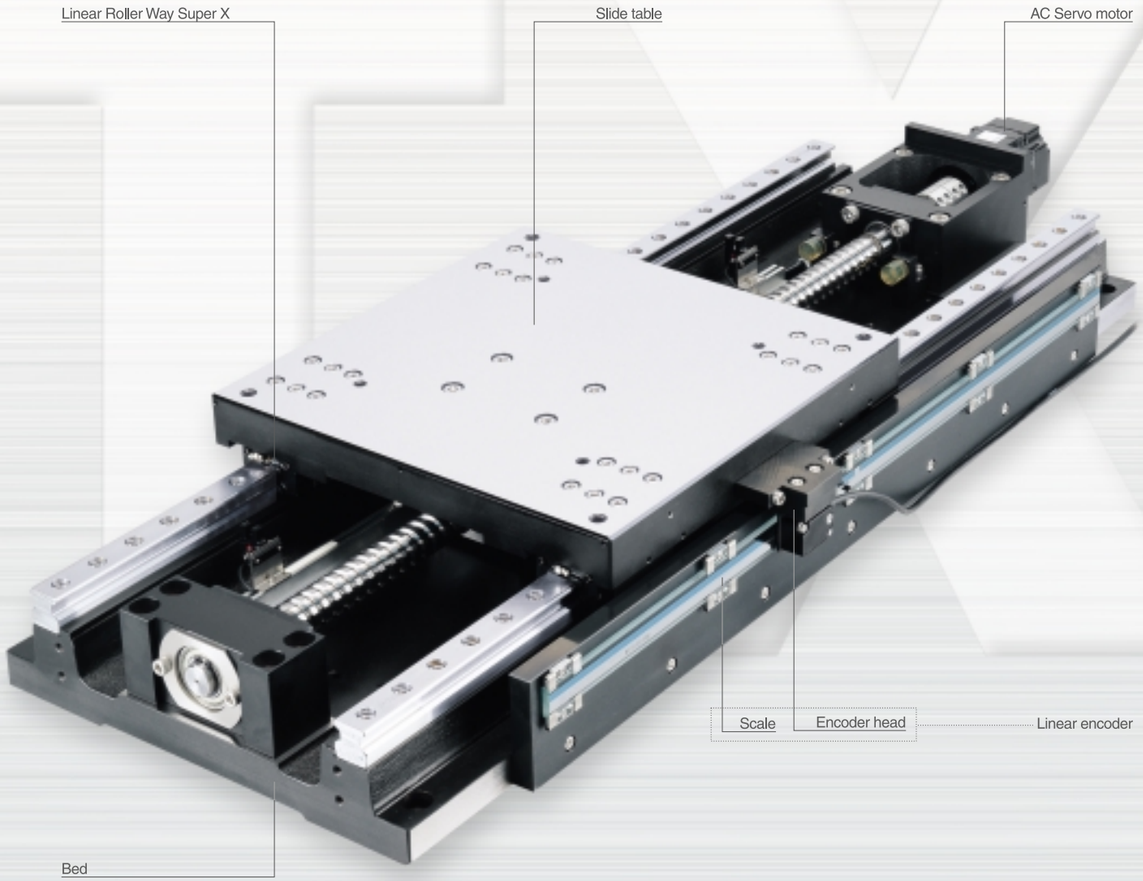
Super Precision Positioning Table

TX

PATENT PENDING



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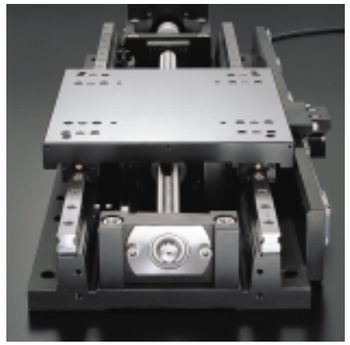
TX



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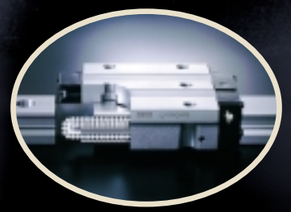
TX

IKO Super Precision Positioning Table



IKO TX is a Super Precision Positioning Table realizes super high running accuracy and high load capacity by incorporated IKO Linear Roller Way Super X as it guidance component. Epoch-making 5-micron meter of positioning accuracy is possible by full-closed-loop control system. This series is suitable to the application where high level of running accuracy is required and conventional rolling type positioning table cannot be used.

- **Incorporated Linear Roller Way Super X gives the best running accuracy.**
- **Full-closed-loop system governs direct control of table positioning.**
- **Linear encoder with 0.016 μm resolution is standardized.**

Note) Possible to change detail specification

High reliability and stability against fluctuating load

High rigidity and high load capacity are realized by incorporating Linear Roller Way Super X on rigid body of cast iron. Deflection level against load and mass can be minimal and high stability operation is promised even under fluctuating load.

Use in vacuum condition

Possible to use in vacuum environment in that air slide could not be used as its air gave negative affection. Can be supplied with vacuum environment grease on request.

For clean room application

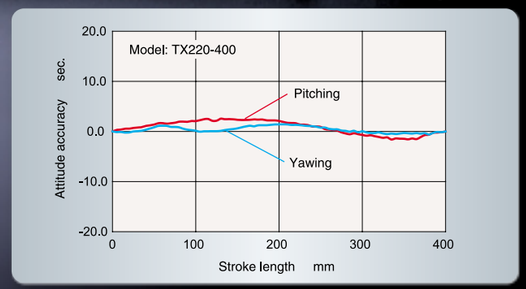
Low dust generating clean grease is available as an option. Please consult.

Simple construction

System configuration can be very simple since this positioning table does not require air-supplying equipment which is necessary for air slide, and helps saving space and cost.

*Less than **5** micron meter of positioning accuracy*

*Less than **7** seconds of attitude accuracy*



Identification Number and Specification

Example of identification number

TX 220 – 150 A / Y017 10
❶ ❷ ❸ ❹ ❺ ❻

❶Series	TX : Super Precision Positioning Table TX
❷Size	Refer to Table 1.
❸Stroke length	Refer to 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 servomotor, driver, serial exchange unit, motor code, encoder cord, and serial exchange cord are appended to the table.

❺Motor type	Refer to Table 2.
❻Ball screw code	5 : 5mm lead 10 : 10mm lead

Table 1 Model and stroke length

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

Table 2 Motors

Model	Motor code	
	With brake	Without brake
TX220	Y017	Y024
TX320	Y018	Y025
TX420	Y019	Y026

Accuracy

Accuracy of Super Precision Positioning Table TX is shown in Table 3.

Table 3 Accuracy

unit : mm

Model	Stroke length	Positioning accuracy	Repeatability	Lost motion	Parallelism in table operation A	Attitude accuracy(1) sec.	Straightness in vertical Straightness in horizontal
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

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

Maximum Speed

Maximum speed of Super Precision Positioning Table TX is shown in Table 4.
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 4.

Table 4 Maximum speeds

Lead of ball screw mm	Electron gear		Maximum speed mm/sec
	Numerator	Denominator	
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)

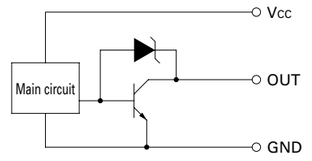
Remark 1. : Values in ( ) are applicable for TX320 and TX420.
2. : Actual maximum speed may be affected by load condition.
3. : Resolution is obtained by the following formula. The pitch of scale is 4 micron meter.

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

Sensor Specification

In Super Precision Positioning Table TX, one origin sensor, two limit sensors and one pre-origin sensor are appended in delivery. The specification of sensors is shown in Table 5, the specification of connectors is shown in Table 6 and sensor-timing chart is shown in Table 7.

Table 5 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 : 100mA ・Applied voltage : DC30V or less ・Residual voltage : 1.0V or less at 100mA 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	

Remark : Origin point is provided as a signal of linear encoder from the driver.

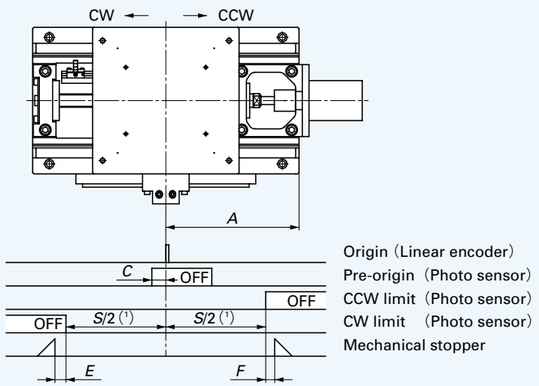
Table 6 Specifications of connector

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. : Connector is made by Tyco Electronics Co., Ltd.
2. : Opposite-side connector and contactor are not appended.

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

Table 7 Sensor timing chart



unit : mm

Model number	Ball screw lead	A	C	E	F
TX220	5	L/2 (1)	3	14	10
	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 9 to 10.

Table Inertia and Starting Torque

The table inertia, coupling inertia and starting torque of Super Precision Positioning Table TX are shown in Table 8.

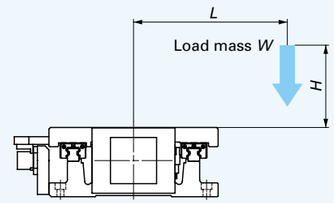
Table 8 Table inertia, coupling inertia and starting torque

Mode number	Stroke length mm	Table inertia J_T $\times 10^{-5}$kg・m² Lead 5mm	Table inertia J_T $\times 10^{-5}$kg・m² Lead 10mm	Coupling inertia J_C $\times 10^{-5}$kg・m²	Starting torque N・m
TX220	150	5.2	7.0	0.71	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	1.0	0.26
	400	23	29		
	500	26	32		
TX420	500	30	39	1.0	0.30
	600	33	42		
	800	39	48		

Maximum Load Mass

Maximum load masses of Super Precision Positioning Table TX are shown in Table 9. 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 9 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
TX220	5	0	410	220	140	100	79	66	56	43	35
		200	410	210	140	100	79	65	56	43	35
		400	400	200	130	99	79	65	56	43	35
		600	340	190	130	98	78	65	55	43	35
	10	0	230	170	110	78	62	51	43	34	27
		200	230	160	100	77	61	51	43	34	27
		400	230	140	98	75	60	50	43	33	27
		600	190	120	91	71	58	49	42	33	27
TX320	5	0	630	630	510	390	310	260	230	170	140
		200	630	630	500	380	310	260	220	170	140
		400	630	630	500	380	310	260	220	170	140
		600	630	630	480	370	300	260	220	170	140
	10	0	390	390	390	300	240	200	170	140	110
		200	390	390	390	300	240	200	170	140	110
		400	390	390	370	290	230	200	170	130	110
		600	390	390	340	270	230	190	170	130	110
TX420	5	0	610	610	610	530	440	370	320	250	210
		200	610	610	610	530	440	370	320	250	210
		400	610	610	610	530	430	370	320	250	210
		600	610	610	610	520	430	360	320	250	210
	10	0	370	370	370	370	340	290	250	200	160
		200	370	370	370	370	340	290	250	200	160
		400	370	370	370	370	330	280	250	200	160
		600	370	370	370	370	320	280	240	190	160

Remark : 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.

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 in Table 10.

●System configuration

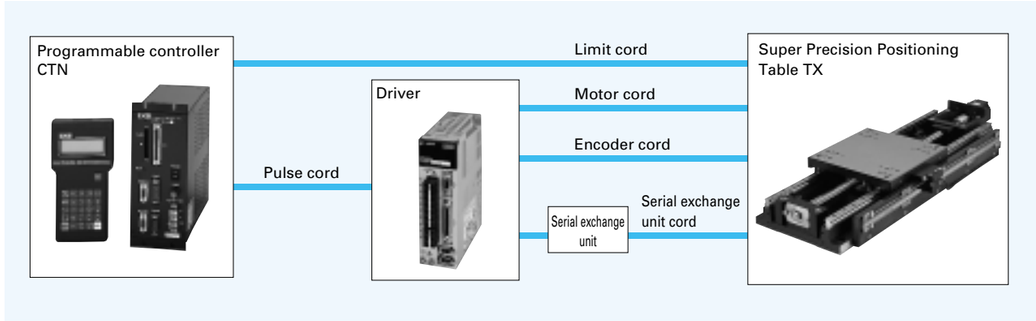


Table 10 Models of electric devices

With or without brake	Model number	Motor code	Model number of motor※	Model number of driver※	Serial exchange unit※	Motor cord	Encoder cord※	Serial exchange unit cord※
Without brake	TX220	Y017	SGMAS-04ACA21	SGDS-04A02A	JZDP-A003-000	JZSP-CSM02-03	JZSP-CSP01-03	JZSP-CLP20-03
	TX320	Y018	SGMAS-06ACA21	SGDS-08A02A		JZSP-CSM03-03		
	TX420	Y019	SGMAS-08ACA21					
With brake	TX220	Y024	SGMAS-04ACA2C	SGDS-04A02A		JZSP-CSM12-03		
	TX320	Y025	SGMAS-06ACA2C	SGDS-08A02A				
	TX420	Y026	SGMAS-08ACA2C			JZSP-CSM13-03		

Remark : Devices marked ※ are made by Yaskawa Electric Co., Ltd.

■Motor specifications

Motor specifications for Super Precision Positioning Table TX are shown in Table 11.

Table 11 Motor specifications

Item \ Motor code		Y017	Y018	Y019	Y024	Y025	Y026
Power supply voltage	V	200					
Rated output	W	400	600	750	400	600	750
Rated torque	N·m	1.27	1.91	2.39	1.27	1.91	2.39
Instantaneous maximum torque	N·m	3.82	5.73	7.16	3.82	5.73	7.16
Rated number of revolution	r/min	3000					
Motor inertia J_M	$\times 10^{-4}$kg·m^2	0.190	0.326	0.769	0.254	0.390	0.940
Dimensions □W×L_M (1)		60×98.5	60×124.5	80×115	60×138.5	60×172	80×160
Mass	kg	1.2	1.7	2.5	1.8	2.4	3.2

Note(1) : Refer to dimension tables on page 9 to 10.

■Driver specifications

Driver specifications for Super Precision Positioning Table TX are shown in Table 12.

Table 12 Driver specifications

Item \ Model code of driver	SGDS-04A02A	SGDS-08A02A	
Applicable motor code	Y017・Y024	Y018・Y025	Y019・Y026
Rated output	400W	600W	750W
Feedback	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	Line driver		
Capability of command input	1Mpps in maximum		
Main power supply voltage	Single phase AC200～230V +10～−15% 50/60Hz		
Control circuit supply voltage	Single phase AC200～230V +10～−15% 50/60Hz		
Continuous rated current Arms	2.8	5.5	
Maximum consumption current Arms	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	0.9	1.4	

■Programmable controller

Programmable controller and devices for Super Precision Positioning Table TX are shown in Table 13.

Table 13 Model of programmable controller and devices

Controller	Teaching box	Pulse cord	Limit cord
CTN130G	TAE1016-TB	TAE10C4-PC	Not specified (TAE1042-LC□□)
CTN140G	TAE1025-TB	TAE10C7-PC	TAE1027-LCA□□ (TAE1083-RLCA□□)
CTN150S	TAE1048-TB	TAE10D0-LD□□ (TAE10D1-LD□□)	

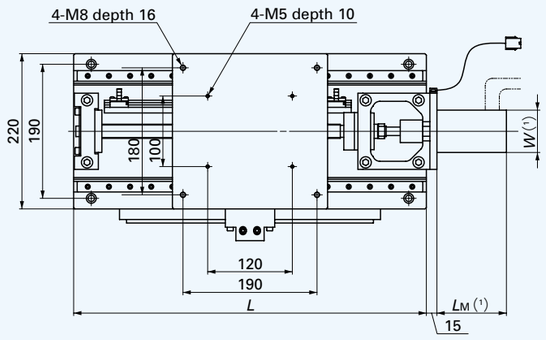
Remark 1. : The cord in ( ) is high bending resistance type.
2. : The length of limit cord is specified in the end of model number □□ by 1m pitch, maximum length is 20m.
3. : Length of pulse cord is 1.5m.

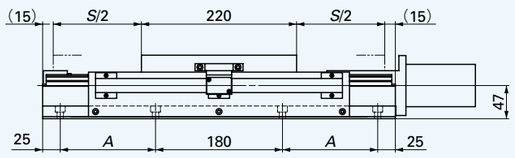
Caution in Use

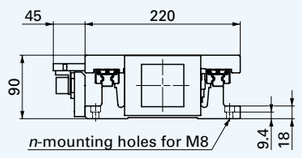
- Super Precision Positioning Table TX is a precision equipment. A careful handling is strongly required. Do not apply any excessive force or heavy shock.
- Make sure the mounting base to be free from dirt and harmful foreign objects.
- Grease is applied to the linear motion rolling guide and ball screw in 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 and, 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 encoder 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

TX220





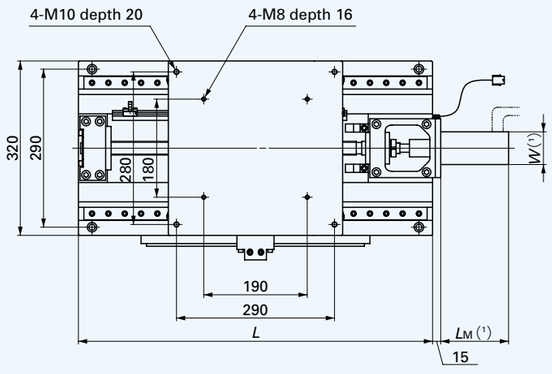


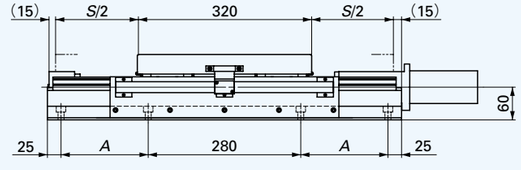
unit : mm

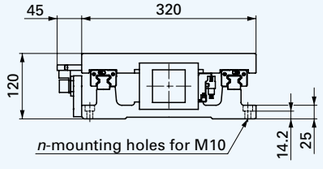
Model number	Stroke length S	Total length L	Mounting holes for bed A (number×pitch)	n	Table mass kg
TX220-150	150	400	85	8	33.6
TX220-200	200	450	110	8	36.4
TX220-250	250	500	135	8	38.7
TX220-300	300	550	160	8	41.2
TX220-400	400	650	210(2×105)	12	46.4

Note(1) : For dimensions of motors, refer table 11 on page 7.

TX320





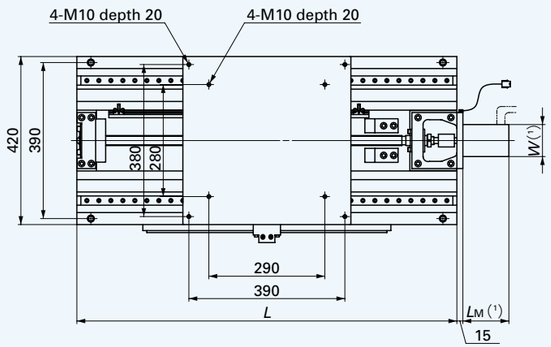


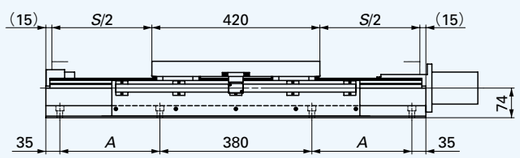
unit : mm

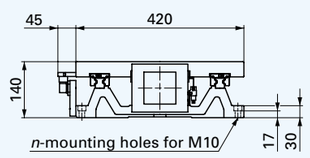
Model number	Stroke length S	Total length L	Mounting holes for bed A (number×pitch)	n	Table mass kg
TX320-300	300	650	160	8	103.7
TX320-400	400	750	210	8	114.1
TX320-500	500	850	260	8	124.0

Note(1) : For dimensions of motors, refer table 11 on page 7.

TX420







unit : mm

Model number	Stroke length S	Total length L	Mounting holes for bed A (number×pitch)	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 table 11 on page 7.

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