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June 2008 IKO Overseas Dept.

TX Series of Rolling Guide Type Realizing Ultimate Positioning Performance

IKO High Precision Positioning Table TX has realized almost as high positioning performance as the air stage by incorporated the ultimate rolling guide IKO Liner Roller Way Super X in IKO Precision Positioning Table LH which is well-known for high accuracy and high rigidity as the base.
IKO High Precision Positioning Table TX has four kinds of table widths from 120 mm to 420 mm. In addition to the conventional single-axis specification, a new Two-axes specification is added. The new table series assures high positioning accuracy with X and Y axes.
This positioning table series is best suitable for the fields that require higher accuracy and cannot be satisfied by conventional rolling guide types.

TX
(Single-axis specification)

IKO High Precision Positioning Table TX and CTX

Use in low and medium vacuum condition

No influence to a vacuum environment by an air flow in an air stage. Can be supplied with vacuum environment grease on request. Please consult IKO.

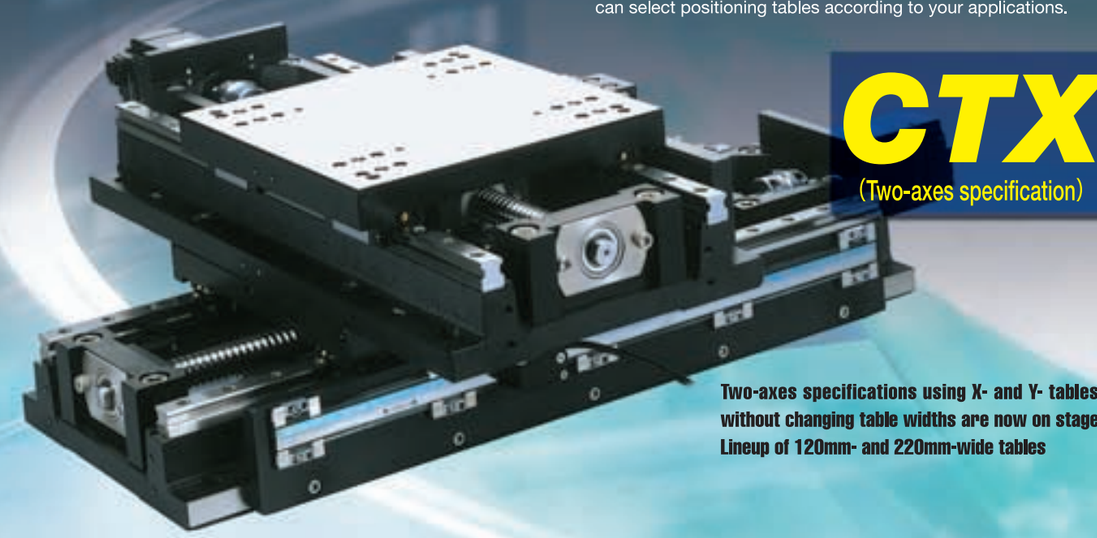
For clean room application

Low dust generating clean grease is available as an option. Please consult IKO.

Wide variation

This series provides four table sizes ranging from 120 mm to 420 mm. Tables of double-axis specifications are manufactured in series to assure accuracies in X- and Y-axes combination. You can select positioning tables according to your applications.

CTX
(Two-axes specification)

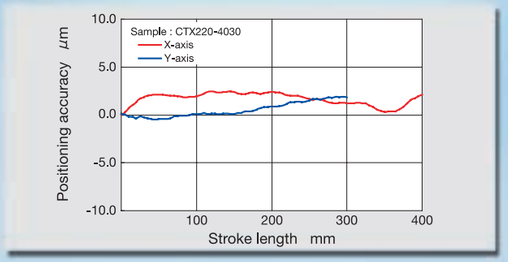


Two-axes specifications using X- and Y- tables without changing table widths are now on stage. Lineup of 120mm- and 220mm-wide tables

Ultimate positioning performance

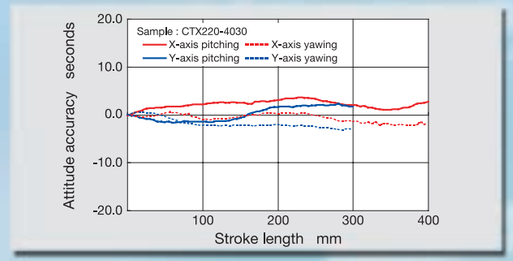
High positioning accuracy and resolution due to super-high accuracy linear encoder

By directly feeding back positional information from the super-high accuracy linear encoder of a resolution of 0.016 μm, a full-closed-loop control system is established. This control system assures high positioning accuracy in the whole stroke length.



Ultimate running accuracy by adopting Linear Roller Way Super X

Rolling guide type of ultimate running accuracy thanks to good combination of components that are machined and assembled very accurately and IKO Linear Roller Way Super X that demonstrates the best running accuracy.



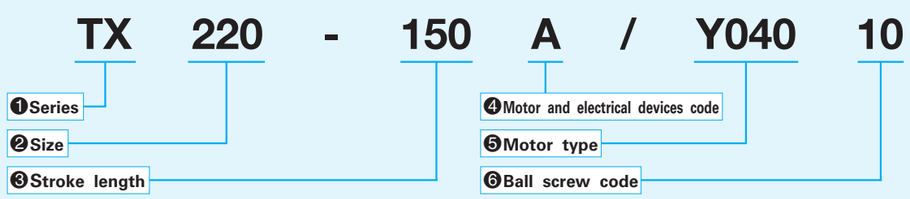
Always demonstrating stable performance by the employment of Linear Roller Way Super X

By using IKO Linear Roller Way Super X which demonstrates excellent rigidity under high load capacity, this series of tables can demonstrate high rigidity and specifically stable performance in an environment of fluctuating loads.

Linear Roller Way Super X

Identification Number and Specification

Example of identification number (Single axis)



❶Series	TX : Super Precision Positioning Table TX (Single axis)
❷Size	Width of table Select from Table 1.
❸Stroke length	Select from Table 1.
❹Motor and electrical devices code	A : with motor and electrical devices
	Super Precision Positioning Table TX is operated by full closed control. Electrical devices, AC servo motor, driver, serial exchange unit, motor code, encoder cord and serial exchange cord are appended to the table.
❺Motor type	Select servomotor from Table 2.
❻Ball screw code	5 : 5mm lead 10 : 10mm lead

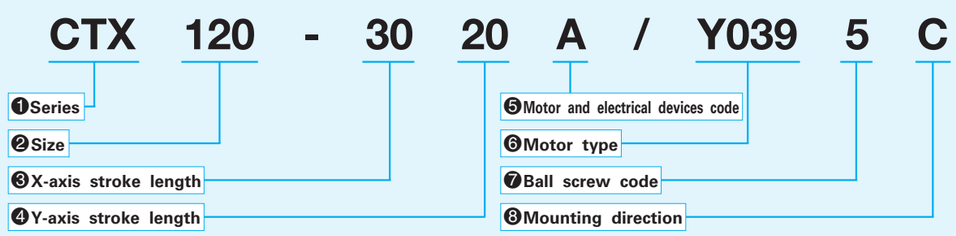
Table 1 Models and stroke lengths

Model	Width of table mm	Stroke length mm				
TX120	120	100	150	200	250	300
TX220	220	150	200	250	300	400
TX320	320	300	400	500	—	—
TX420	420	500	600	800	—	—

Table 2 Motor types

Model	Motor code	
	With brake	Without brake
TX120	Y039	Y043
TX220	Y040	Y044
TX320	Y041	Y045
TX420	Y042	Y046

Example of identification number (X-Y specification)



❶Series	CTX : Super Precision Positioning Table (X-Y specification)
❷Size	Width of table Select from Table 3.
	Combination of tables in different sizes is possible.
❸X-axis stroke length **❹Y-axis stroke length**	Select from Table 3.
	Indicate the stroke length by "cm".
❺Motor and electrical devices code	A : with motor and electrical devices
	Super Precision Positioning Table TX is operated by full closed control. Electrical devices, AC servo motor, driver, serial exchange unit, motor code, encoder cord and serial exchange cord are appended to the table.
❻Motor type	Select servomotor from Table 4.
❼Ball screw code	5 : 5mm lead 10 : 10mm lead
❽Mounting direction	No symbol : X-axis motor locates 90 degrees from Y-motor in clockwise direction when looking down. C : X-axis motor locates 90 degrees from Y-motor in counterclockwise direction when looking down.

Table 3 Models and stroke lengths

Model	Width of table mm	Stroke length mm	
		X-axis	Y-axis
CTX120	120	100	100
		200	100
		200	200
		300	200
CTX220	220	200	200
		300	200
		300	300
		400	300

Table 4 Motor types

Model	Motor code	
	With brake	Without brake
CTX120	Y039	Y043
CTX220	Y040	Y044

Remark : For the table with brake, motor with brake is mounted on Y-axis only. For example, if Y043 is selected, X-axis has Y039 and Y-axis has Y043.

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

Accuracy

Table 5 Accuracy

unit : mm

Model		Stroke length X-axis	Stroke length Y-axis	Positioning accuracy	Repeatability	Lost motion	Parallelism in table operation A	Attitude accuracy(1) sec.	Straightness in vertical Straightness in horizontal	Squareness of X-Y travel
Single axis	TX120	100		0.003	±0.0005	0.001	0.005	5	0.003	—
		150								
		200		0.004			0.006	6	0.004	
		250								
		300								
	TX220	150		0.003	±0.0005	0.001	0.005	5	0.003	—
		200		0.004			0.006	6	0.004	
		250								
		300								
		400		0.005			0.007	7	0.005	
	TX320	300		0.004	±0.0005	0.001	0.006	6	0.004	—
		400		0.005			0.007	7	0.005	
		500								
	TX420	500		0.005	±0.0005	0.001	0.007	7	0.005	—
		600		0.006			0.008	8	0.006	
		800		0.008			0.009	9	0.008	
X-Y axis	CTX120	100	100	0.005	±0.0005	0.001	0.008	8	0.005	0.005
		200	100							0.010
		200	200							
		300	200							
	CTX220	200	200	0.006	±0.0005	0.001	0.009	9	0.006	0.005
		300	200							0.010
		300	300							
		400	300	0.008			0.011	11	0.008	

Note(1) Amounts in the table show pitching and yawing.

Maximum Speed

Maximum speed of Super Precision Positioning Table TX is shown in Table 6.
Maximum speed and resolution are given by the lead of ball screw and driver's parameter (Electric gear).
Actual speed should not exceed values in Table 6.

Table 6 Maximum speeds

Lead of ball screw mm	Electron gear Numerator	Electron gear Denominator	Maximum speed mm/sec
5	1	1	15.6
	2	1	31.2
	4	1	62.5
	8	1	125
	16	1	250(224)
10	1	1	15.6
	2	1	31.2
	4	1	62.5
	8	1	125
	16	1	250
	32	1	500(448)

Remark 1. : Values in ( ) are applicable for TX320 and TX420.
2. : Actual maximum speed may be affected by load condition.
3. : Resolution is obtained by the following formula. The pitch of scale is 4 micron meter.

$$\text{Resolution} = \frac{\text{Pitch of scale}}{256} \times \frac{\text{Electric gear numerator}}{\text{Electric gear denominator}} \ [\mu\text{m}]$$

Sensor Specification

Table 7 Specifications of sensor

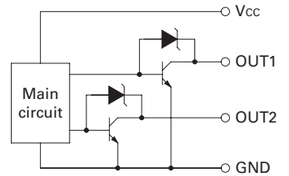
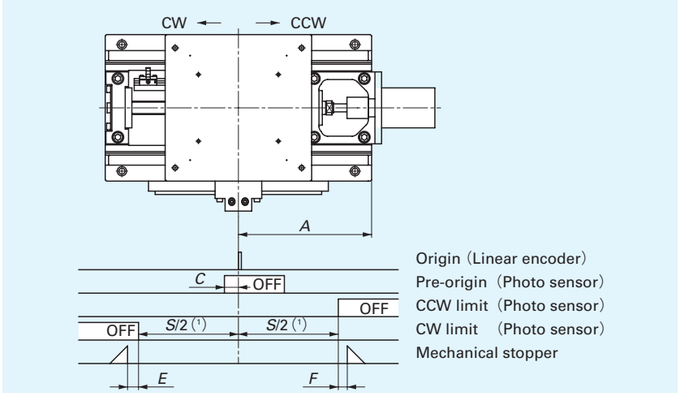
Item \ Sensor	Pre-origin, CW limit, CCW limit
Type	Photo sensor
Power supply voltage	DC5～24V ±10%
Current consumption	30mA or less
Output	Open collector ・Max. current : 50mA ・Applied voltage : DC30V or less ・Residual voltage : 0.7V or less at 50mA in-flow current 0.4V or less at 16mA in-flow current
Output operation	When approaching : ON
Operation indicator	Operation indicator LED (red)
Circuit diagram	

Table 8 Specifications of connector

Pin No.	Signal name	Sensor-side connector type	Opposite-side connector type
1	—	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		

Remarks1. : The origin signal of linear encoder from driver can be used as origin point.
2. : Connector is made by Tyco Electronics Co., Ltd.
3. : Opposite-side connector and contactor are not appended.

Table 9 Sensor timing chart



unit : mm

Model number	Ball screw lead	A	C	E	F
TX120	5	L/2(1)	3	5.5	4.5
CTX120	10		7		
TX220	5	L/2(1)	3	14	10
CTX220	10		7	12	10
TX320	5	L/2(1)	3	20	15
	10		7		
TX420	5	L/2(1)	3	18	15
	10		7		

Note(1) Refer to dimension tables on page 11 to 14.
Remark : For X-Y axis table, specification of each axis are the same as those of single axis.

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

Table Inertia and Starting Torque

Table 10 Table inertia, coupling inertia and starting torque

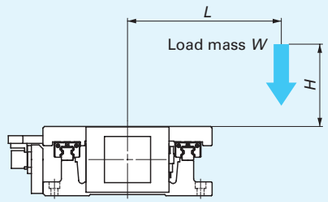
Mode number		Stroke length mm		Table inertia J_T $\times10^{-5}$kg・m²		Coupling inertia J_C	Starting torque T_O
		X-axis	Y-axis	Lead 5mm	Lead 10mm	$\times10^{-5}$kg・m²	N・m
Single axis	**TX120**	100		1.3	1.8	0.29	0.07
		150		1.5	2.0		
		200		1.6	2.2		
		250		1.8	2.4		
		300		2.0	2.6		
	TX220	150		5.2	7.0	0.85	0.12
		200		5.8	7.6		
		250		6.4	8.2		
		300		7.1	8.8		
		400		8.3	10		
	TX320	300		20	26	0.85	0.26
		400		23	29		
		500		26	32		
	TX420	500		30	39	0.85	0.30
		600		33	42		
		800		39	48		
X-Y axis	**CTX120**	100	100	2.1	4.7	0.29	0.07
		200	100	2.4	5.1		
		200	200	2.5	5.8		
		300	200	2.9	6.2		
	CTX220	200	200	8.2	16.9	0.85	0.13
		300	200	9.5	18.1		
		300	300	9.8	19.3		
		400	300	11.0	20.5		

Remark : For X-Y axis table, values in the table show of X axis. Values of Y axis are applicable to the single axis in the table.

Maximum Load Mass

Maximum load masses of Super Precision Positioning Table TX are shown in Table 11. The values in the table are reference values for the maximum mass that can be mounted on each models used in horizontal position and vary much depending on the position of load mass.

Table 11 Maximum Load Mass



unit : kg

Model	Ball screw lead mm	Height H mm	Length L mm								
			0	100	200	300	400	500	600	800	1000
TX120	5	0	310	94	55	39	30	25	21	16	13
		200	260	92	55	39	30	25	21	16	13
		400	200	87	53	38	30	25	21	16	13
		600	160	80	52	38	30	24	21	16	13
	10	0	180	74	43	30	24	19	16	12	10
		200	150	67	42	30	23	19	16	12	10
		400	100	58	39	29	23	19	16	12	9.9
		600	75	50	35	27	22	18	16	12	9.8
TX220	5	0	410	260	170	120	97	80	68	53	43
		200	410	260	170	120	97	80	68	53	43
		400	410	250	160	120	96	80	68	53	43
		600	410	230	160	120	95	79	68	53	43
	10	0	270	210	130	96	76	63	53	41	33
		200	270	190	130	95	75	62	53	41	33
		400	270	170	120	91	73	61	52	41	33
		600	230	150	110	87	71	60	51	40	33
TX320	5	0	820	820	620	470	380	320	270	210	180
		200	820	820	620	470	380	320	270	210	180
		400	820	820	610	470	380	320	270	210	180
		600	820	820	600	460	370	320	270	210	180
	10	0	380	380	380	370	300	250	210	170	140
		200	380	380	380	360	290	250	210	170	140
		400	380	380	380	350	290	240	210	160	140
		600	380	380	380	340	280	240	210	160	130
TX420	5	0	800	800	800	660	540	450	390	310	250
		200	800	800	800	650	530	450	390	310	250
		400	800	800	800	650	530	450	390	310	250
		600	800	800	800	640	530	450	390	310	250
	10	0	360	360	360	360	360	350	310	240	200
		200	360	360	360	360	360	350	300	240	200
		400	360	360	360	360	360	350	300	240	200
		600	360	360	360	360	360	340	300	240	200

Remarks 1. : The above values are obtained by calculating the mass for which the rating life of the ball screw or linear motion rolling guide becomes 18,000 hours when the table is operated continuously at the maximum speed (for each size), and 0.2s each, at acceleration and at deceleration.

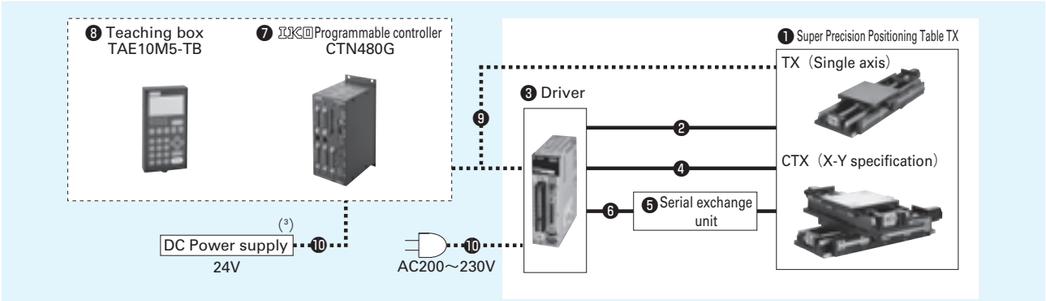
2. : For CTX, consider load mass for each axis independently.

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

Electric Devices

■System configuration

Super Precision Positioning Table TX is operated by highly accurate full-closed-loop control and electric devices (AC servo motor, driver, serial exchange unit, motor code, encoder code and serial exchange unit cord) to each model are designated to achieve best performance. Models of these devices are shown below.
Exclusive controller, pulse and limit codes are prepared by customer.



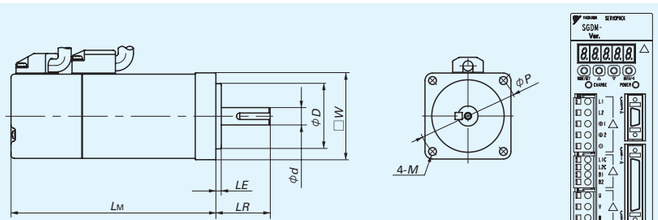
Items		Model code					
❶Super Precision Positioning Table TX		TX120	TX220	TX320	TX420	CTX120	CTX220
Motor without brake	Motor code(1)	Y039	Y040	Y041	Y042	Y039	Y040
	❷Motor cord(1)	JZSP-CSM02-03-E			JZSP-CSM03-03-E	JZSP-CSM02-03-E 2pcs.	
Motor with brake(2)	Motor code(1)	Y043	Y044	Y045	Y046	Y043	Y044
	❷Motor cord(1)	JZSP-CSM12-03-E			JZSP-CSM13-03-E	JZSP-CSM12-03-E 2pcs.	
❸Driver(1)		SGDS-02A02A-E	SGDS-04A02A-E	SGDS-08A02A-E		SGDS-02A02A-E 2units	SGDS-04A02A-E 2units
❹Encoder cord(1)		JZSP-CSP01-03-E					
❺Serial exchange unit(1)		JZDP-D003-000-E					
❻Serial exchange unit cord(1)		JZSP-CLP70-03-E					
❼Programmable controller		CTN480G					
❽Teaching box		TAE10M5-TB					
❾Pulse and limit cord		TAE10M7-LD□□ (TAE10M8-LD□□)					
❿Power supply cord(3)		Prepared by customer					

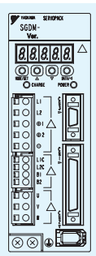
Note(1) Delivered with AC servo motor (Yaskawa Electric Corporation), motor code, driver, encoder cord, serial exchange unit and serial exchange unit cord.
(2) For "with brake model", power supply for brake release is needed.
(3) DC24V power supply is prepared by customer.

Remarks 1. : For "with brake model" in X-Y axis table, brake is applicable to Y axis only.
2. : The length of motor cord and encoder cord are 3 m each.
3. : Cord in ( ) have high bending resistance.
4. : The length of pulse and limit cord can be specified by □□ in the end of supplemental code. Selecting length is up to 20 m in increments of 1 m.
※The length under 10 m is also selected by two digits. (Example of 3 m: TAE10M7-LD03)
5. : The length of pulse and limit cord is 1.5 m.
6. : For X-Y axis table, two pieces each of pulse and limit cord are necessary.

Specifications of motor and driver

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





Motor specifications

Motor code	Motor 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 $\times10^{-4}$ kg・m^2	Encoder specification	Mass kg
Y039	SGMAS-02ACA21-E	200	200	0.637	1.91	3000	0.116	Incremental 17bits (131072pulse/rev)	0.9
Y040	SGMAS-04ACA21-E		400	1.27	3.82		0.190		1.2
Y041	SGMAS-06ACA21-E		600	1.91	5.73		0.326		1.7
Y042	SGMAS-08ACA21-E		750	2.39	7.16		0.769		2.5
Y043	SGMAS-02ACA2C-E		200	0.637	1.91		0.180		1.5
Y044	SGMAS-04ACA2C-E		400	1.27	3.82		0.254		1.8
Y045	SGMAS-06ACA2C-E		600	1.91	5.73		0.390		2.4
Y046	SGMAS-08ACA2C-E		750	2.39	7.16		0.940		3.2

Motor mounting dimension

Motor code	□W×L_M	LR	LE	d	D	P	M
Y039	60× 80	30	3	14	50	70	φ5.5
Y040	60× 98.5	30	3	14	50	70	φ5.5
Y041	60×124.5	30	3	14	50	70	φ5.5
Y042	80×115	40	3	16	70	90	φ7
Y043	60×120	30	3	14	50	70	φ5.5
Y044	60×138.5	30	3	14	50	70	φ5.5
Y045	60×172	30	3	14	50	70	φ5.5
Y046	80×160	40	3	16	70	90	φ7

Driver specifications

Item \ Model code of driver	SGDS-02A02A	SGDS-04A02A	SGDS-08A02A	
Applicable motor code	Y039・Y043	Y040・Y044	Y041・Y045	Y042・Y046
Rated output	200W	400W	600W	750W
Command input pulse	Selection one from Symbol with pulse line, CCW or CW with pulse line, two phases pulse with 90-degree difference (A-phases or B-phases).			
Type of command input pulse	Line driver			
Capability of command input speed	1Mpps in maximum			
Main power supply voltage	Single phase AC200～230V −15～+10% 50/60Hz			
Control circuit supply voltage	Single phase AC200～230V −15～+10% 50/60Hz			
Continuous rated current Arms	2.1	2.8	5.5	
Maximum consumption current Arms	6.5	8.5	16.9	
Ambient temperature in operation	0～+55℃			
Ambient temperature in storage	−20～+85℃			
Ambient temperature in operation and storage	90%RH or less (Keep dewdrop free)			
Mass (Ref.) kg	0.7	0.9	1.4	

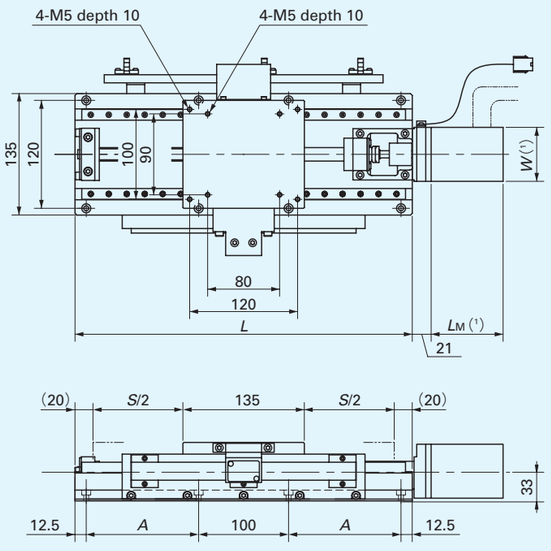
Caution in Use

- Super Precision Positioning Table TX is a precision equipment. A careful handling is strongly required. Do not apply any excessive force or heavy shock.
- Make sure the mounting base to be free from dirt and harmful foreign objects.
- Good flatness is required for mounting bed to assure positioning accuracy. 8μm or better is recommended.
- Grease is applied to the linear motion rolling guide and ball screw at delivery. Dust preventive cover is required to protect the inside of table from foreign particles or dusts. In case foreign particles or dusts enter into the table, intensive cleaning and re-greasing are necessary.
- The re-lubrication interval varies depending on the operating conditions of the table. A six month interval is generally recommended. If the table operation consists of reciprocating motions with many cycles and long strokes, re-lubrication in every three months with replacing old grease is recommended.
- Super Precision Positioning Table TX is machined, assembled and adjusted very precisely. Therefore, never disassemble or modify the table.
- Linear encoder is made of glass. Great care is necessary not to apply load and/or shock to it.
- Please make sure that surface of linear scale must be kept clean by ethyl alcohol or alternative cleaning solution, otherwise, malfunction or irregular operation may happen. In the application of dusty environment, dust protective cover for linear encoder is recommended.

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

Dimension

TX120

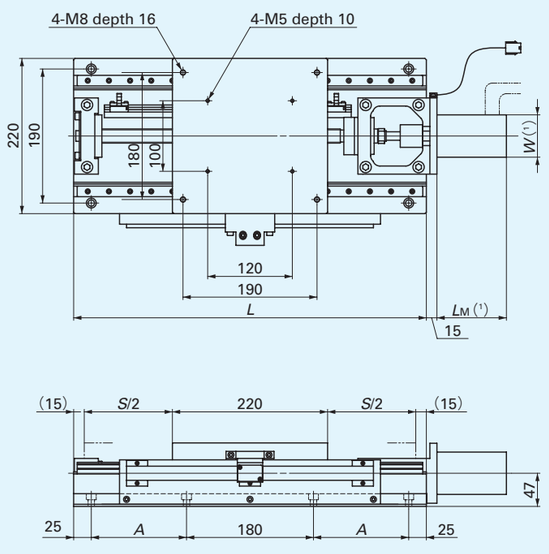


unit : mm

Model number	Stroke length S	Total length L	Mounting holes for bed A	Mounting holes for bed n	Table mass kg
TX120-100	100	275	75	8	11.3
TX120-150	150	325	100	8	12.9
TX120-200	200	375	125	8	14.0
TX120-250	250	425	150	8	15.3
TX120-300	300	475	175	8	16.7

Note (1) : For dimensions of motors, refer page 9-10.
(2) : Motor weight is not included.

TX220



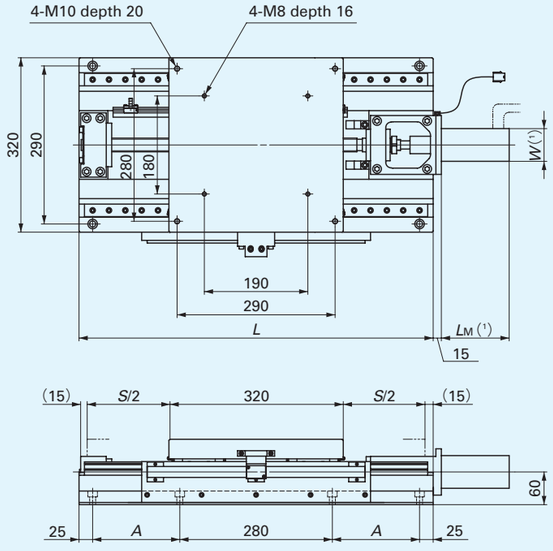
unit : mm

Model number	Stroke length S	Total length L	Mounting holes for bed A	Mounting holes for bed n	Table mass kg
TX220-150	150	400	85	8	33.6
TX220-200	200	450	110	8	36.4
TX220-250	250	500	135	8	38.7
TX220-300	300	550	160	8	41.2
TX220-400	400	650	210 (2×105)	12	46.4

Note (1) : For dimensions of motors, refer page 9-10.
(2) : Motor weight is not included.

Dimension

TX320

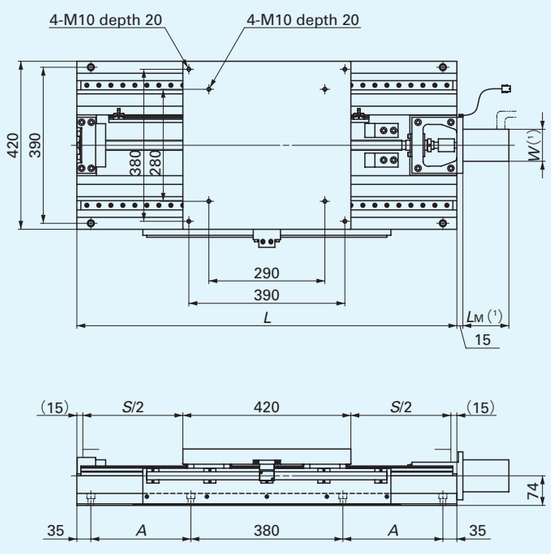


unit : mm

Model number	Stroke length S	Total length L	Mounting holes for bed A	Mounting holes for bed n	Table mass kg
TX320-300	300	650	160	8	103.7
TX320-400	400	750	210	8	114.1
TX320-500	500	850	260	8	124.0

Note (1) : For dimensions of motors, refer page 9-10.
(2) : Motor weight is not included.

TX420



unit : mm

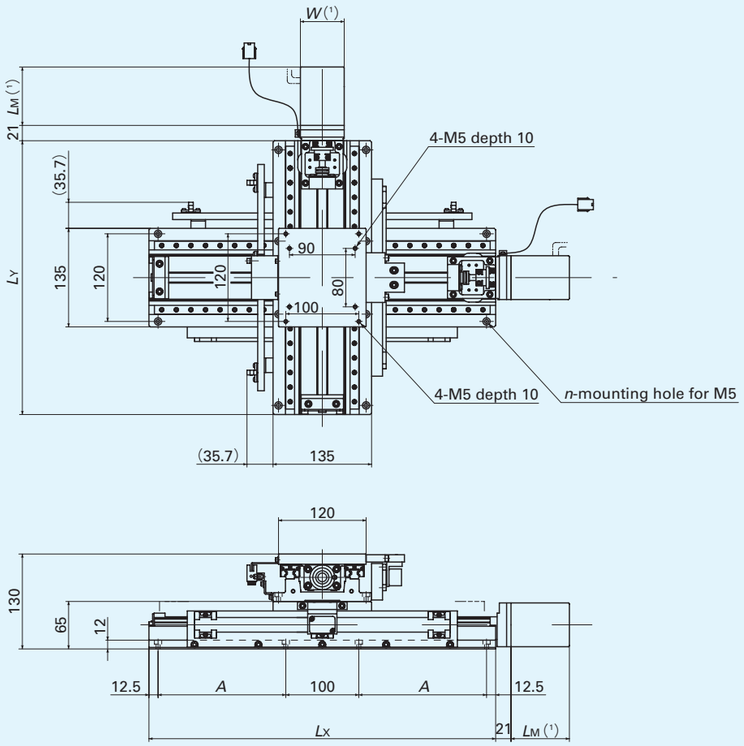
Model number	Stroke length S	Total length L	Mounting holes for bed A	Mounting holes for bed n	Table mass kg
TX420-500	500	950	250	8	183.0
TX420-600	600	1050	300	8	196.1
TX420-800	800	1250	400 (2×200)	12	222.2

Note (1) : For dimensions of motors, refer page 9-10.
(2) : Motor weight is not included.

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

Dimension

CTX120



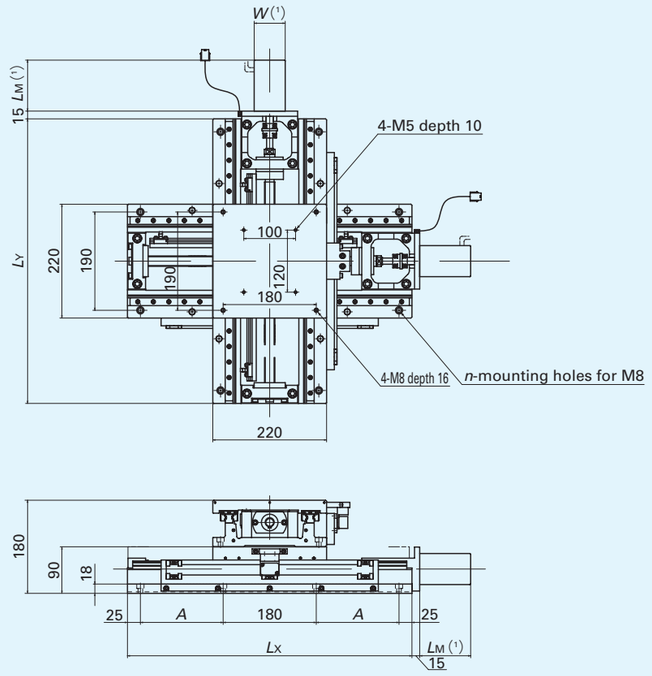
unit : mm

Model number	Stroke length S		Total length		Mounting holes for bed		Table mass(2) kg
	X-axis	Y-axis	LX	LY	A	n	
CTX120-1010	100	100	275	275	75	8	22.6
CTX120-2010	200	100	375	275	125	8	25.3
CTX120-2020	200	200	375	375	125	8	28.0
CTX120-3020	300	200	475	375	175	8	30.7

Note(1) : For dimension of motor, refer page 9-10.
(2) : Motor weight is not included.
Remark : Different stroke lengths, combination of different table sizes and tables with plastic cable carrier can be available. Consult IKO.

Dimension

CTX220



unit : mm

Model number	Stroke length S		Total length		Mounting holes for bed		Table mass(2) kg
	X-axis	Y-axis	LX	LY	A	n	
CTX220-2020	200	200	450	450	110	8	72.8
CTX220-3020	300	200	550	450	160	8	77.6
CTX220-3030	300	300	550	550	160	8	82.4
CTX220-4030	400	300	650	550	210 (2×105)	12	87.6

Note(1) : For dimension of motor, refer page 9-10.
(2) : Motor weight is not included.
Remark : Different stroke lengths, combination of different table sizes and tables with plastic cable carrier can be available. Consult IKO.

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

The Roller Effect Monster

IKO Linear Roller Way Super X

LRX

IKO

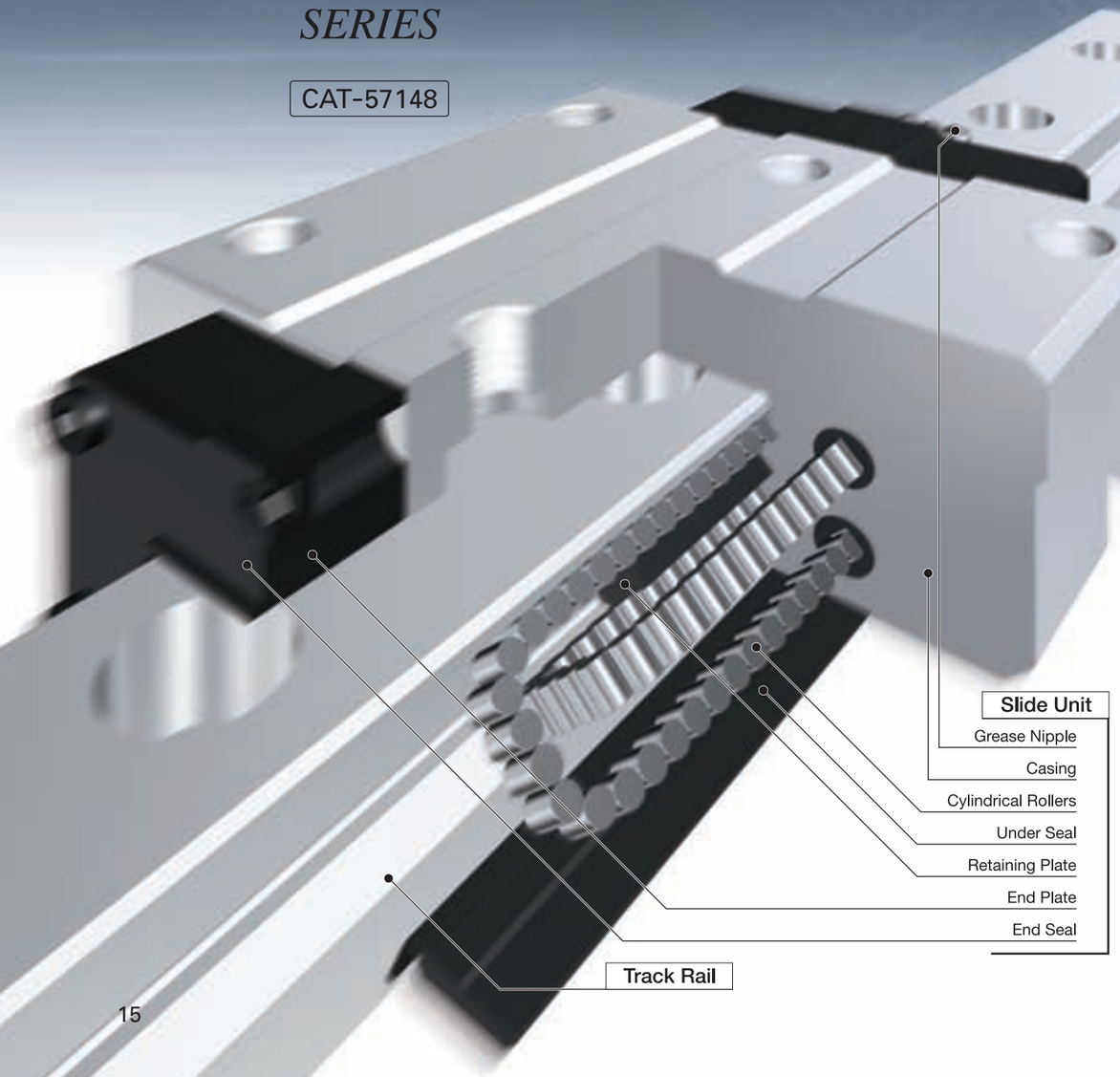
Linear Roller Way

SUPER X

SERIES

CAT-57148

In IKO Linear Roller Way Super X, four rows of cylindrical rollers are incorporated in a highly rigid casing with good balance, and the cylindrical rollers in each row are arranged in parallel to each other. Owing to its small elastic deformation, stable operation is ensured even under heavy or fluctuating loads. Smooth and quiet motion, high reliability, high rigidity and high running accuracy are realized.



High Rigidity

Superior Damping Characteristic

Well-balanced Structure

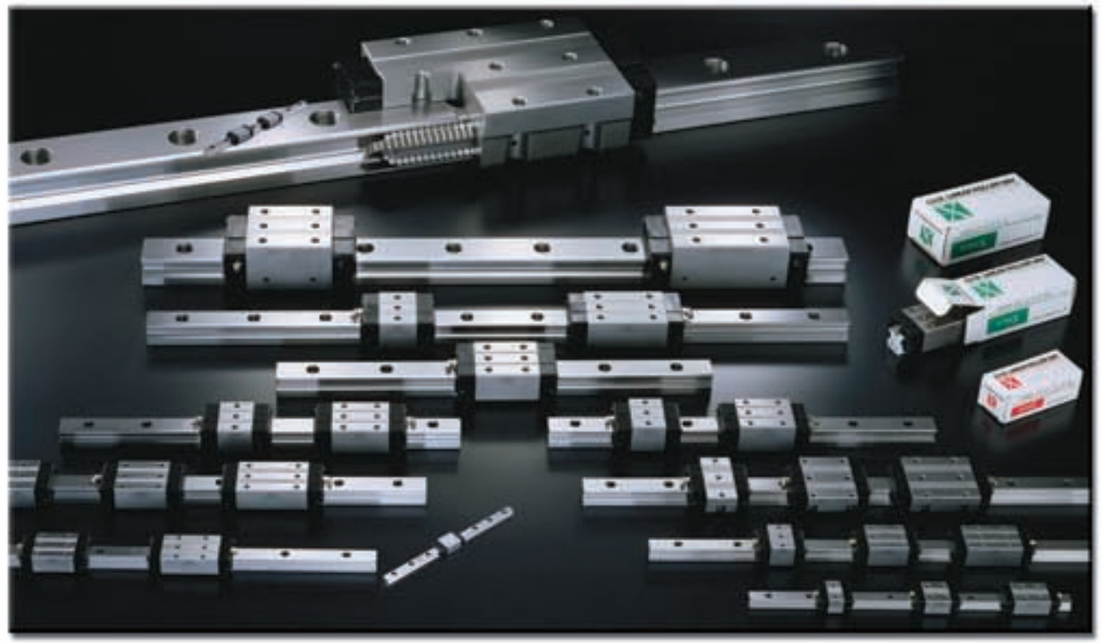
The Super X interchangeable series brings to you the **"Six Roller Effects"**, whenever and wherever they are required to give higher potentials for your application.

High Load Capacity

Long Life and High Accuracy

Smooth and Quiet Motion

In high rigidity and high load capacity IKO **Linear Roller Way Super X series**, the smallest size **LRX 10** is newly introduced covering a full range of variation. Nine types are now available in various sizes with track rail width ranging from 10mm to 100mm. Interchangeable, stainless steel made and nineteen kinds of special options are also available.



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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