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# Single Axis Robot

Technical Information

# Single Axis Robot

## Technical Information

### KK Series

P. 01



### KA Series

P. 21



### KS Series

P. 49



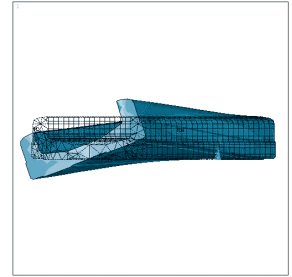
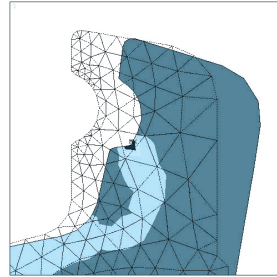
### Appendix

P. 55

# Single Axis Robot KK Series

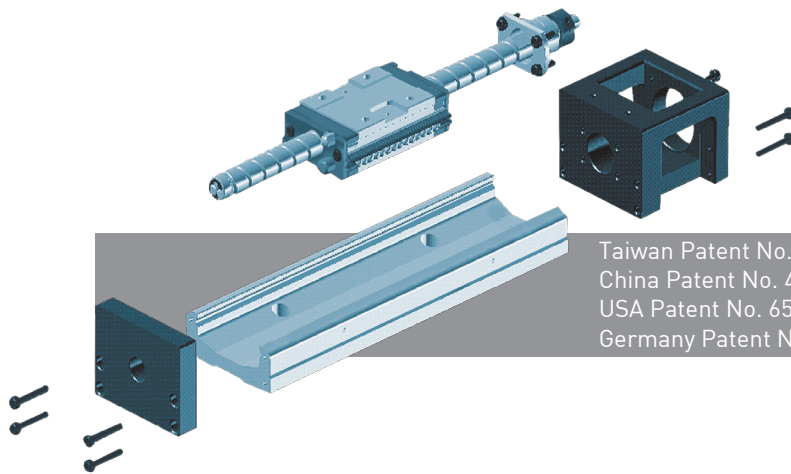
## 1.1 Features

- An integrated system
- Easy installation and maintenance
- Compact and lightweight
- High accuracy
- High stiffness
- Complete selection of accessories for most applications.



Caption: FEM Analysis

The KK Single Axis Robot features a slider actuated by a motor-driven ballscrew and guided by a linear guideway with a U-shape rail. The slider acts as the ballscrew's nut and the guideway's block.

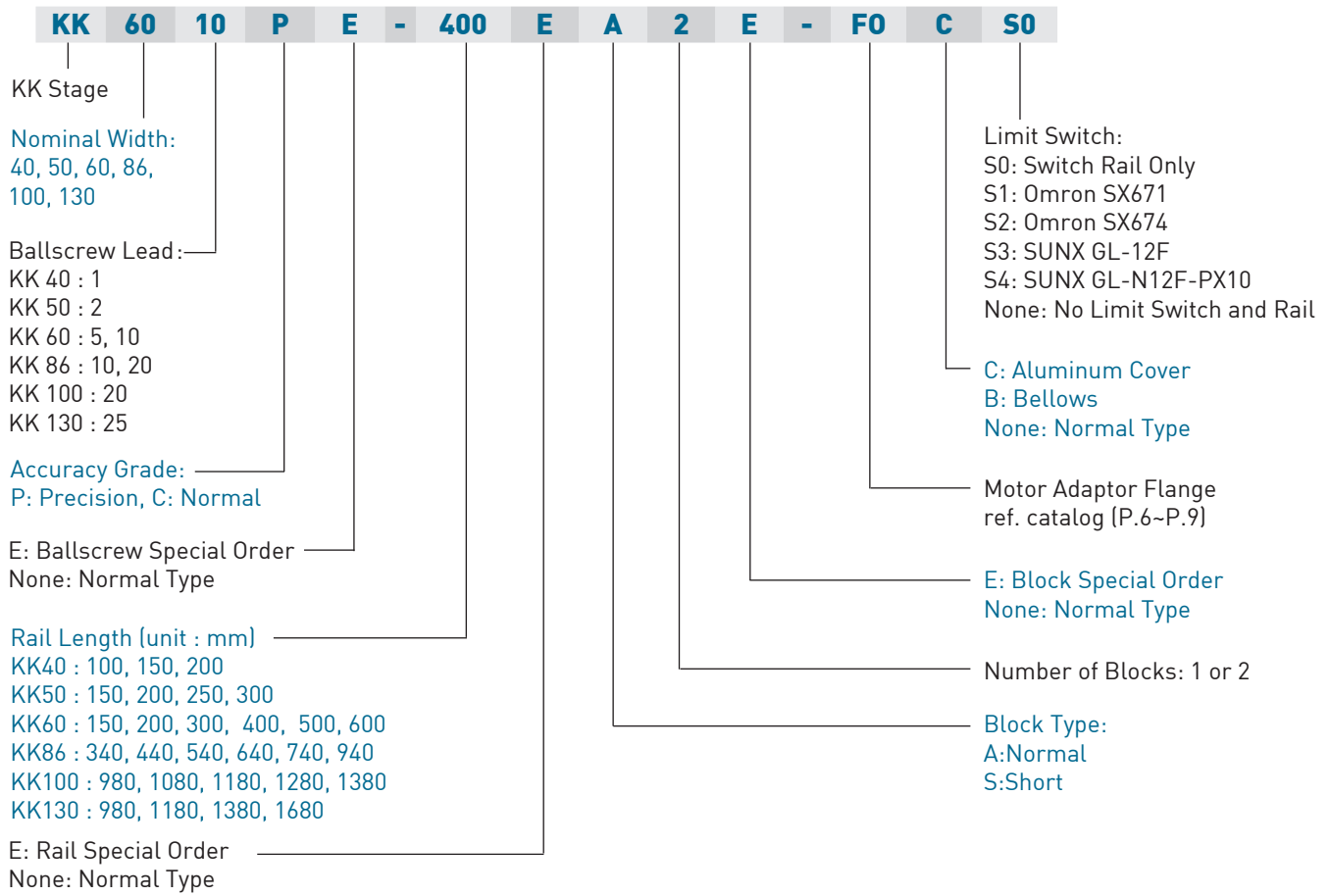


Taiwan Patent No. 183022  
China Patent No. 481446  
USA Patent No. 6584868  
Germany Patent No. 20117489.8



## 1.2 Model Number of KK Series

Example: KK6010P-E-400-E-A-2-E-F0-C-S0

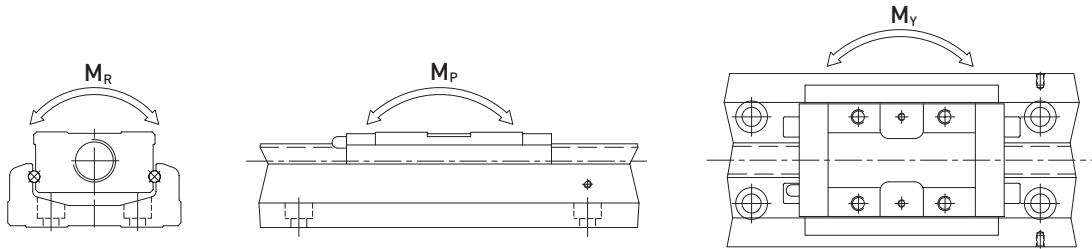




## 1.3 Maximum Speed Limit

Model	Ball screw Lead (mm)	Rail Length (mm)	Speed (mm/sec)	
			Precision	Normal
KK40	01	100	190	190
		150	190	190
		200	190	190
KK50	02	150	270	270
		200	270	270
		250	270	270
		300	270	270
KK60	05	150	550	390
		200	550	390
		300	550	390
		400	550	390
		500	550	390
		600	340	340
	10	150	1100	790
		200	1100	790
		300	1100	790
		400	1100	790
		500	1100	790
		600	670	670
KK86	10	340	740	520
		440	740	520
		540	740	520
		640	740	520
		740	740	520
		940	610	430
	20	340	1480	1050
		440	1480	1050
		540	1480	1050
		640	1480	1050
		740	1480	1050
		940	1220	870
KK100	20	980	1120	800
		1080	980	800
		1180	750	750
		1280	510	630
		1380	440	530
KK130	25	980	1120	800
		1180	1120	800
		1380	830	800
		1680	550	550

## 1.4 Specifications



Model No.		Ball screw				Guideway															
		Nominal Diameter (mm)	Lead (mm)	Basic Dynamic Load (N)	Basic Static Load (N)	Basic Dynamic Load Rating (N)		Basic Static Load Rating (N)		Static Rated Moment											
						Block A	Block S	Block A	Block S	Allowable Static Moment $M_p$ (N-m) (pitching)				Allowable Static Moment $M_y$ (N-m) (yawing)				Allowable Static Moment $M_R$ (N-m) (rolling)			
										Block A1	Block A2	Block S1	Block S2	Block A1	Block A2	Block S1	Block S2	Block A1	Block A2	Block S1	Block S2
KK40	Precision	8	1	735	1538	3920	-	6468	-	33	182	-	-	33	182	-	-	81	162	-	-
	Normal			676	1284																
KK50	Precision	8	2	2136	3489	8007	-	12916	-	116	278	-	-	116	278	-	-	222	444	-	-
	Normal			1813	2910																
KK60	Precision	12	5	3744	6243	13230	7173	21462	11574	152	348	72	205	152	348	72	205	419	838	241	482
	Normal			3377	5625																
KK60	Precision	12	10	2410	3743	13230	7173	21462	11574	152	348	72	205	152	348	72	205	419	838	241	482
	Normal			2107	3234																
KK86	Precision	15	10	7144	12642	31458	21051	50764	29475	622	3050	166	1309	622	3050	166	1309	1507	3014	847	1694
	Normal			6429	11387																
KK86	Precision	15	20	4645	7655	31458	21051	50764	29475	622	3050	166	1309	622	3050	166	1309	1507	3014	847	1694
	Normal			4175	6889																
KK100	Precision	20	20	7046	12544	39200	-	63406	-	960	4763	-	-	960	4763	-	-	2205	4410	-	-
	Normal			4782	9163																
KK130	Precision	25	25	7897	15931	48101	-	84829	-	1536	7350	-	-	1536	7350	-	-	3885	7770	-	-
	Normal			7092	14352																

## 1.5 Accuracy Grade

Unit : mm

Model	Rail Length	Repeatability		Accuracy		Running Parallelism		Starting Torque(N-cm)					
		Precision	Normal	Precision	Normal	Precision	Normal	Precision	Normal				
KK40	100	±0.003	±0.01	0.020	-	0.010	-	1.2	0.8				
	150												
	200												
KK50	150	±0.003	±0.01	0.020	-	0.010	-	4	2				
	200												
	250												
	300												
KK60	150	±0.003	±0.01	0.020	-	0.010	-	15	7				
	200												
	300												
	400												
	500	±0.003	±0.01	0.025	-	0.015	-	15	7				
	600												
KK86	340	±0.003	±0.01	0.025	-	0.015	-	15	10				
	440												
	540												
	640												
	740	±0.003	±0.01	0.030	-	0.020	-	17	10				
	940												
KK100	980	±0.005	±0.01	0.035	-	0.025	-	17	12				
	1080												
	1180	±0.005	±0.01	0.040	-	0.03	-	20	12				
	1280			0.045		0.035		23					
	1380			0.05		0.04		25					
KK130	980	±0.005	±0.01	0.035	-	0.025	-	25	15				
	1180			0.04		0.03		25	15				
	1380			±0.007		±0.012		0.05	-	0.04	-	27	18
	1680												

## 1.6 Motor and Motor Adaptor Flange

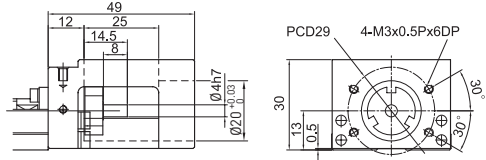
### 1.6.1 Motor and Motor Adaptor Flange

Motor		Model	KK40	KK50	KK60	KK86	KK100	KK130	
AC Servo Motor	HIWIN	FBAC102(200W)				F0	F0	F1	
		FBAC104(400W)							
	Panasonic	MSM3AZ(30W)	F2	F2	F2	F3			
		MSM5AZ(50W)							
		MSM01(100W)							
		MSM02(200W)				F1			
		MSM04(400W)							
		MSM08(750W)				F4	F2	F4	
	MHI	HC-PQ033(30W)	F1	F1	F1	F2			
		HC-PQ053(50W)							
		HC-PQ13(100W)							
		HC-KFS053(50W)	F1	F1	F1	F2			
		HC-KFS13(100W)							
		HC-KFS23(200W)				F0	F0	F1	
		HC-KFS43(400W)							
	HC-MF73(750W)					F1	F2		
	Yaskawa	SGMAH-A3(30W)		F1	F1	F2			
		SGMAH-A5(50W)							
		SGMAH-01(100W)							
		SGMPH-01(100W)							
SGMAH-02(200W)					F0	F0	F1		
SGMAH-04(400W)									
SGMPH-02(200W)							F0		
SGMPH-04(400W)									
SGMAH-08(750W)					F1	F2			
Nema17			F3	F3	F5				
Nema23				(F-E2)	F4	F6			
Nema34							F4		
Stepping Motor	HIWIN	FRST40-21	F3	F3	F5				
		FRST55-21	F3	F3	F5				
		FRST55-25	F3	F3	F5				
		FRST55-23	F3	F3	F5				
	VEXTA	PK24	F3	F3	F5				
		PK26		(F-E2)	F4	F6			
		PK29					F4	F3	
		PK54		F3	F5				
		PK56		(F-E1)		F5			
	PK59					F3			
	Nema17			F3	F3	F5			
	Nema23				(F-E2)	F4	F6		
Nema34							F4		

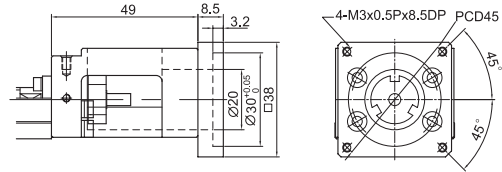
## 1.6.2 Motor Adaptor Flange

### KK40

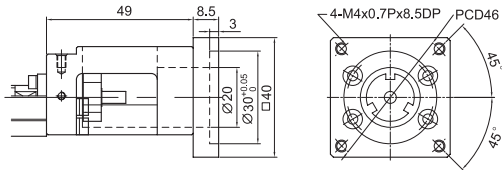
Motor Adaptor Flange F0



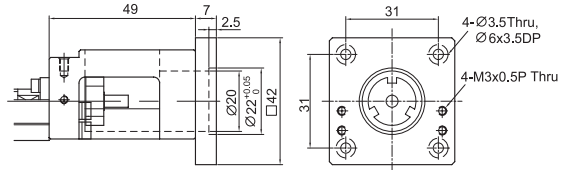
Motor Adaptor Flange F2



Motor Adaptor Flange F1

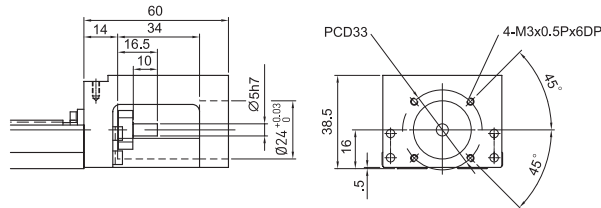


Motor Adaptor Flange F3

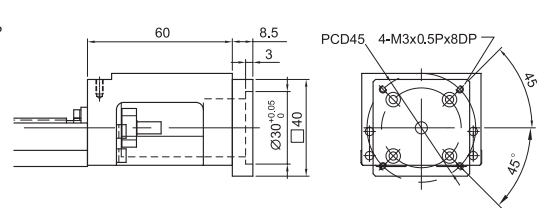


### KK50

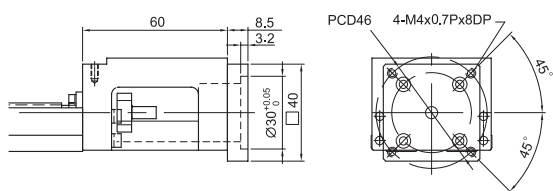
Motor Adaptor Flange F0



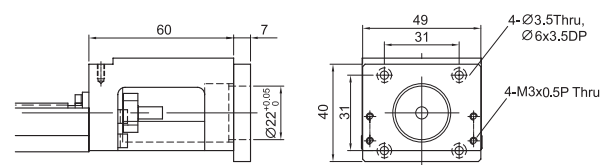
Motor Adaptor Flange F2



Motor Adaptor Flange F1

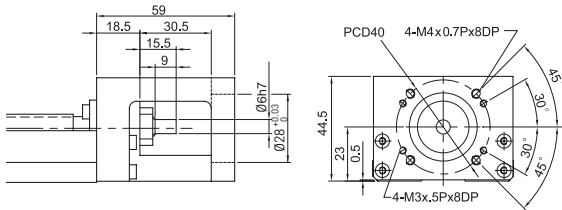


Motor Adaptor Flange F3

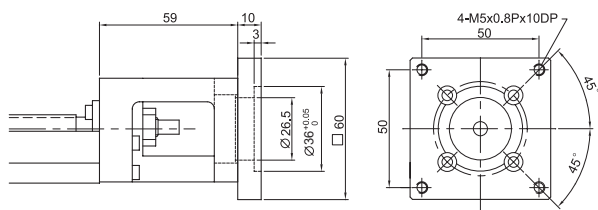


## KK60

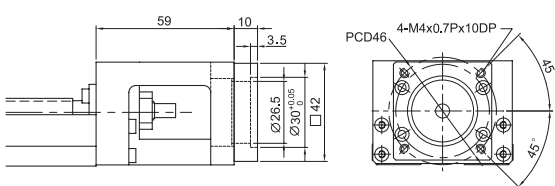
### Motor Adaptor Flange F0



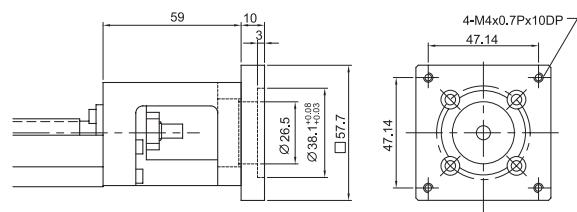
### Motor Adaptor Flange F3



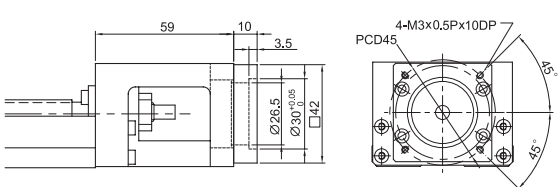
### Motor Adaptor Flange F1



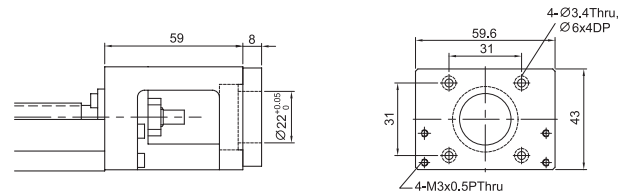
### Motor Adaptor Flange F4



### Motor Adaptor Flange F2

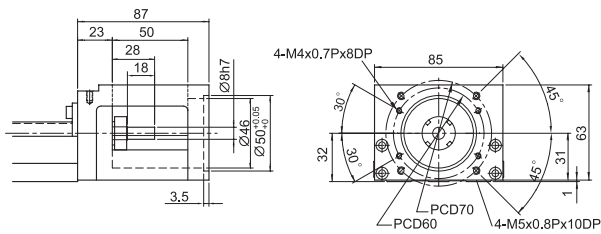


### Motor Adaptor Flange F5

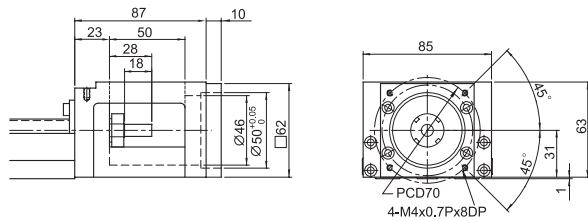


## KK86

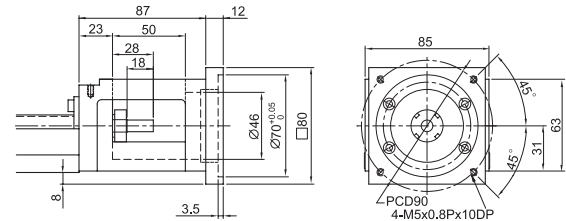
### Motor Adaptor Flange F0



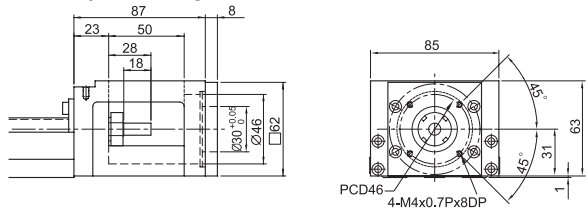
### Motor Adaptor Flange F1



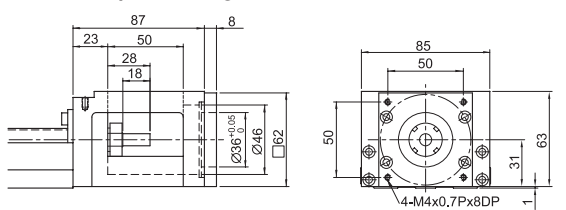
### Motor Adaptor Flange F4



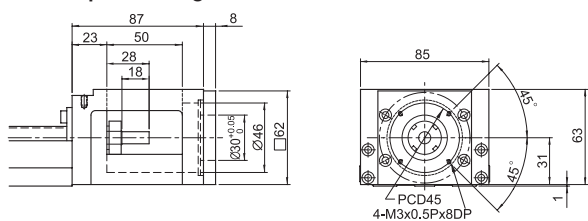
### Motor Adaptor Flange F2



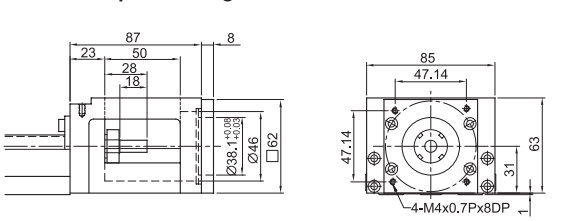
### Motor Adaptor Flange F5



### Motor Adaptor Flange F3

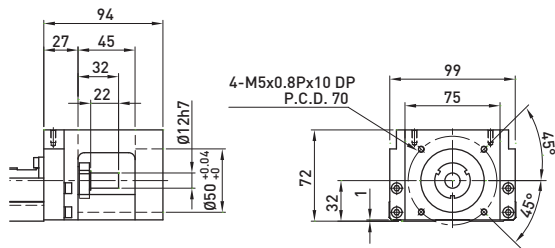


### Motor Adaptor Flange F6

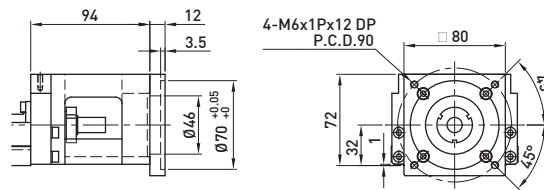


## KK100

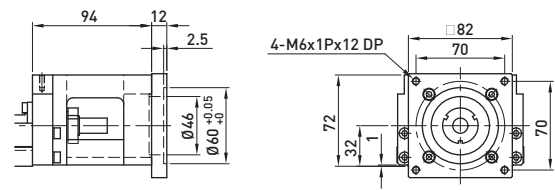
Motor Adaptor Flange F0



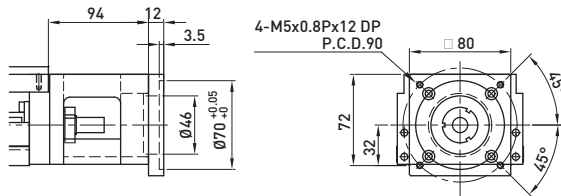
Motor Adaptor Flange F1



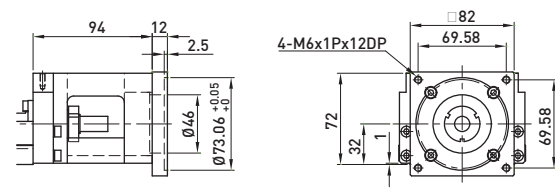
Motor Adaptor Flange F3



Motor Adaptor Flange F2

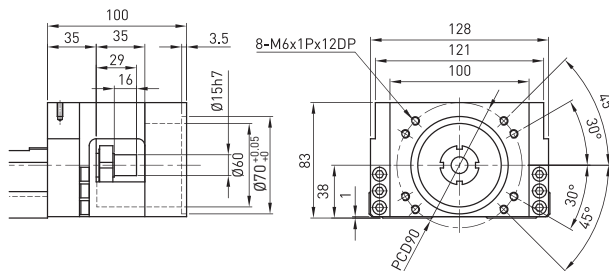


Motor Adaptor Flange F4

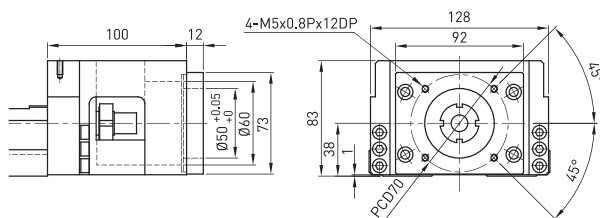


## KK130

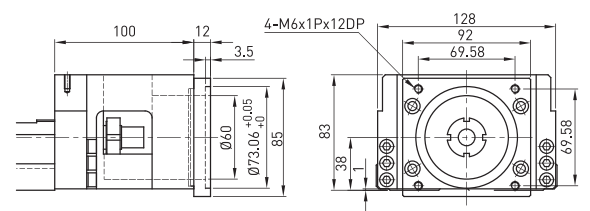
Motor Adaptor Flange F0



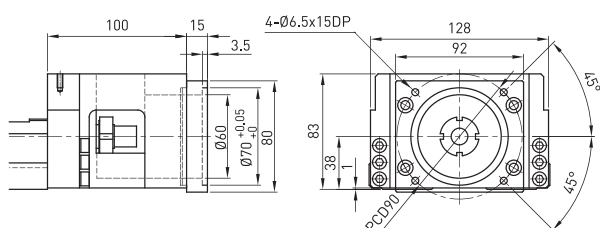
Motor Adaptor Flange F1



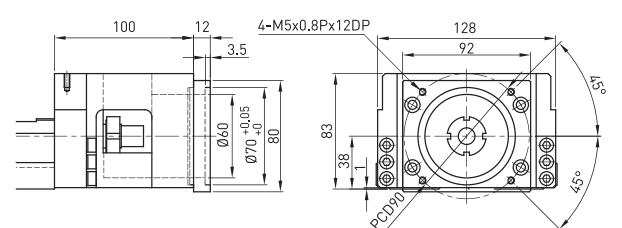
Motor Adaptor Flange F3



Motor Adaptor Flange F2

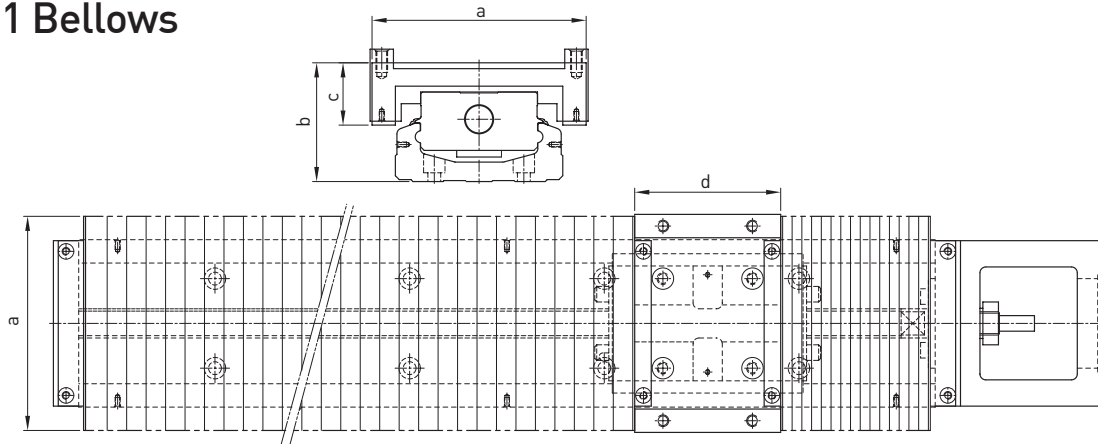


Motor Adaptor Flange F4



## 1.7 Optional Accessories

### 1.7.1 Bellows

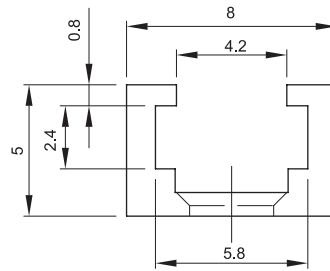


Nominal Width	Rail Length	Stroke	Min.	Max.	a	b	c	d
KK50	150	60	21.5	81.5	62	37	19	47
	200	95	29	124				
	250	130	36.5	166.5				
	300	160	46.5	206.5				
KK60	150	56	16	80	84	45.5	24	54
	200	106	20	126				
	300	166	40	206				
	400	234	56	290				
	500	306	70	376				
	600	366	90	456				
KK86	340	188	36	224	110	61	32	75
	440	260	50	310				
	540	336	62	398				
	640	408	76	484				
	740	480	90	570				
	940	640	110	750				
KK100	980	769	58	827	150	73	41	95
	1080	855	65	920				
	1180	945	70	1015				
	1280	1029	78	1107				
	1380	1115	85	1200				

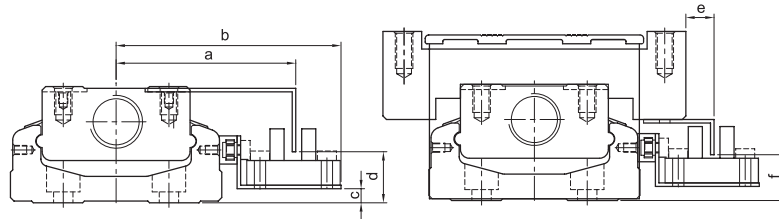


## 1.7.2 Switch

### Switch rail

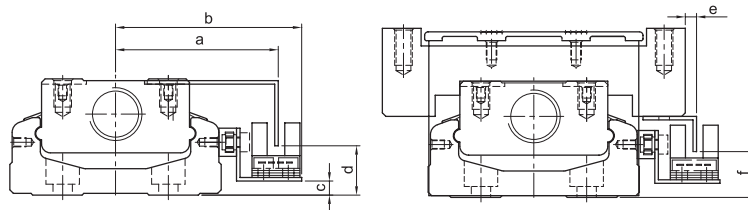


### Switch



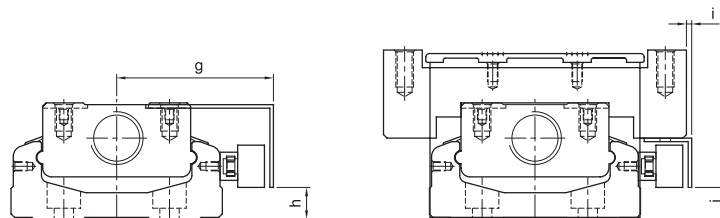
Nominal Width	a	b	c	d	e	f
KK40	41.5	54.1	0.5	10.8	15.3	12
KK50	45.5	59	1	10	15	11
KK60	51	63.8	4	14.5	8	13
KK86	63.5	76.7	8	18	8	18
KK100	71	84	10	20	9	20
KK130	85.5	98.5	14	24	0.5	23

Switch 1 : Omron EE-SX671



Nominal Width	a	b	c	d	e	f
KK40	36.5	44.3	1	9.8	10.5	12
KK50	41.3	48	1	10.5	10.2	11
KK60	46.2	52.8	4	14	3.2	13
KK86	59	65.7	8	18	3	18
KK100	66	73	10	20	4.2	20
KK130	80.8	87.5	14	23.5	-4.1	23.5

Switch 2 : Omron EE-SX674



Nominal Width	g	h	i	j
KK40	40	5.5	13.5	5.5
KK50	39.5	5.7	7	19.5
KK60	44.5	9	2	9
KK86	57	13	1	13
KK100	64.5	15	2.5	15
KK130	79	19	-6	19

Switch 3, 4 : SUNX GL-12F, GL-N12F-PX10

## 1.8 Life Calculations

The three main components of the KK Single Axis Robot are the guideway, ballscrew, and bearing. The calculation formulas of their life are shown as follows:

### 1.8.1 Guideway

$$L = \left( \frac{f_i}{f_w} \cdot \frac{C}{P_n} \right)^3 \times 50 \text{ km}$$

$L$  : Life Rating (km)       $C$  : Basic Dynamic Load Rating (N)  
 $f_i$  : Contact Coefficient (ref. Table 1)       $P_n$  : Calculated Loading (N)  
 $f_w$  : Loading Coefficient (ref. Table 2)

Table 1

Block type	Contact Coefficient $f_i$
A1, S1	1.0
A2, S2	0.81

Table 2

Operating Condition		Loading Coefficient $f_w$
Thrust and Vibration	Velocity (V)	
No Thrust	V < 15m/min	1.0 ~ 1.5
Low Vibration	15m/min < V < 60m/min	1.5 ~ 2.0
High Vibration	V > 60m/min	2.0 ~ 3.5

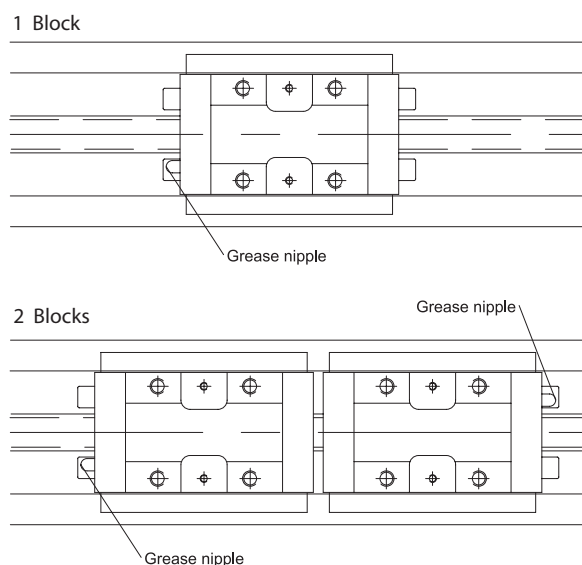
### 1.8.2 Ballscrew and Bearing

$$L = \left( \frac{1}{f_w} \cdot \frac{C_a}{P_{a,n}} \right)^3 \times 10^6 \text{ rev}$$

$L$  : Life Rating (rev.)       $C_a$  : Basic Dynamic Load Rating (N)  
 $f_w$  : Loading Coefficient (ref. Table 2)       $P_{a,n}$  : Axial Loading (N)

## 1.9 Lubrication

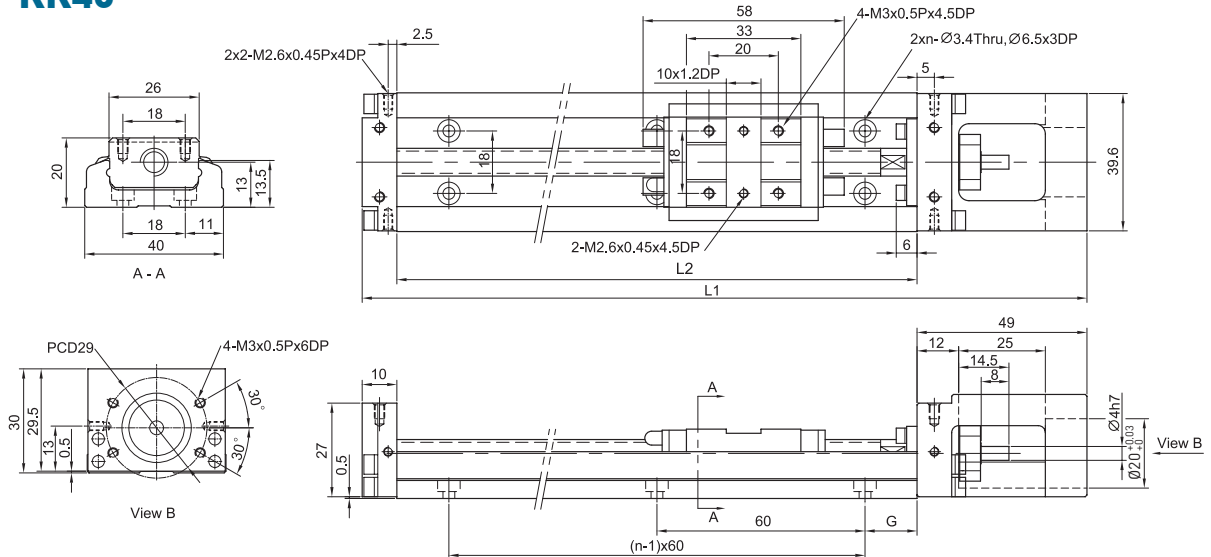
Replenishing the grease every 100km



## 1.10 Dimension

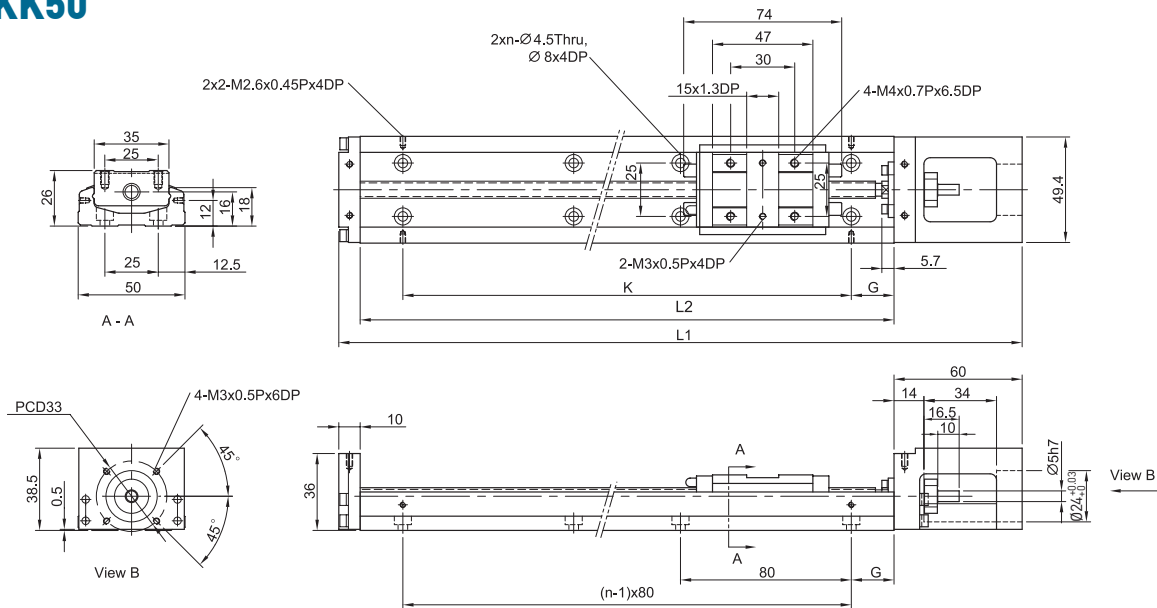
### 1.10.1 Without cover

#### KK40



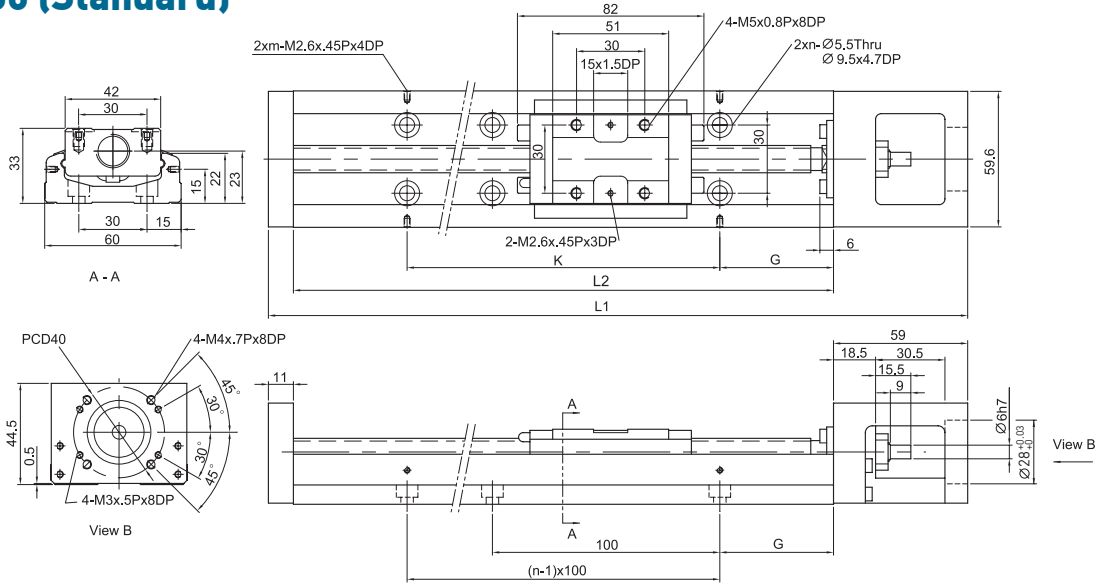
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	n (mm)	Mass (kg)	
		A1 Block	A2 Block			A1 Block	A2 Block
100	159	36	-	20	2	0.48	-
150	209	86	34	15	3	0.6	0.67
200	259	136	84	40	3	0.72	0.79

#### KK50



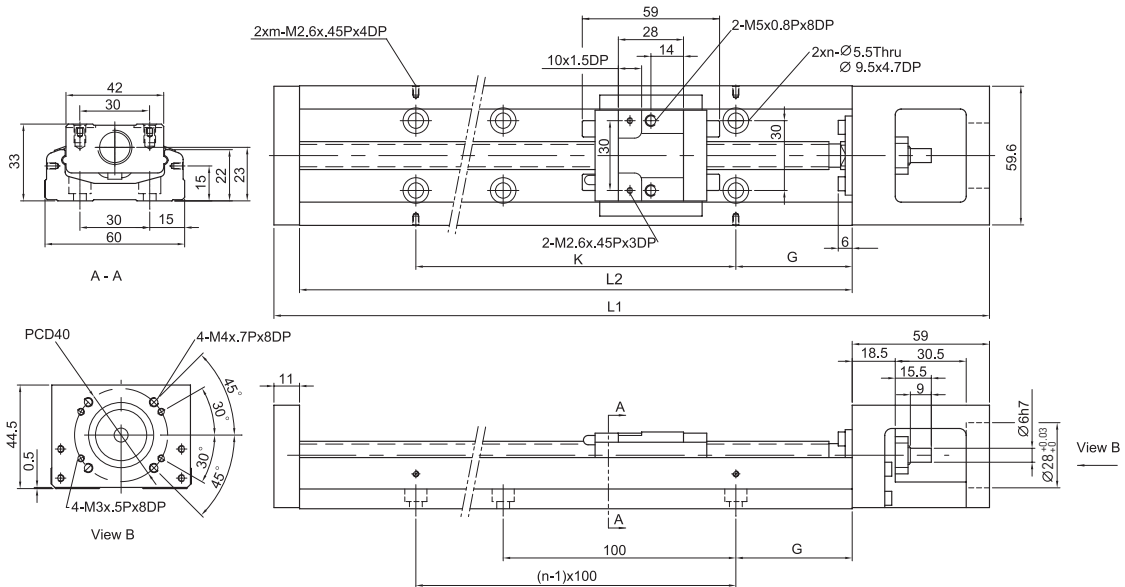
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
150	220	70	-	35	80	2	1	-
200	270	120	55	20	160	3	1.2	1.4
250	320	170	105	45	160	3	1.4	1.6
300	370	220	155	30	240	4	1.6	1.8

### KK60 (Standard)



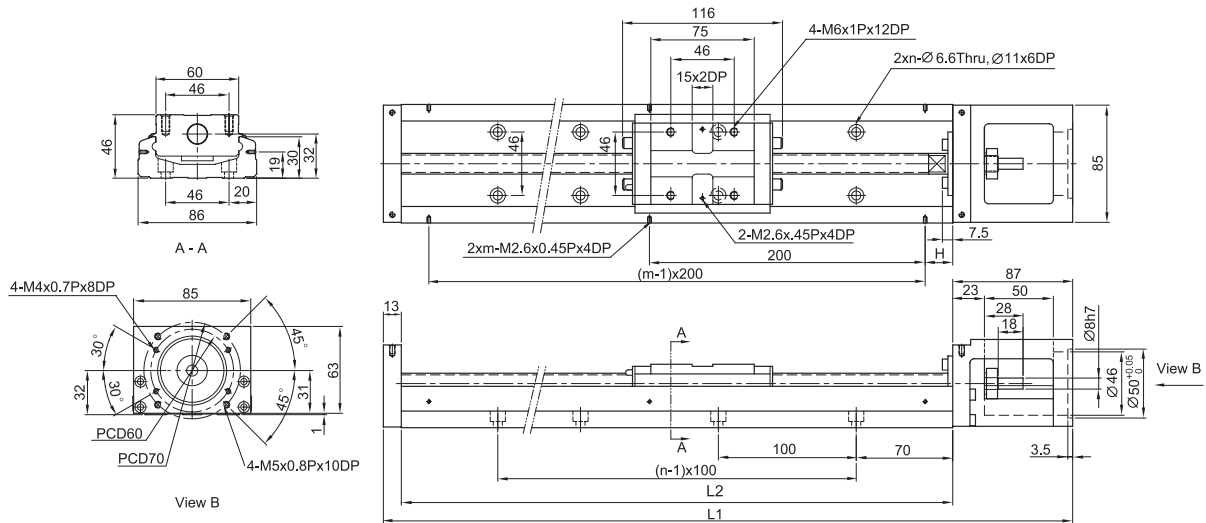
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
150	220	60	-	25	100	2	2	1.5	-
200	270	110	-	50	100	2	2	1.8	-
300	370	210	135	50	200	3	2	2.4	2.7
400	470	310	235	50	100	4	4	3	3.3
500	570	410	335	50	200	5	3	3.6	3.9
600	670	510	435	50	100	6	6	4.2	4.6

### KK60 (Light Duty)



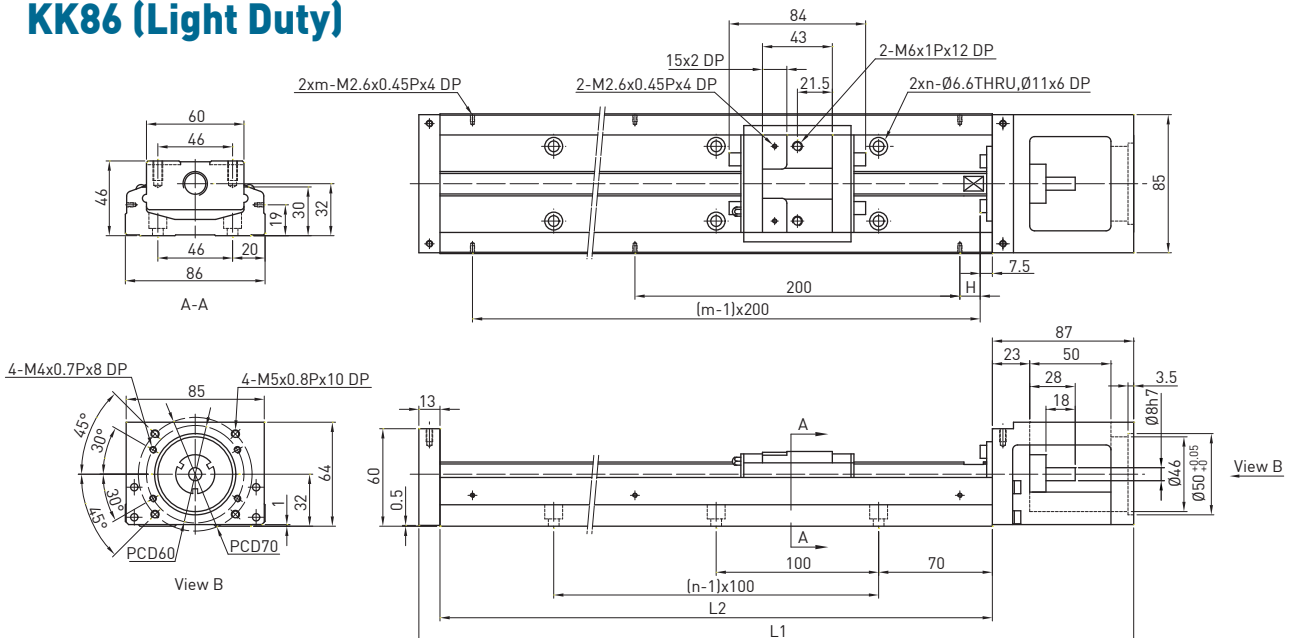
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block					S1 Block	S2 Block
150	220	85	34	25	100	2	2	1.4	1.6
200	270	135	84	50	100	2	2	1.7	1.9
300	370	235	184	50	200	3	2	2.3	2.5
400	470	335	284	50	100	4	4	2.9	3.1
500	570	435	384	50	200	5	3	3.5	3.7
600	670	535	484	50	100	6	6	4.1	4.3

## KK86 (Standard)



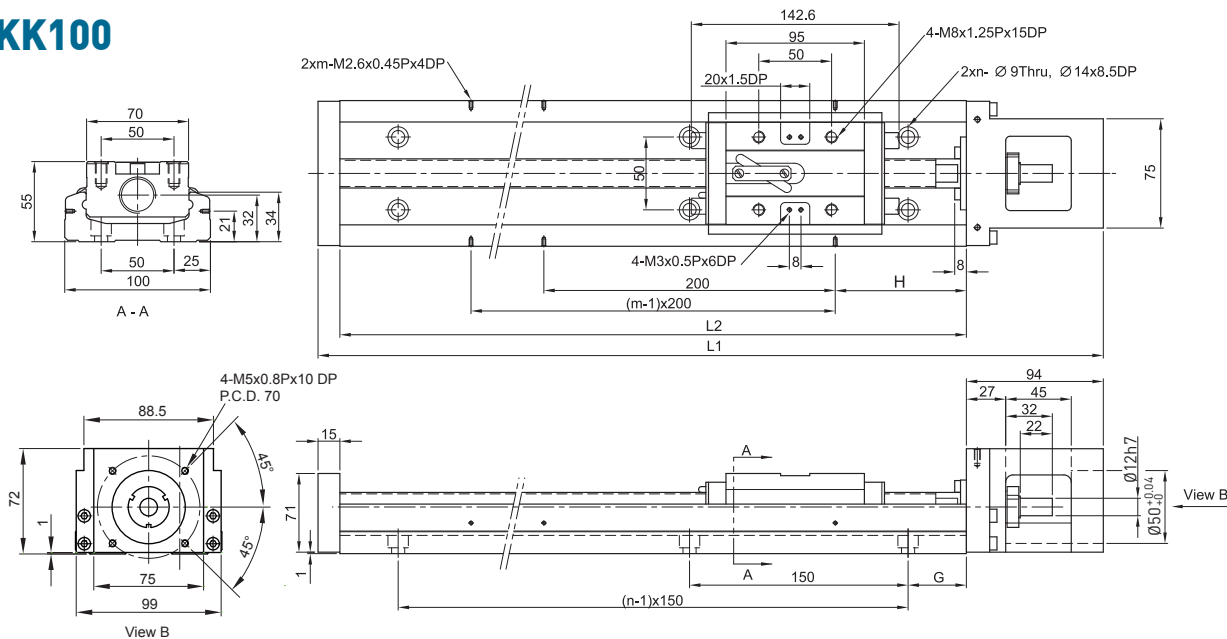
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
340	440	210	100	70	3	2	5.7	6.5
440	540	310	200	20	4	3	6.9	7.7
540	640	410	300	70	5	3	8.0	8.8
640	740	510	400	20	6	4	9.2	10.0
740	840	610	500	70	7	4	10.4	11.2
940	1040	810	700	70	9	5	11.6	12.4

## KK86 (Light Duty)



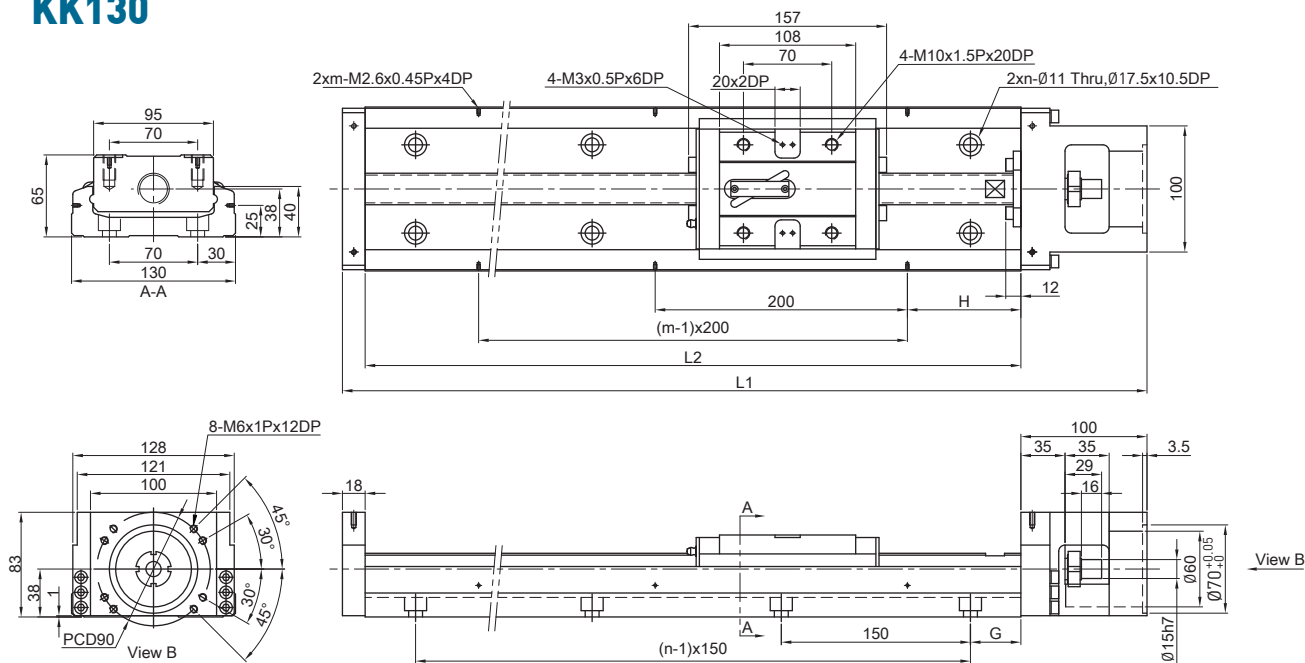
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block				S1 Block	S2 Block
340	440	246	170	70	3	2	5.4	5.9
440	540	346	270	20	4	3	6.6	7.1
540	640	446	370	70	5	3	7.7	8.2
640	740	546	470	20	6	4	8.9	9.4
740	840	646	570	70	7	4	10.1	10.6
940	1040	846	770	70	9	5	11.3	11.8

### KK100



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
980	1089	828	700	40	90	7	5	18.6	20.3
1080	1189	928	800	15	40	8	6	20.3	22.0
1180	1289	1028	900	65	90	8	6	22.0	23.7
1280	1389	1128	1000	40	40	9	7	23.6	25.3
1380	1489	1228	1100	15	90	10	7	25.3	27.0

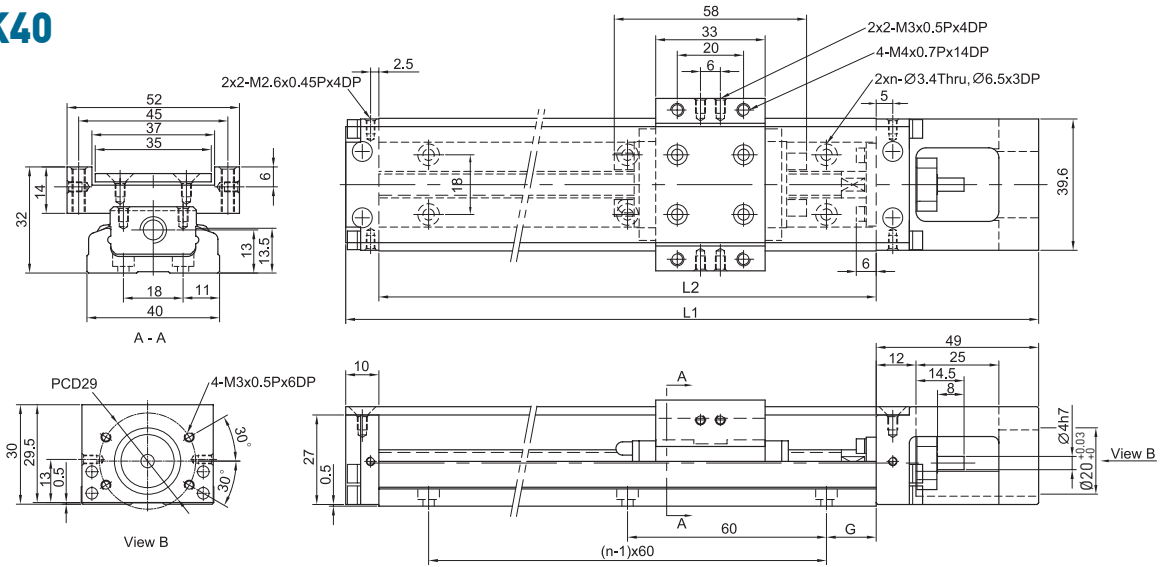
### KK130



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
980	1098	811	659	40	90	7	5	29.4	32.3
1180	1298	1011	859	65	90	8	6	34.3	37.2
1380	1498	1211	1059	90	90	9	7	39.2	42.1
1680	1798	1511	1359	90	40	11	9	46.5	49.4

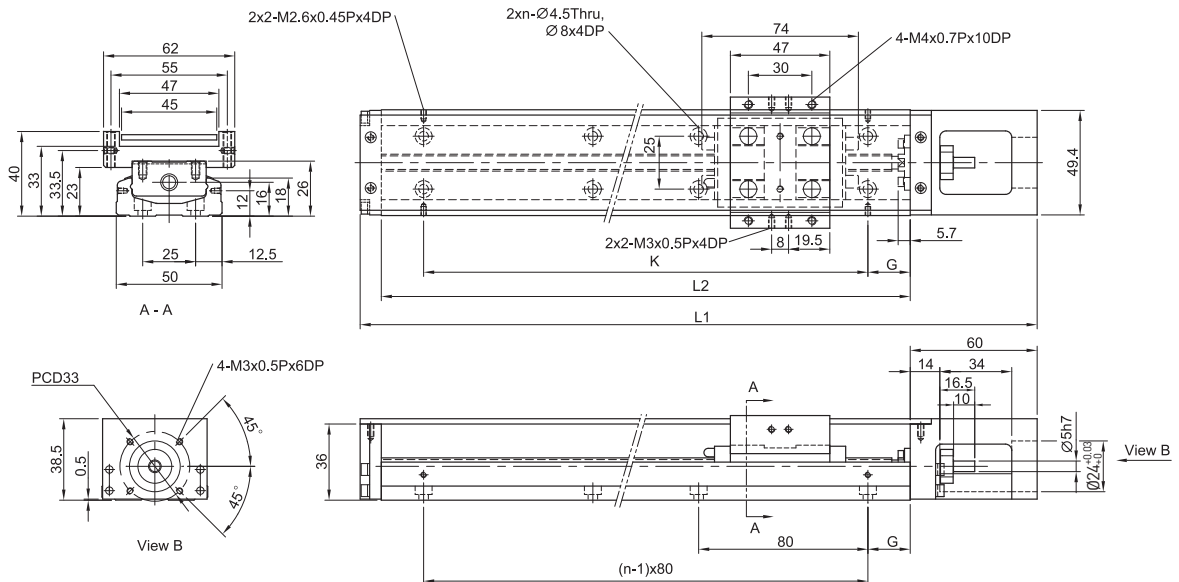
## 1.10.2 With cover

### KK40



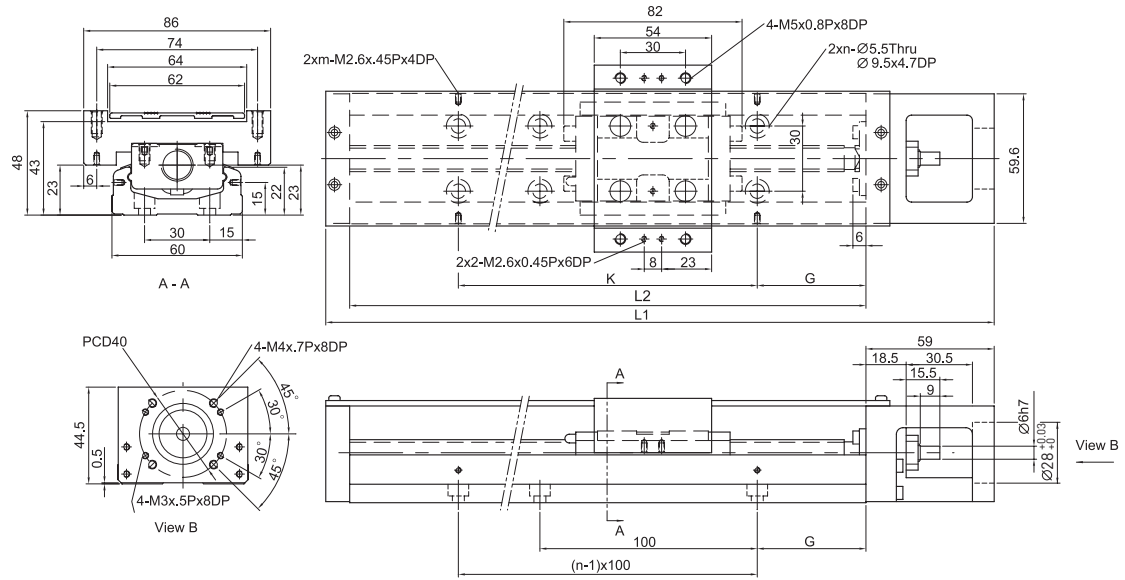
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	n	Mass (kg)	
		A1 Block	A2 Block			A1 Block	A2 Block
100	159	36	-	20	2	0.55	-
150	209	86	34	15	3	0.68	0.76
200	259	136	84	40	3	0.82	0.89

### KK50



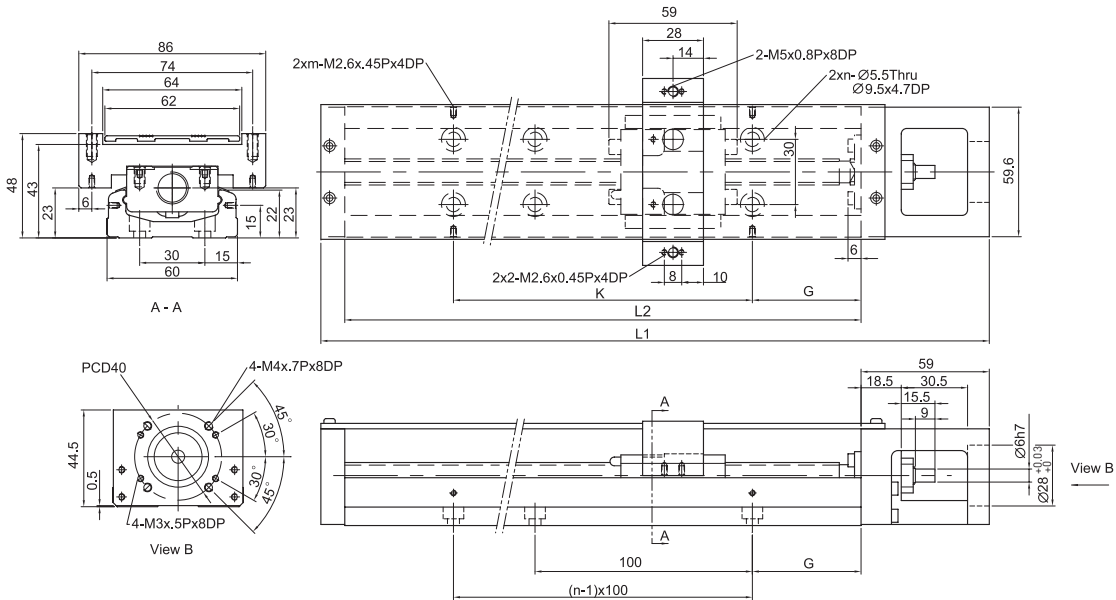
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
150	220	70	-	35	80	2	1.1	-
200	270	120	55	20	160	3	1.3	1.5
250	320	170	105	45	160	3	1.6	1.8
300	370	220	155	30	240	4	1.8	2.0

## KK60 (Standard)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
150	220	60	-	25	100	2	2	1.7	-
200	270	110	-	50	100	2	2	2.1	-
300	370	210	135	50	200	3	2	2.7	3.0
400	470	310	235	50	100	4	4	3.3	3.6
500	570	410	335	50	200	5	3	3.9	4.2
600	670	510	435	50	100	6	6	4.6	5.0

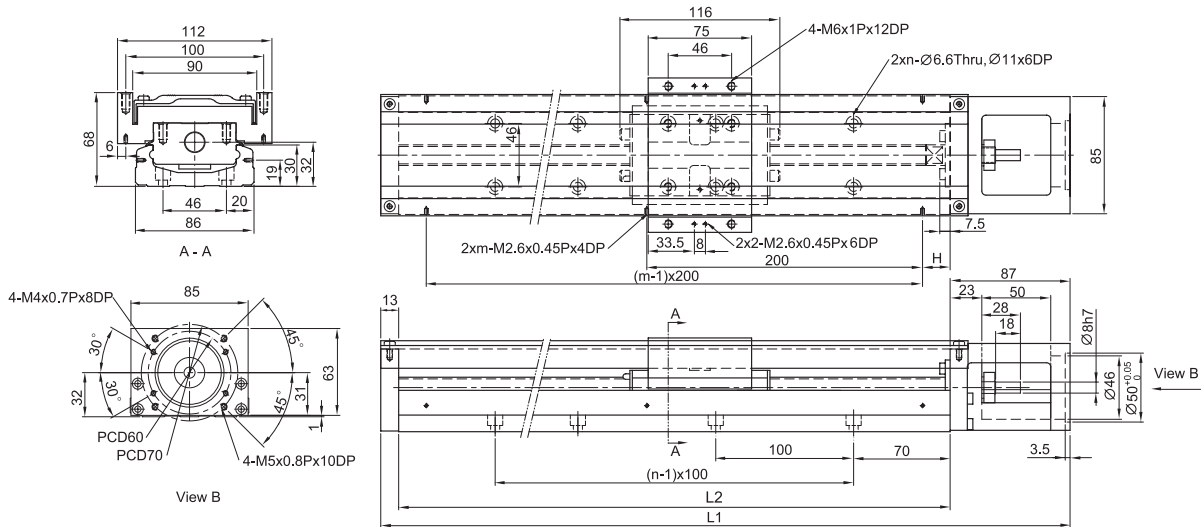
## KK60 (Light Duty)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block					S1 Block	S2 Block
150	220	85	34	25	100	2	2	1.6	1.8
200	270	135	84	50	100	2	2	1.9	2.1
300	370	235	184	50	200	3	2	2.5	2.7
400	470	335	284	50	100	4	4	3.1	3.3
500	570	435	384	50	200	5	3	3.7	3.9
600	670	535	484	50	100	6	6	4.4	4.6

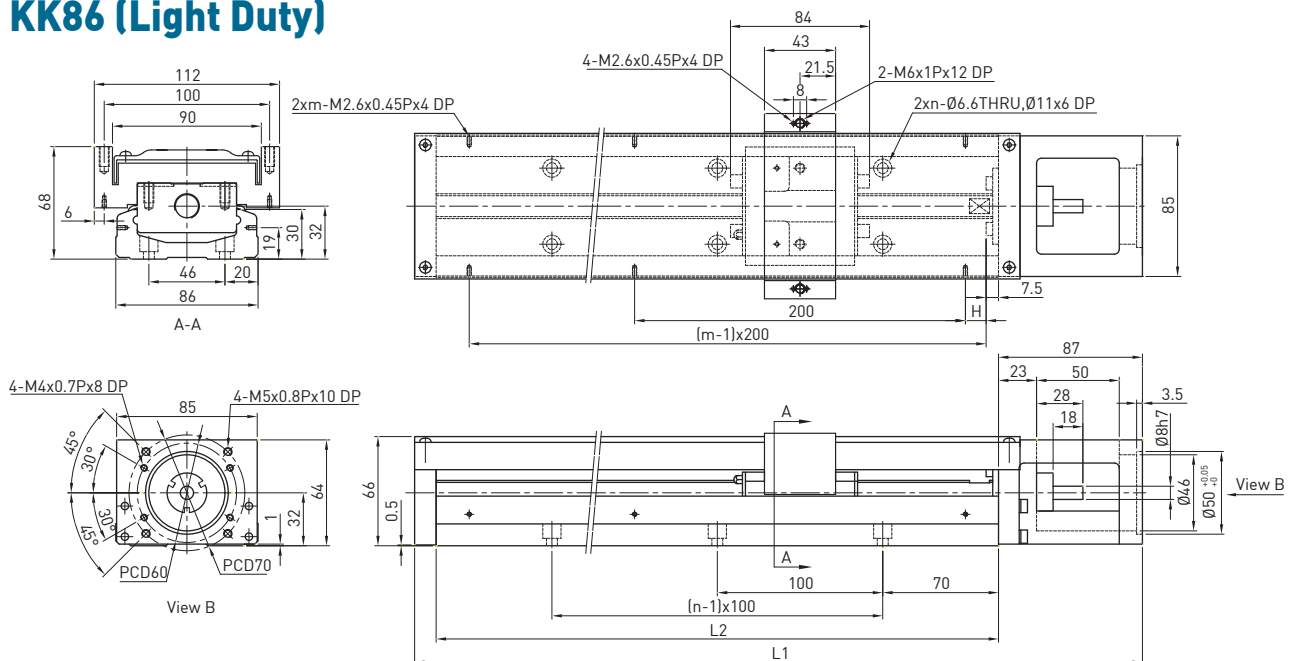


## KK86 (Standard)



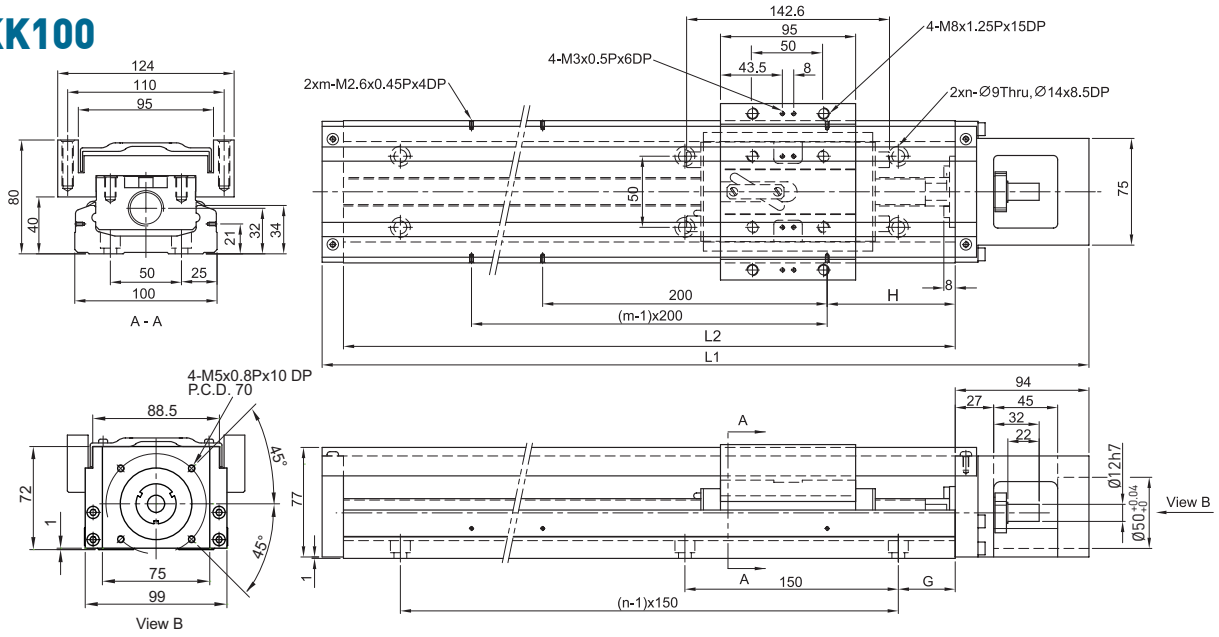
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
340	440	210	100	70	3	2	6.5	7.3
440	540	310	200	20	4	3	7.8	8.6
540	640	410	300	70	5	3	9.0	9.8
640	740	510	400	20	6	4	10.3	11.3
740	840	610	500	70	7	4	11.6	12.4
940	1040	810	700	70	9	5	13.0	13.8

## KK86 (Light Duty)



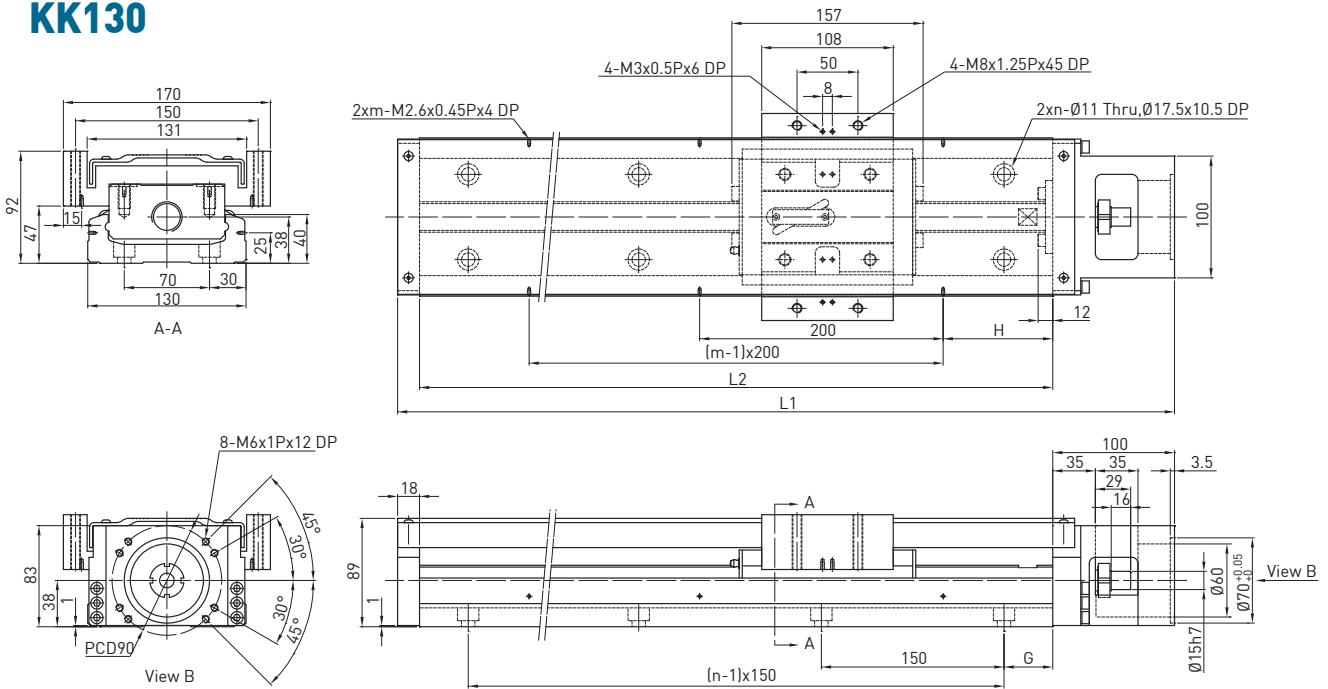
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block				S1 Block	S2 Block
340	440	246	170	70	3	2	6.3	7.1
440	540	346	270	20	4	3	7.6	8.4
540	640	446	370	70	5	3	8.8	9.6
640	740	546	470	20	6	4	10.1	11.1
740	840	646	570	70	7	4	11.4	12.2
940	1040	846	770	70	9	5	12.8	13.6

### KK100



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
980	1089	828	700	40	90	7	5	20.4	22.1
1080	1189	928	800	15	40	8	6	22.2	23.9
1180	1289	1028	900	65	90	8	6	24.0	25.7
1280	1389	1128	1000	40	40	9	7	25.7	27.4
1380	1489	1228	1100	15	90	10	7	27.5	29.2

### KK130



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
980	1089	811	659	40	90	7	5	31.9	35.9
1180	1298	1011	859	65	90	8	6	37.1	41.1
1380	1489	1211	1059	90	90	9	7	42.2	46.2
1680	1798	1511	1359	90	40	11	9	49.9	53.9

# Single Axis Robot

## KA Series



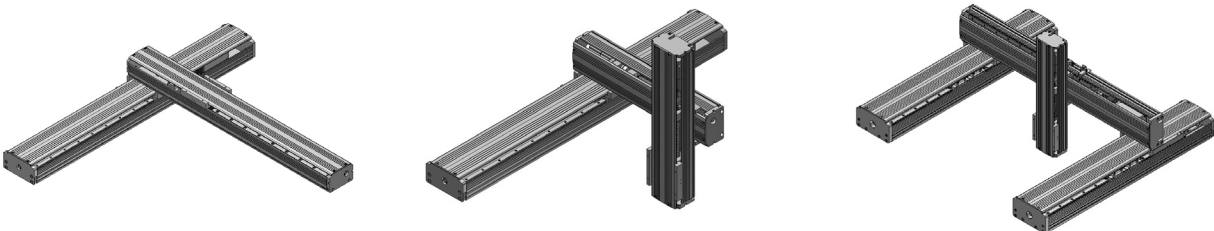
## 2.1 KA Specifications

Series	Driven Type	Aluminum Module Base Width	Motor Choice	Maximum Load (Kg)								Motor Connection Type	Model
				Lead (mm)									
				5	10	20	25	5	10	20	25		
				Horizontal				Vertical					
KA	Ballscrew	100	100W (3150 rpm)	61	42	21		20	12	4		Direct	KA100-
				61	42	21		20	12	4		Bottom	KA100-FD
				61	42	21		20	12	4		Internal	KA100-FI
				61	42	21		20	12	4		Left	KA100-FL
				61	42	21		20	12	4		Right	KA100-FR
		136	200W (3150 rpm)	120	84	42		40	23	8		Direct	KA136-
				120	84	42		40	23	8		Bottom	KA136-FD
				120	84	42		40	23	8		Internal	KA136-FI
				120	84	42		40	23	8		Left	KA136-FL
				120	84	42		40	23	8		Right	KA136-FR
		170	400W (2400 rpm)		221	110	88		61	22	16	Direct	KA170-
					221	110	88		61	22	16	Bottom	KA170-FD
					221	110	88		61	22	16	Internal	KA170-FI
					221	110	88		61	22	16	Left	KA170-FL
					221	110	88		61	22	16	Right	KA170-FR
	Belt*	100	100W	10								Left	KA100B-FL
				10								Right	KA100B-FR
		136	200W	19								Left	KA136B-FL
				19								Right	KA136B-FR
		170	400W	39								Left	KA170B-FL
39											Right	KA170B-FR	

\*Belt driven KA is preferred to be used in horizontal applications. Maximum linear velocity of 1800 mm/sec.

## 2.2 Features

- Complete selection of modules and accessories for most applications.  
 Driven Type : ballscrew, toothed belt  
 AC motor output : 30W~750W servo motor or step motor  
 Motor connection type (depends on available space) : direct, bottom, internal, left, right  
 Max stroke : 100mm~3000mm  
 Maximum load : max of 221kg horizontally and max of 61kg vertically.
- Easy transformation into a multi-axis robot.



3. U-shaped aluminum base features a light weight construction and high rigidity.

The following table lists the moment of inertia for each KA aluminum base :

Moment of Inertia (mm <sup>4</sup> )	I <sub>xx</sub>	I <sub>yy</sub>	I polar
KA100	434933	1811708	2246641
KA136	854975	5126158	5981133
KA170	2307669	11852669	14160338

4. Easy installation and maintenance.

5. Customized designs available for different applications.

## 2.3 Applications

KA single axis robots can be used in a wide range of applications. The following are examples of applicable systems : Automatic soldering system, screw feeding machine, adhesive laminating machine, CCD lens shifting, automatic paint spray machine, cutting machine, semiconductor manufacturing equipment, assembly equipment, press machine, spot welding machine, surface processing automation, self adhesive labeling machine, packaging machine, marking press machine, conveying equipment, and more.

## 2.4 Technical Information

Please note the following technical information while selecting a proper KA model.

### 2.4.1 Specification

The KA series designation is represented as the following:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Aluminum Cover	Limit Switch	Motor	Installation

#### (1) Model

KA is the designation for all KA models and the number represents the width of the aluminum module base.

#### (2) Lead

The lead on the ballscrew, in millimeters, indicates how far a sliding table travels with a complete rotation of the ballscrew. The following table shows the current available ballscrews for the KA series :

KA Model	KA136						KA170							
	KA100													
Ballscrew diameter (Φ)	15			16			20				25		32	
Lead (P)	10	20	40	5	10	32	5	10	20	40	25	50	32	40
L (available in left hand thread)			*	L	L	*	L		L	*	*	*	*	*

\*Please contact HIWIN for high lead screws, left-hand thread screws, or any unlisted ballscrew.

#### (3) Precision Grade

The precision grade for the sliding table to repeat the same position after traveling back and forth.

C; Normal grade : ±0.02mm, P; Precision grade : ±0.01mm.

The repeatability is measured by the largest error occurred at any point when the sliding table is traveling back and forth.

\* Attention : KA products do not mark the absolute position accuracy.

#### (4) Effective Stroke

The travel range for the KA sliding table (in millimeters).

\* Attention : Vibration might occur when the effective stroke is longer than listed in the catalog. The RPM's should be decreased to improve the situation, please refer to the "Speed" section for RPM description.

#### (5) Load Type

Currently, the KA series is designed to only support the listed standard load. Please contact a HIWIN sales representative for inquiries on greater dynamic load or heavy load models.

#### (6) Motor Flange

Direct connection is the standard type on the KA series (coupling driven). There are different flange options for adapting different types of motors, please refer to the following table.

	KA100		KA136		KA170	
	Screw	PCD	Screw	PCD	Screw	PCD
F0	M3	40	M4	60	M5	70
	M4	46	M5	70		
F1	M3	45	M4	70	M6	90
F2			M4	46	M6	□70
F3			M3	45	M5	90
F4			M5	90	M6	□69.58
F5			M4	□50		
F6			M4	□47.14		

FD : Bottom connected motor (belt pulley drive).

FI : Internal connected motor (coupling drive).

FL : Left connected motor (belt pulley drive).

FR : Right connected motor (belt pulley drive).

Please refer to the Appendix for different flange sizes.

#### (7) Aluminum Cover

All standard KA models are equipped with an aluminum protection cover. U : without aluminum cover.

#### (8) Limit Switch

HIWIN provides some options for limit switches in this catalog. Please contact a HIWIN sales representative for any other type not listed.

#### (9) Motor

No mark : motor not included. Please inform HIWIN in advance when installing a motor provided by the customer.

M : motor included. Please refer to the Appendix for motor selection, for other customized motors please contact a HIWIN sales representative.

#### (10) Installation

The designation "V" is indicated when the KA module is installed vertically. Please limit the load within each module's limit.

\* Attention : To prevent the load from slipping off, a brake system is recommended on the motor when the KA module is installed vertically.

Please contact a HIWIN sales representative for other special specifications.

## 2.4.2 Speed

### (1) Maximum Linear Velocity

The KA sliding table's maximum linear velocity (V) is derived from the maximum ballscrew RPM(S) multiplied by the lead (L).

$$V(\text{mm/sec}) = S(\text{rpm}) \div 60 \times L(\text{mm})$$

Please verify the maximum linear velocity meets your requirement when selecting a KA model. The maximum linear velocity is :

Lead(mm)	5	10	20	25
RPM: S(rpm)	Maximum Linear Velocity V: (mm/sec)			
200	17	33	67	83
400	33	67	133	167
600	50	100	200	250
800	67	133	267	333
1000	83	167	333	417
1200	100	200	400	500
1400	117	233	467	583
1600	133	267	533	667
1800	150	300	600	750
2000	167	333	667	833
2200	183	367	733	917
2400	200	400	800	1000
2600	217	433	867	1083
2800	233	467	933	1167
3000	250	500	1000	1250
3200	267	533	1067	1333

## [2] Maximum Speed

The maximum allowable speed for the ballscrew is determined by its critical speed. When the rotational speed is over the critical speed limit, it will cause the ballscrew to bend under the stress of vibration. The critical speed is correlated closely with the total length of the ballscrew. Therefore, the critical speed also determines the effective stroke and total length of a KA model.

The critical speed of a ballscrew is calculated using the following equation :

$$Np = 0.8 \times 2.71 \times 10^8 \times \frac{M_f d_r}{L_t^2}$$

Np = maximum permissible speed (rpm)

Mf = factor for different mounting types,

KA uses fixed-supported type, Mf = 0.689

dr = root diameter of screw shaft (mm)

Lt = distance between support bearings (mm)

Derived from the above equation, the table below shows the maximum stroke and critical speed of different KA models.

KA Model	KA136						
	KA100				KA170		
Ballscrew (Φ -P)	16-5	15-10	16-10	15-20	20-20	20-10	25-25
Ballscrew (dr)	12.899	12.364	12.684	12.399	17.084	15.982	22.094
RPM	Maximum Stroke						
200	2948	2883	2922	2887	3416	3211	3818
400	2039	1993	2020	1996	2370	2199	2628
600	1636	1598	1621	1601	1906	1751	2101
800	1396	1363	1383	1366	1630	1483	1787
1000	1232	1203	1220	1205	1441	1301	1573
1200	1111	1085	1101	1086	1302	1166	1414
1400	1017	993	1007	994	1194	1062	1291
1600	941	918	932	920	1107	978	1192
1800	879	857	870	858	1035	908	1110
2000	826	805	817	806	974	849	1041
2200	780	760	772	762	921	798	981
2400	740	721	733	722	875	753	929
2600	705	687	698	688	835	714	883
2800	674	656	667	657	799	679	842
3000	645	629	639	630	766	648	805
3200	620	604	613	605	737	620	772

**[3] Acceleration/Deceleration**

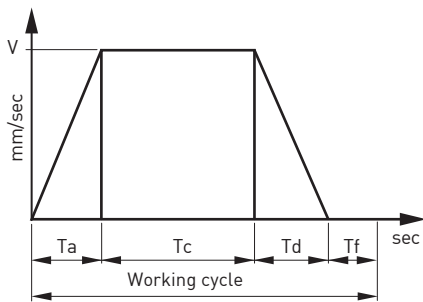
Speed is specified as the working speed of the sliding table. The sliding table must accelerate to the designated speed to move to the target place, in opposite, it must decelerate before it comes to a stop.

Acceleration/deceleration is programmed by the operator according to the conditions. The acceleration on a KA system is set at : 0.15G calculated for lead = 5, 0.3G is calculated for all other leads.  $1G = 9.8mm/s^2$ , therefore  $0.15G = 1470mm/s^2$ ,  $0.3G = 2940mm/s^2$ . The maximum load shown in the catalog is based in this acceleration/ deceleration.

\* Attention : Acceleration/deceleration will generate an inertia force on the load. For higher acceleration/ deceleration, load will increase accordingly. Moreover, the higher acceleration/deceleration could generate a serious impact, which should be noted.

**[4] Working Cycle**

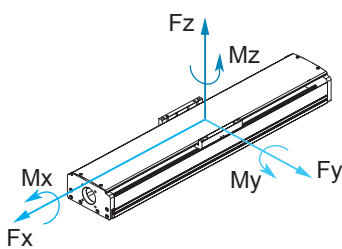
The KA system's working cycle is determined by the operator. Generally, the working cycle is calculated as shown on the below diagram. The variables include acceleration time  $T_a$ , constant speed time  $T_c$ , deceleration time  $T_d$ , and idling time  $T_f$ .



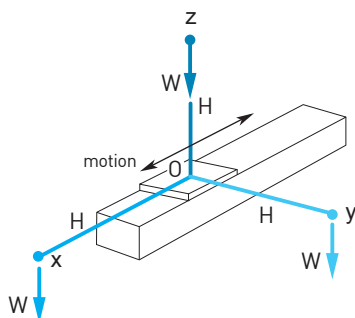
Accelerating Speed =  $V/T_a$   
 Decelerating Speed =  $V/T_d$   
 Working cycle (sec) =  $T_a + T_c + T_d + T_f$   
 Working time = working cycle  $\times$  frequency  
 Operating ratio = working time / (working time + off time)  
 Operating ratio is closely related to the load of the motor.  
 Normally, the operating ratio is not recommended to exceed 0.5 for long, continuous work.

**2.5 Dynamic Load**

Several factors affect the calculation of loads acting on a KA system as shown in the figure below. The dynamic load indicated in the catalog ( $F_y, F_z, M_x, M_y, M_z$ ) are calculated based on 10,000 km of travel distance. To obtain the correct load value and maintain the service life of the KA, each load condition should be carefully considered.



The below figure shows that the load is applied on the center of the KA sliding table. In fact, the load is not necessarily in the middle during its operation. If the load is not on the center, there could be potential vibrations, over torque, or slow reaction.





To avoid these circumstances, please keep the loading (W) close to the center of the sliding table(0) within the distance(H).

Off Center Distance	H (mm)		
	x	y	z
KA100	550	550	550
KA136	550	550	550
KA170	780	780	780

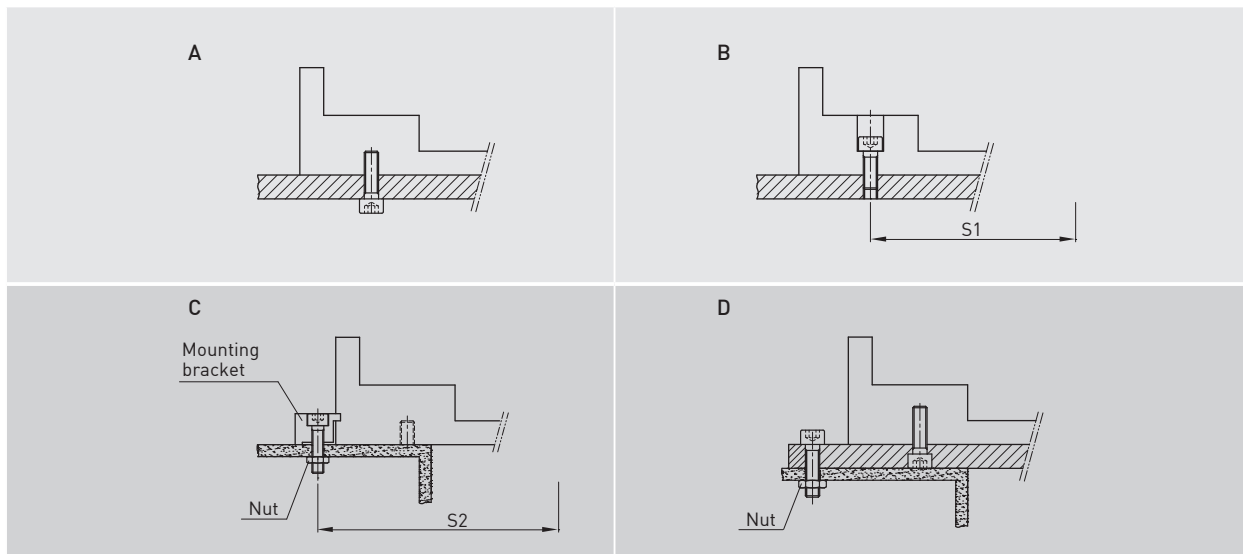
## 2.6 Service Life

The life expectancy of the KA depends on the service life of the linear guideway when it's installed horizontally or tilted less than 30 degrees from a flat surface ; The life expectancy of the KA depends on the service life of the ballscrew or the bearing on the fixed end (whichever one has a lower service life) when it's installed vertically or tilted greater than 30 degrees from a flat surface.

The equivalent dynamic forces (Fy, Fz, Mx, My, Mz) listed in the catalog are calculated based on 10,000 km of travel distance. In cases, when the load is less than the listed loading value (  $F_y/F_{yd} + F_z/F_{zd} + M_x/M_{xd} + M_y/M_{yd} + M_z/M_{zd} \leq 1$  ), the service life can be extended longer; as opposed to the actual load being greater than the listed loading value, which can shorten the service life. It is recommended to keep the load under the listed value to ensure the service life of the KA module.

## 2.7 Installation Method

There are several installation methods for the KA series as shown in the following figures.



The table indicates the distance between fixing screws (S1) on type B (fixing from above):

KA Model	S1	Screw
KA100	80	M5
KA136	112	M6
KA170	170	M8

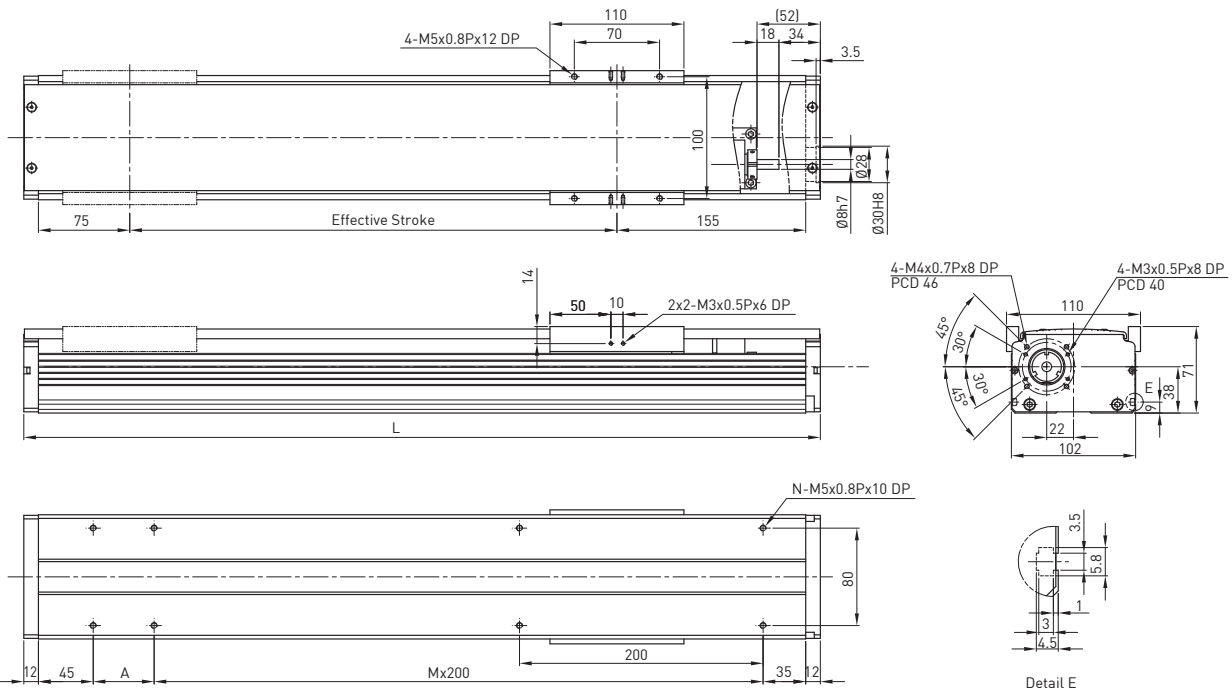
## 2.8 Maintenance Cycle

The parts requiring maintenance in a KA system include the ballscrew, guideway and accessories. Please check for any dirt or debris inside the system every 3 months or 100km of distance traveled. Adding lubricant to both the ballscrew and guideway is essential, in addition, to changing the grease if it is getting dirty. Please contact HIWIN for any concerns on maintenance.

## 2.9 KA Series

### 2.9.1 Model Number for KA100

KA100	-20	P	-500	A	F0	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install

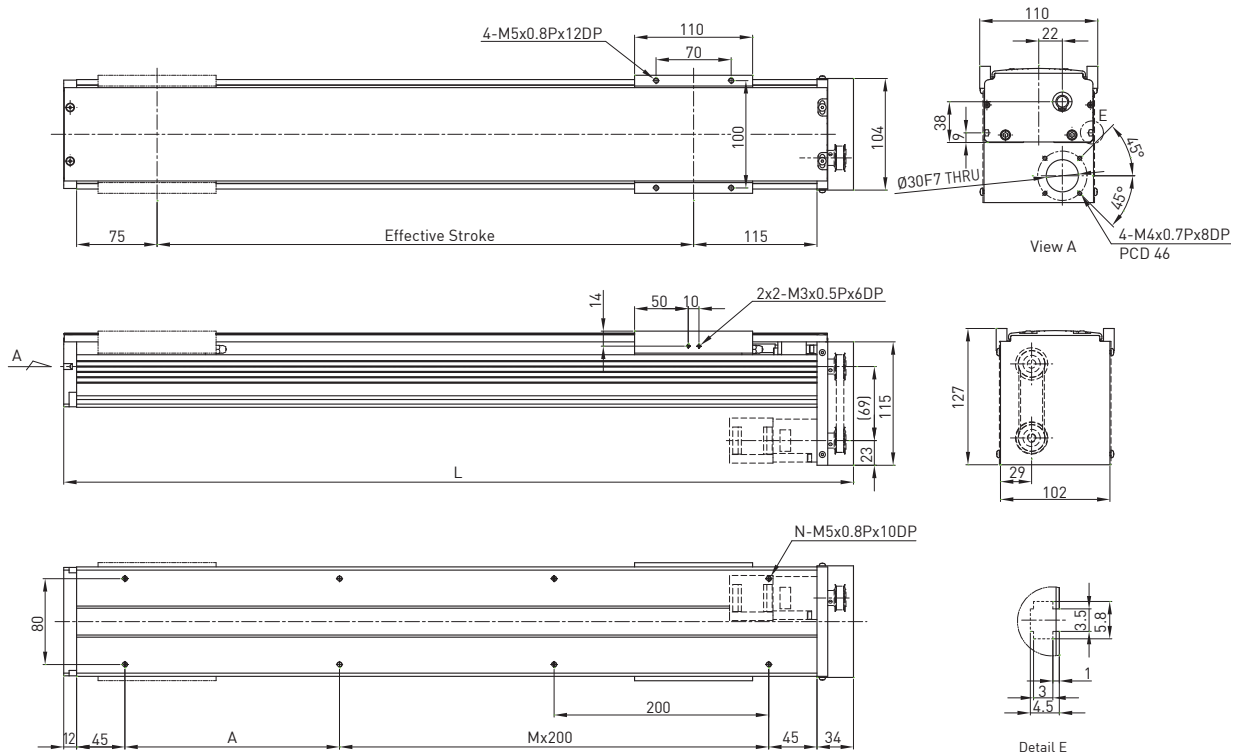


Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	100					
							Ball screw					
100	354	50	1	6	Lead	mm	5	10	20			
150	404	100	1	6	Max linear speed*	mm/sec	263	525	1050			
200	454	150	1	6	Max RPM	RPM	3150	3150	3150			
250	504	200	1	6	Rated thrust	N	356	178	89			
300	554	50	2	8	Repeatability	mm	±0.02					
350	604	100	2	8	Effective stroke	mm	100~1050					
400	654	150	2	8	Rated dynamic load**	Fyd	N	232				
450	704	200	2	8		Fzd	N	397				
500	754	50	3	10		Mxd	N-m	12.5				
550	804	100	3	10		Myd	N-m	12.6				
600	854	150	3	10		Mzd	N-m	12.6				
650	904	200	3	10		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads						
700	954	50	4	12	Permitted load condition***							
750	1004	100	4	12								
800	1054	150	4	12								
850	1104	200	4	12								
900	1154	50	5	14								
950	1204	100	5	14								
1000	1254	150	5	14								
1050	1304	200	5	14								

\* Vibration might occur when the effective stroke is longer than 700mm. The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.2 Model Number for KA100-FD

KA100	-20	P	-500	A	FD	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard	FD: Bottom	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical install None: Horizontal Install

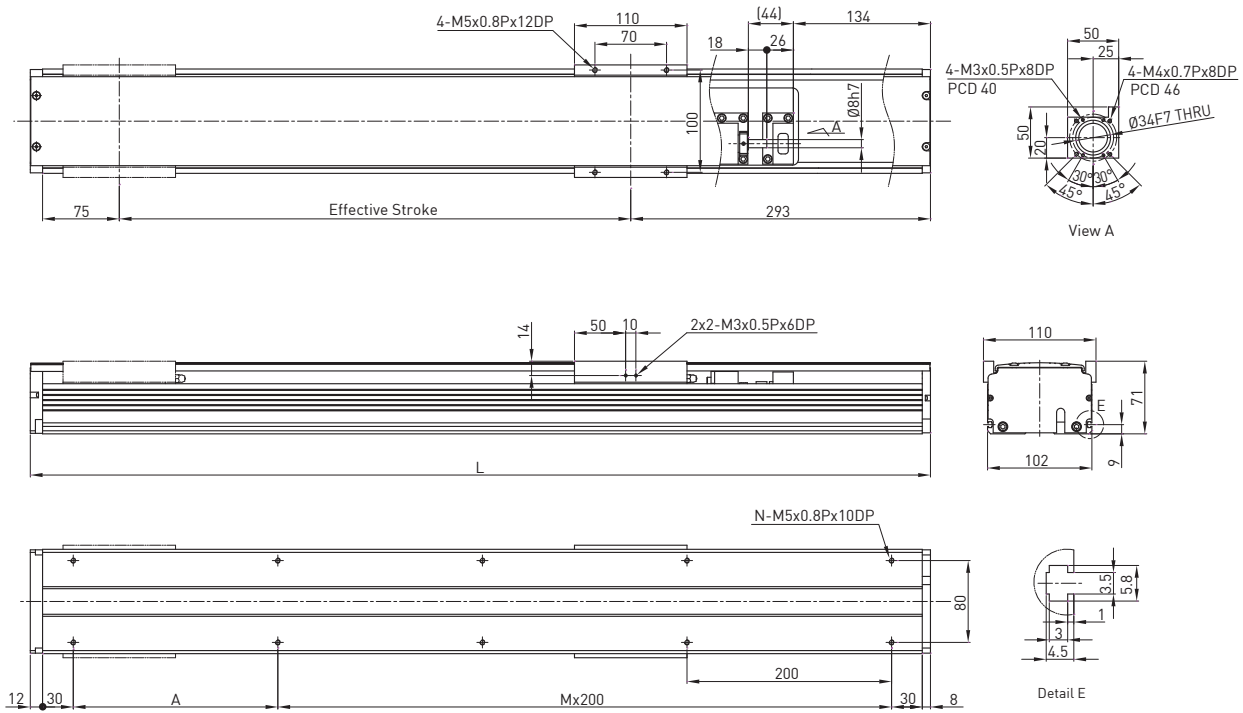


Effective stroke (mm)	L	A	M	N	AC motor output			W		
					Drive	Lead	Max linear speed*	mm	Ballscrew	
100	336	200	0	4		mm	5	10	20	
150	386	50	1	6		mm/sec	263	525	1050	
200	436	100	1	6		RPM	3150	3150	3150	
250	486	150	1	6		N	356	178	89	
300	536	200	1	6		mm	±0.02			
350	586	50	2	8		mm	100~1050			
400	636	100	2	8		Fyd	N	232		
450	686	150	2	8		Fzd	N	397		
500	736	200	2	8		Mxd	N-m	12.5		
550	786	50	3	10		Myd	N-m	12.6		
600	836	100	3	10		Mzd	N-m	12.6		
650	886	150	3	10	<b>Permitted load condition***</b> $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads					
700	936	200	3	10						
750	986	50	4	12						
800	1036	100	4	12						
850	1086	150	4	12						
900	1136	200	4	12						
950	1186	50	5	14						
1000	1236	100	5	14						
1050	1286	150	5	14						

\* Vibration might occur when the effective stroke is longer than 700mm.  
The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
\*\* The load condition is based on 10,000km operation.  
\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.3 Model Number for KA100-FI

KA100	-20	P	-500	A	FI	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard	FI : Internal	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install

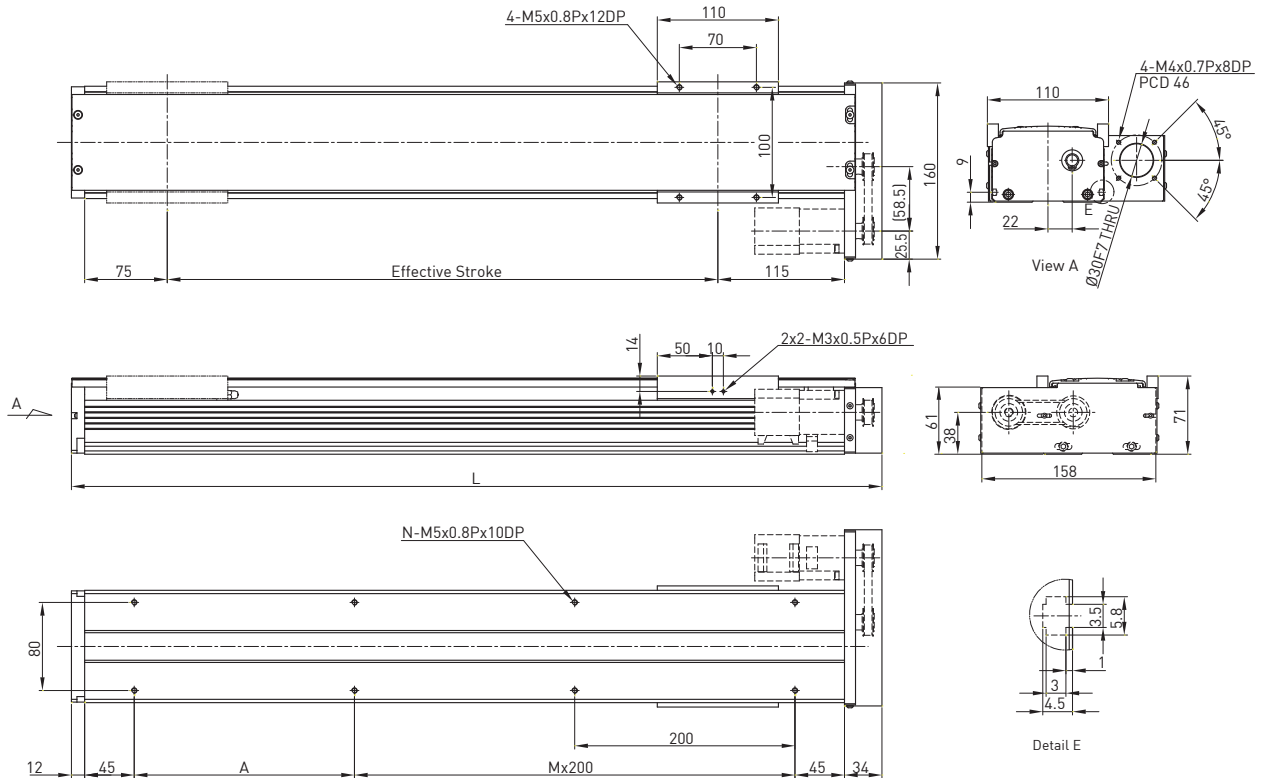


Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	100	
100	480	200	1	6	Lead	mm	5 10 20	
150	530	50	2	8	Max linear speed*	mm/sec	263 525 1050	
200	580	100	2	8	Max RPM	RPM	3150 3150 3150	
250	630	150	2	8	Rated thrust	N	356 178 89	
300	680	200	2	8	Repeatability	mm	±0.02	
350	730	50	3	10	Effective stroke	mm	100~1050	
400	780	100	3	10		Fyd	N	232
450	830	150	3	10		Fzd	N	397
500	880	200	3	10		Mxd	N-m	12.5
550	930	50	4	12		Myd	N-m	12.6
600	980	100	4	12		Mzd	N-m	12.6
650	1030	150	4	12	<b>Permitted load condition***</b> $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads			
700	1080	200	4	12				
750	1130	50	5	14				
800	1180	100	5	14				
850	1230	150	5	14				
900	1280	200	5	14				
950	1330	50	6	16				
1000	1380	100	6	16				
1050	1430	150	6	16				

\* Vibration might occur when the effective stroke is longer than 700mm. The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.4 Model Number for KA100-FL

KA100	-20	P	-500	A	FL	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard	FL: Left	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install

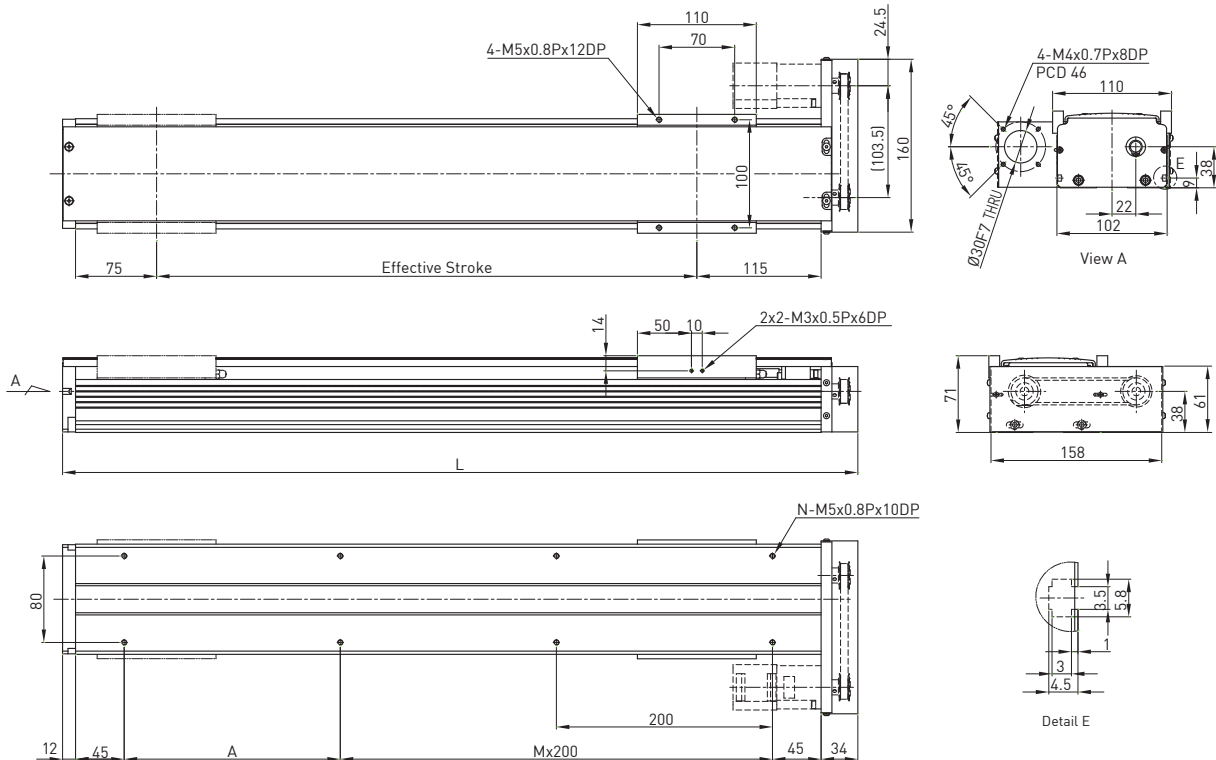


Effective stroke (mm)	L	A	M	N	AC motor output		W		
					Drive	100	Ball screw		
100	336	200	0	4	Lead	mm	5	10	20
150	386	50	1	6	Max linear speed*	mm/sec	263	525	1050
200	436	100	1	6	Max RPM	RPM	3150	3150	3150
250	486	150	1	6	Rated thrust	N	356	178	89
300	536	200	1	6	Repeatability	mm	±0.02		
350	586	50	2	8	Effective stroke	mm	100-1050		
400	636	100	2	8	Rated dynamic load**	F <sub>yd</sub>	N	232	
450	686	150	2	8		F <sub>zd</sub>	N	397	
500	736	200	2	8		M <sub>xd</sub>	N-m	12.5	
550	786	50	3	10		M <sub>yd</sub>	N-m	12.6	
600	836	100	3	10		M <sub>zd</sub>	N-m	12.6	
650	886	150	3	10	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads			
700	936	200	3	10					
750	986	50	4	12					
800	1036	100	4	12					
850	1086	150	4	12					
900	1136	200	4	12					
950	1186	50	5	14					
1000	1236	100	5	14					
1050	1286	150	5	14					

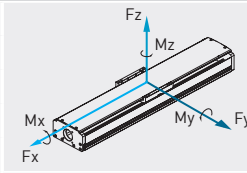
\* Vibration might occur when the effective stroke is longer than 700mm. The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.5 Model Number for KA100-FR

KA100	-20	P	-500	A	FR	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard	FR: Right	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install



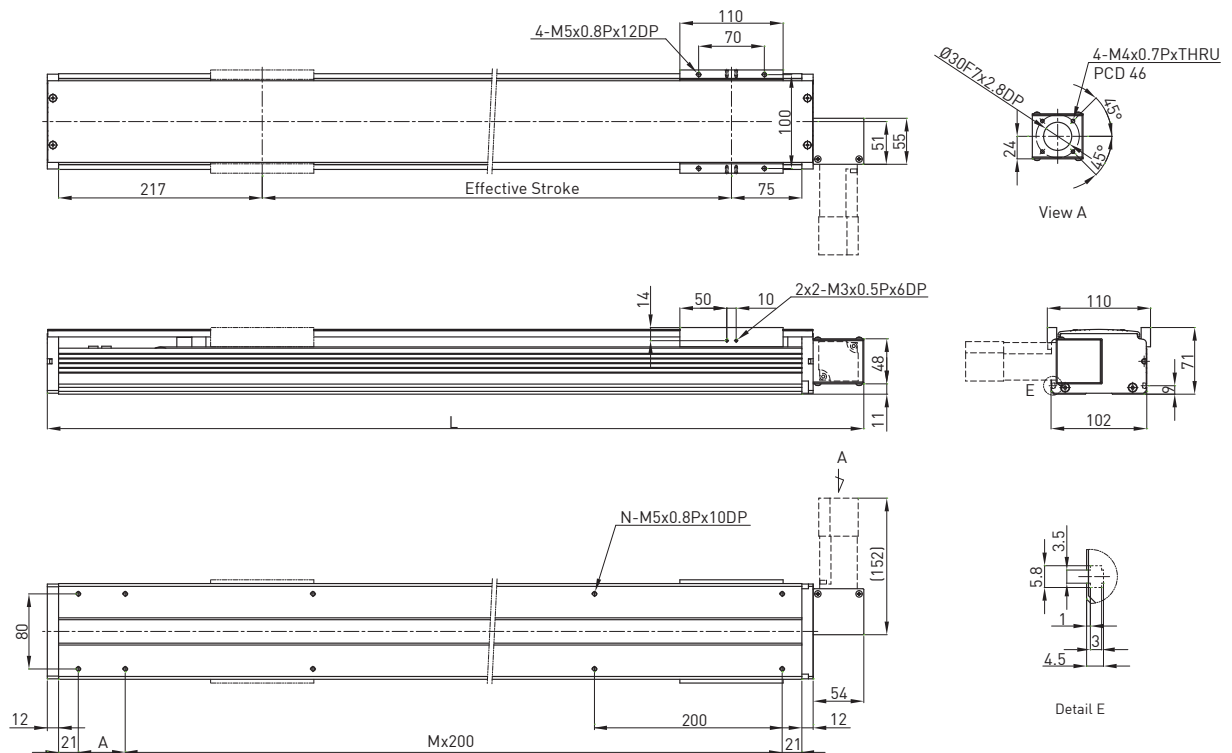
Effective stroke (mm)	L	A	M	N	AC motor output				
					W	100			
					Drive	Ball screw			
100	336	200	0	4	Lead	mm	5	10	20
150	386	50	1	6	Max linear speed*	mm/sec	263	525	1050
200	436	100	1	6	Max RPM	RPM	3150	3150	3150
250	486	150	1	6	Rated thrust	N	356	178	89
300	536	200	1	6	Repeatability	mm	±0.02		
350	586	50	2	8	Effective stroke	mm	100~1050		
400	636	100	2	8	Rated dynamic load**	F <sub>yd</sub>	N	232	
450	686	150	2	8		F <sub>zd</sub>	N	397	
500	736	200	2	8		M <sub>xd</sub>	N-m	12.5	
550	786	50	3	10		M <sub>yd</sub>	N-m	12.6	
600	836	100	3	10		M <sub>zd</sub>	N-m	12.6	
650	886	150	3	10	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads			
700	936	200	3	10					
750	986	50	4	12					
800	1036	100	4	12					
850	1086	150	4	12					
900	1136	200	4	12					
950	1186	50	5	14					
1000	1236	100	5	14					
1050	1286	150	5	14					



\* Vibration might occur when the effective stroke is longer than 700mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.6 Model Number for KA100B-FL

KA100	B	-84	C	-3000	A	FL	U	S1	M	V
Model	Timing Belt	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
			C: Normal		A: Standard	FL: Left	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V: Vertical Install None: Horizontal Install



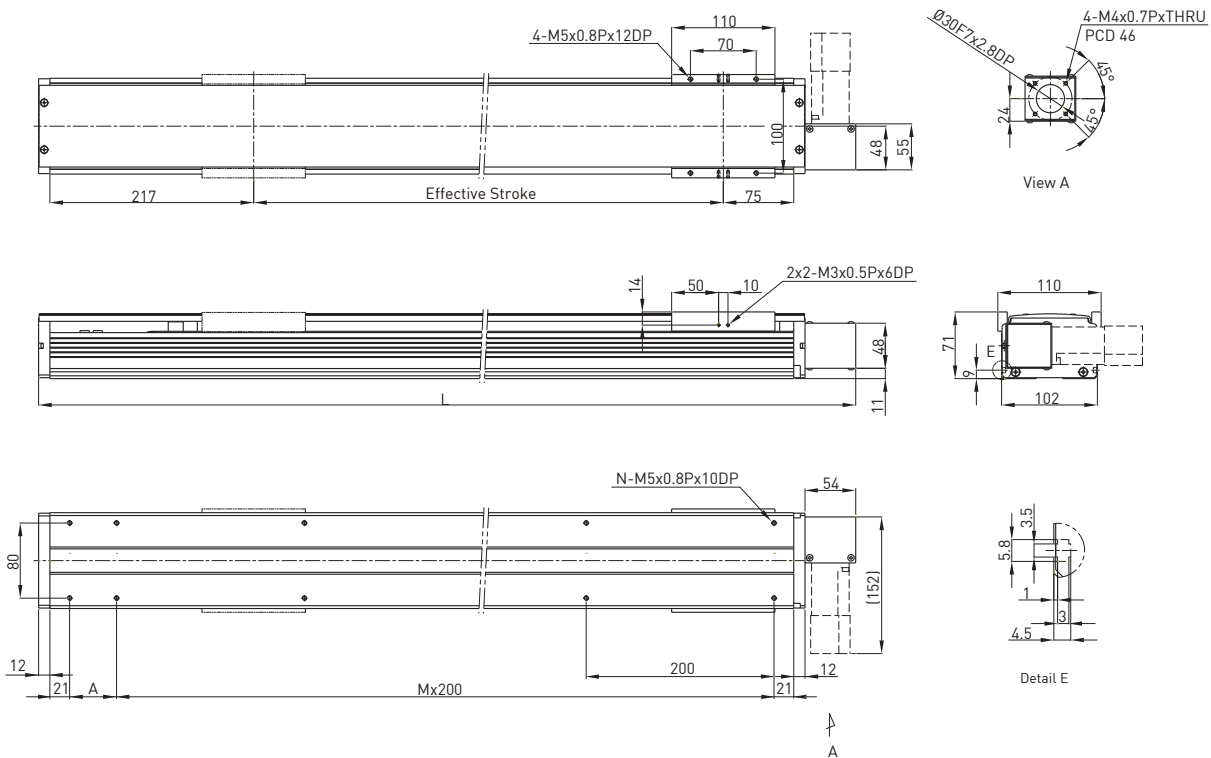
Effective stroke (mm)	L	A	M	N	AC motor output	W	100	
200	570	50	2	8	Drive		Timing Belt	
400	770	50	3	10	Lead	mm	84	
600	970	50	4	12	Max linear speed	mm/sec	1800	
800	1170	50	5	14	Rated thrust	N	33	
1000	1370	50	6	16	Repeatability	mm	±0.1	
1200	1570	50	7	18	Effective stroke	mm	200~3000	
1400	1770	50	8	20	Rated dynamic load*	F <sub>yd</sub>	N	232
1600	1970	50	9	22		F <sub>zd</sub>	N	397
1800	2170	50	10	24		M <sub>xd</sub>	N-m	12.5
2000	2370	50	11	26		M <sub>yd</sub>	N-m	12.6
2200	2570	50	12	28		M <sub>zd</sub>	N-m	12.6
2400	2770	50	13	30	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> M <sub>z</sub> are working loads		
2600	2970	50	14	32				
2800	3170	50	15	34				
3000	3370	50	16	36				

\*The load condition is based on 10,000km operation

\*\*For horizontal application only. If used in special condition, please contact HIWIN.

## 2.9.7 Model Number for KA100B-FR

KA100	B	-84	C	-3000	A	FR	U	S1	M	V
Model	Timing Belt	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
			C: Normal		A: Standard	FR: Right	U: Without Cover None: Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V: Vertical Install None: Horizontal Install



Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	100	
200	570	50	2	8	Lead	mm	84	
400	770	50	3	10	Max linear speed	mm/sec	1800	
600	970	50	4	12	Rated thrust	N	33	
800	1170	50	5	14	Repeatability	mm	±0.1	
1000	1370	50	6	16	Effective stroke	mm	200~3000	
1200	1570	50	7	18	Rated dynamic load* 	Fyd	N	232
1400	1770	50	8	20		Fzd	N	397
1600	1970	50	9	22		Mxd	N-m	12.5
1800	2170	50	10	24		Myd	N-m	12.6
2000	2370	50	11	26		Mzd	N-m	12.6
2200	2570	50	12	28	Permitted load condition** $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz Mz are working loads			
2400	2770	50	13	30				
2600	2970	50	14	32				
2800	3170	50	15	34				
3000	3370	50	16	36				

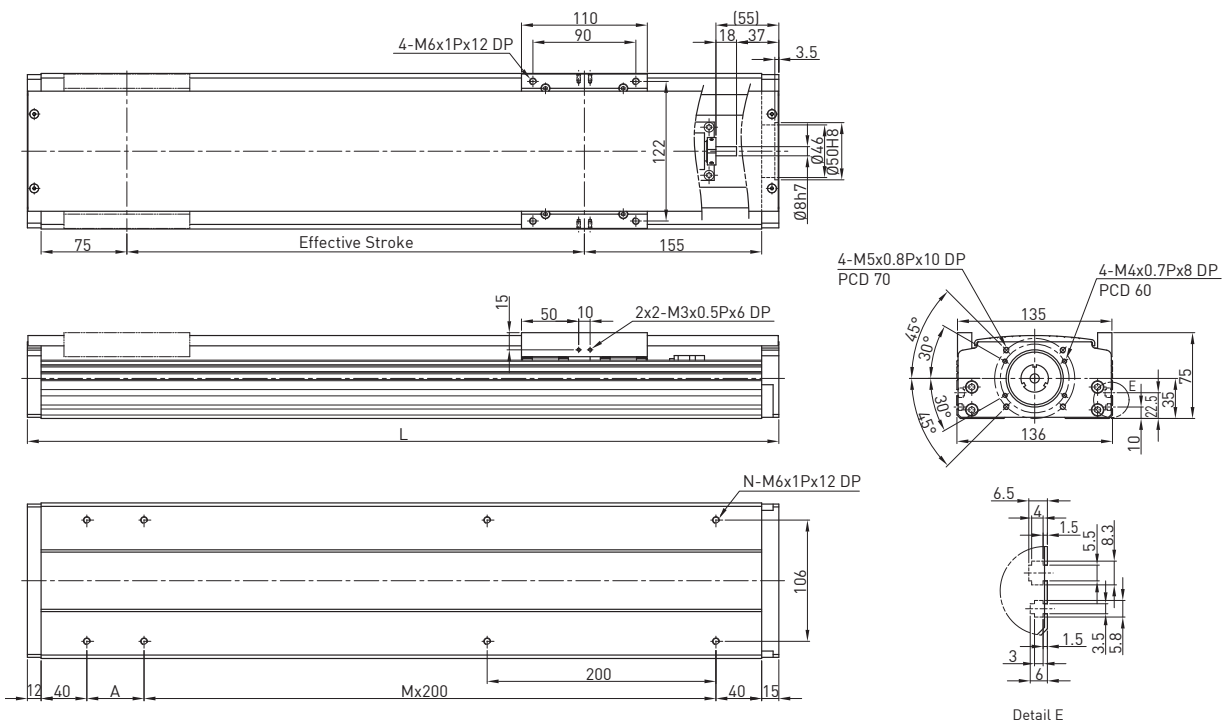
\*The load condition is based on 10,000km operation

\*\*For horizontal application only. If used in special condition, please contact HIWIN.



## 2.9.8 Model Number for KA136

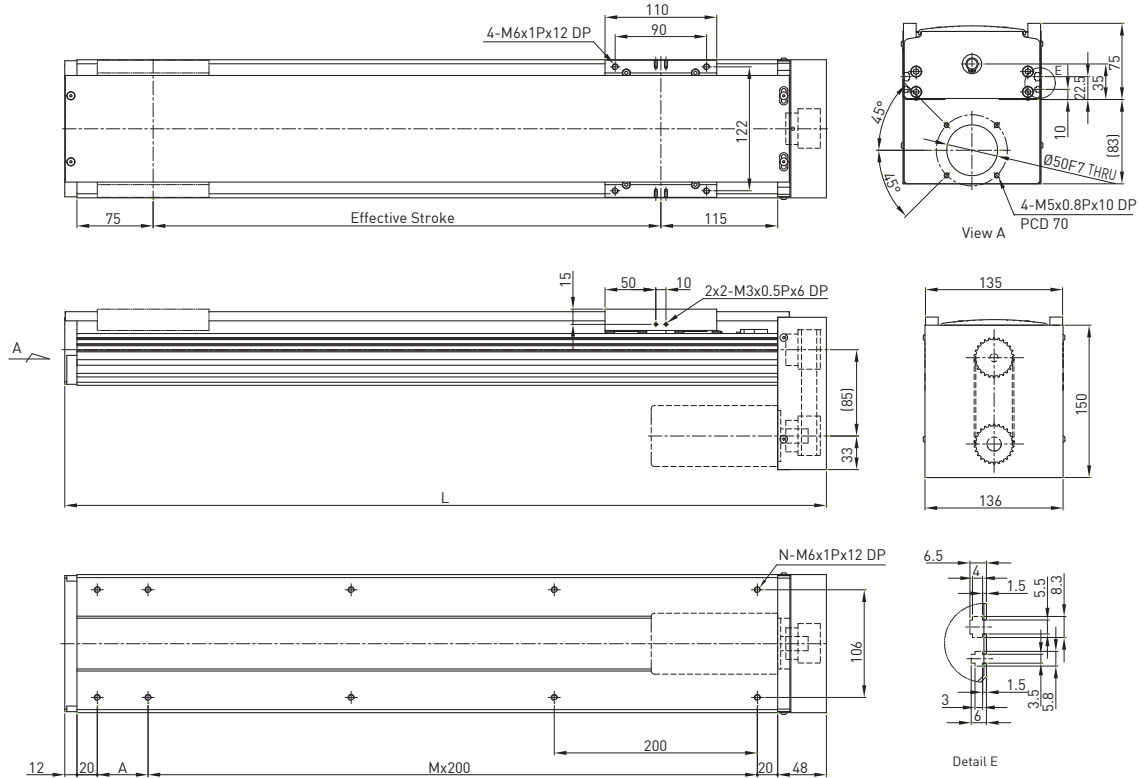
KA136	-20	P	-1050	A	F0	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install



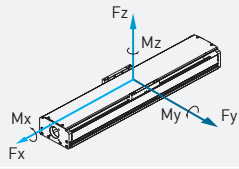
Effective stroke (mm)	L	A	M	N	AC motor output			W	200		
					Drive				Ball screw		
100	357	50	1	6	Lead	mm	5	10	20		
150	407	100	1	6	Max linear speed*	mm/sec	263	525	1050		
200	457	150	1	6	Max RPM	RPM	3150	3150	3150		
250	507	200	1	6	Rated thrust	N	712	356	178		
300	557	50	2	8	Repeatability	mm	±0.02				
350	607	100	2	8	Effective stroke	mm	100-1050				
400	657	150	2	8	Rated dynamic load**	F <sub>yd</sub>	N	448			
450	707	200	2	8		F <sub>zd</sub>	N	712			
500	757	50	3	10		M <sub>xd</sub>	N-m	30.1			
550	807	100	3	10		M <sub>yd</sub>	N-m	24.2			
600	857	150	3	10		M <sub>zd</sub>	N-m	24.2			
650	907	200	3	10	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads					
700	957	50	4	12							
750	1007	100	4	12							
800	1057	150	4	12							
850	1107	200	4	12							
900	1157	50	5	14	* Vibration might occur when the effective stroke is longer than 700mm. The maximum speed should be decreased by 15% for every 100mm of increased stroke.						
950	1207	100	5	14	** The load condition is based on 10,000km operation.						
1000	1257	150	5	14	*** If used on the vertical axis or in a special condition, please contact HIWIN.						
1050	1307	200	5	14							

## 2.9.9 Model Number for KA136-FD

KA136	-20	P	-1050	A	FD	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FD: Bottom	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install



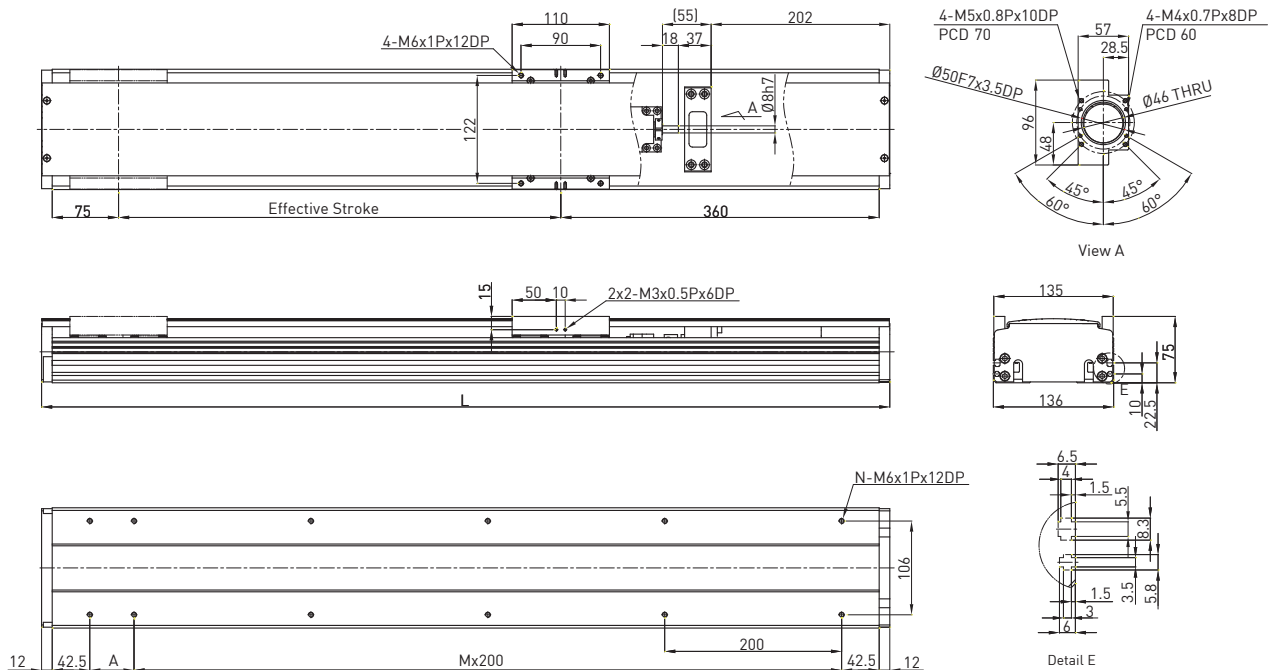
Effective stroke (mm)	L	A	M	N	AC motor output				
					W	200			
					Drive	Ball screw			
100	350	50	1	6	Lead	mm	5	10	20
150	400	100	1	6	Max linear speed*	mm/sec	263	525	1050
200	450	150	1	6	Max RPM	RPM	3150	3150	3150
250	500	200	1	6	Rated thrust	N	712	356	178
300	550	50	2	8	Repeatability	mm	±0.02		
350	600	100	2	8	Effective stroke	mm	100~1050		
400	650	150	2	8	Rated dynamic load**	F <sub>yd</sub>	N	448	
450	700	200	2	8		F <sub>zd</sub>	N	712	
500	750	50	3	10		M <sub>xd</sub>	N-m	30.1	
550	800	100	3	10		M <sub>yd</sub>	N-m	24.2	
600	850	150	3	10		M <sub>zd</sub>	N-m	24.2	
650	900	200	3	10	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads			
700	950	50	4	12					
750	1000	100	4	12					
800	1050	150	4	12					
850	1100	200	4	12					
900	1150	50	5	14					
950	1200	100	5	14					
1000	1250	150	5	14					
1050	1300	200	5	14					



\* Vibration might occur when the effective stroke is longer than 700mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.10 Model Number for KA136-FI

KA136	-20	P	-1050	A	FI	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FI : Internal	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install

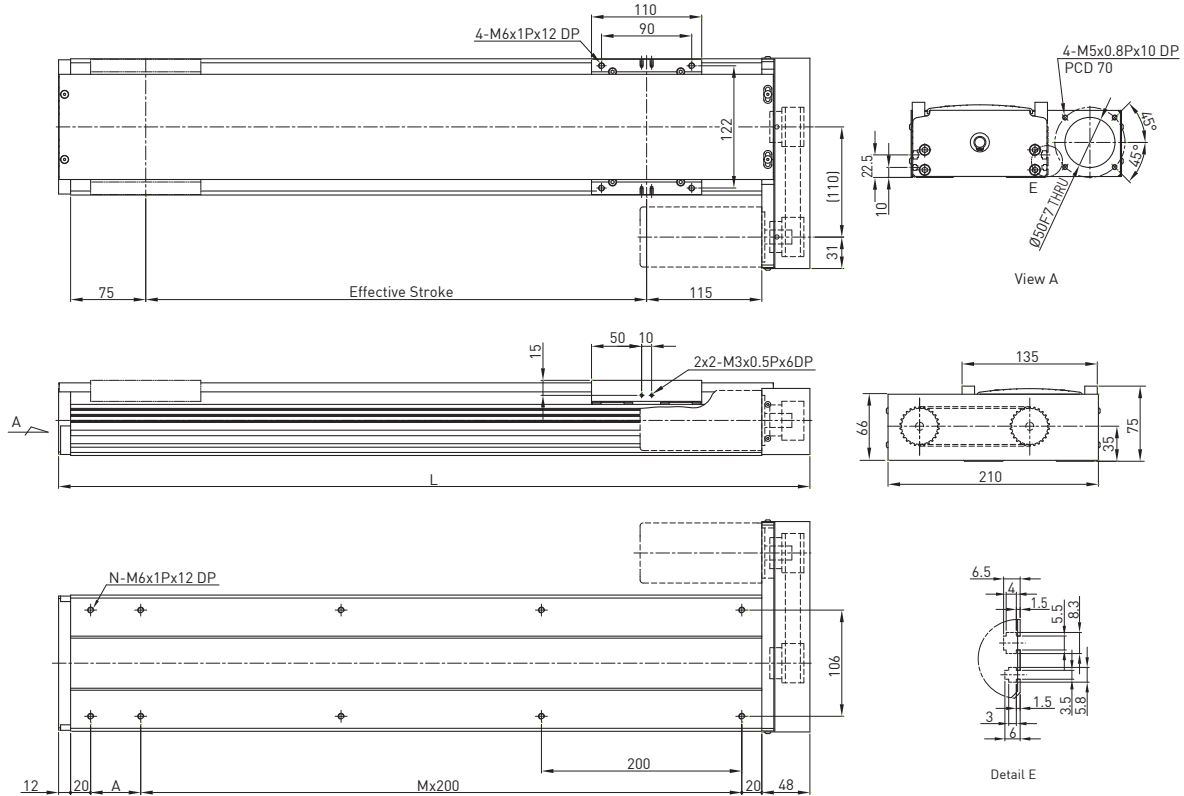


Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	200													
100	559	50	2	8	Lead	mm	5 10 20													
150	609	100	2	8	Max linear speed*	mm/sec	263 525 1050													
200	659	150	2	8	Max RPM	RPM	3150 3150 3150													
250	709	200	2	8	Rated thrust	N	712 356 178													
300	759	50	3	10	Repeatability	mm	±0.02													
350	809	100	3	10	Effective stroke	mm	100~1050													
400	859	150	3	10	<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>Rated dynamic load**</p> </div> <div style="flex: 1;"> </div> <div style="flex: 1;"> <table border="1"> <tr><td>Fyd</td><td>N</td><td>448</td></tr> <tr><td>Fzd</td><td>N</td><td>712</td></tr> <tr><td>Mxd</td><td>N-m</td><td>30.1</td></tr> <tr><td>Myd</td><td>N-m</td><td>24.2</td></tr> <tr><td>Mzd</td><td>N-m</td><td>24.2</td></tr> </table> </div> </div>	Fyd	N	448	Fzd	N	712	Mxd	N-m	30.1	Myd	N-m	24.2	Mzd	N-m	24.2
Fyd	N	448																		
Fzd	N	712																		
Mxd	N-m	30.1																		
Myd	N-m	24.2																		
Mzd	N-m	24.2																		
450	909	200	3	10	<p>Permitted load condition***</p> $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ <p>F<sub>y</sub>, F<sub>z</sub>, M<sub>x</sub>, M<sub>y</sub>, M<sub>z</sub> are working loads</p>															
500	959	50	4	12																
550	1009	100	4	12																
600	1059	150	4	12																
650	1109	200	4	12																
700	1159	50	5	14																
750	1209	100	5	14																
800	1259	150	5	14																
850	1309	200	5	14																
900	1359	50	6	16																
950	1409	100	6	16																
1000	1459	150	6	16																
1050	1509	200	6	16																

\* Vibration might occur when the effective stroke is longer than 700mm.  
The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
\*\* The load condition is based on 10,000km operation.  
\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.11 Model Number for KA136-FL

KA136	-20	P	-1050	A	FL	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FL: Left	U: Without Cover None: Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V: Vertical Install None: Horizontal Install

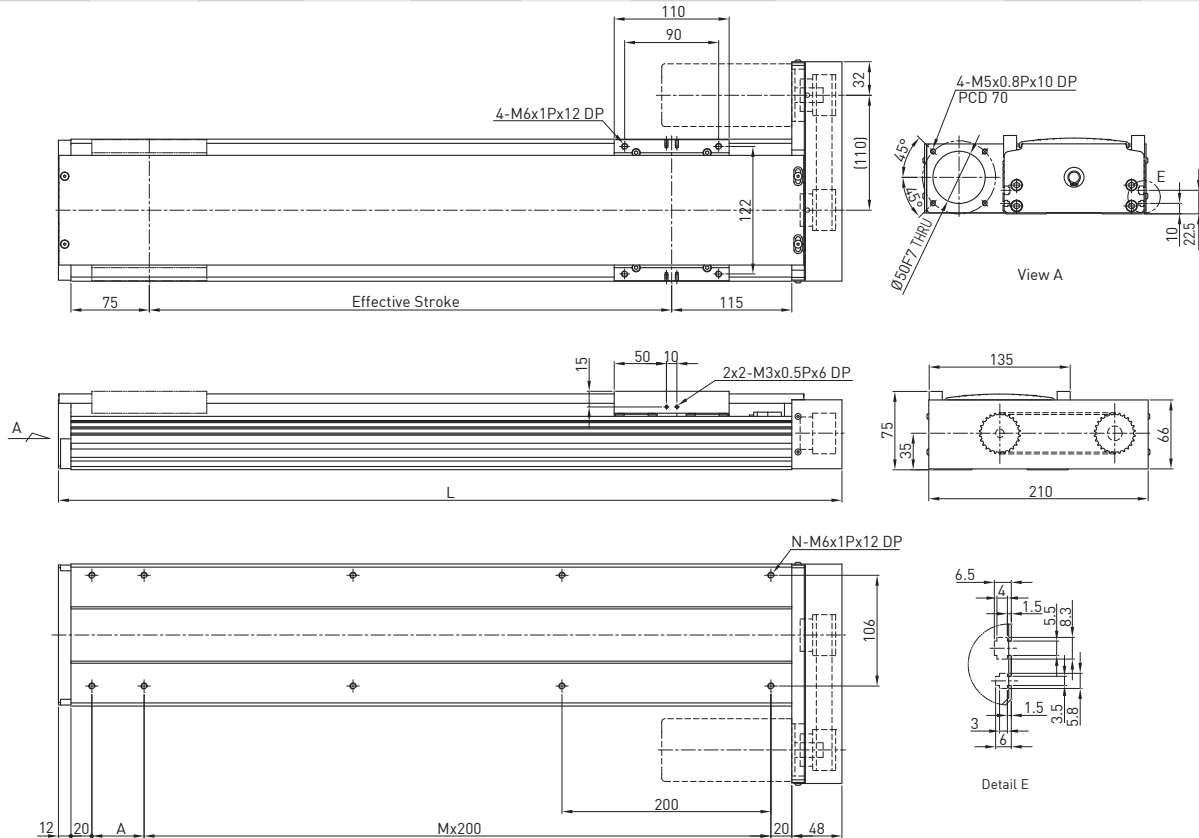


Effective stroke (mm)	L	A	M	N	AC motor output				
					W	200			
					Drive	Ball screw			
100	350	50	1	6	Lead	mm	5	10	20
150	400	100	1	6	Max linear speed*	mm/sec	263	525	1050
200	450	150	1	6	Max RPM	RPM	3150	3150	3150
250	500	200	1	6	Rated thrust	N	712	356	178
300	550	50	2	8	Repeatability	mm	±0.02		
350	600	100	2	8	Effective stroke	mm	100~1050		
400	650	150	2	8	Rated dynamic load**		F <sub>yd</sub>	N	448
450	700	200	2	8			F <sub>zd</sub>	N	712
500	750	50	3	10			M <sub>xd</sub>	N-m	30.1
550	800	100	3	10			M <sub>yd</sub>	N-m	24.2
600	850	150	3	10			M <sub>zd</sub>	N-m	24.2
650	900	200	3	10					
700	950	50	4	12	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$			
750	1000	100	4	12		F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads			
800	1050	150	4	12					
850	1100	200	4	12					
900	1150	50	5	14					
950	1200	100	5	14					
1000	1250	150	5	14					
1050	1300	200	5	14					

\* Vibration might occur when the effective stroke is longer than 700mm.  
The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
\*\* The load condition is based on 10,000km operation.  
\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.12 Model Number for KA136-FR

KA136	-20	P	-1050	A	FR	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	5 mm 10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FR: Right	U: Without Cover None: Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V: Vertical Install None: Horizontal Install

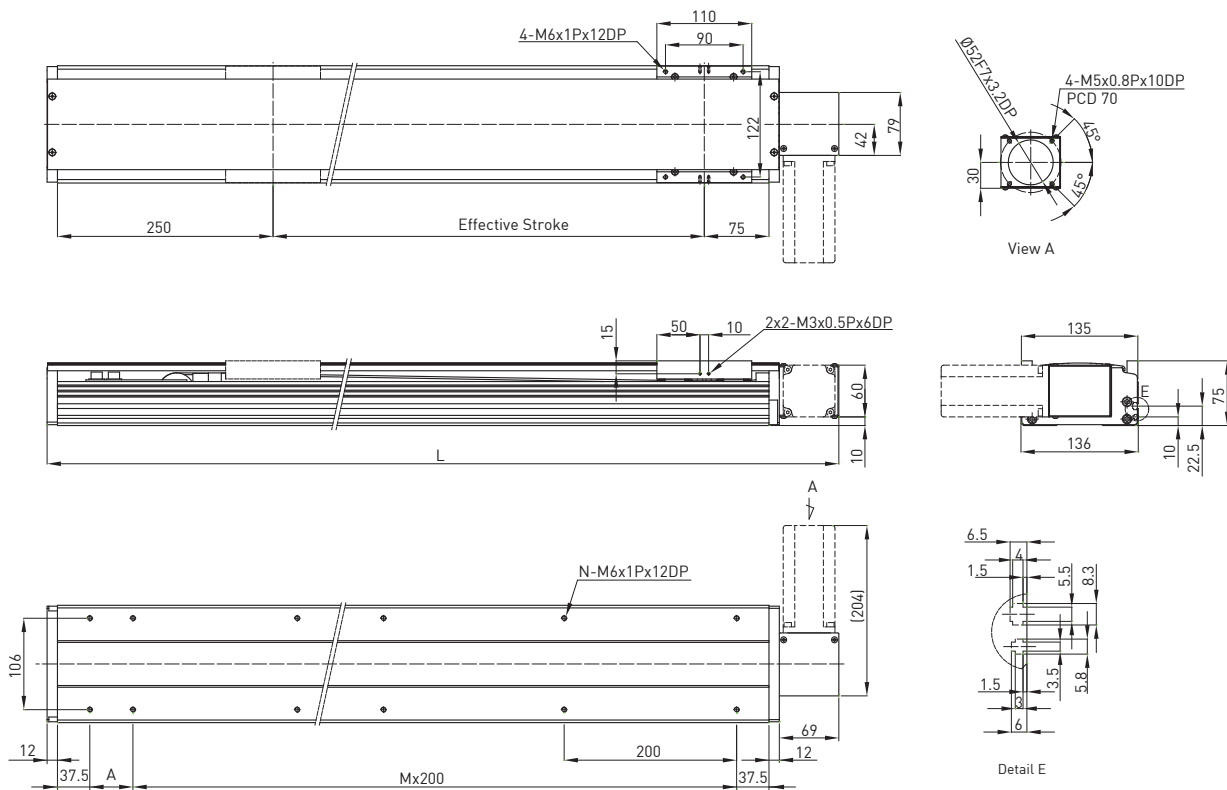


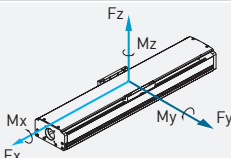
Effective stroke (mm)	L	A	M	N	AC motor output			W		
					Drive	W	200	Ball screw		
100	350	50	1	6	Lead	mm	5	10	20	
150	400	100	1	6	Max linear speed*	mm/sec	263	525	1050	
200	450	150	1	6	Max RPM	RPM	3150	3150	3150	
250	500	200	1	6	Rated thrust	N	712	356	178	
300	550	50	2	8	Repeatability	mm	±0.02			
350	600	100	2	8	Effective stroke	mm	100-1050			
400	650	150	2	8	Rated dynamic load**		F <sub>yd</sub>	N	448	
450	700	200	2	8			F <sub>zd</sub>	N	712	
500	750	50	3	10			M <sub>xd</sub>	N-m	30.1	
550	800	100	3	10			M <sub>yd</sub>	N-m	24.2	
600	850	150	3	10			M <sub>zd</sub>	N-m	24.2	
650	900	200	3	10						
700	950	50	4	12	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$				
750	1000	100	4	12		F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads				
800	1050	150	4	12						
850	1100	200	4	12						
900	1150	50	5	14						
950	1200	100	5	14						
1000	1250	150	5	14						
1050	1300	200	5	14						

\* Vibration might occur when the effective stroke is longer than 700mm.  
The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
\*\* The load condition is based on 10,000km operation.  
\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.13 Model Number for KA136B-FL

KA136	B	-120	C	-3000	A	FL	U	S1	M	V
Model	Timing Belt	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
			C: Normal		A: Standard	FL: Left	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install



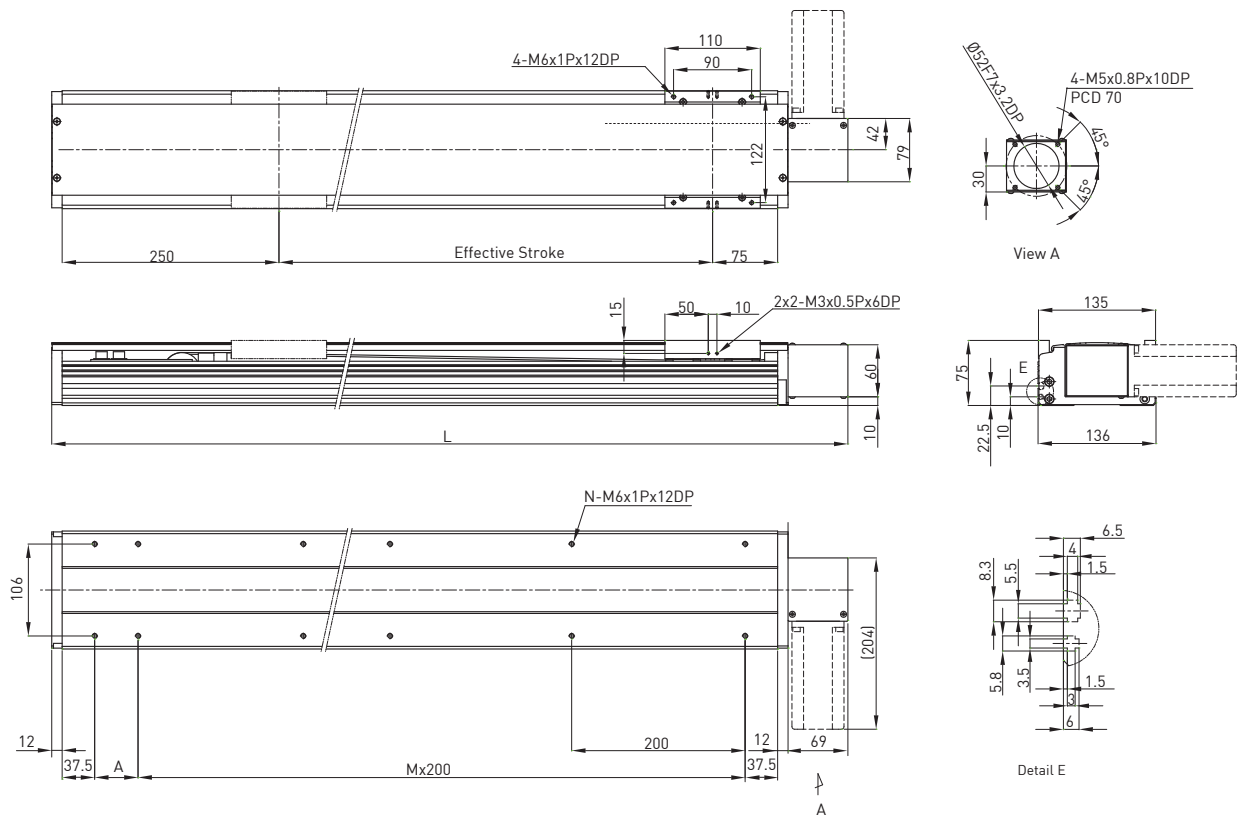
Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	200	
200	618	50	2	8	Lead	mm	120	
400	818	50	3	10	Max linear speed	mm/sec	1800	
600	1018	50	4	12	Rated thrust	N	66	
800	1218	50	5	14	Repeatability	mm	±0.1	
1000	1418	50	6	16	Effective stroke	mm	200~3000	
1200	1618	50	7	18	Rated dynamic load* 	Fyd	N	448
1400	1818	50	8	20		Fzd	N	712
1600	2018	50	9	22		Mxd	N-m	30.1
1800	2218	50	10	24		Myd	N-m	24.2
2000	2418	50	11	26		Mzd	N-m	24.2
2200	2618	50	12	28	Permitted load condition** $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads			
2400	2818	50	13	30				
2600	3018	50	14	32				
2800	3218	50	15	34				
3000	3418	50	16	36				

\*The load condition is based on 10,000km operation

\*\*For horizontal application only. If used in special condition, please contact HIWIN.

## 2.9.14 Model Number for KA136B-FR

KA136	B	-120	C	-3000	A	FR	U	S1	M	V
Model	Timing Belt	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
			C: Normal		A: Standard	FR: Right	U: Without Cover None: Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V: Vertical Install None: Horizontal Install



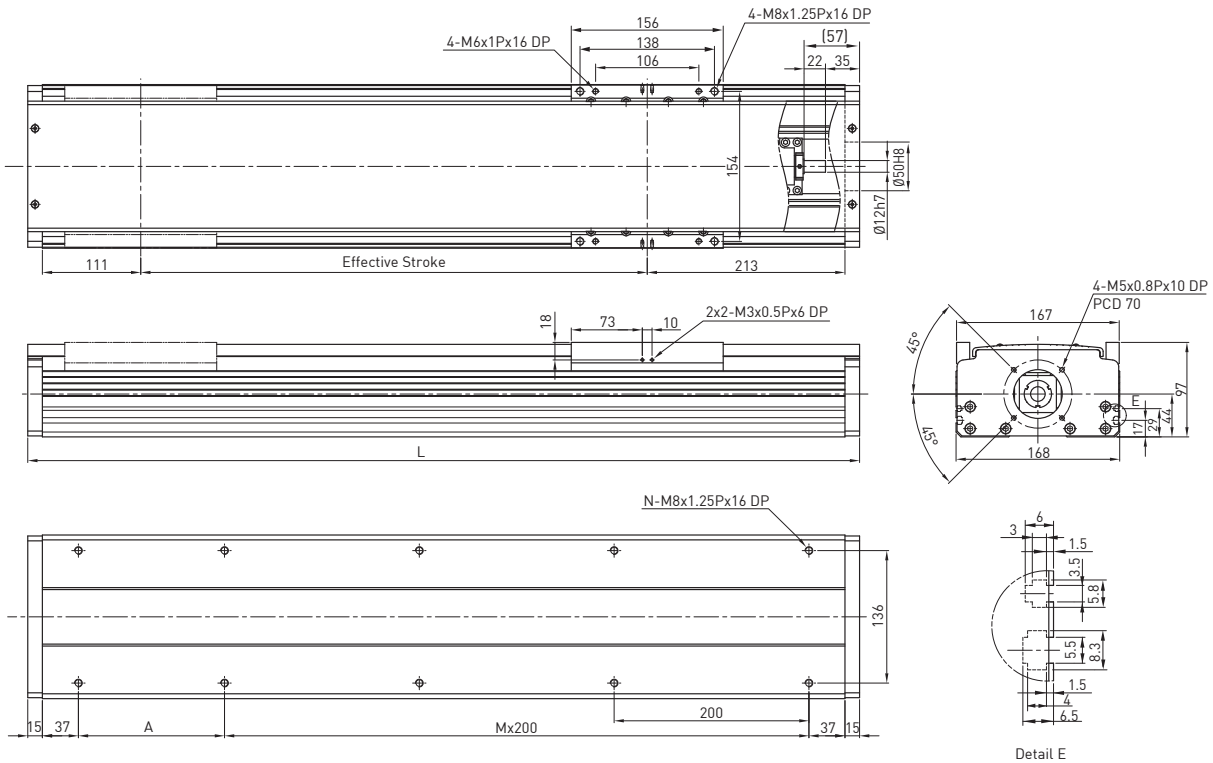
Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	200	
200	618	50	2	8	Lead	mm	120	
400	818	50	3	10	Max linear speed	mm/sec	1800	
600	1018	50	4	12	Rated thrust	N	66	
800	1218	50	5	14	Repeatability	mm	±0.1	
1000	1418	50	6	16	Effective stroke	mm	200~3000	
1200	1618	50	7	18	Rated dynamic load* 	Fyd	N	448
1400	1818	50	8	20		Fzd	N	712
1600	2018	50	9	22		Mxd	N-m	30.1
1800	2218	50	10	24		Myd	N-m	24.2
2000	2418	50	11	26		Mzd	N-m	24.2
2200	2618	50	12	28	Permitted load condition** $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz Mz are working loads			
2400	2818	50	13	30				
2600	3018	50	14	32				
2800	3218	50	15	34				
3000	3418	50	16	36				

\*The load condition is based on 10,000km operation

\*\*For horizontal application only. If used in special condition, please contact HIWIN.

## 2.9.15 Model Number for KA170

KA170	-20	P	-1050	A	F0	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	10 mm 20 mm	P: Precision C: Normal		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install



Effective stroke (mm)	L	A	M	N	AC motor output		W	
					Drive		400	
150	504	200	1	6	Lead	mm	10	20
200	554	50	2	8	Max linear speed*	mm/sec	400	800
250	604	100	2	8	Max RPM	RPM	2400	2400
300	654	150	2	8	Rated thrust	N	936	468
350	704	200	2	8	Repeatability	mm	±0.02	
400	754	50	3	10	Effective stroke	mm	150~1250	
450	804	100	3	10	Rated dynamic load**	F <sub>yd</sub>	N	1324
500	854	150	3	10		F <sub>zd</sub>	N	2367
550	904	200	3	10		M <sub>xd</sub>	N-m	127.8
600	954	50	4	12		M <sub>yd</sub>	N-m	92.9
650	1004	100	4	12		M <sub>zd</sub>	N-m	92.9
700	1054	150	4	12		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> M <sub>z</sub> are working loads		
750	1104	200	4	12				
800	1154	50	5	14				
850	1204	100	5	14				
900	1254	150	5	14				
950	1304	200	5	14				
1000	1354	50	6	16	Permitted load condition***			
1050	1404	100	6	16				
1100	1454	150	6	16				
1150	1504	200	6	16				
1200	1554	50	7	18				
1250	1604	100	7	18				

\* Vibration might occur when the effective stroke is longer than 800mm.

The maximum speed should be decreased by 15% for every 100mm of increased stroke.

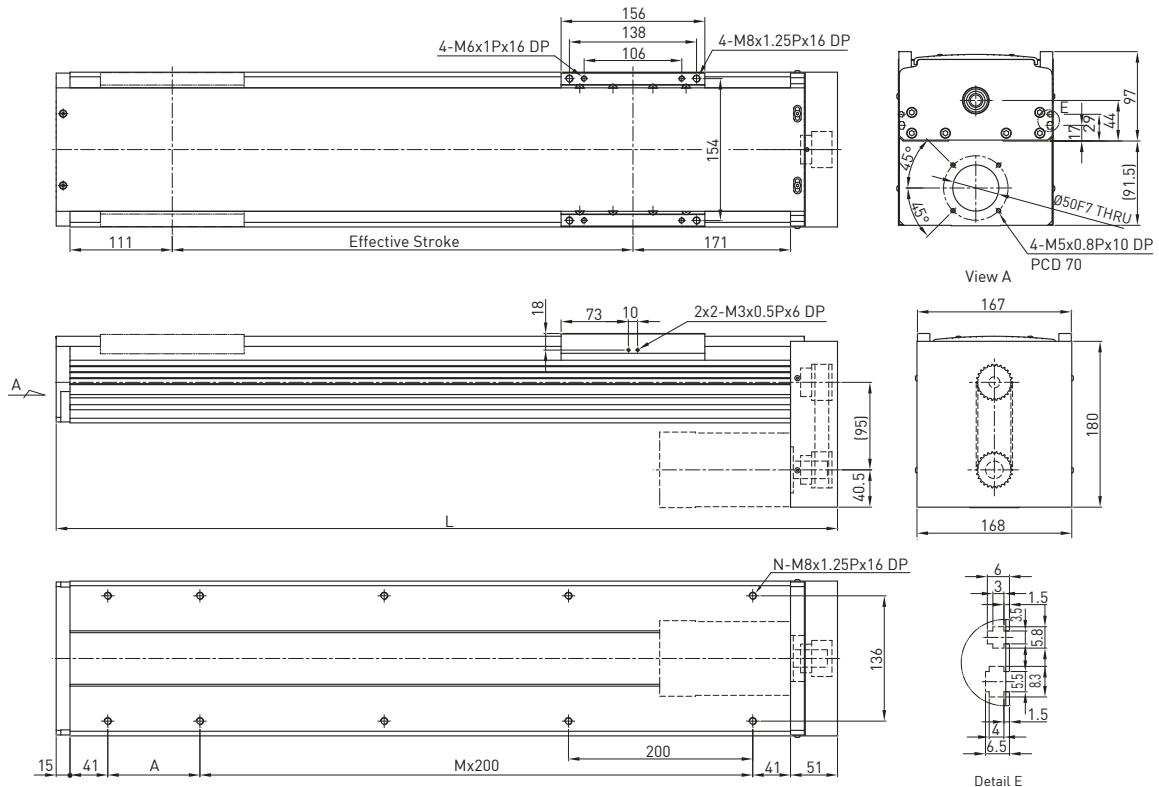
\*\* The load condition is based on 10,000km operation.

\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.



## 2.9.16 Model Number for KA170-FD

KA170	-20	P	-1050	A	FD	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FD: Bottom	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install

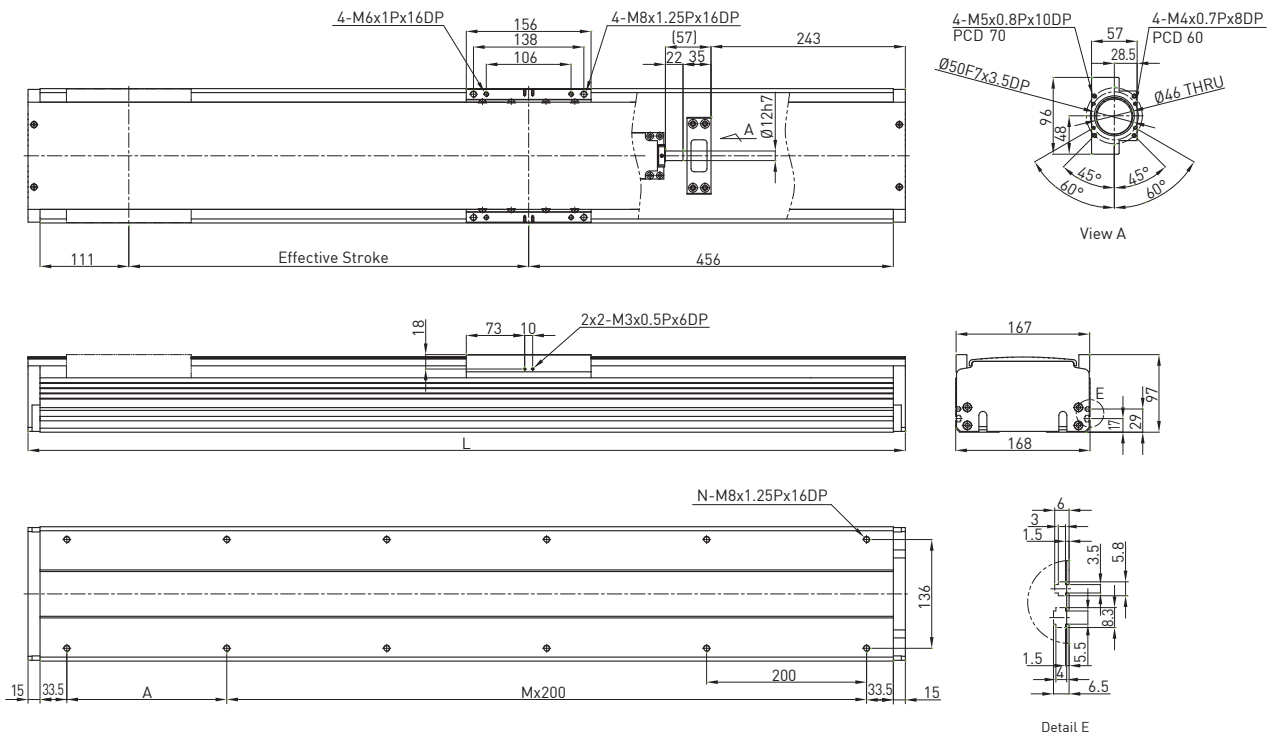


Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	400	
150	498	150	1	6	Lead	mm	10 20	
200	548	200	1	6	Max linear speed*	mm/sec	400 800	
250	598	50	2	8	Max RPM	RPM	2400 2400	
300	648	100	2	8	Rated thrust	N	936 468	
350	698	150	2	8	Repeatability	mm	±0.02	
400	748	200	2	8	Effective stroke	mm	150-1250	
450	798	50	3	10		Fyd	N	1324
500	848	100	3	10		Fzd	N	2367
550	898	150	3	10		Mxd	N-m	127.8
600	948	200	3	10		Myd	N-m	92.9
650	998	50	4	12		Mzd	N-m	92.9
700	1048	100	4	12		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads		
750	1098	150	4	12	<b>Permitted load condition***</b>			
800	1148	200	4	12				
850	1198	50	5	14				
900	1248	100	5	14				
950	1298	150	5	14				
1000	1348	200	5	14				
1050	1398	50	6	16				
1100	1448	100	6	16				
1150	1498	150	6	16				
1200	1548	200	6	16				
1250	1598	50	7	18				

\* Vibration might occur when the effective stroke is longer than 800mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.17 Model Number for KA170-FI

KA170	-20	P	-1050	A	FI	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FI : Internal	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install

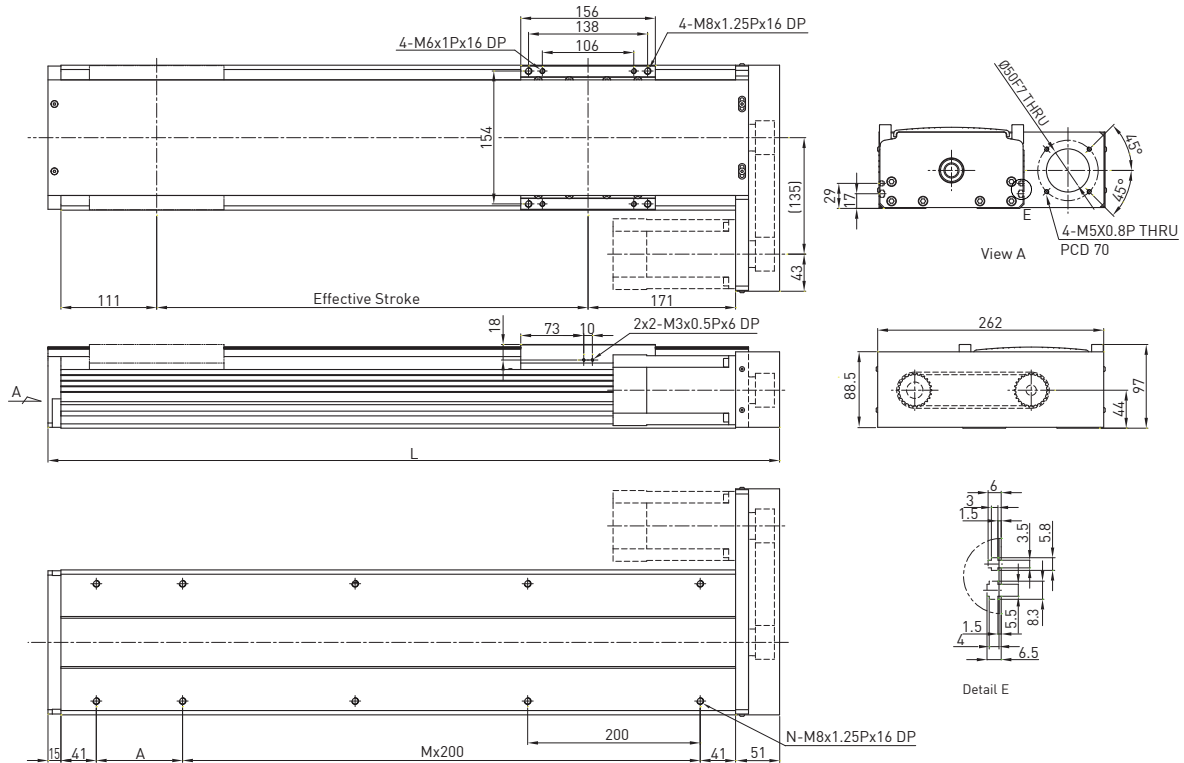


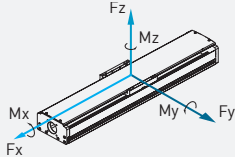
Effective stroke (mm)	L	A	M	N	AC motor output	W	400	
150	747	50	3	10	Drive	Ball screw		
200	797	100	3	10	Lead	mm	10 20	
250	847	150	3	10	Max linear speed*	mm/sec	400 800	
300	897	200	3	10	Max RPM	RPM	2400 2400	
350	947	50	4	12	Rated thrust	N	936 468	
400	997	100	4	12	Repeatability	mm	±0.02	
450	1047	150	4	12	Effective stroke	mm	150~1250	
500	1097	200	4	12		Fyd	N	1324
550	1147	50	5	14		Fzd	N	2367
600	1197	100	5	14		Mxd	N-m	127.8
650	1247	150	5	14		Myd	N-m	92.9
700	1297	200	5	14		Mzd	N-m	92.9
750	1347	50	6	16		<b>Permitted load condition***</b> $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads		
800	1397	100	6	16				
850	1447	150	6	16				
900	1497	200	6	16				
950	1547	50	7	18				
1000	1597	100	7	18				
1050	1647	150	7	18				
1100	1697	200	7	18				
1150	1747	50	8	20				
1200	1797	100	8	20				
1250	1847	150	8	20				

\* Vibration might occur when the effective stroke is longer than 800mm. The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.18 Model Number for KA170-FL

KA170	-20	P	-1050	A	FL	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FL: Left	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install

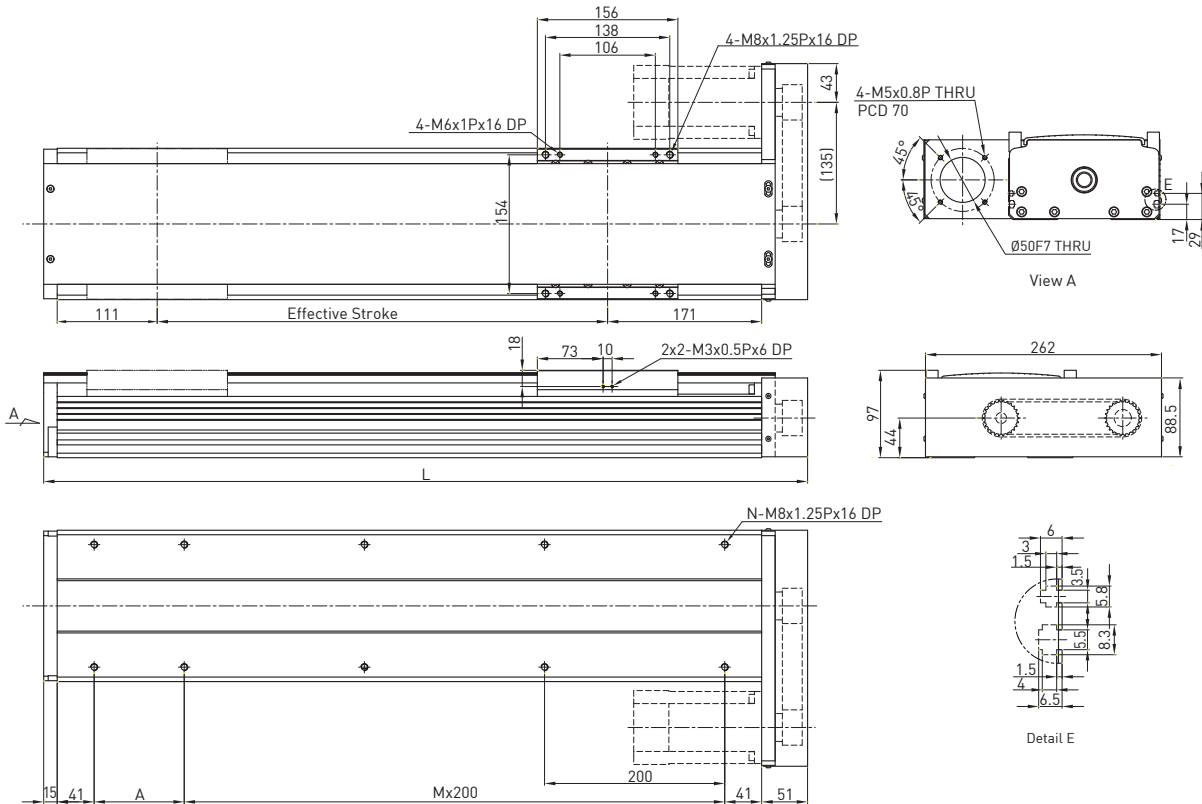


Effective stroke (mm)	L	A	M	N	AC motor output	W	400	
					Drive		Ballscrew	
150	498	150	1	6	Lead	mm	10 20	
200	548	200	1	6	Max linear speed*	mm/sec	400 800	
250	598	50	2	8	Max RPM	RPM	2400 2400	
300	648	100	2	8	Rated thrust	N	936 468	
350	698	150	2	8	Repeatability	mm	±0.02	
400	748	200	2	8	Effective stroke	mm	150~1250	
450	798	50	3	10	<b>Rated dynamic load**</b> 	Fyd	N	1324
500	848	100	3	10		Fzd	N	2367
550	898	150	3	10		Mxd	N-m	127.8
600	948	200	3	10		Myd	N-m	92.9
650	998	50	4	12		Mzd	N-m	92.9
700	1048	100	4	12	<b>Permitted load condition***</b> $\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads			
750	1098	150	4	12				
800	1148	200	4	12				
850	1198	50	5	14				
900	1248	100	5	14				
950	1298	150	5	14				
1000	1348	200	5	14				
1050	1398	50	6	16				
1100	1448	100	6	16				
1150	1498	150	6	16				
1200	1548	200	6	16				
1250	1598	50	7	18				

\* Vibration might occur when the effective stroke is longer than 800mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.19 Model Number for KA170-FR

KA170	-20	P	-1050	A	FR	U	S1	M	V
Model	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
	10 mm 20 mm	P: Precision C: Normal		A: Standard H: Heavy Load	FR: Right	U: Without Cover None: Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V: Vertical Install None: Horizontal Install

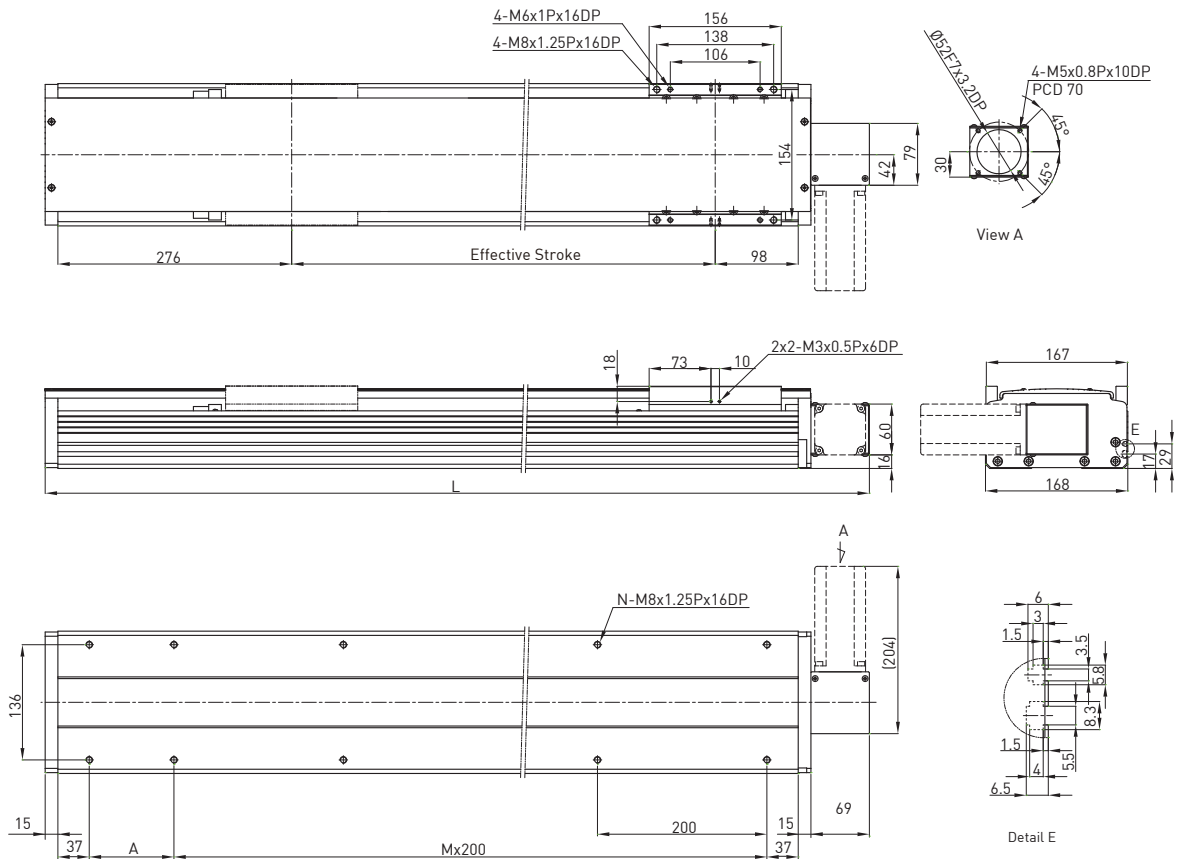


Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	400
150	498	150	1	6	Lead	mm	10 20
200	548	200	1	6	Max linear speed*	mm/sec	400 800
250	598	50	2	8	Max RPM	RPM	2400 2400
300	648	100	2	8	Rated thrust	N	936 468
350	698	150	2	8	Repeatability	mm	±0.02
400	748	200	2	8	Effective stroke	mm	150-1250
450	798	50	3	10	Rated dynamic load**	F <sub>yd</sub>	N 1324
500	848	100	3	10		F <sub>zd</sub>	N 2367
550	898	150	3	10		M <sub>xd</sub>	N-m 127.8
600	948	200	3	10		M <sub>yd</sub>	N-m 92.9
650	998	50	4	12		M <sub>zd</sub>	N-m 92.9
700	1048	100	4	12	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads	
750	1098	150	4	12			
800	1148	200	4	12			
850	1198	50	5	14			
900	1248	100	5	14			
950	1298	150	5	14			
1000	1348	200	5	14			
1050	1398	50	6	16			
1100	1448	100	6	16			
1150	1498	150	6	16			
1200	1548	200	6	16			
1250	1598	50	7	18			

\* Vibration might occur when the effective stroke is longer than 800mm. The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## 2.9.20 Model Number for KA170B-FL

KA170	B	-120	C	-3000	A	FL	U	S1	M	V
Model	Timing Belt	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
			C: Normal		A: Standard	FL: Left	U: Without Cover None : Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V : Vertical Install None: Horizontal Install



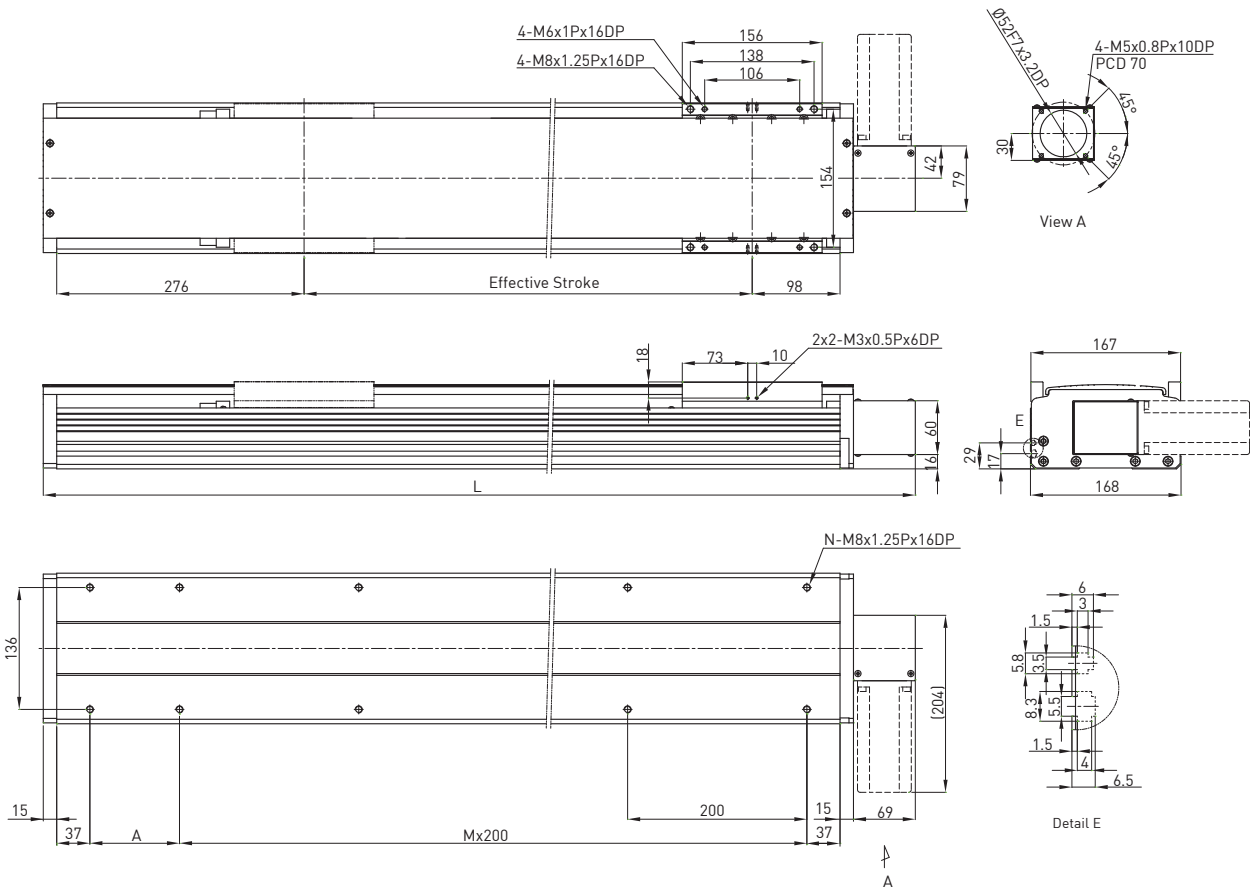
Effective stroke (mm)	L	A	M	N	AC motor output	W	400	
200	673	100	2	8	Drive		Timing Belt	
400	873	100	3	10	Lead	mm	120	
600	1073	100	4	12	Max linear speed	mm/sec	1800	
800	1273	100	5	14	Rated thrust	N	133	
1000	1473	100	6	16	Repeatability	mm	±0.1	
1200	1673	100	7	18	Effective stroke	mm	200-3000	
1400	1873	100	8	20	Rated dynamic load*	F <sub>yd</sub>	N	1324
1600	2073	100	9	22		F <sub>zd</sub>	N	2367
1800	2273	100	10	24		M <sub>xd</sub>	N-m	127.8
2000	2473	100	11	26		M <sub>yd</sub>	N-m	92.9
2200	2673	100	12	28		M <sub>zd</sub>	N-m	92.9
2400	2873	100	13	30	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		
2600	3073	100	14	32		F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads		
2800	3273	100	15	34				
3000	3473	100	16	36				

\*The load condition is based on 10,000km operation

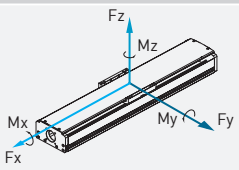
\*\*For horizontal application only. If used in special condition, please contact HIWIN.

## 2.9.21 Model Number for KA170B-FR

KA170	B	-120	C	-3000	A	FR	U	S1	M	V
Model	Timing Belt	Lead	Precision Grade	Effective Stroke	Load Type	Motor Flange	Cover	Limit Switch	Motor	Installation
			C: Normal		A: Standard	FR: Right	U: Without Cover None: Standard Cover	S1: Omron SX-671 S2: Omron SX-674 S3: Sunx GL-12F S4: Sunx GL-N12F-PX10 None: Without Sensor	M: Supplied With Motor None: Without Motor	V: Vertical Install None: Horizontal Install



Effective stroke (mm)	L	A	M	N	AC motor output Drive	W	400	
200	673	100	2	8	Lead	mm	120	
400	873	100	3	10	Max linear speed	mm/sec	1800	
600	1073	100	4	12	Rated thrust	N	133	
800	1273	100	5	14	Repeatability	mm	±0.1	
1000	1473	100	6	16	Effective stroke	mm	200~3000	
1200	1673	100	7	18	Rated dynamic load*	F <sub>yd</sub>	N	1324
1400	1873	100	8	20		F <sub>zd</sub>	N	2367
1600	2073	100	9	22		M <sub>xd</sub>	N-m	127.8
1800	2273	100	10	24		M <sub>yd</sub>	N-m	92.9
2000	2473	100	11	26		M <sub>zd</sub>	N-m	92.9
2200	2673	100	12	28	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads		
2400	2873	100	13	30				
2600	3073	100	14	32				
2800	3273	100	15	34				
3000	3473	100	16	36				



\*The load condition is based on 10,000km operation  
 \*\*For horizontal application only. If used in special condition, please contact HIWIN.

# Single Axis Robot

## KS Series

### 3.1 Features

- Reasonable price
- Use in Clean room
- Stainless covers
- Already installed AC servo motor (optional)
- High repeatability  $\pm 0.02\text{mm}$
- Dust proof
- Support different strokes

### 3.2 Applications

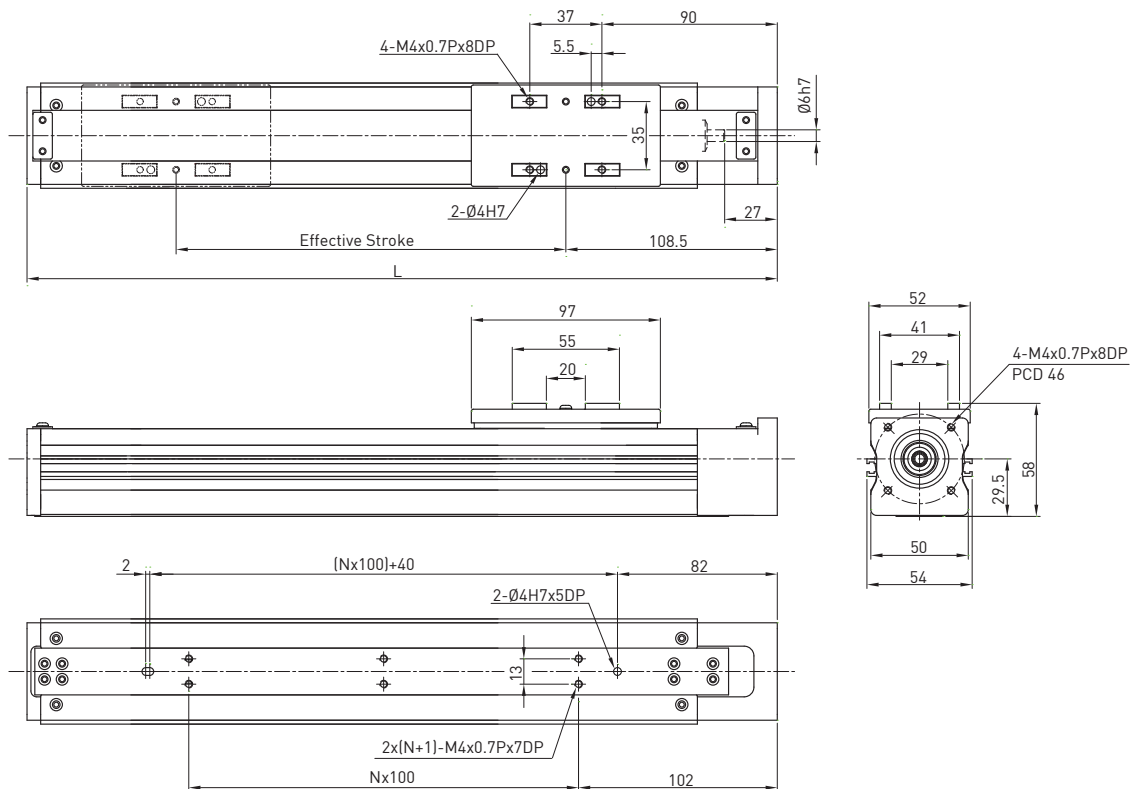
- FPD industry
- Semiconductor
- Medical applications
- FPD glass transfer
- Inspection & testing equipment



### 3.3 KS Series

#### 3.3.1 Model Number for KS05 (Single Slider)

KS05	-04	-0200	-C	-M1	D	B	-S1	-5	-F1
Model	Lead	Effective Stroke	Precision Grade	Motor	Driver	Brake	Limit Switch	Cable Length	Adaptor Flange
	4 mm		C: Normal	M0: Without Motor M1: Mitsubishi Motor 50W P1: Panasonic Motor 50W	D: With Driver None: Without Driver	B: With Brake None: Without Brake	S1: Omron SX-674 None: Without Sensor	5: 5M (Standard) A: 10M None: Without Cable	F1: Adaptor Panasonic Motor None: Use Mitsubishi Motor



Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	50	
100	285	1	1.4	Drive		Ballscrew	
200	385	2	1.7	Lead	mm	4	
300	485	3	2	Max linear speed	mm/sec	210	
400	585	4	2.3	Max RPM	RPM	3150	
				Rated thrust	N	223	
				Repeatability	mm	±0.02	
				Effective stroke	mm	100~400 (100 Pitch)	
					Fyd	N	34
					Fzd	N	173
					Mxd	N-m	2.2
					Myd	N-m	1.2
					Mzd	N-m	1.2
				Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads		

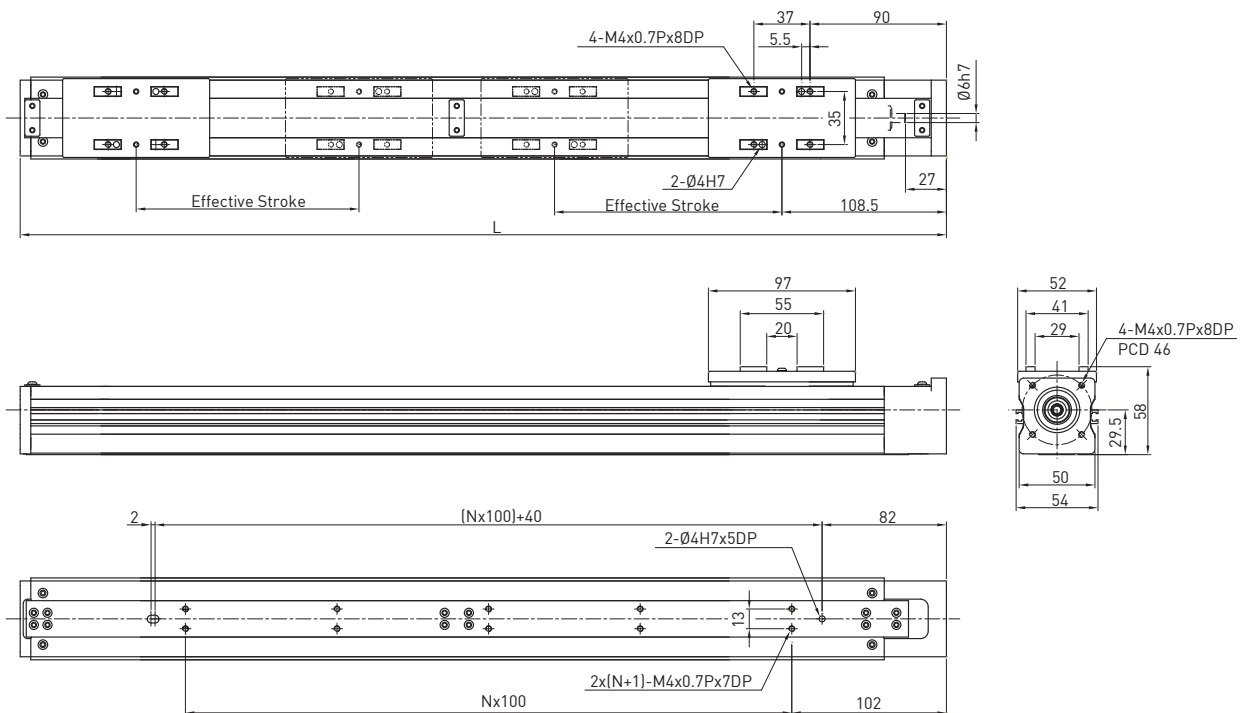
\*\* The load condition is based on 10,000km operation.

\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.



### 3.3.2 Model Number for KS05 (Double Slider)

KS05	-04	-0200	-C	-2	-M1	D	B	-S1	-5	-F1
Model	Lead	Effective Stroke	Precision Grade	Number of Slider	Motor	Driver	Brake	Limit Switch	Cable Length	Adaptor Flange
	4 mm		C: Normal	2: Double slider None: Single slider	M0: Without Motor M1: Mitsubishi Motor 50W P1: Panasonic Motor 50W	D: With Driver None: Without Driver	B: With Brake None: Without Brake	S1: Omron SX-674 None: Without Sensor	5: 5M (Standard) A: 10M None: Without Cable	F1: Adaptor Panasonic Motor None: Use Mitsubishi Motor



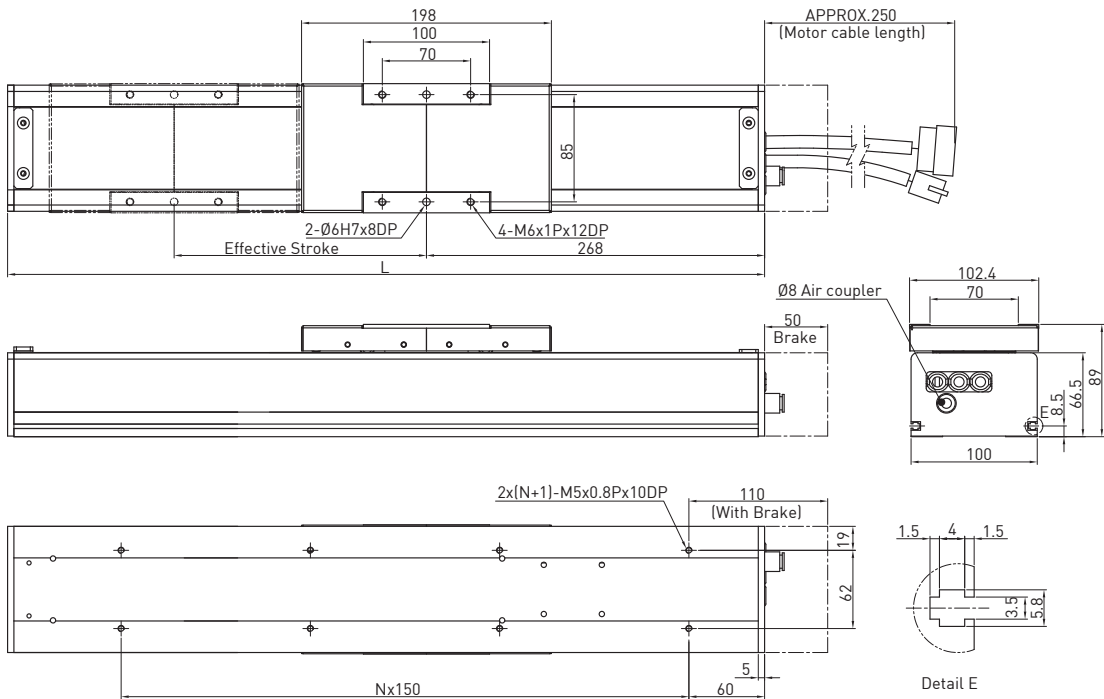
Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	50	
				Drive		Ballscrew	
100	511	3	2.3	Lead	mm	4	
150	611	4	2.5	Max linear speed	mm/sec	210	
200	711	5	2.8	Max RPM	RPM	3150	
250	811	6	3	Rated thrust	N	223	
				Repeatability	mm	±0.02	
				Effective stroke	mm	100~250 (50 Pitch)	
Rated dynamic load**					Fyd	N	34
					Fzd	N	173
					Mxd	N-m	2.2
					Myd	N-m	1.2
					Mzd	N-m	1.2
Permitted load condition***				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads			

\*\* The load condition is based on 10,000km operation.

\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

### 3.3.3 Model Number for KS10

KS10	-10	-0400	-C	-M2	D	B	-S1	-5
Model	Lead	Effective Stroke	Precision Grade	Motor	Driver	Brake	Limit Switch	Cable Length
	10 mm 20 mm		C: Normal P: Precision	M0: Without Motor M2: Mitsubishi Motor 100W P2: Panasonic Motor 100W	D: With Driver None: Without Driver	B: With Brake None: Without Brake	S1: Omron SX-674 None: Without Sensor	5: 5M (Standard) A: 10M None: Without Cable

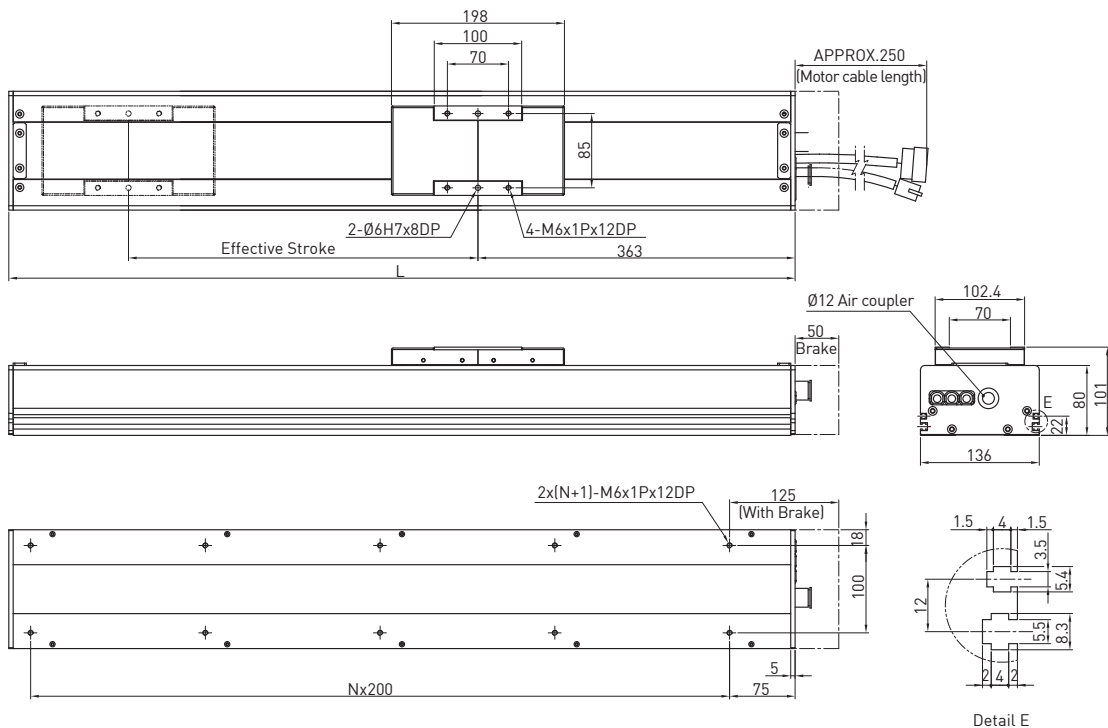


Effective stroke (mm)	L	N	Weight (kg)	AC motor output Drive	W	100	
200	600	3	9.1	Lead	mm	10 20	
300	700	4	9.8	Max linear speed*	mm/sec	525 1050	
400	800	4	10.5	Max RPM	RPM	3150 3150	
500	900	5	11.2	Rated thrust	N	178 89	
600	1000	6	11.9	Repeatability	mm	±0.02	
700	1100	6	12.6	Effective stroke	mm	200-800 (100 Pitch)	
800	1200	7	13.3		Fyd	N	68
			Fzd		N	303	
			Mxd		N-m	6.6	
			Myd		N-m	2.7	
			Mzd		N-m	2.7	
			Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads			

\* Vibration might occur when the effective stroke is longer than 700mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

### 3.3.4 Model Number for KS14

KS14	-20	-0600	-C	-M3	D	B	-S1	-5
Model	Lead	Effective Stroke	Precision Grade	Motor	Driver	Brake	Limit Switch	Cable Length
	10 mm 20 mm		C: Normal  P: Precision	M0: Without Motor  M3: Mitsubishi Motor 200W  P3: Panasonic Motor 200W	D: With Driver  None: Without Driver	B: With Brake  None: Without Brake	S1: Omron SX-674  None: Without Sensor	5: 5M (Standard)  A: 10M  None: Without Cable

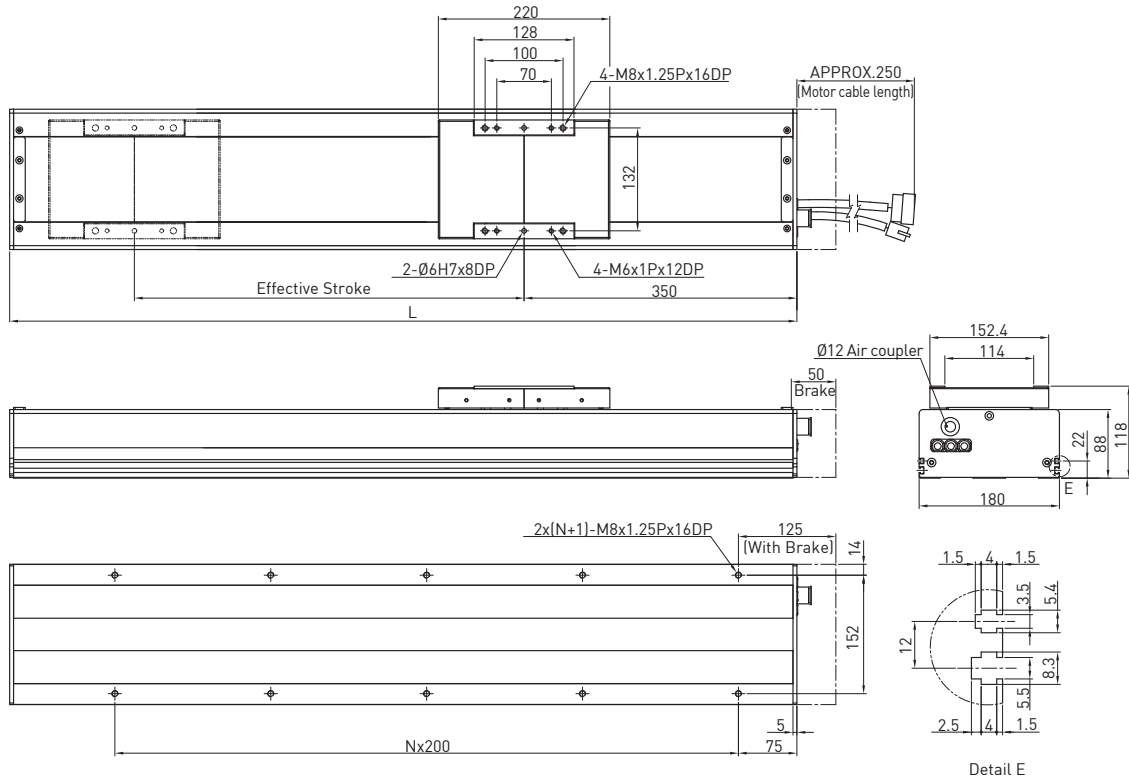


Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	200		
				Drive		Ball screw		
				Lead	mm	10	20	
				Max linear speed*	mm/sec	525	1050	
				Max RPM	RPM	3150	3150	
				Rated thrust	N	357	178	
				Repeatability	mm	±0.02		
				Effective stroke	mm	200~1100 (100 Pitch)		
				Rated dynamic load**		F <sub>yd</sub>	N	666
						F <sub>zd</sub>	N	1517
						M <sub>xd</sub>	N-m	66.8
M <sub>yd</sub>	N-m	51.6						
M <sub>zd</sub>	N-m	51.6						
Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads					

\* Vibration might occur when the effective stroke is longer than 700mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

### 3.3.5 Model Number for KS18

KS18	-20	-0600	-C	-M4	D	B	-S1	-5
Model	Lead	Effective Stroke	Precision Grade	Motor	Driver	Brake	Limit Switch	Cable Length
	10 mm 20 mm		C: Normal  P: Precision	M0: Without Motor  M4: Mitsubishi Motor 400W  P4: Panasonic Motor 400W	D: With Driver  None: Without Driver	B: With Brake  None: Without Brake	S1: Omron SX-674  None: Without Sensor	5: 5M (Standard)  A: 10M  None: Without Cable



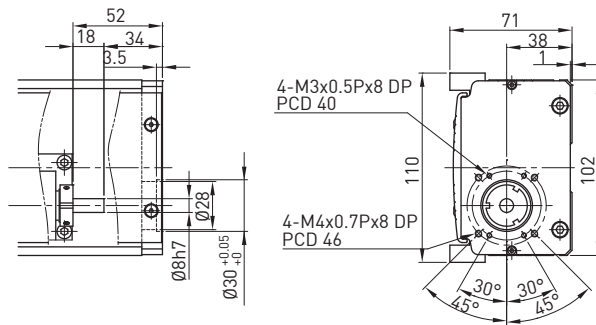
Effective stroke (mm)	L	N	Weight (kg)	AC motor output Drive	W	400
200	710	3	16.5	Lead	mm	10 20
300	810	3	18.1	Max linear speed*	mm/sec	400 800
400	910	4	19.7	Max RPM	RPM	2400 2400
500	1010	4	21.3	Rated thrust	N	936 468
600	1110	5	22.9	Repeatability	mm	±0.02
700	1210	5	24.4	Effective stroke	mm	200~1200 (100 Pitch)
800	1310	6	26		Fyd	N 642
900	1410	6	27.6		Fzd	N 1517
1000	1510	7	29.2		Mxd	N-m 88.8
1100	1610	7	30.8		Myd	N-m 51.6
1200	1710	8	32.3		Mzd	N-m 51.6
Permitted load condition***				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads		

\* Vibration might occur when the effective stroke is longer than 700mm. The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

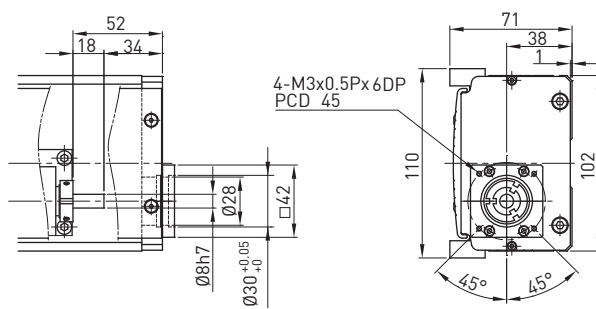
## Appendix: Motor Adaptor Flange

### KA100

Motor Adaptor Flange F0

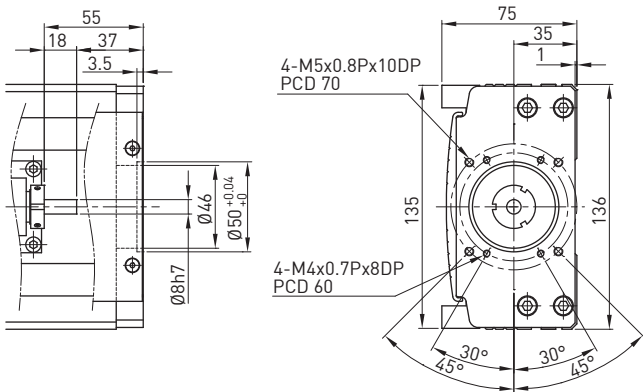


Motor Adaptor Flange F1

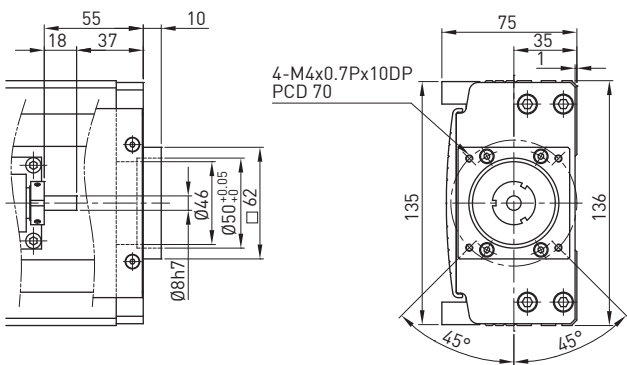


# KA136

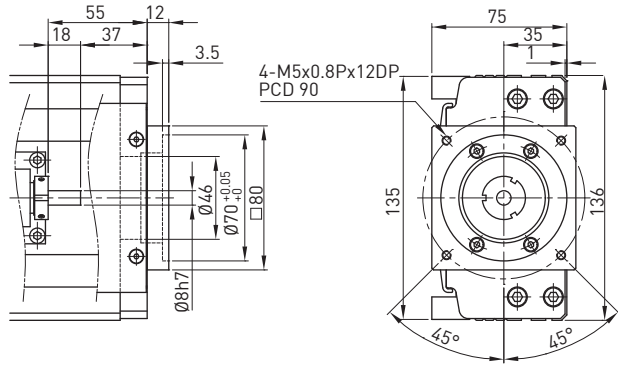
## Motor Adaptor Flange F0



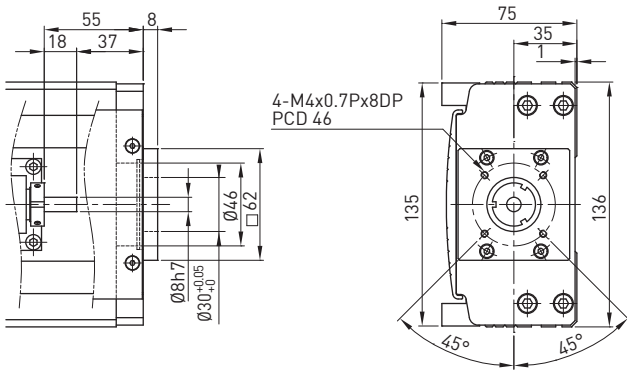
## Motor Adaptor Flange F1



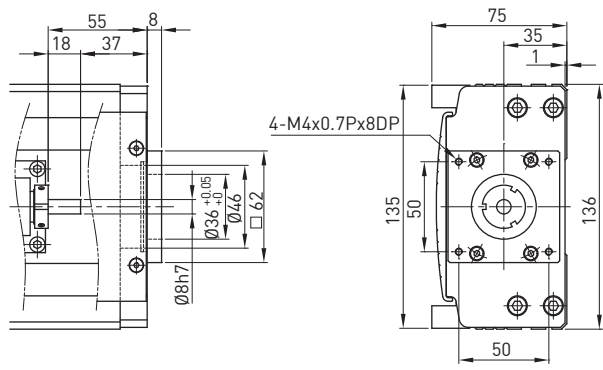
## Motor Adaptor Flange F4



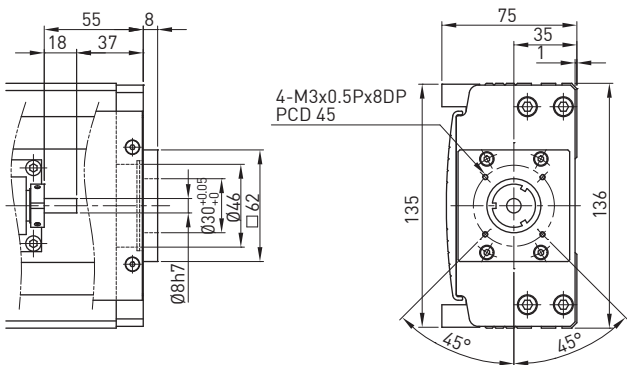
## Motor Adaptor Flange F2



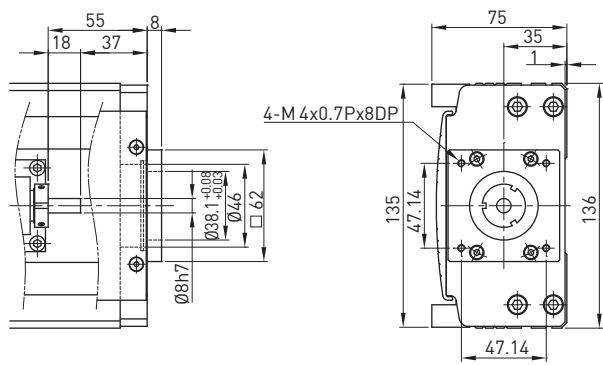
## Motor Adaptor Flange F5



## Motor Adaptor Flange F3

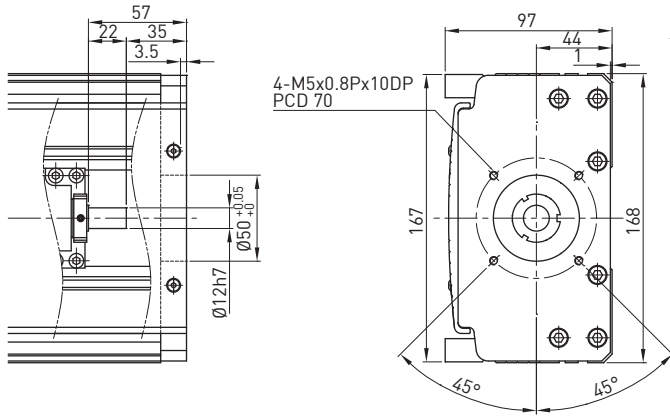


## Motor Adaptor Flange F6

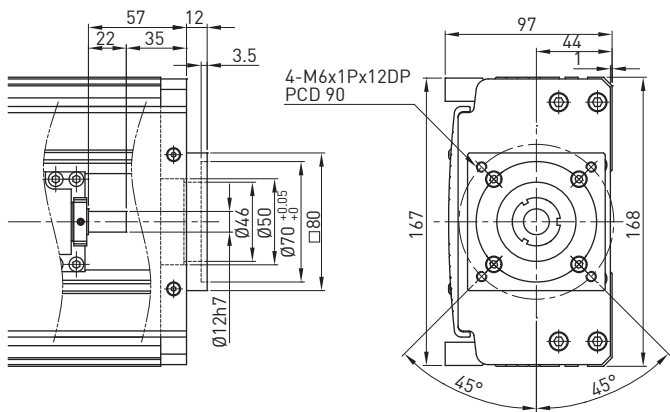


# KA170

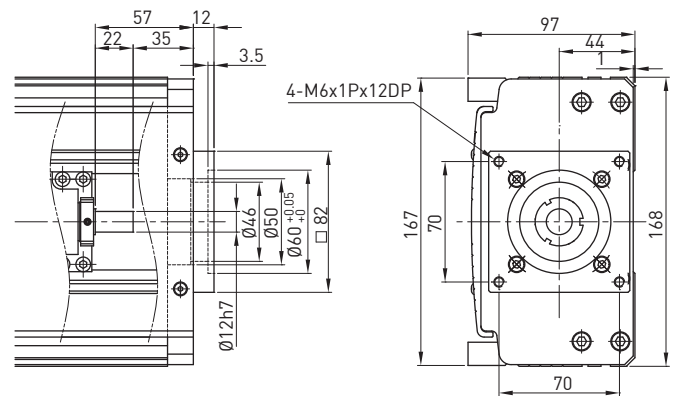
Motor Adaptor Flange F0



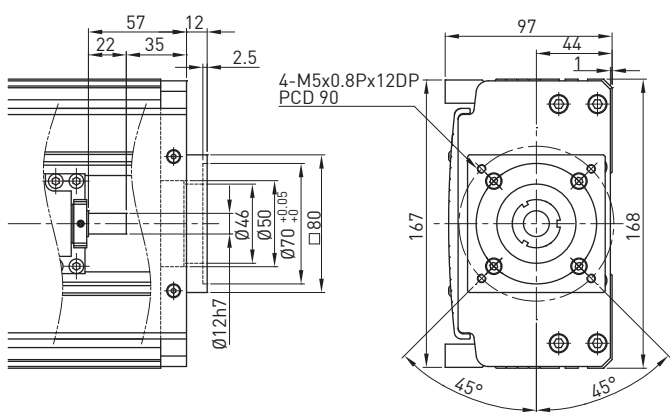
Motor Adaptor Flange F1



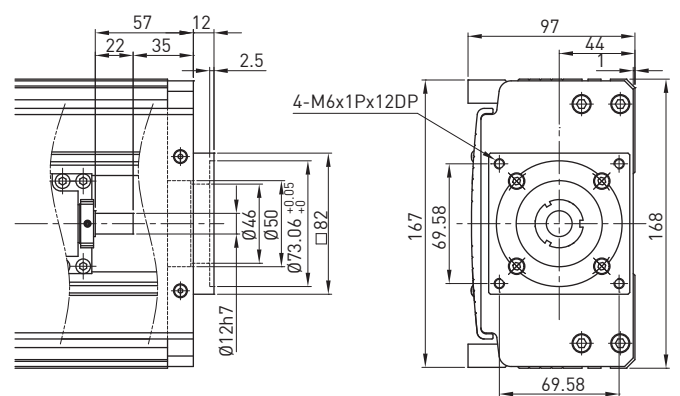
Motor Adaptor Flange F3



Motor Adaptor Flange F2



Motor Adaptor Flange F4



## Appendix: Motor Selection

### HIWIN Mikrosystem Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection			+Brake Weight (kg)	Driver	Weight (kg)	Voltage
			KA100	KA136	KA170				
200W	FRAC10211001	-	-	F0	F0	-	LMDSA1 10 11	-	110V
400W	FRAC10411001	-	-	F0	F0	-	LMDSA1 10 11	-	110V

### Mitsubishi Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection			+Brake Weight (kg)	Driver	Weight (kg)	Voltage
			KA100	KA136	KA170				
30W	HC-PQ033	0.32	F0	F2			MR-C10A	0.6	100V
50W	HC-PQ053	0.37	F0	F2			MR-C10A	0.6	200V
50W	HC-KFS053	0.4	F0	F2		0.75	MR-J2S-10A	0.7	100V
100W	HC-PQ13	0.5	F0	F2			MR-C10A	0.6	200V
100W	HC-KFS13	0.53	F0	F2		0.89	MR-J2S-10A	0.7	100V
200W	HC-KFS23	0.99		F0	F0	1.6	MR-J2S-20A	0.7	200V
400W	HC-KFS43	1.45		F0	F0	2.1	MR-J2S-40A	1.1	100V
750W	HC-MFS73	3			F1	4	MR-J2S-70A	1.7	200V

### Panasonic Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection			+Brake Weight (kg)	Driver	Weight (kg)	Voltage
			KA100	KA136	KA170				
50W	MSM5AZA	0.32	F1	F3		0.53	MADDT1105	0.8	100V
50W	MSM5AZA	0.32	F1	F3		0.53	MADDT1205	0.8	200V
100W	MSM01A	0.47	F1	F3		0.68	MADDT1107	0.8	100V
100W	MSM01A	0.47	F1	F3		0.68	MADDT1207	0.8	200V
200W	MSM02A	0.82		F1		1.3	MBDDT2110	1.1	100V
200W	MSM02A	0.82		F1		1.3	MBDDT2210	0.8	200V
400W	MSM04A	1.2		F1		1.7	MCDDT3120	1.5	100V
400W	MSM04A	1.2		F1		1.7	MBDDT2210	1.1	200V
750W	MSM082A	2.3		F4	F2	3.1	MCDDT3520	1.5	200V

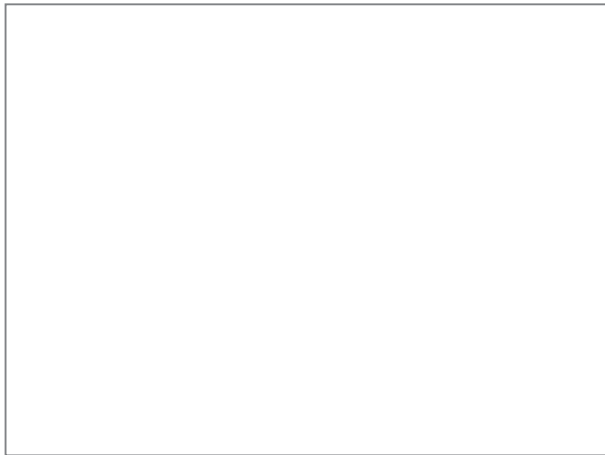
### Yaskawa Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection			Brake (-1+C)	Driver	Weight (kg)	Remarks
			KA100	KA136	KA170				
50W	SGMAV-A5ADA61	0.3	F0	F2		0.6	SGDV-R70A01A	0.9	with key
50W	SGMAV-A5ADA2C	0.3	F0	F2		0.6			no key
50W	SGMJV-A5ADA21	0.3	F0	F2		0.6			Mid inertia
100W	SGMAV-01ADA61	0.4	F0	F2		0.7	SGDV-R90A01A	0.9	
200W	SGMAV-02ADA61	0.9		F0	F0	1.5	SGDV-1R6A01A	0.9	
400W	SGMAV-04ADA61	1.2		F0	F0	1.8	SGDV-2R8A01A	1.0	
750W	SGMAV-08ADA61	2.6			F1	4.6	SGDV-5R5A01A	1.5	



## Oriental Step Motor

Series	Model	Flange Selection			Built in Motor	Weight (kg)	Built in Motor	Weight (kg)
		KA100	KA136	KA170				
CSK 2 phase	CSK243-AP				PK243-01A	0.21	CSD2109-P	0.12
	CSK244-AP				PK244-01A	0.27	CSD2112-P	0.12
	CSK245-AP				PK245-01A	0.35	CSD2112-P	0.12
	CSK264-AP		F6		PK264-02A	0.45	CSD2120-P	0.12
	CSK266-AP		F6		PK266-02A	0.7	CSD2120-P	0.12
	CSK268-AP		F6		PK268-02A	1.0	CSD2120-P	0.12
	CSK296-AP			F4	PK296-03A	1.7	CSD2145P	0.2
	CSK299-AP			F4	PK299-03A	2.8	CSD2145P	0.2
	CSK2913-AP			F4	PK2913-02A	3.8	CSD2140P	0.2
CFKII 5 phase micro stepping	CFK543AP2				PK543NAW	0.21	DFC5107P	0.2
	CFK544AP2				PK544NAW	0.27	DFC5107P	0.2
	CFK545AP2				PK545NAW	0.35	DFC5107P	0.2
	CFK564AP2		F5		PK564NAW	0.6	DFC5114P	0.2
	CFK566AP2		F5		PK566NAW	0.8	DFC5114P	0.2
	CFK569AP2		F5		PK569NAW	1.3	DFC5114P	0.2
	CFK566HAP2		F5		PK566HNAW	0.8	DFC5128P	0.22
	CKF569HAP2		F5		PK569HNAW	1.3	DFC5128P	0.22
	CFK596HAP2			F3	PK596HNAW	1.7	DFC5128P	0.22
	CFK599HAP2			F3	PK599HNAW	2.8	DFC5128P	0.22
	CFK5913HAP2			F3	PK5913HNAW	3.8	DFC5128P	0.22
UMK 2 phase	UMK243A				PK243-01	0.21	UDK2109	0.47
	UMK244A				PK244-01	0.27	UDK2112	0.47
	UMK245A				PK245-01	0.35	UDK2112	0.47
	UMK264A		F6		PK264-02	0.45	UDK2120	0.47
	UMK266A		F6		PK266-02	0.7	UDK2120	0.47
	UMK268A		F6		PK268-02	1.0	UDK2120	0.47
	RK543AA				PK543W	0.25	RKD507-A	0.4
RK544AA				PK544W	0.3	RKD507-A	0.4	
RK545AA				PK545W	0.4	RKD507-A	0.4	
RK 5 phase	RK566AA		F5		PK566W	0.8	RKD514L-A	0.85
	RK569AA		F5		PK569W	1.3	RKD514L-A	0.85
	RK596AA			F3	PK596W	1.7	RKD514H-A	0.85
	RK599AA			F3	PK599W	2.8	RKD514H-A	0.85
	RK5913AA			F3	PK5913W	3.8	RKD514H-A	0.85



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