFF	When approaching : ON
Operation indicator	LED(orange) (OFF at detection)	LED(orange) (ON at detection)	LED(orange) (OFF at detection)	LED(orange) (ON at detection)
Circuit diagram				

Table 7 Specification of sensor connectors

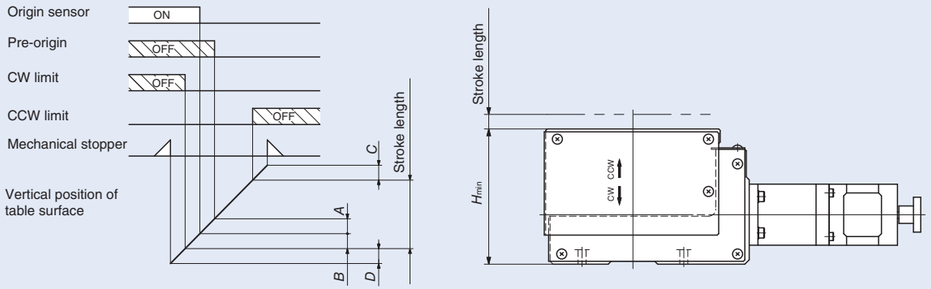
Pin No.	Signal name	Sensor-side connector type	Opposite-side connector type(1)
1	Origin sensor	Cap housing 172160-1 Contactor 170365-1	Plug housing 172168-1 Contactor 170363-1
2	Pre-origin		
3	CW limit		
4	CCW limit		
5	Power input		
6	GND		

Note(1) Prepare the opposite-side connector on the customer side.
Remarks: 1. The connector is a product manufactured by Tyco Electronics AMP K.K
2. When the AC servo motor is used, wiring for the origin signal is not available. Use the encoder origin signal output from the driver.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Sensor Specification

Table 8 Timing chart of sensors



unit mm

Model number	*A*	*B*	*C*	*D*
TZ120-2 **TZ120X-2**	1	1	1	1
TZ120-4 **TZ120X-4**	0.5	0.5	0.5	0.5
TZ200H-2 **TZ200X-2**	1.5	1	2.5	1
TZ200H-4 **TZ200X-4**	0.75	0.5	1.25	0.5

System configuration

Electric devices optimum to Precision Elevating Tables are provided according to the specification of motor types and linear encoders. Models of these devices are shown below. For ordering, specify the models as shown below.

■AC servo motor (without linear encoder)

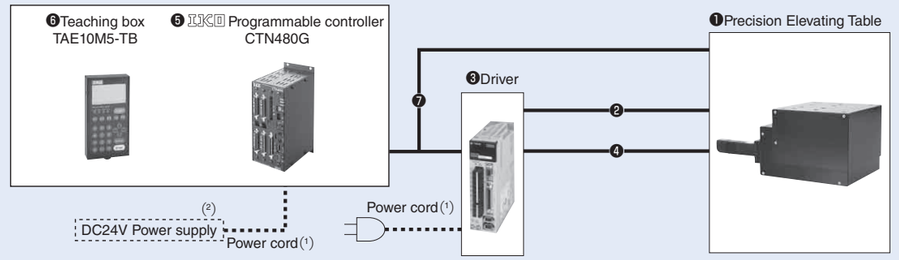


Fig.1 System configuration of AC servo motor (without linear encoder)

Note (1) Power cord is prepared by customer.
(2) DC24V power supply is prepared by customer.

Table 9 Electric devices with motor (Yaskawa Electric Corporation)

Items		Model code		
❶Precision Elevating Table		TZ120	TZ120X	
Motor without brake	Motor code	Y027	Y027	Y047
	❷Motor cord	TAE20G2-AM□□ (TAE20G1-AM□□)	TAE20G2-AM□□ (TAE20G1-AM□□)	JZSP-CSM01-□□-E (JZSP-CSM21-□□-E)
Motor with brake (1)	Motor code	Y032	Y032	Y049
	❷Motor cord	TAE20G4-AMB□□ (TAE20G3-AMB□□)	TAE20G4-AMB□□ (TAE20G3-AMB□□)	JZSP-CSM11-□□-E (JZSP-CSM31-□□-E)
❸Driver		SGDH-A5AE-E	SGDH-A5AE-E	SGDV-R70A01A
❹Encoder cord		TAE20G6-EC□□ (TAE20G5-EC□□)	TAE20G6-EC□□ (TAE20G5-EC□□)	JZSP-CSP01-□□-E (JZSP-CSP21-□□-E)

Items		Model code	
❶Precision Elevating Table		TZ200H, TZ200X	
Motor without brake	Motor code	Y028	Y048
	❷Motor cord	TAE20G2-AM□□ (TAE20G1-AM□□)	JZSP-CSM01-□□-E (JZSP-CSM21-□□-E)
Motor with brake (1)	Motor code	Y033	Y050
	❷Motor cord	TAE20G4-AMB□□ (TAE20G3-AMB□□)	JZSP-CSM11-□□-E (JZSP-CSM31-□□-E)
❸Driver		SGDH-01AE-E	SGDV-R90A01A
❹Encoder cord		TAE20G6-EC□□ (TAE20G5-EC□□)	JZSP-CSP01-□□-E (JZSP-CSP21-□□-E)

Note (1) For "with brake model", power supply for brake release is needed.
Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of motor and encoder cord can be specified by □□ in the end of supplemental code. Selecting length is 3m, 5m, 10m, 15m, and 20m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE20G2-AM03)

Table 10 Electric devices with motor (Yaskawa Electric Corporation) and Programmable controller CTN480G

Items	Model code
Motor code	Y027, Y028, Y032, Y033, Y047, Y048, Y049, Y050
❺Programmable controller	CTN480G
❻Teaching box	TAE10M5-TB
❼Pulse limit cord	TAE10M7-LD□□ (TAE10M8-LD□□)

Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20m in increments of 1m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE10M7-LD03)
3. The length of pulse and limit cord is 1.5m.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

System configuration

Table 11 Electric devices with motor (Panasonic Corporation)

Items			Model code		
❶Precision Elevating Table			TZ120	TZ120X	
Motor without brake		Motor code	P001	P001	P011
		❷Motor cord	TAE20G8-AM□□ (TAE20G7-AM□□)	TAE20G8-AM□□ (TAE20G7-AM□□)	MFMCA0□□0EED
Motor with brake(1)		Motor code	P006	P006	P016
		❷Motor cord	TAE20H0-AMB□□ (TAE20G9-AMB□□)	TAE20H0-AMB□□ (TAE20G9-AMB□□)	MFMCA0□□0EED
		Brake cord(2)	—	—	MFMCB0□□0GET
❸Driver			MSDA5A5A1A	MSDA5A5A1A	MADDT1205
❹Encoder cord			TAE20H2-EC□□ (TAE20H1-EC□□)	TAE20H2-EC□□ (TAE20H1-EC□□)	MFECA0□□0EAD

Items			Model code	
❶Precision Elevating Table			TZ200H, TZ200X	
Motor without brake		Motor code	P002	P012
		❷Motor cord	TAE20G8-AM□□ (TAE20G7-AM□□)	MFMCA0□□0EED
Motor with brake(1)		Motor code	P007	P017
		❷Motor cord	TAE20H0-AMB□□ (TAE20G9-AMB□□)	MFMCA0□□0EED
		Brake cord(2)	—	MFMCB0□□0GET
❸Driver			MSDA015A1A	MADDT1205
❹Encoder cord			TAE20H2-EC□□ (TAE20H1-EC□□)	MFECA0□□0EAD

Note(1) For “with brake model”, power supply for brake release is needed.
(2) Additionally, a brake cord is needed.
Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of motor, brake and encoder cord can be specified by □□ in the end of supplemental code. Selecting length is 3m, 5m, 10m and 20m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE20G8-AM03)

Table 12 Electric devices with motor (Panasonic Corporation) and Programmable controller CTN480G

Items	Model code	
Motor code	P001, P002, P006, P007	P011, P012, P016, P017
❺Programmable controller	CTN480G	
❻Teaching box	TAE10M5-TB	
❼Pulse limit cord	TAE10M9-LD□□ (TAE10P0-LD□□)	TAE10V2-LD□□ (TAE10V3-LD□□)

Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20m in increments of 1m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE20M9-LD03)
3. The length of pulse and limit cord is 1.5m.

Table 13 Electric devices with motor (Mitsubishi Electric Corporation)

Items			Model code		
❶Precision Elevating Table			TZ120	TZ120X	
Motor without brake		Motor code	J001	J001	J011
		❷Motor cord	TAE20H4-AM□□ (TAE20H3-AM□□)	TAE20H4-AM□□ (TAE20H3-AM□□)	MR-PWS1CBL□M-A1-L (MR-PWS1CBL□M-A1-H)
Motor with brake(1)		Motor code	J006	J006	J016
		❷Motor cord	TAE20H6-AMB□□ (TAE20H5-AMB□□)	TAE20H6-AMB□□ (TAE20H5-AMB□□)	MR-PWS1CBL□M-A1-L (MR-PWS1CBL□M-A1-H)
		Brake cord(2)	—	—	MR-BKS1CBL□M-A1-L (MR-BKS1CBL□M-A1-H)
❸Driver			MR-J2S-10A	MR-J2S-10A	MR-J3-10A
❹Encoder cord			TAE20H8-EC□□ (TAE20H7-EC□□)	TAE20H8-EC□□ (TAE20H7-EC□□)	MR-J3ENCBL□M-A1-L (MR-J3ENCBL□M-A1-H)

Items			Model code	
❶Precision Elevating Table			TZ200H, TZ200X	
Motor without brake		Motor code	J002	J012
		❷Motor cord	TAE20H4-AM□□ (TAE20H3-AM□□)	MR-PWS1CBL□M-A1-L (MR-PWS1CBL□M-A1-H)
Motor with brake(1)		Motor code	J007	J017
		❷Motor cord	TAE20H6-AMB□□ (TAE20H5-AMB□□)	MR-PWS1CBL□M-A1-L (MR-PWS1CBL□M-A1-H)
		Brake cord(2)	—	MR-BKS1CBL□M-A1-L (MR-BKS1CBL□M-A1-H)
❸Driver			MR-J2S-10A	MR-J3-10A
❹Encoder cord			TAE20H8-EC□□ (TAE20H7-EC□□)	MR-J3ENCBL□M-A1-L (MR-J3ENCBL□M-A1-H)

Note(1) For “with brake model”, power supply for brake release is needed.
(2) Additionally, a brake cord is needed.
Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of motor, brake and encoder cord can be specified by □□ or □ in the end of supplemental code. Selecting length is 2m, 5m, and 10m.
※For □□ , the length under 10m is also selected by two digits. (Example of 2m: TAE20H4-AM02)
※For □ , the length under 10m is selected by one digit and the length 10m is selected by two digits. (Example of 2m: MR-PWS1CBL2M-A1-L)

Table 14 Electric devices with motor (Mitsubishi Electric Corporation) and Programmable controller CTN480G

Items	Model code	
Motor code	J001, J002, J006, J007	J011, J012, J016, J017
❺Programmable controller	CTN480G	
❻Teaching box	TAE10M5-TB	
❼Pulse limit cord	TAE10P1-LD□□ (TAE10P2-LD□□)	TAE10V4-LD□□ (TAE10V5-LD□□)

Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20m in increments of 1m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE10P1-LD03)
3. The length of pulse and limit cord is 1.5m.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

System configuration

■AC servo motor (with linear encoder)

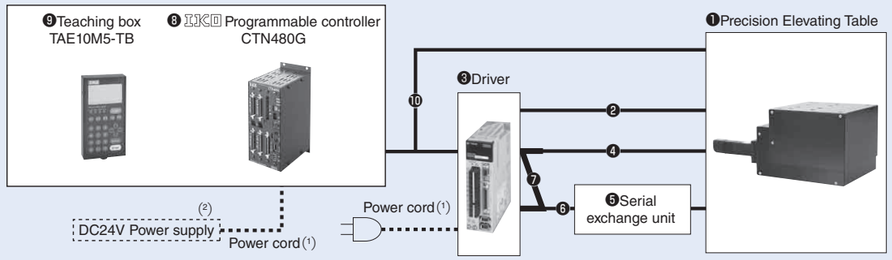


Fig.2 System configuration of AC servo motor (with linear encoder)

Note(1) Power cord is prepared by customer.
(2) DC24V power supply is prepared by customer.

Table 15 Electric devices with motor (Yaskawa Electric Corporation)

Items		Model number	
❶Precision Elevating Table		TZ120X	TZ200H, TZ200X
Motor without brake	Motor code	Y047	Y048
	❷Motor cord	JZSP-CSM01-□□-E (JZSP-CSM21-□□-E)	
Motor with brake(1)	Motor code	Y049	Y050
	❷Motor cord	JZSP-CSM11-□□-E (JZSP-CSM31-□□-E)	
❸Driver		SGDV-R70A01A 000000001	SGDV-R90A01A 000000001
❹Encoder cord		JZSP-CSP01-□□-E (JZSP-CSP21-□□-E)	
❺Serial exchange unit		JZDP-D005-000-E	
❻Serial exchange unit cord		(JZSP-CLP70-□□-E)	
❼Encoder power supply branch cord		Not required	

Note(1) For "with brake model", power supply for brake release is needed.
Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of motor and encoder cord can be specified by □□ in the end of supplemental code. Selecting length is 3m, 5m,10m, 15m, and 20m.
※The length under 10m is also selected by two digits. (Example of 3m: JZSP-CSM01-03-E)
3. The length of serial exchange unit cord can be specified by □□ in the end of supplemental code. Selecting length is 3m, 5m,10m, 15m, and 20m.
※The length under 10m is also selected by two digits. (Example of 3m: JZSP-CLP70-03-E)

Table 16 Electric devices with motor (Yaskawa Electric Corporation) and Programmable controller CTN480G

Items	Model number
Motor code	Y047, Y048, Y049, Y050
❽Programmable controller	CTN480G
❾Teaching box	TAE10M5-TB
❿Pulse limit cord	TAE10M7-LD□□ (TAE10M8-LD□□)

Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20m in increments of 1m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE10M7-LD03)
3. The length of pulse and limit cord is 1.5m.

Table 17 Electric devices with motor (Panasonic Corporation)

Items		Model number	
❶Precision Elevating Table		TZ120X	TZ200H, TZ200X
Motor without brake	Motor code	P011	P012
	❷Motor cord	MFMCA0□□0EED	
Motor with brake(1)	Motor code	P016	P017
	❷Motor cord	MFMCA0□□0EED	
	Brake cord(2)	MFMCB0□□0GET	
❸Driver		MADDT1205F	
❹Encoder cord		MFECA0□□0EAD	
❺Serial exchange unit		Not required	
❻Linear encoder cord		TAE20T6-EC□□	
❼Encoder power supply branch cord		TAE20T3-EC	

Note(1) For "with brake model", power supply for brake release is needed.
(2) Additionally, a brake cord is needed.
Remarks: 1. Cord with high bending resistance is not set.
2. The length of motor, brake, and encoder cord can be specified by □□ in the end of supplemental code. Selecting length is 3m, 5m, 10m and 20m.
※The length under 10m is also selected by two digits. (Example of 3m: MFMCA0030EED)
3. The length of linear encoder cord can be specified by □□ in the end of supplemental code. Selecting length is 1m and 2m.
※The length is selected by two digits. (Example of 1m: TAE20T6-EC01)
4. The length of the encoder power supply branch cord is 0.2m.

Table 18 Electric devices with motor (Panasonic Corporation) and Programmable controller CTN480G

Items	Model number
Motor code	P011, P012, P016, P017
❽Programmable controller	CTN480G
❾Teaching box	TAE10M5-TB
❿Pulse limit cord	TAE10V2-LD□□ (TAE10V3-LD□□)

Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20m in increments of 1m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE10V2-LD03)
3. The length of pulse and limit cord is 1.5m.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

System configuration

Table 19 Electric devices with motor (Mitsubishi Electric Corporation)

Items			Model number	
❶Precision Elevating Table			TZ120X	TZ200H, TZ200X
Motor without brake		Motor code	J011	J012
		❷Motor cord	MR-PWS1CBL□M-A1-L (MR-PWS1CBL□M-A1-H)	
Motor with brake(1)		Motor code	J016	J017
		❷Motor cord	MR-PWS1CBL□M-A1-L (MR-PWS1CBL□M-A1-H)	
		Brake cord(2)	MR-BKS1CBL□M-A1-L (MR-BKS1CBL□M-A1-H)	
❸Driver			MR-J3-10A-KE005	
❹Encoder cord			MR-J3ENCBL□M-A1-L (MR-J3ENCBL□M-A1-H)	
❺Serial exchange unit			Not required	
❻Linear encoder cord			TAE20T6-EC□□ (TAE20T7-EC□□)	
❼Encoder power supply branch cord			Not required	

Note(1) For “with brake model”, power supply for brake release is needed.
(2) Additionally, a brake cord is needed.
Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of motor, brake, and encoder cord can be specified by □ in the end of supplemental code. Selecting length is 2m, 5m and 10m.
※The length under 10m is selected by one digit and the length 10m is selected by two digits. (Example of 2m: MR-PWS1CBL2M-A1-L)
3. The length of linear encoder cord can be specified by □□ in the end of supplemental code. Selecting length is 1m and 2m.
※The length is selected by two digits. (Example of 1m: TAE20T6-EC01)

Table 20 Electric devices with motor (Mitsubishi Electric Corporation) and Programmable controller CTN480G

Items	Model number
Motor code	J011, J012, J016, J017
❸Programmable controller	CTN480G
❾Teaching box	TAE10M5-TB
❿Pulse limit cord	TAE10V4-LD□□ (TAE10V5-LD□□)

Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20m in increments of 1m.
※The length under 10 m is also selected by two digits. (Example of 3 m: TAE10V4-LD03)
3. The length of pulse and limit cord is 1.5m.

■Stepper motors

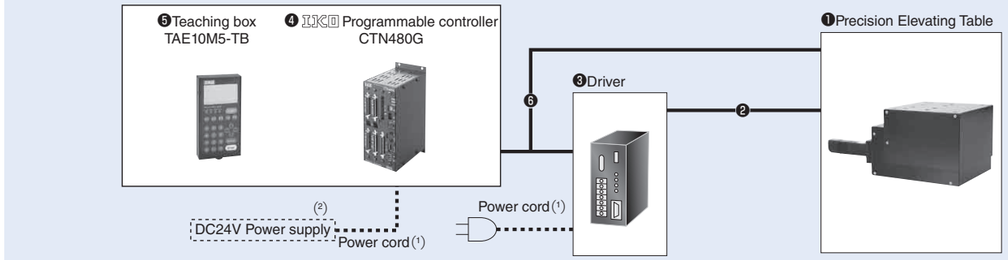


Fig.3 System configuration in Open Loop Control mode

Note(1) Power cord is prepared by customer.
(2) DC24V power supply is prepared by customer.

Table 21 Electric devices with motor (Oriental Motor Co.,Ltd.)

Items		Model number	
❶Precision Elevating Table		TZ120, TZ120X	TZ200H, TZ200X
Motor without brake	Motor code	V017	V018
	❷Motor cord	TAE20R8-SM□□ (TAE20R9-SN□□)	
	❸Driver	RKD507-A	RKD514L-A
Motor with brake(1)	Motor code	V006	V008
	❷Motor cord	TAE20S1-SMB□□ (TAE20S2-SNB□□)	
	❸Driver	RKD507M-A	RKD514LM-A

Note(1) For “with brake model”, power supply for brake release is needed.
Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of motor cord can be specified by □□ in the end of supplemental code. Selecting length is up to 10m in increments of 1m.
※The length under 10m is also selected by two digits. (Example of 3m: TAE20R8-SM03)

Table 22 Electric devices with motor (Oriental Motor Co.,Ltd.) and Programmable controller CTN480G

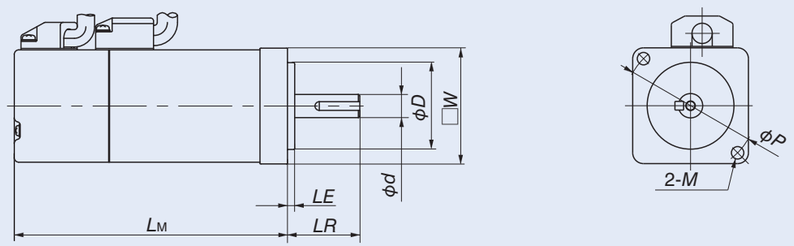
Items	Model number
Motor type	V006, V008, V017, V018
❹Programmable controller	CTN480G
❺Teaching box	TAE10M5-TB
❻Pulse limit cord	TAE10S3-LD□□ (TAE10S4-LD□□)

Remarks: 1. Cord in ( ) have high bending resistance.
2. The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20m in increments of 1m.
※The length under 10m is also selected by two digits. (Example of 3 m: TAE10S3-LD03)
3. The length of pulse and limit cord is 1.5m.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Specification of motor and driver

■AC servo motor and driver Yaskawa Electric Corporation (RoHS compliant)



Motor specification

Motor code	Model code	Power supply voltage V	Rated output W	Rated torque N·m	Instantaneous maximum torque N·m	Rated number of revolution r/min	Motor inertia J_M ×10^{-4}kg·m^2	Encoder specification	Mass kg
Y027	SGMAH-A5AAA21 -E	200	50	0.159	0.477	3000	0.0220	Incremental 13 bits (8192pulse/rev)	0.4
Y028	SGMAH-01AAA21 -E		100	0.318	0.955		0.0364		0.5
Y032	SGMAH-A5AAA2C-E		50	0.159	0.477		0.0305		0.7
Y033	SGMAH-01AAA2C-E		100	0.318	0.955		0.0449		0.8
Y047	SGMJV-A5A3A21		50	0.159	0.557		0.0414	Incremental/absolute 20 bits (1048576pulse/rev)	0.3
Y048	SGMJV -01A3A21		100	0.318	1.110		0.0665		0.4
Y049	SGMJV-A5A3A2C		50	0.159	0.557		0.0561		0.6
Y050	SGMJV -01A3A2C		100	0.318	1.110		0.0812		0.7

Motor mounting dimensions

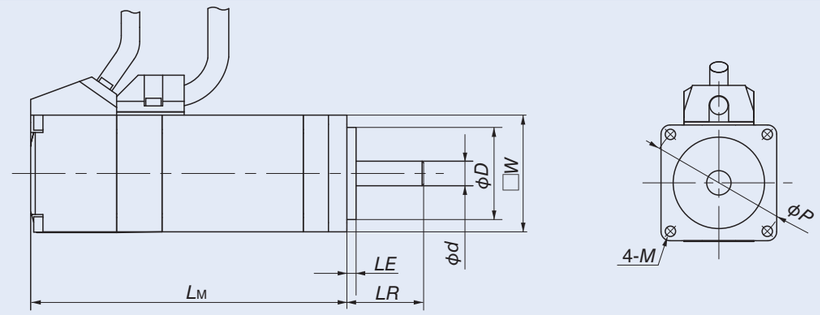
unit mm

Motor code	□W×L_M	LR	LE	d	D	P	M
Y027	40× 77	25	2.5	6	30	46	ϕ4.3
Y028	40× 94.5			8			
Y032	40×108.5			6			
Y033	40×135			8			
Y047	40× 69						
Y048	40× 82.5						
Y049	40×114						
Y050	40×127.5						

Driver specification

Item \ Model code of driver		SGDH-A5AE-E	SGDH-01AE-E	SGDV-R70A01A	SGDV-R90A01A	SGDV-R70A01A 000000001	SGDV-R90A01A -000000001
Applicable motor code		Y027, Y032	Y028, Y033	Y047, Y049	Y048, Y050	Y047, Y049	Y048, Y050
Supply voltage		200V	200V	200V	200V	200V	200V
Rated output of applicable motor		50W	100W	50W	100W	50W	100W
Feedback	Servo motor	Serial encoder					
	Linear encoder	—				Serial encoder	
Command input pulse		Selection one from symbol with pulse line, CCW or CW with pulse line, two phases pulse with 90-degree difference					
Type of command input pulse		Line driver, open corrector					
Maximum input pulse count		Line driver : 500kpps Open corrector : 200kpps		Line driver : 4Mpps Open corrector : 200kpps			
Main power supply voltage		Single phase AC200 to 230V −15 to 10% 50/60Hz		3 phases AC200 to 230V −15 to 10% 50/60Hz			
Control circuit supply voltage		Single phase AC200～230V −15～10% 50/60Hz					
Continuous output current Arms		0.64	0.91	0.66	0.91	0.66	0.91
Maximum output current Arms		2.0	2.8	2.1	2.9	2.1	2.9
Ambient temperature in operation		0 to 55℃					
Ambient temperature in storage		−20 to 85℃					
Ambient humidity in operation and storage		90%RH or less (No condensation)					
Mass kg		0.8	0.8	0.9	0.9	0.9	0.9

■AC servo motor and driver Panasonic Corporation (RoHS compliant)



Motor specification

Motor code	Model code	Power supply voltage V	Rated output W	Rated torque N·m	Instantaneous maximum torque N·m	Rated number of revolution r/min	Motor inertia J_M ×10^{-4}kg·m^2	Encoder specification	Mass kg
P001	MSMA5AZA1A	200	50	0.16	0.48	3000	0.025	Incremental (10000pulse/rev)	0.34
P002	MSMA012A1A		100	0.32	0.95		0.062		0.56
P006	MSMA5AZA1B		50	0.16	0.48		0.030		0.53
P007	MSMA012A1B		100	0.32	0.95		0.066		0.76
P011	MSMD5AZS1A		50	0.16	0.48		0.025	Incremental/absolute 17 bits (131072pulse/rev)	0.32
P012	MSMD012S1A		100	0.32	0.95		0.051		0.47
P016	MSMD5AZS1B		50	0.16	0.48		0.027		0.53
P017	MSMD012S1B		100	0.32	0.95		0.054		0.68

Motor mounting dimensions

unit mm

Motor code	□W×L_M	LR	LE	d	D	P	M
P001	38× 73	25	3	8	30	45	ϕ3.4
P002	38×103						
P006	38×105						
P007	38×135						
P011	38× 72						
P012	38× 92						
P016	38×102						
P017	38×122						

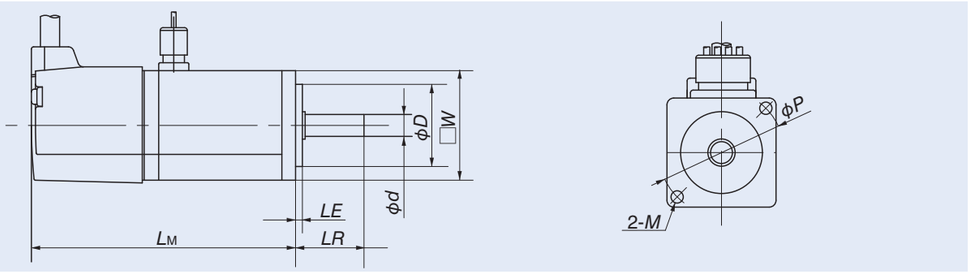
Driver specification

Item \ Model code of driver		MSDA5A5A1A	MSDA015A1A	MADDT1205	MADDT1205F
Applicable motor code		P001, P006	P002, P007	P011, P012, P016, P017	P011, P012, P016, P017
Supply voltage		200V	200V	200V	200V
Rated output of applicable motor		50W	100W	50W, 100W	50W, 100W
Feedback	Servo motor	Incremental encoder		Serial encoder	
	Linear encoder	—			Incremental encoder
Command input pulse		Selection one from Symbol with pulse line, CCW or CW with pulse line, two phases pulse with 90-degree difference			
Type of command input pulse		Line driver, open corrector			Line driver
Maximum input pulse count		Line driver : 500kpps Open corrector : 200kpps		Line driver : 2Mpps Open corrector : 200kpps	4Mpps
Main power supply voltage		Single phase/3 phases AC200 to 230V −15 to 10% 50/60Hz		Single phase AC200 to 240V −15 to 10% 50/60Hz	
Control circuit supply voltage		Single phase AC200 to 230V −15 to 10% 50/60Hz		Single phase AC200 to 240V −15 to 10% 50/60Hz	
Continuous output current Arms		1.0	1.0	1.1	1.1
Maximum output current Arms		4.3	4.3	4.7	4.7
Ambient temperature in operation		0 to 55℃ (No freezing)			
Ambient temperature in storage		−20 to 65℃ (No freezing)			
Ambient humidity in operation and storage		90% RH or less (No condensation)			
Mass kg		1.0	1.0	0.8	0.8

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Specification of motor and driver

■AC servo motor and driver Mitsubishi Electric Corporation (RoHS compliant)



Motor specification

Motor code	Model code	Power supply voltage V	Rated output W	Rated torque N·m	Instantaneous maximum torque N·m	Rated number of revolution r/min	Motor inertia J_M ×10^{-4}kg·m^2	Encoder specification	Mass kg
J001	HC-KFS053	200	50	0.16	0.48	3000	0.053	Incremental/absolute 17 bits (131072pulse/rev)	0.4
J002	HC-KFS13		100	0.32	0.95		0.084		0.53
J006	HC-KFS053B		50	0.16	0.48		0.056		0.75
J007	HC-KFS13B		100	0.32	0.95		0.087		0.89
J011	HF-KP053		50	0.16	0.48		0.052	Incremental/absolute 18 bit (262144pulse/rev)	0.35
J012	HF-KP13		100	0.32	0.95		0.088		0.56
J016	HF-KP053B		50	0.16	0.48		0.054		0.65
J017	HF-KP13B		100	0.32	0.95		0.090		0.86

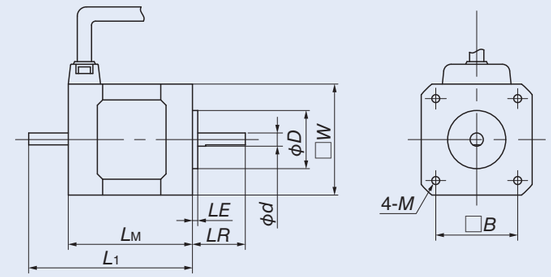
Motor mounting dimensions unit mm

Motor code	□*W*×*L*$_M$	*LR*	*LE*	*d*	*D*	*P*	*M*
J001	40× 81.5	25	2.5	8	30	46	ϕ4.5
J002	40× 96.5						
J006	40×109.5						
J007	40×124.5						
J011	40× 66.4						
J012	40× 82.4						
J016	40×107.5						
J017	40×123.5						

Driver specification

Item \ Model code of driver		MR-J2S-10A		MR-J3-10A		MR-J3-10A-KE005	
Applicable motor code		J001, J006	J002, J007	J011, J016	J012, J017	J011, J016	J012, J017
Supply voltage		200V	200V	200V	200V	200V	200V
Rated output of applicable motor		50W	100W	50W	100W	50W	100W
Feedback	Servo motor	Serial encoder					
	Linear encoder	—				Serial encoder Incremental encoder	
Command input pulse		Selection one from Symbol with pulse line, CCW or CW with pulse line, two phases pulse with 90-degree difference					
Type of command input pulse		Line driver, open corrector				Line driver	
Maximum input pulse count		Line driver ：500kpps Open corrector：200kpps		Line driver ：1Mpps Open corrector：200kpps		4Mpps	
Main power supply voltage		3 phases AC200～230V −15 to 10% 50/60Hz or single phase AC230V −15 to 10% 50/60Hz		3 phases AC200 to 230V −15 to 10% 50/60Hz or single phase AC200 to 230V −15 to 10% 50/60Hz			
Control circuit supply voltage		Single phase AC200～230V −15 to 10% 50/60Hz					
Continuous output current		0.83	0.71	0.9	0.8	0.9	0.8
Maximum output current		2.5	2.2	2.7	2.4	2.7	2.4
Ambient temperature in operation		0 to 55℃ (No freezing)					
Ambient temperature in storage		−20 to 65℃ (No freezing)					
Ambient humidity in operation and storage		90% RH or less (No condensation)					
Mass kg		0.7	0.7	0.8	0.8	0.8	0.8

■Stepper motor and driver Oriental Motor Co., Ltd. (RoHS compliant)



Motor specification

Motor code	Model code	Step angle degree	Maximum holding torque N·m	Current A-phase	Rotor inertia J_M ×10^{-4}kg·m^2	Mass kg
V006	PK545AWM	0.72	0.24	0.75	0.083	0.52
V008	PK564AEM		0.42	1.4	0.335	0.9
V017	PK545BW		0.24	0.75	0.068	0.4
V018	PK564BE		0.42	1.4	0.175	0.6

Motor mounting dimensions unit mm

Motor code	□*W*×*L*$_M$	*L*$_1$	*LR*	*LE*	*d*	*D*	*B*	*M*
V006	42×77	—	20	2	5	22	31	M3 depth 4.5
V008	60×88.5	—	24	1.5	8	36	50	ϕ4.5
V017	42×47	63	20	2	5	22	31	M3 depth 4.5
V018	60×48.5	72.5	24	1.5	8	36	50	ϕ4.5

Driver specification

Item \ Model code of driver	RKD507M-A	RKD514LM-A	RKD507-A	RKD514L-A
Applicable motor code	V006	V008	V017	V018
Excitation type	Micro step			
Command input pulse	Selection one from Symbol with pulse line, CW/CCW signal, pulse signal, rotation direction signal			
Type of command input pulse	Photo coupler input, input resistance 220Ω, Input current of 10 to 20mA			
Main power supply voltage	Single phase 100 to 115V±15% 50/60Hz 1A	Single phase 100 to 115V±15% 50/60Hz 4.5A	Single phase 100 to 115V±15% 50/60Hz 1A	Single phase 100 to 115V±15% 50/60Hz 4.5A
Ambient temperature in operation	0 to 50℃ (No freezing)			
Ambient humidity in operation	85%以下 (No condensation)			
Mass kg	0.4	0.85	0.4	0.85

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Caution in Use

◆Precision Elevating Table is a precision device. Excessive loads and impacts on the table will cause reduction in its accuracy and damages of its components. Therefore, handle it with great care.
◆Make sure the object surface to be mounted on the table is clean and free from any harmful protuberances.
◆The linear motion rolling guide and ball screws assembled in Precision Elevating Table are lubricated with grease. It is necessary to protect the inside of the table unit against invasion of dust or foreign matters. If the table unit is contaminated with dust or others, completely remove them and the contaminated grease and apply new grease.
◆The best way to lubricate Precision Elevating Table varies by operating conditions. In general, every six months in normal services or every 3 months when the table reciprocally runs a long distance although the frequency of replacement of grease depends upon the running conditions. Wipe off old grease and apply new clean grease.
◆Precision Elevating Table is machined, assembled and adjusted with high accuracy. Accordingly never disassemble or remodel it in any case.
◆Do not apply any excessive load or strong impact to the linear encoder.
◆Make sure that the linear encoder surface is free from dirt. If it is dirty, it may not able to detect table positions. In such a case, wipe clean the surface with clean cloth dipped with ethyl alcohol or the like. Cover the linear encoder with a proper protector when using the linear encoder in a dusty environment.

◎The appearance, specifications and other details of the products are subject to change without prior notice for improvement.

■Duration and scope of warranty

The period of warranty for the Precision Elevating Table and related electrical devices is set at one year after delivery. If a failure occurs while the product is correctly being used and the failure is clearly attributable to its manufacture, the product will be repaired at no cost within the warranty period. However, disposables are outside the scope of warranty. Furthermore, our guarantee covers the acquired product itself. Any damages, direct or indirect, damages, occurring from failures or use of this product, are outside the scope of this warranty.

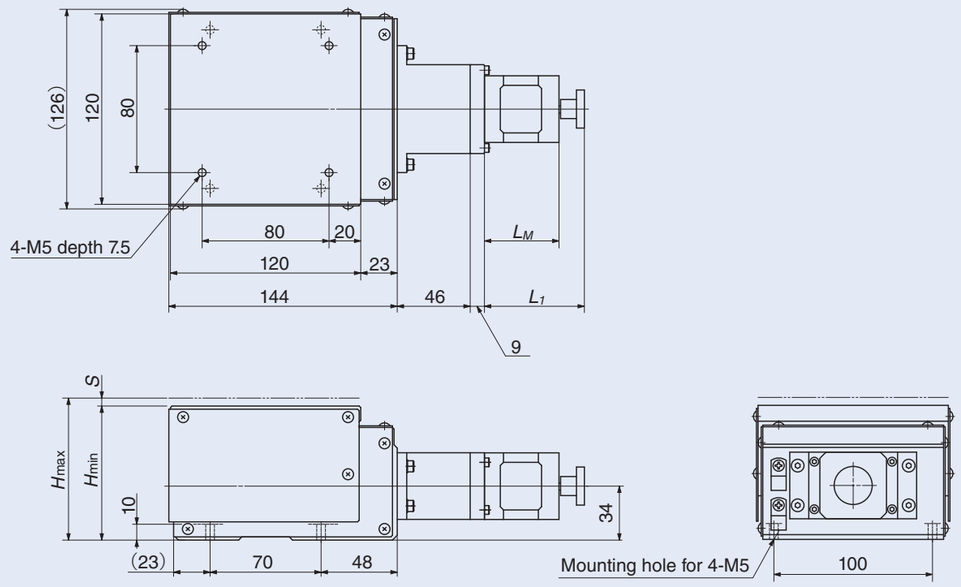
A warranty here means the guarantee of the Precision Elevating Table itself as a single unit.
It shall be a fare-paying services if field service is required.

When the trouble is not obviously judged by our product deficiency as a result of our investigation, customer shall be responsible for the repair cost. Secondary damage that occurs on the product breakdown or use is out of our warranty.

When disposing of the products, treat them as ordinary industrial waste.

IKO Precision Elevating Table

TZ120



unit mm

Model number	Wedge reduction ratio	Mass(1) (Ref.) kg	Height		Stroke length S
			H_{min} (CW limit position)	H_{max} (CCW limit position)	
TZ120-2	1：2	3.8	93	103	10
TZ120-4	1：4	3.4	84.5	89.5	5

Note(1) Motor weight is not included.

Motor dimensions

unit mm

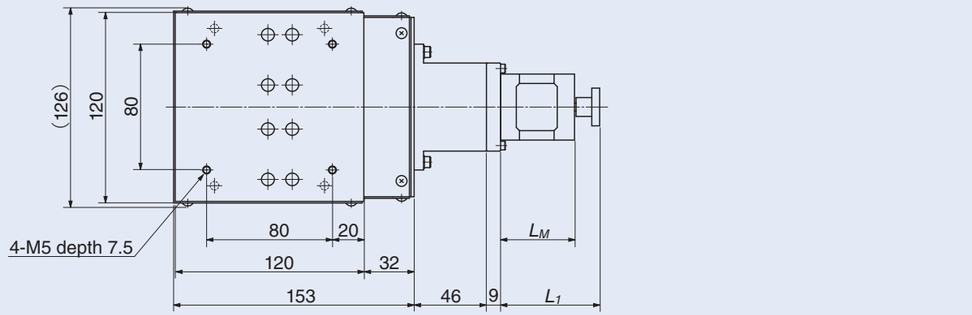
Motor type	With or without brake	Motor code	L_M	L_1
AC servo motor	Without brake	Y027	77	—
		P001	73	—
		J001	81.5	—
	With brake	Y032	108.5	—
		P006	105	—
		J006	109.5	—
Stepper motor	Without brake	V017	47	63
	With brake	V006	77	—

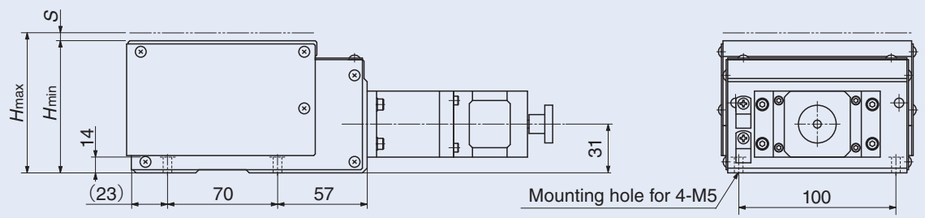
Remark: Only V017 has a manual knob on the end of the motor.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Precision Elevating Table

TZ120X without linear encoder





unit mm

Model number	Wedge reduction ratio	Mass(1) (Ref.) kg	Height		Stroke length S
			H_{min} (CW limit position)	H_{max} (CCW limit position)	
TZ120X-2	1 : 2	3.8	93	103	10
TZ120X-4	1 : 4	3.4	84.5	89.5	5

Note(1) Motor weight is not included.

Motor dimensions

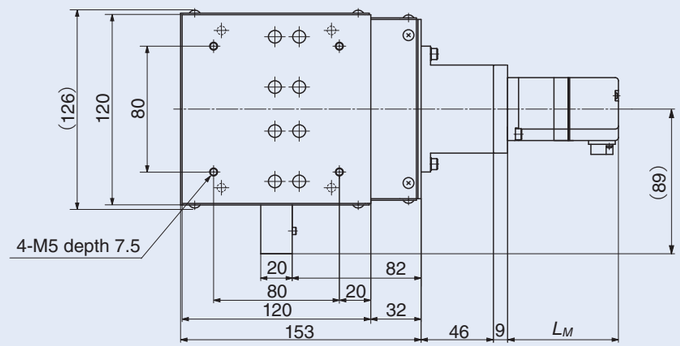
unit mm

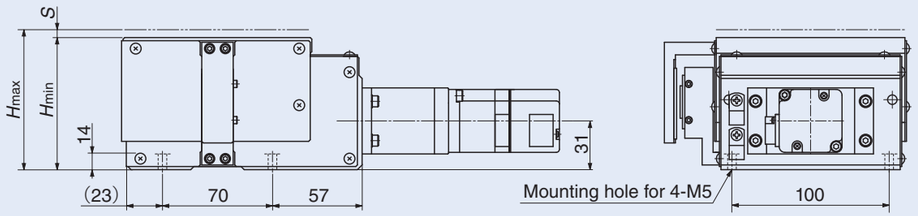
Motor type	With or without brake	Motor code	L_M	L_1
AC servo motor	Without brake	Y027	77	—
		Y047	69	—
		P001	73	—
		P011	72	—
		J001	81.5	—
		J011	66.4	—
	With brake	Y032	108.5	—
		Y049	114	—
		P006	105	—
		P016	102	—
		J006	109.5	—
		J016	107.5	—
Stepper motor	Without brake	V017	47	63
	With brake	V006	77	—

Remark: Only V017 has a manual knob on the end of the motor.

IKO Precision Elevating Table

TZ120X with linear encoder





unit mm

Model number	Wedge reduction ratio	Mass(1) (Ref.) kg	Height		Stroke length S
			H_{min} (CW limit position)	H_{max} (CCW limit position)	
TZ120X-2	1 : 2	4.5	93	103	10
TZ120X-4	1 : 4	4.1	84.5	89.5	5

Note(1) Motor weight is not included.

Motor dimensions

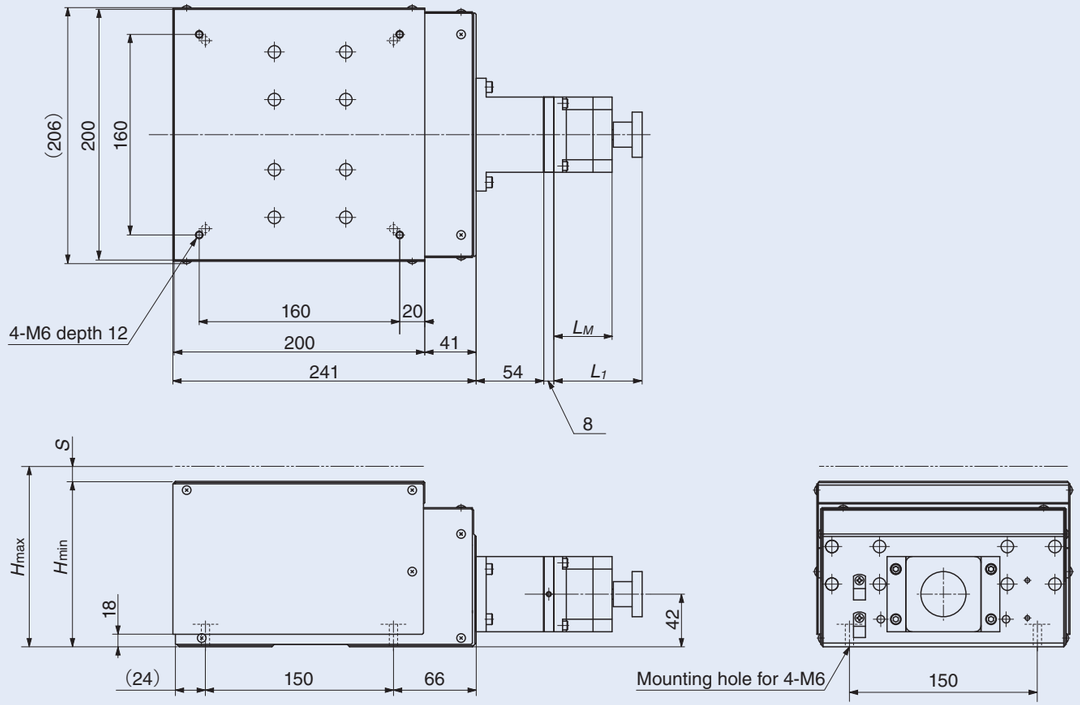
unit mm

Motor type	With or without brake	Motor code	L_M
AC servo motor	Without brake	Y047	69
		P011	72
		J011	66.4
	With brake	Y049	114
		P016	102
		J016	107.5

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Precision Elevating Table

TZ200H, TZ200X without linear encoder



unit mm

Model number	Wedge reduction ratio	Mass(1) (Ref.) kg	Height		Stroke length S
			H_{min} (CW limit position)	H_{max} (CCW limit position)	
TZ200H-2	1 : 2	13.2	146	170	24
TZ200H-4	1 : 4	12.2	132	144	12
TZ200X-2	1 : 2	13.3	146	170	24
TZ200X-4	1 : 4	12.3	132	144	12

Note(1) Motor weight is not included.

Motor dimensions

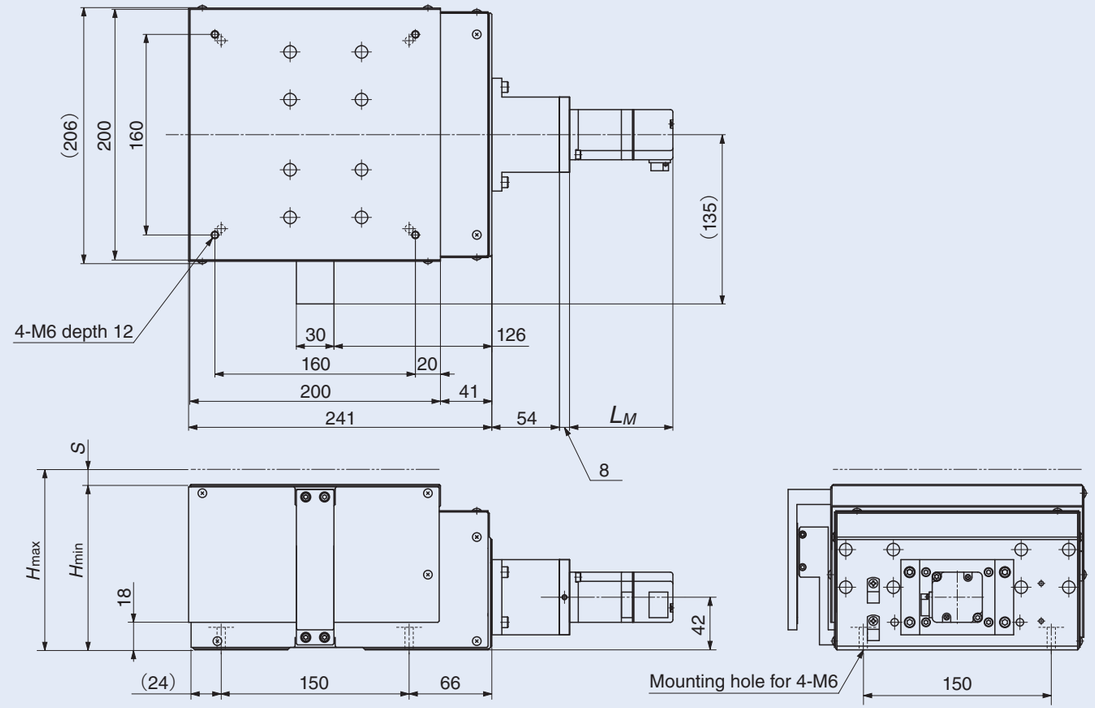
unit mm

Motor type	With or without brake	Motor code	L_M	L_1
AC servo motor	Without brake	Y028	94.5	—
		Y048	82.5	—
		P002	103	—
		P012	92	—
		J002	96.5	—
		J012	82.4	—
	With brake	Y033	135	—
		Y050	127.5	—
		P007	135	—
		P017	122	—
		J007	124.5	—
		J017	123.5	—
Stepper motor	Without brake	V018	48.5	72.5
	With brake	V008	88.5	—

Remark: Only V018 has a manual knob on the end of the motor.

IKO Precision Elevating Table

TZ200H, TZ200X with linear encoder



unit mm

Model number	Wedge reduction ratio	Mass(1) (Ref.) kg	Height		Stroke length S
			H_{min} (CW limit position)	H_{max} (CCW limit position)	
TZ200H-2	1 : 2	14.2	146	170	24
TZ200H-4	1 : 4	13.2	132	144	12
TZ200X-2	1 : 2	14.3	146	170	24
TZ200X-4	1 : 4	13.3	132	144	12

Note(1) Motor weight is not included.

Motor dimensions

unit mm

Motor type	With or without brake	Motor code	L_M
AC servo motor	Without brake	Y048	82.5
		P012	92
		J012	82.4
	With brake	Y050	127.5
		P017	122
		J017	123.5

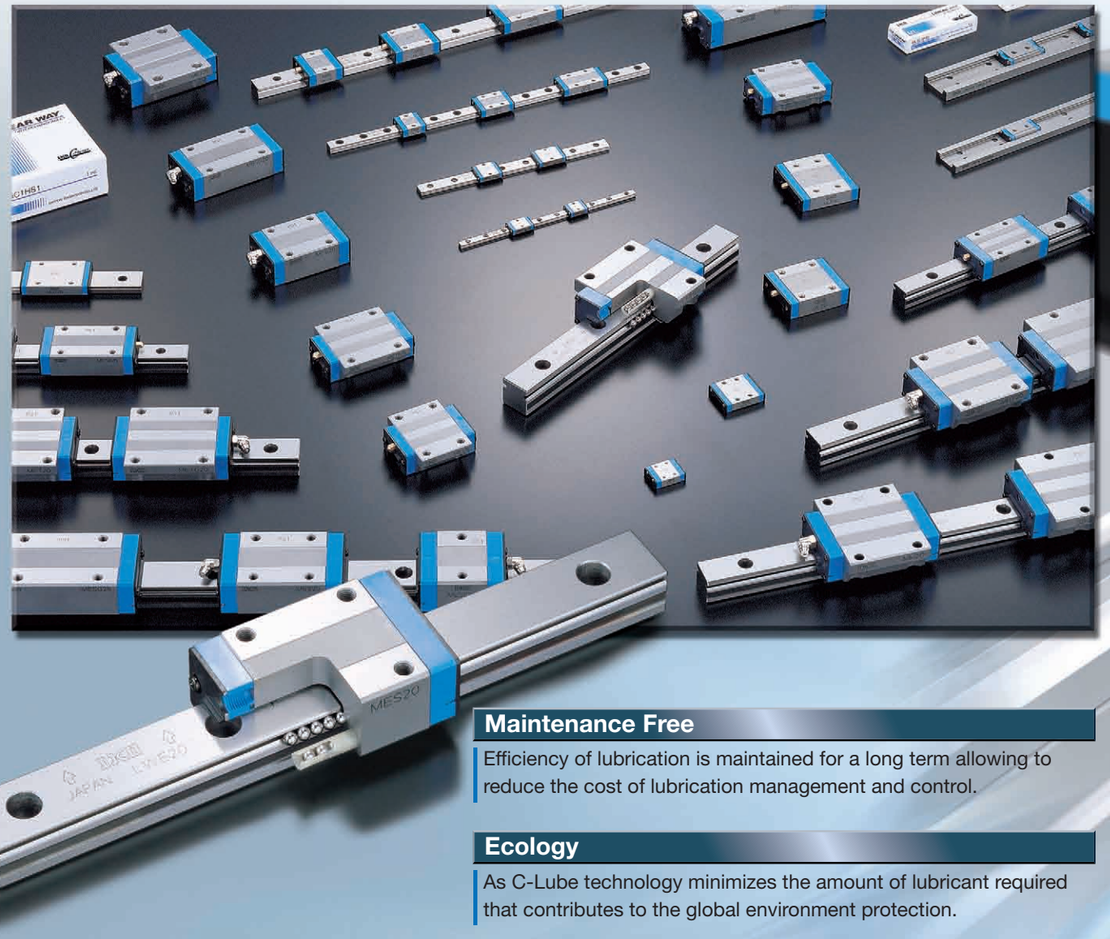
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Maintenance free for 20,000km or 5 years

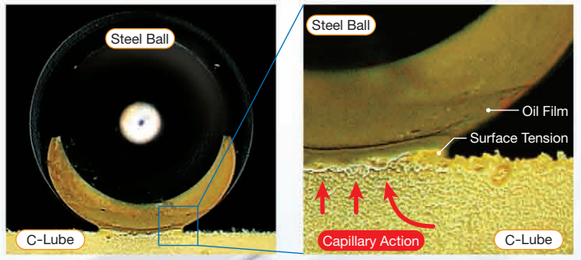
IKO Maintenance Free & Interchangeable

CAT-5510

C-Lube Linear Way
C-Lube Linear Roller Way



The Capillary system that IKO has developed is a new method of lubrication. The Lube-body is formed by sintering fine resin powder to act as reservoir and the open pores are impregnated with a large amount of lubrication oil.
The capillary action deposits the appropriate amount of lubrication on the rolling elements to protect the raceways for long periods.



Interchangeable series is available.

C-Lube slide units can be supplied by themselves not with rails, and can be matched, replaced and added freely to the interchangeable track rail. This feature is useful in machine design, facilitating standardization of product specification and quick changes of specification.

Maintenance Free

Efficiency of lubrication is maintained for a long term allowing to reduce the cost of lubrication management and control.

Ecology

As C-Lube technology minimizes the amount of lubricant required that contributes to the global environment protection.

Compact

Unlike attached-on external lubrication parts, there is no increase in carriage length.
No loss of available stroke length when replacing standard units.

Smooth

Light and smooth running is achieved by the improvement of internal design. C-Lube is designed not to have direct contact with the track rail allowing very smooth operation.

IKO *Clean Lubrication*
C-Lube
Friendly to Maintenance
Gentle to the Earth

Miniature type ML series

Compact ME series

High load capacity MH series

U-shaped track rail MUL series

Linear Roller Way MX series

World Network of IKO

IKO Clean Lubrication
C-Lube
Friendly to Maintenance
Gentle to the Earth

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Recognizing that conservation of the global environment is the top-priority challenge for the world's population, IKO will conduct its activities with consideration of the environment as a corporate social responsibility, reduce its negative impact on the environment, and help foster a rich global environment.

ISO 9001 & 14001 Quality system registration certificate

ISO 9001 Certified
ISO 14001 Certified