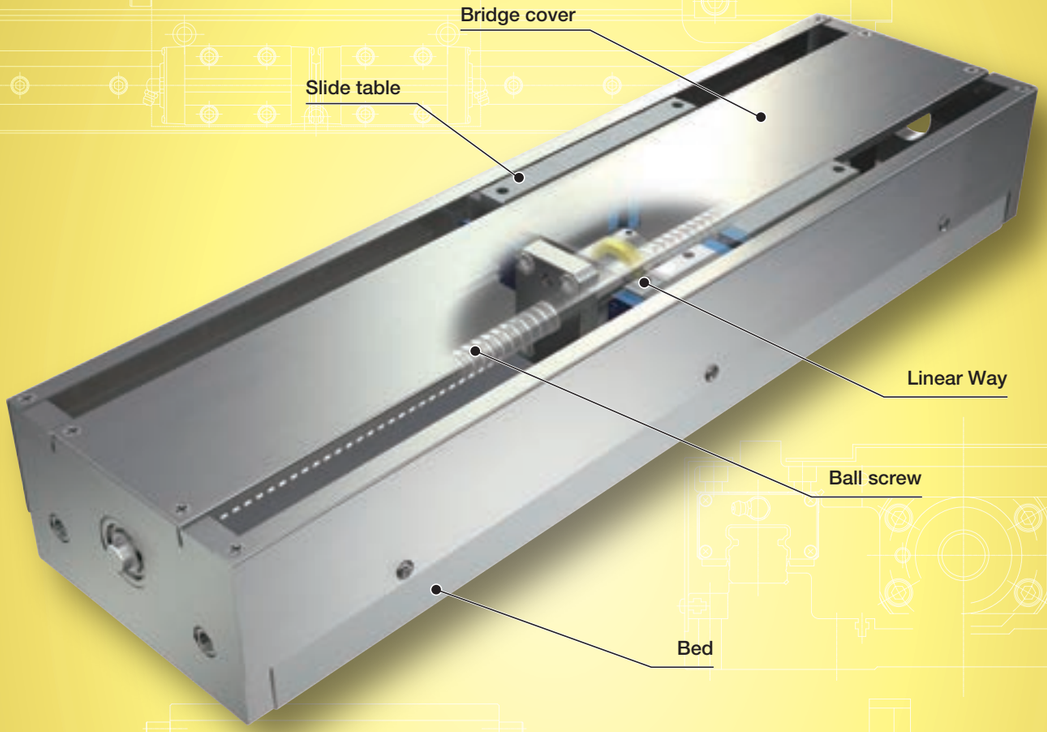
TSL…M

TSL···M

Ball screw

Linear



Major product specifications

Driving method	Precision ball screw
Linear motion rolling guide	Linear Way（ball type）
Built-in lubrication part	Lubrication part "C-Lube" is built-in
Material of table and bed	High-strength aluminum alloy
Sensor	Provided as standard

Accuracy

unit: mm

Positioning repeatability	±0.002
Positioning accuracy	0.015～0.060
Lost motion	–
Parallelism in table motion A	–
Parallelism in table motion B	0.020～0.070
Attitude accuracy	–
Straightness	–
Backlash	0.003

Points

● Light weight and long stroke positioning table

1 Light weight and long stroke positioning table configured with the slide table and bed made from high-strength aluminum alloy.

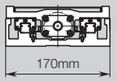
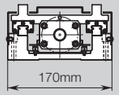
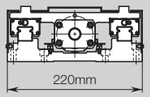
● Stable high running accuracy and positioning accuracy

2 High running accuracy and high accuracy positioning are realized by incorporating 2 sets of Linear Way in parallel, and combining with precision ball screws.

● Configuration of multiaxis system available with XY bracket

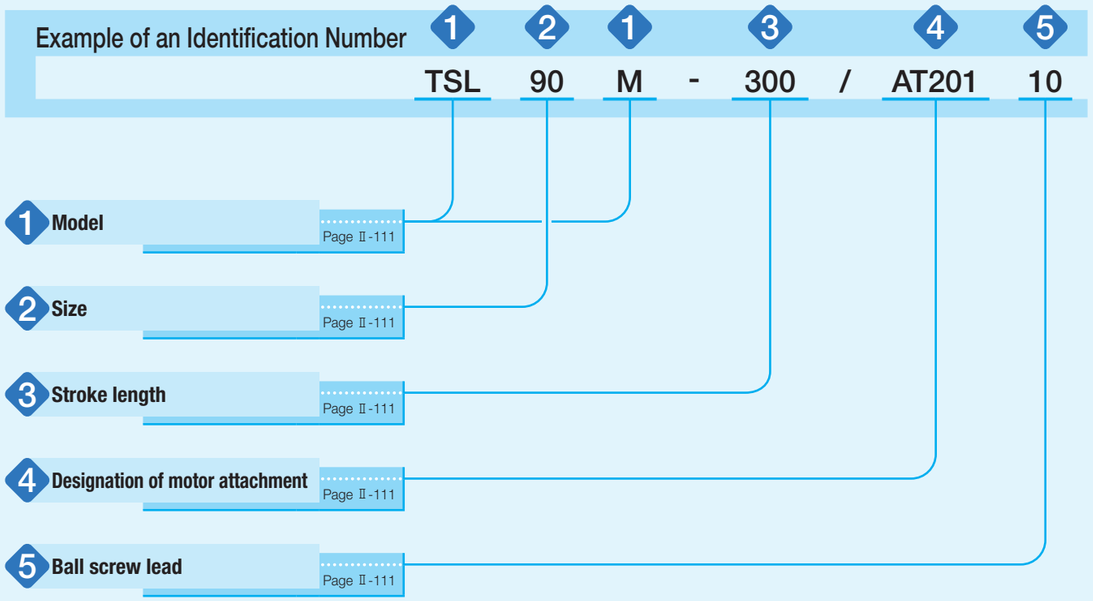
3 A series of four sizes from 90mm to 220mm (table width) is available. Multiaxis configuration can be easily realized with XY bracket.

Variation

Shape	Model and size	Table width (mm)	Stroke length (mm) 50	100	150	200	250	300	400	500	600	800	1 000
 90mm	TSL 90 M	90	☆	☆	☆	☆	☆	☆	–	–	–	–	–
 120mm	TSL120 M	120	–	☆	☆	☆	☆	☆	☆	☆	☆	–	–
 170mm	TSL170 M	170	–	–	☆	☆	☆	☆	☆	☆	–	–	–
 170mm	TSL170SM	170	–	–	–	–	–	☆	☆	☆	☆	☆	☆
 220mm	TSL220 M	220	–	–	–	–	–	☆	☆	☆	☆	☆	☆

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

Identification Number



Identification Number and Specification

1 Model

TSL···M: Precision Positioning Table L

2 Size

Size indicates table width.
Select a size from the list of Table 1.

3 Stroke length

Select a stroke length from the list of Table 1.

Table 1 Sizes, table width dimensions, and stroke lengths unit: mm

Model and size	Table width	Stroke length
TSL 90 M	90	50, 100, 150, 200, 250, 300
TSL120 M	120	100, 150, 200, 250, 300, 400, 500, 600
TSL170 M	170	150, 200, 250, 300, 400, 500
TSL170S M	170	300, 400, 500, 600, 800, 1 000
TSL220 M	220	300, 400, 500, 600, 800, 1 000

4 Designation of motor attachment

As for a motor attachment, select it from the list of Table 2.

- Motor should be prepared by customer.
- Please specify motor attachment applicable to motor for use.
- A coupling shown in Table 3 is mounted on the main body before shipment. However, the final position adjustment should be performed by customer since it is only temporarily fixed.
- When specifying an AC servomotor attachment, an origin sensor is not provided.

5 Ball screw lead

5: Lead 5mm
10: Lead 10mm

Identification Number and Specification

Table 2 Application of motor attachment

Models of motor to be used					Flange size mm	Motor attachment			
Type	Manufacturer	Series	Model	Rated output W		TSL 90M TSL170M	TSL120M	TSL170SM	TSL220M
AC servo motor	YASKAWA ELECTRIC CORPORATION	Σ-7	SGM7J-01A	100	□40	AT201	AT201	–	–
			SGM7A-01A			AT201	AT201	–	–
			SGM7J-02A	200	□60	–	–	AT202	AT202
			SGM7A-02A			–	–	AT202	AT202
	Mitsubishi Electric Corporation	J4/J5	HG-MR13	100	□40	AT201	AT201	–	–
			HG-KR13/HK-KT13W			AT201	AT201	–	–
			HG-MR23	200	□60	–	–	AT202	AT202
			HG-KR23/HK-KT23W			–	–	AT202	AT202
	Panasonic Corporation	MINAS A6	MSMF01	100	□38	AT203	AT203	–	–
			MSMF02	200	□60	–	–	AT204	AT204
	Hitachi Industrial Equipment Systems Co., Ltd	AD	ADMA-01L	100	□40	AT201	AT201	–	–
			ADMA-02L	200	□60	–	–	AT202	AT202
Stepper motor	ORIENTAL MOTOR Co., Ltd.	α step	ARM66		□60	AT205	AT206	–	–
			ARM69		□60	AT205	AT206	–	–
			ARM98		□85	–	–	AT207	AT210
			ARM911		□85	–	–	AT207	AT210
		RKS CRK	CRK56(1)		□60	AT208	AT209	–	–
			RKS59		□85	–	–	AT207	AT210

Note (1) Applicable to the outer diameter φ8 of motor output shaft.
Remark: For detailed motor specifications, please see respective motor manufacturer's catalog.

Table 3 Coupling models

Motor attachment	Coupling models	Manufacturer	Coupling inertia J_C ×10^{-5}kg · m^2
AT201	UA-25C- 8× 8	Sakai Manufacturing Co., Ltd	0.29
AT202	UA-35C-12×14	Sakai Manufacturing Co., Ltd	1.34
AT203	UA-25C- 8× 8	Sakai Manufacturing Co., Ltd	0.29
AT204	UA-35C-11×12	Sakai Manufacturing Co., Ltd	1.34
AT205	MSTS-25C- 8×10	Nabeya Bi-tech Kaisha	0.71
AT206	MSTS-25C- 8×10	Nabeya Bi-tech Kaisha	0.71
AT207	MSTS-32C-12×14	Nabeya Bi-tech Kaisha	2.70
AT208	MSTS-20C- 8× 8	Nabeya Bi-tech Kaisha	0.25
AT209	MSTS-25C- 8× 8	Nabeya Bi-tech Kaisha	0.71
AT210	MSTS-32C-12×14	Nabeya Bi-tech Kaisha	2.70

Remark: For detailed coupling specifications, please see respective manufacturer's catalog.

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

Specifications

Table 4 Accuracy unit: mm

Model and size	Stroke length	Positioning repeatability	Positioning accuracy	Parallelism in table motion B	Backlash
TSL 90 M	50	±0.002	0.015	0.020	0.003
	100		0.020	0.030	
	150				
	200		0.025		
	250				
	300		0.030	0.040	
TSL120 M	100	±0.002	0.020	0.030	0.003
	150				
	200		0.025		
	250				
	300		0.030	0.040	
	400		0.040	0.050	
	500		0.045		
	600		0.050	0.070	
TSL170 M	150	±0.002	0.020	0.030	0.003
	200		0.025		
	250				
	300		0.030	0.050	
	400		0.040		
	500		0.045		
TSL170SM TSL220 M	300	±0.002	0.030	0.040	0.003
	400		0.040	0.050	
	500		0.045		
	600		0.050	0.070	
	800				
	1 000		0.060		

Table 5 Maximum speed

Motor type	Model and size	Stroke length mm	Maximum speed mm/s	
			Lead 5mm	Lead 10mm
AC Servomotor	TSL 90 M	–	500	1000
	TSL120 M	500 or less	370	750
		600	370	720
	TSL170 M	–	370	750
	TSL170 SM	800 or less	280	560
	TSL220 M	1000	190	390
Stepper motor	TSL 90 M TSL120 M TSL170 M TSL170 SM TSL220 M	–	150	300

Remark: To measure the practical maximum speed, it is required to consider operation patterns based on the motor to be used and load conditions.

Table 6 Maximum carrying mass

Model and size	Ball screw lead mm	Carrying mass position mm (Length L / Height H)	Maximum carrying mass kg							
			Horizontal direction				Vertical direction			
			0	100	200	300	0	100	200	300
TSL 90 M	5	0	46	20	11	8	7	7	7	7
		100	46	20	11	8	7	7	7	7
		200	46	20	11	8	7	7	7	7
		300	46	20	11	8	7	7	6	5
	10	0	26	16	9	6	4.7	4.7	4.7	4.7
		100	26	15	9	6	4.7	4.7	4.7	4.7
		200	26	14	8	6	4.7	4.7	4.7	4.7
		300	26	13	8	6	4.7	4.7	4.7	4.4
TSL120 M	5	0	195	144	84	59	18	18	18	18
		100	195	143	83	59	18	18	18	18
		200	195	140	83	58	18	18	18	18
		300	195	136	82	58	18	18	18	18
	10	0	97	97	63	44	18	18	18	18
		100	97	97	63	44	18	18	18	18
		200	97	97	61	44	18	18	18	18
		300	97	92	59	43	18	18	18	18
TSL170 M	5	0	195	174	104	74	18	18	18	18
		100	195	171	103	74	18	18	18	18
		200	195	166	102	73	18	18	18	18
		300	195	160	101	73	18	18	18	18
	10	0	97	97	78	55	17	17	17	17
		100	97	97	77	55	17	17	17	17
		200	97	97	74	54	17	17	17	17
		300	97	97	70	52	17	17	17	17
TSL170SM	5	0	218	191	117	84	21	21	21	21
		100	218	190	117	84	21	21	21	21
		200	218	188	116	84	21	21	21	21
		300	218	186	116	84	21	21	21	21
	10	0	113	113	90	65	20	20	20	20
		100	113	113	89	64	20	20	20	20
		200	113	113	88	64	20	20	20	20
		300	113	113	86	63	20	20	20	20
TSL220 M	5	0	226	226	226	226	19	19	19	19
		100	226	226	226	226	19	19	19	19
		200	226	226	226	226	19	19	19	19
		300	226	226	226	225	19	19	19	19
	10	0	111	111	111	111	18	18	18	18
		100	111	111	111	111	18	18	18	18
		200	111	111	111	111	18	18	18	18
		300	111	111	111	111	18	18	18	18

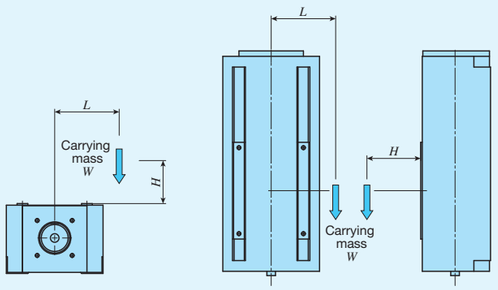
Remark: The maximum carrying mass is adjusted by the mass when the rating life of the linear motion rolling guide, ball screws, or bearings is 18,000 hours during continuous operation at a number of revolutions of the motor of 3000min^{-1} and an acceleration/deceleration time of 0.2s. The mass calculated is based upon the basic static load rating of the linear motion rolling guide.

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

Table 7 Maximum load mass

Model and size	Ball screw lead mm	Maximum load mass kg	
		Horizontal direction	Vertical direction
TSL 90 M	5	169	42
	10	89	21
TSL120 M	5	124	36
	10	76	20
TSL170 M	5	132	37
	10	78	20
TSL170 SM	5	92	41
	10	114	36
TSL220 M	5	77	36
	10	110	35

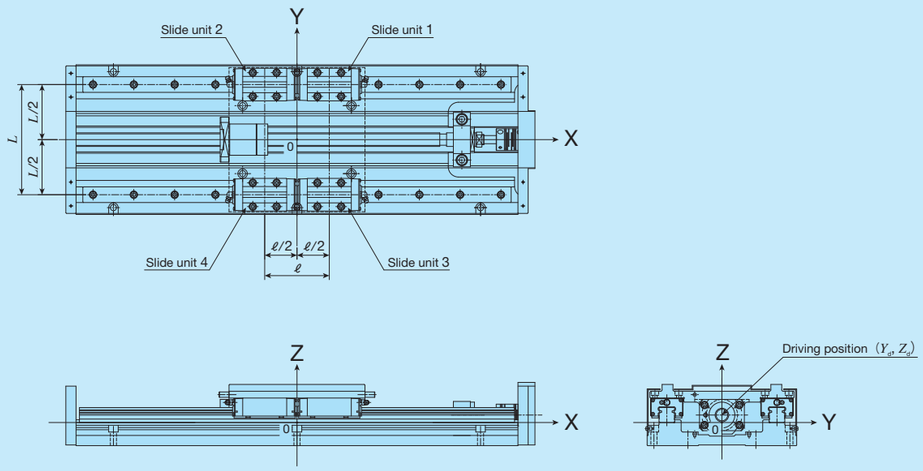
Remarks 1. The maximum load mass shows the mass that ensures acceleration/deceleration of 0.3G.
2. The values shown in this table were calculated with the motor with the highest rated torque installed, selected from the AC servomotor models listed in Table 2.



Carrying mass position (horizontal direction)

Carrying mass position (vertical direction)

Table 8 Specification of linear motion rolling guide



Model and size	Basic dynamic load rating(1) C N	Basic static load rating(1) C_0 N	Arrangement			
			L mm	ℓ mm	Y_d mm	Z_d mm
TSL 90 M	1 810	2 760	60	60	0	−7
TSL120 M	11 600	13 400	80	66	0	8
TSL170 M			106	66	0	11
TSL170SM			120	130	0	1
TSL220 M	25 200	28 800	162	95	0	11

Note (1) Represent the value per slide unit.

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

Specifications

Table 9.1 Specifications of ball screw 1

Model and size	Lead mm	Shaft dia. mm	Axial clearance mm	Basic dynamic load rating C N	Basic static load rating C_0 N
TSL 90 M	5	10	0.005	1 470	2 210
	10			1 030	1 370
TSL120 M TSL170 M	5	15	0.005	3 820	6 370
	10			3 820	6 370
TSL170SM TSL220 M	5	20	0.005	4 460	8 580
	10			4 460	8 580

Table 9.2 Specifications of ball screw 2

unit: mm

Model and size	Stroke length	Shaft dia.	Overall length
TSL 90 M	50	10	179
	100		229
	150		279
	200		329
	250		379
	300		429
TSL120 M	100	15	273
	150		323
	200		373
	250		423
	300		473
	400		573
	500		673
	600		773
TSL170 M	150	15	289
	200		339
	250		389
	300		439
	400		539
	500		639
TSL170SM	300	20	545
	400		645
	500		745
	600		845
	800		1 045
	1 000		1 245
TSL220 M	300	20	545
	400		645
	500		745
	600		845
	800		1 045
	1 000		1 245

Table 10 Table inertia and starting torque

Model and size	Stroke length mm	Table inertia J_T ×10⁻⁵kg・m²		Starting torque T_S N・m
		Lead 5mm	Lead 10mm	
TSL 90 M	50	0.20	0.33	0.05
	100	0.25	0.38	
	150	0.28	0.40	
	200	0.33	0.45	
	250	0.35	0.48	
	300	0.40	0.53	
TSL120 M	100	1.3	1.7	0.06
	150	1.5	1.9	
	200	1.7	2.1	
	250	1.9	2.3	
	300	2.1	2.5	
	400	2.4	2.9	
	500	2.8	3.3	
	600	3.2	3.7	
TSL170 M	150	1.4	1.8	0.06
	200	1.6	2.0	
	250	1.8	2.2	
	300	2.0	2.4	
	400	2.3	2.8	
	500	2.7	3.2	
TSL170S M	300	6.9	7.4	0.10
	400	8.1	8.6	
	500	9.3	9.8	
	600	11	11	
	800	13	14	
	1 000	15	16	
TSL220 M	300	7.5	8.5	0.10
	400	8.7	9.7	
	500	9.9	11	
	600	11	12	
	800	14	15	
	1 000	16	17	

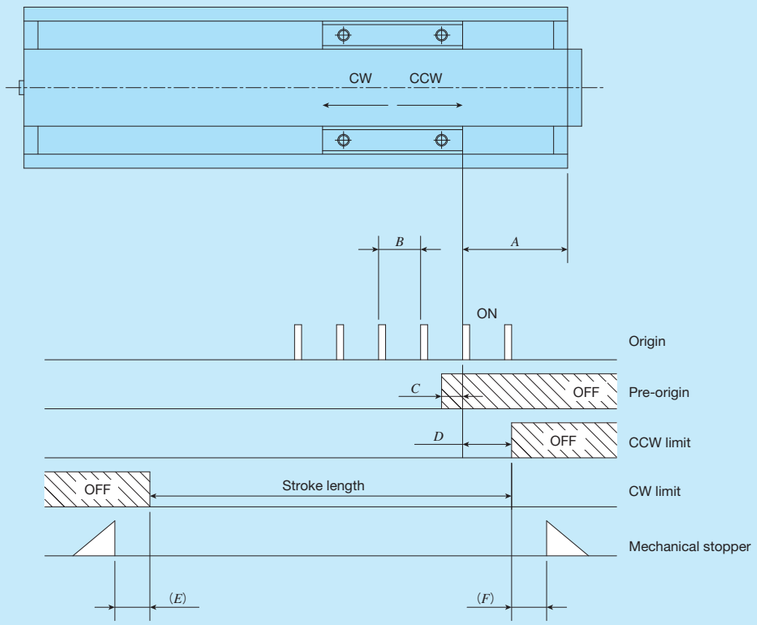
Mounting

For the processing accuracy of the Precision Positioning Table mounting surface and the tightening torque of the fixing screws, see page Ⅲ-30.

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

Sensor Specification

Table 11 Sensor timing chart



unit: mm

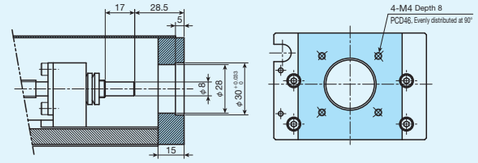
Model and size	Ball screw lead	*A*	*B*	*C*	*D*	*E*	*F*
TSL 90 M	5	50	5	3	20	5	5
	10		10	7			
TSL120 M	5	60	5	3	20	15	15
	10		10	7			
TSL170 M	5	45	5	3	20	3	3
	10		10	7			
TSL170SM	5	60	5	3	20	5	5
	10		10	7			
TSL220 M	5	60	5	3	20	5	5
	10		10	7			

Remark: For detailed specifications of respective sensors, please see the section of sensor specification in General Explanation.

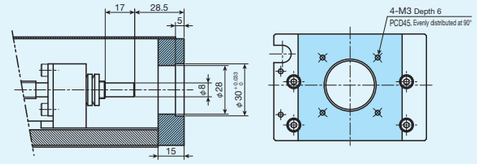
Dimensions of Motor Attachment

TSL90M

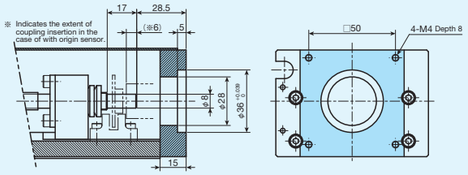
AT201



AT203

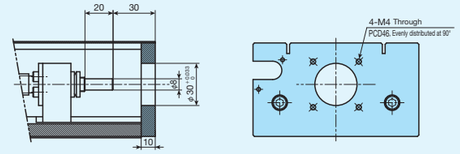


AT205
AT208

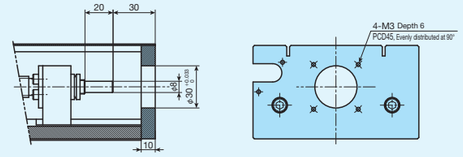


TSL120M

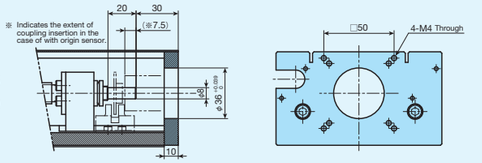
AT201



AT203

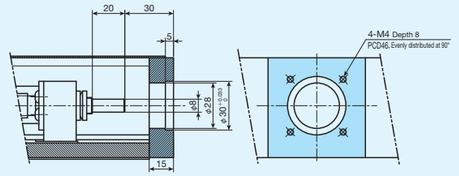


AT206
AT209

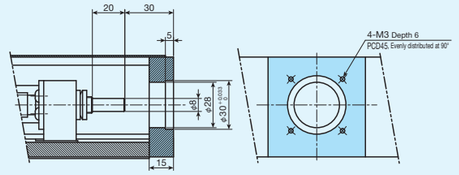


TSL170M

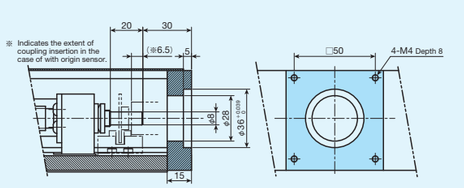
AT201



AT203

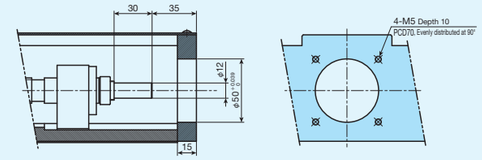


AT205
AT208

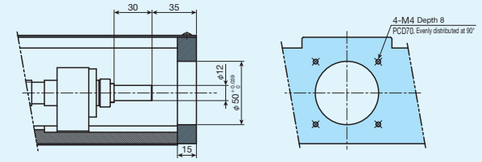


TSL170SM

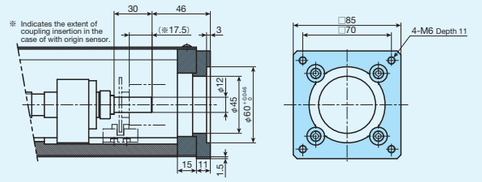
AT202



AT204



AT207

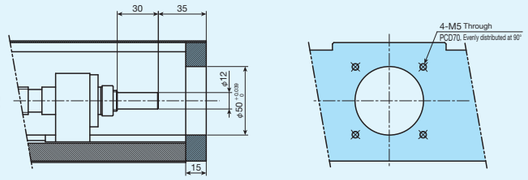


1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

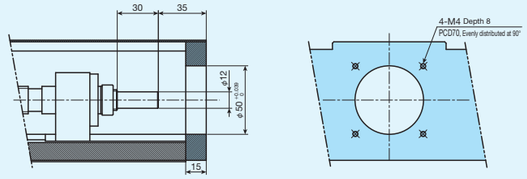
Dimensions of Motor Attachment

TSL220M

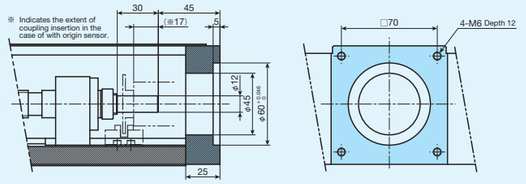
AT202



AT204



AT210



XY Bracket

Precision Positioning Table L can configure various combinations of two-axis using XY bracket (aluminum alloy) shown in Fig. 2. If you are interested, please specify the identification number of your desired model from the figure.

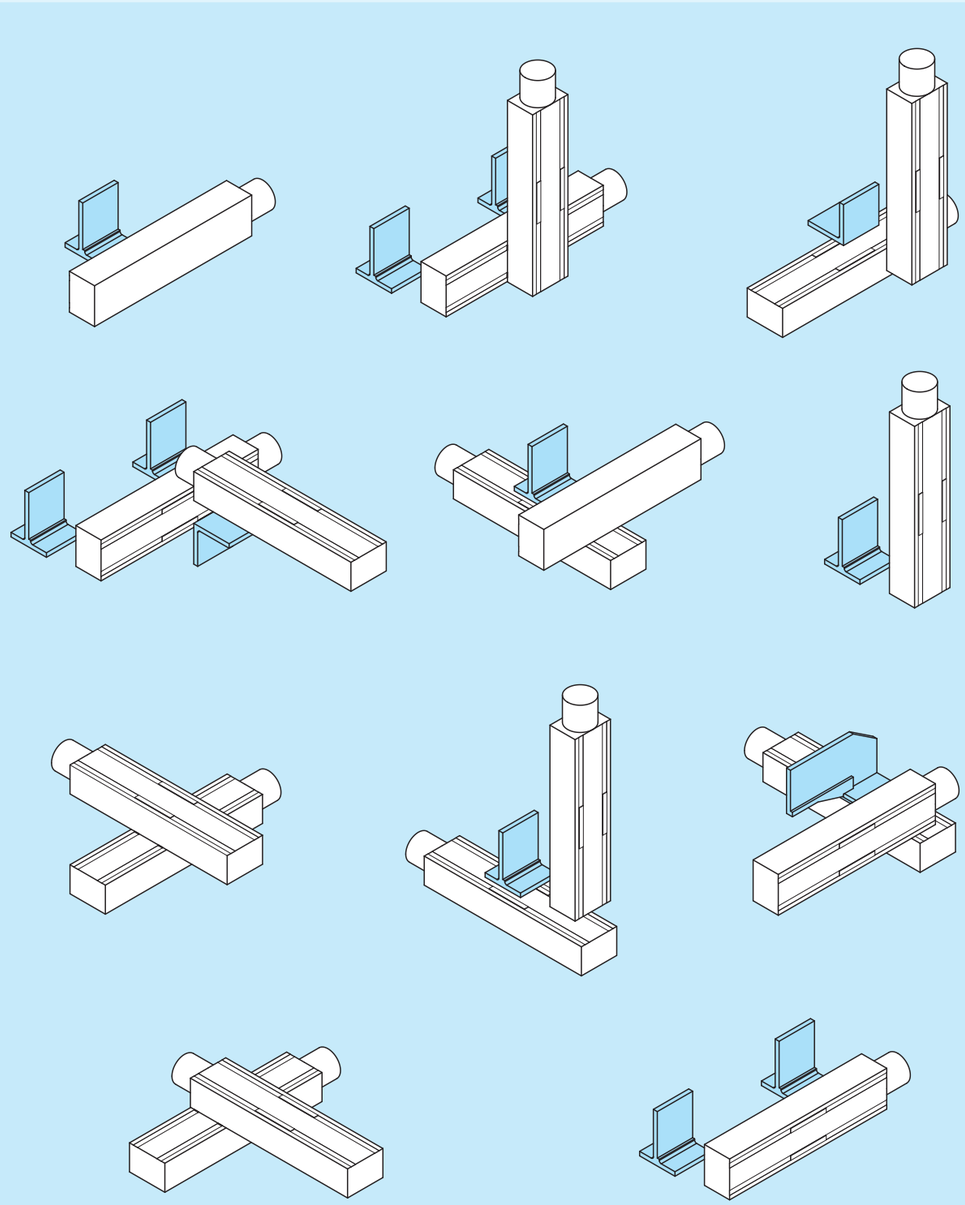
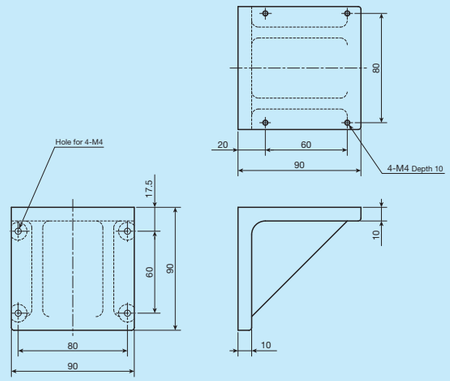


Fig. 1 Examples of two-axis combinations

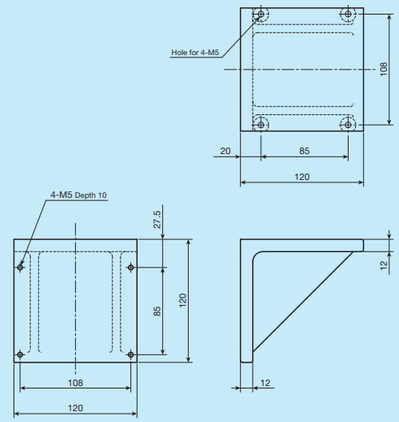
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

XY Bracket

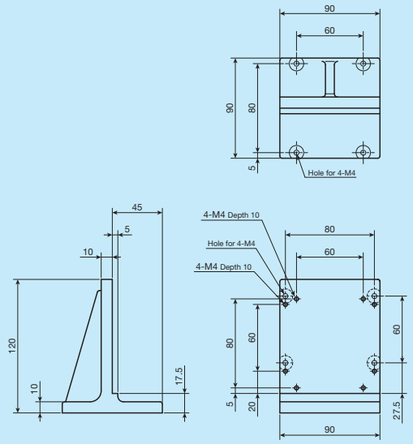
●TSL90-AGL



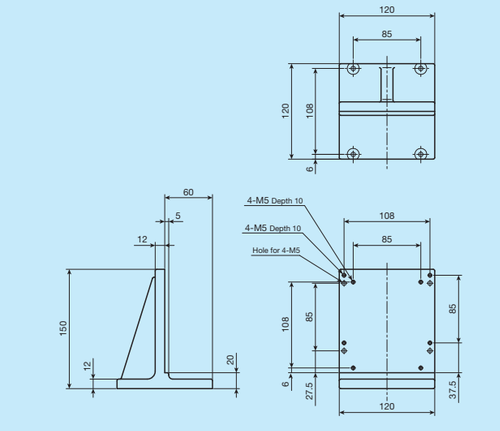
●TSL120-AGL



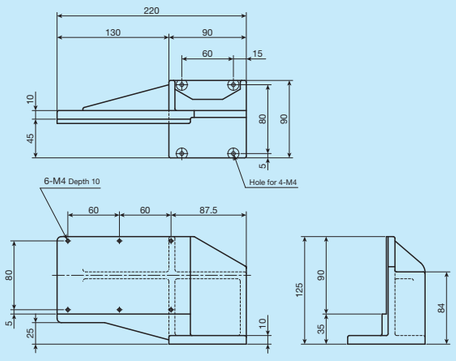
●TSL90-AGI



●TSL120-AGI



●TSL90-AGT



●TSL120-AGT

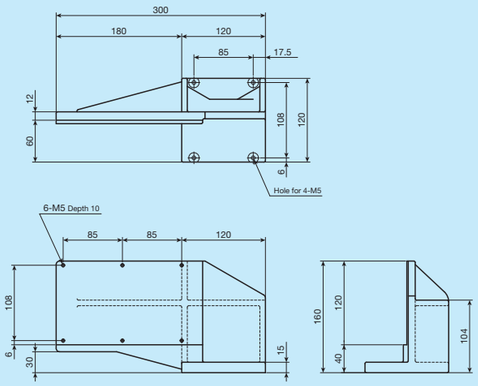
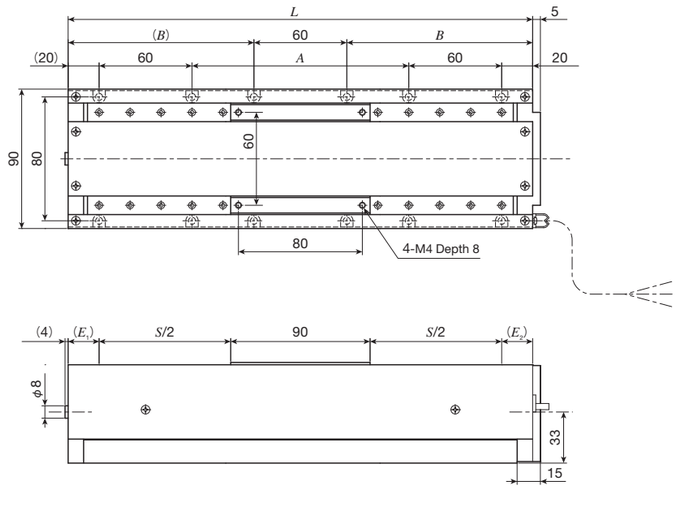


Fig. 2 XY bracket

IKO Precision Positioning Table L

TSL90M

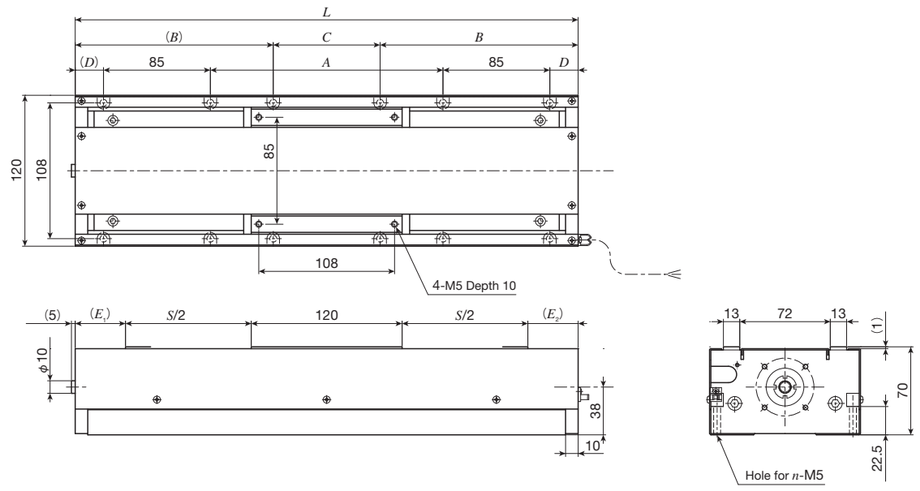


unit: mm

Identification number	Stroke length			Dimensions of table			Mass (Ref.) kg
	S	E_1	E_2	Overall length L	Mounting holes of bed A	B	
TSL90M- 50	50	30	30	200	40	70	2.8
TSL90M-100	100			250	90	95	3.2
TSL90M-150	150			300	140	120	3.5
TSL90M-200	200			350	190	145	3.9
TSL90M-250	250			400	240	170	4.2
TSL90M-300	300			450	290	195	4.6

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

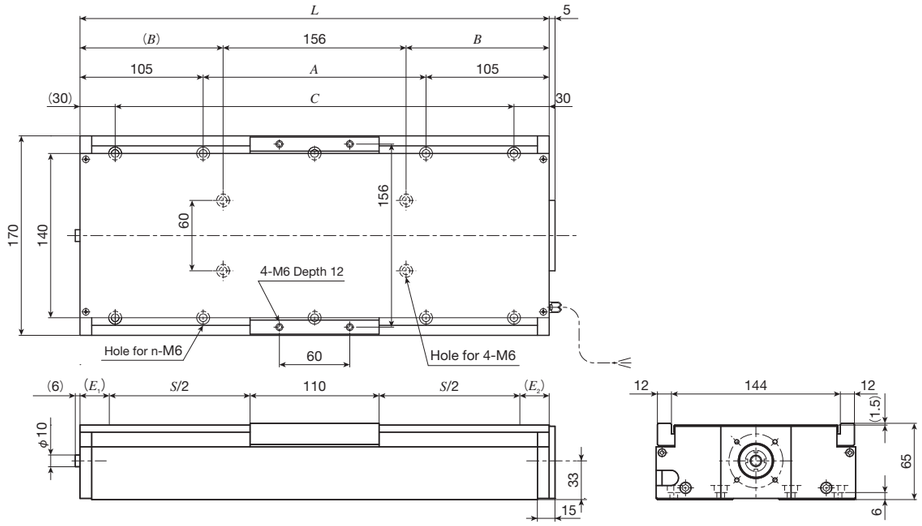
TSL120M



unit: mm

Identification number	Stroke length			Dimensions of table						Mass (Ref.) kg
					Mounting holes of bed					
	S	E_1	E_2	Overall length L	A	B	C	D	n	
TSL120M-100	100	40	40	300	85	107.5	85	22.5	8	6.1
TSL120M-150	150			350	135	132.5	85	22.5	12	6.6
TSL120M-200	200			400	185	157.5	85	22.5	12	7.1
TSL120M-250	250			450	235	182.5	85	22.5	12	7.6
TSL120M-300	300			500	255	207.5	85	37.5	12	8.1
TSL120M-400	400			600	355	207.5	185	37.5	12	9.1
TSL120M-500	500			700	455	207.5	285	37.5	12	10.1
TSL120M-600	600			800	555	207.5	385	37.5	12	11.1

TSL170M

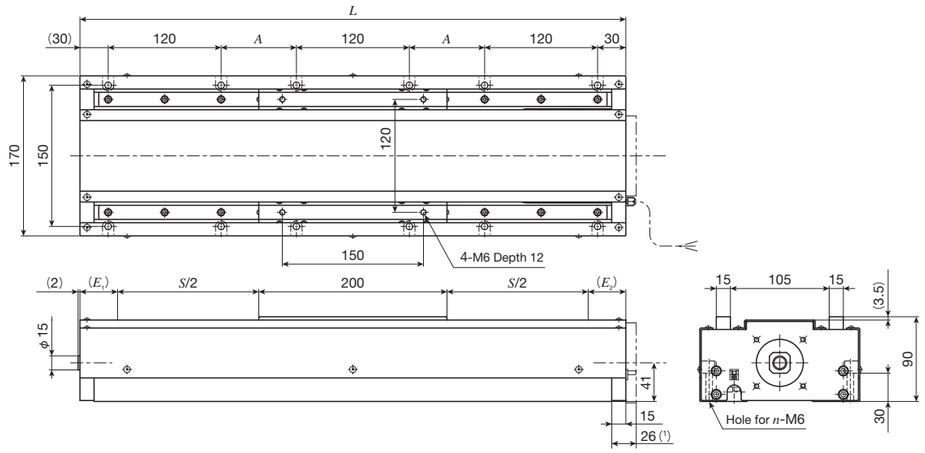


unit: mm

Identification number	Stroke length			Dimensions of table					Mass (Ref.) kg
					Mounting holes of bed				
	S	E_1	E_2	Overall length L	A	B	C (the number of holes×pitch)	n	
TSL170M-150	150	25	25	310	100	77	250	8	7.2
TSL170M-200	200			360	150	102	300	8	7.8
TSL170M-250	250			410	200	127	350 (2×175)	10	8.4
TSL170M-300	300			460	250	152	400 (2×200)	10	9.1
TSL170M-400	400			560	350	202	500 (2×250)	10	10.4
TSL170M-500	500			660	450	252	600 (2×300)	10	11.6

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

TSL170SM

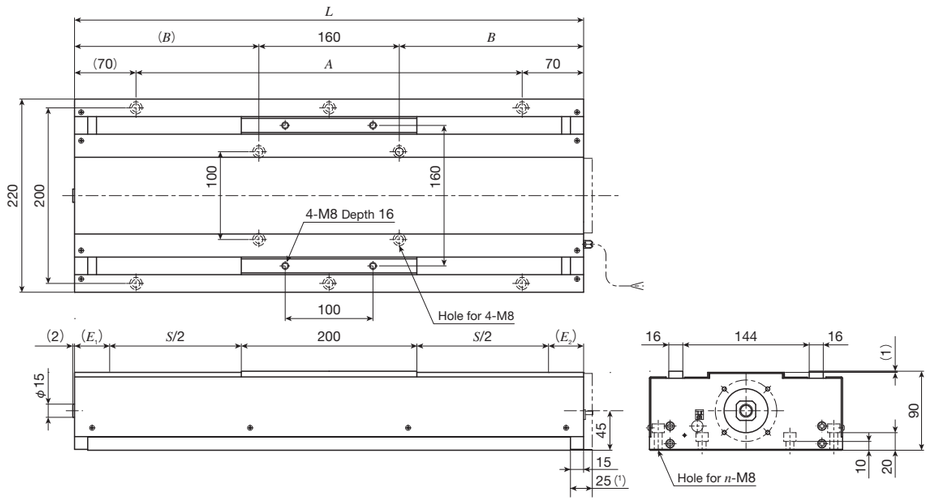


unit: mm

Identification number	Stroke length			Dimensions of table			Mass (Ref.) kg
	S	E_1	E_2	Overall length L	Mounting holes of bed A (the number of holes×pitch)	n	
TSL170SM- 300	300	40	40	580	80	12	14.8
TSL170SM- 400	400			680	130	12	16.6
TSL170SM- 500	500			780	180	12	18.5
TSL170SM- 600	600			880	230	12	20.3
TSL170SM- 800	800			1 080	330 (2×165)	16	24.0
TSL170SM-1000	1 000			1 280	430 (2×215)	16	27.7

Note (1) Applicable to AT207.

TSL220M



unit: mm

Identification number	Stroke length			Dimensions of table				Mass (Ref.) kg
	S	E_1	E_2	Overall length L	Mounting holes of bed A (the number of holes×pitch)	B	n	
TSL220M- 300	300	40	40	580	440 (2×220)	210	6	20.1
TSL220M- 400	400			680	540 (2×270)	260	6	22.5
TSL220M- 500	500			780	640 (2×320)	310	6	24.7
TSL220M- 600	600			880	740 (4×185)	360	10	27.0
TSL220M- 800	800			1 080	940 (4×235)	460	10	31.5
TSL220M-1000	1 000			1 280	1 140 (4×285)	560	10	36.2

Note (1) Applicable to AT210.

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