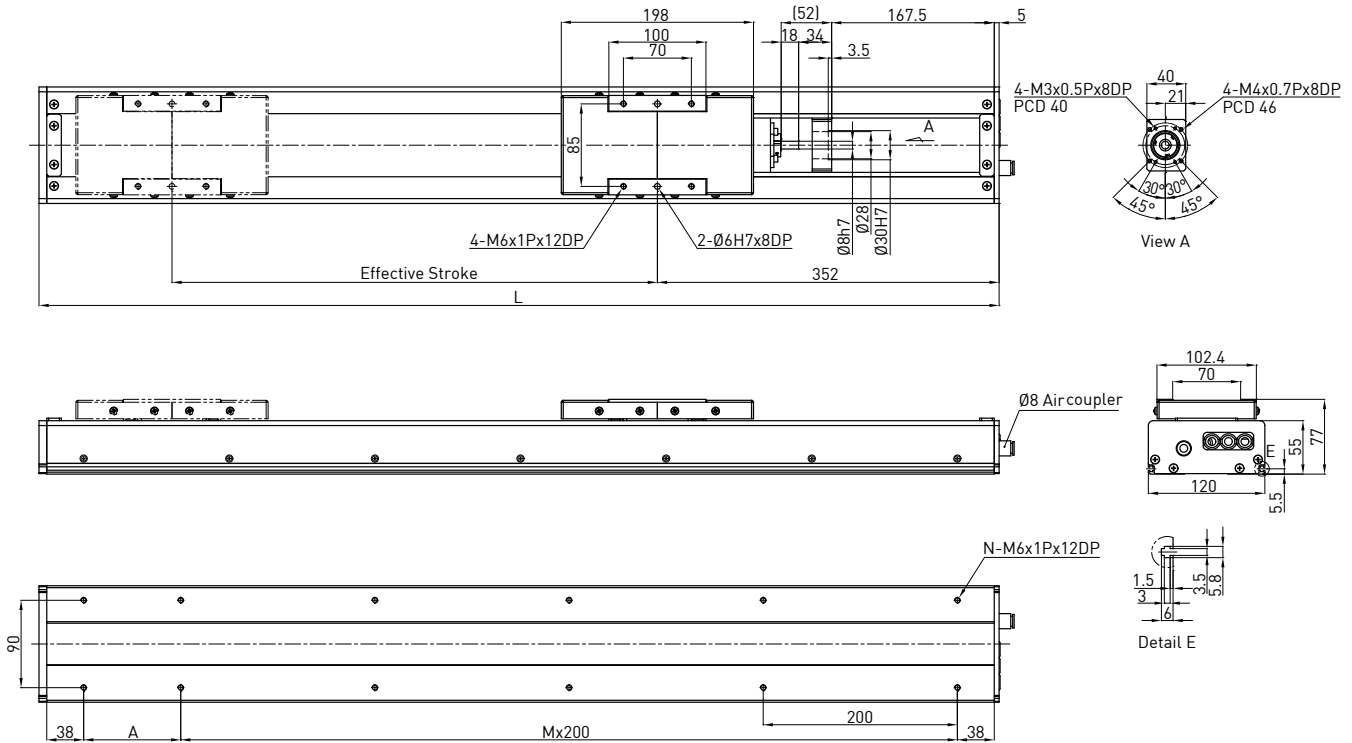
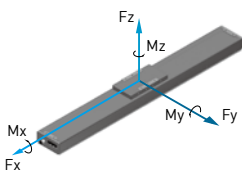


## Model Number for KS120-FI

KS120	-20	P	-1050	A	FI	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	FI: Internal	S1: OMRON SX671 S2: OMRON SX674 S3: SUNX GX-F12A S4: SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor

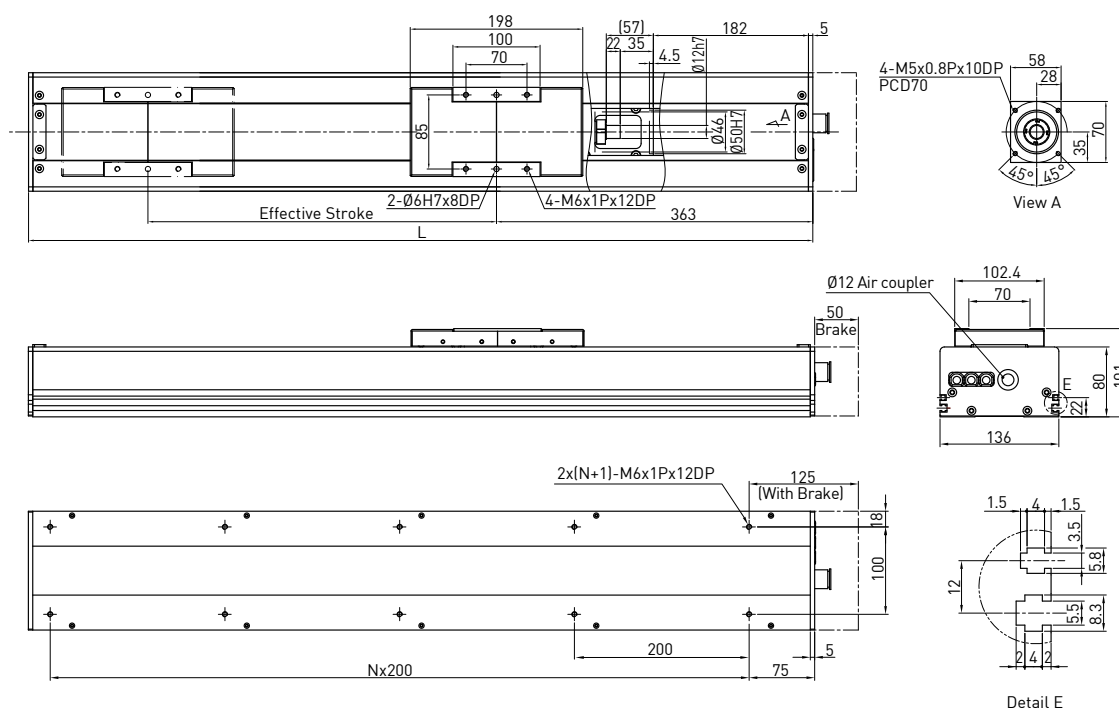


Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output Drive	W	100	
100	589	100	2	8	6.32	Lead	mm	5 10 20	
150	639	150	2	8	6.94	Rated RPM	RPM	3000 3000 3000	
200	689	200	2	8	7.57	Max linear speed*	mm/sec	250 500 1000	
250	739	50	3	10	8.2	Rated thrust	N	280 140 70	
300	789	100	3	10	8.83	Repeatability	mm	±0.02	
350	839	150	3	10	9.46	Effective stroke	mm	100-1050	
400	889	200	3	10	10.09	Max load (H)	kg	50 32 20	
450	939	50	4	12	10.72	Rated dynamic load** 	F <sub>yd</sub>	N	50 50 50
500	989	100	4	12	11.35		F <sub>zd</sub>	N	500 320 200
550	1039	150	4	12	11.98		M <sub>xd</sub>	N-m	25 27 28
600	1089	200	4	12	12.61		M <sub>yd</sub>	N-m	20 22 23
650	1139	50	5	14	13.24		M <sub>zd</sub>	N-m	20 22 23
700	1189	100	5	14	13.87				
750	1239	150	5	14	14.5	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			
800	1289	200	5	14	15.13				
850	1339	50	6	16	15.76				
900	1389	100	6	16	16.39				
950	1439	150	6	16	17.02				
1000	1489	200	6	16	17.65				
1050	1539	50	7	18	18.28				

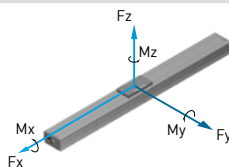
\* Vibration might occur when the effective stroke is longer than 600mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## Model Number for KS140-FI

KS140	-20	P	-1100	A	FI	S2	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	10mm 20mm	P: Precision C: Normal		A: Standard	FI: Internal	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



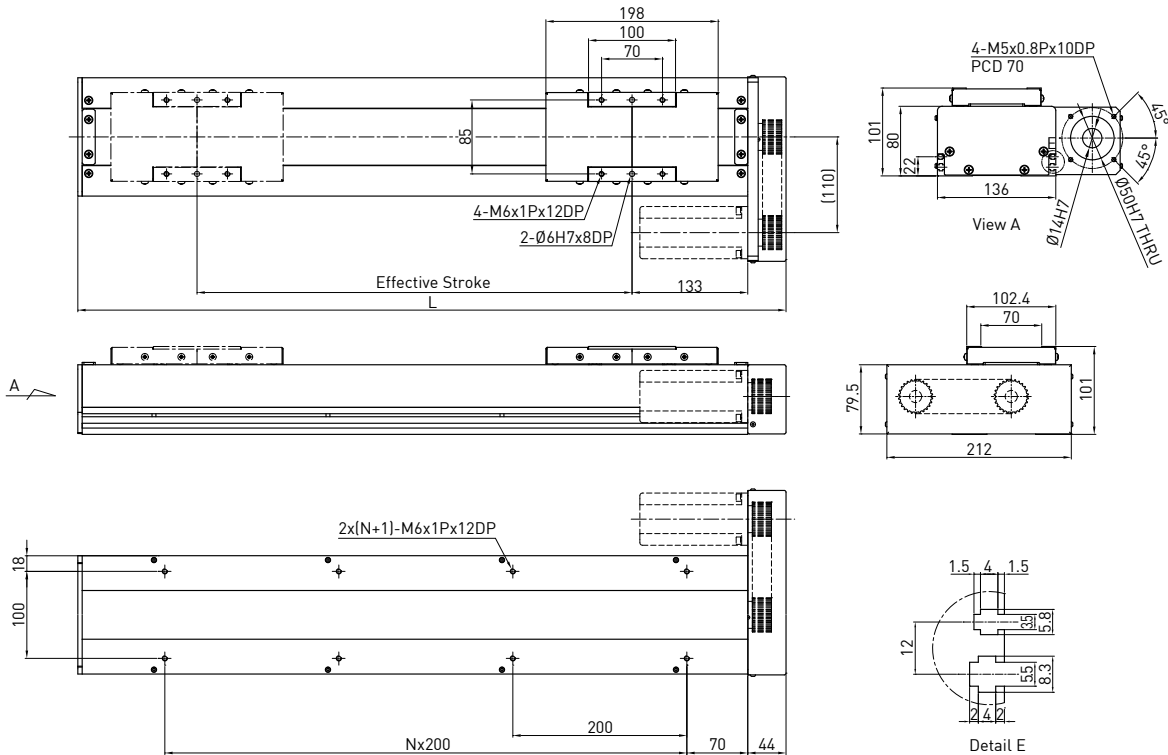
Effective stroke (mm)	L	N	Weight (kg)	AC motor output Drive	W	200		
200	700	3	13.5	Lead	mm	10	20	
300	800	3	14.7	Rated RPM	RPM	3000	3000	
400	900	4	15.9	Max linear speed*	mm/sec	500	1000	
500	1000	4	17.1	Rated thrust	N	280	140	
600	1100	5	18.3	Repeatability	mm	±0.02		
700	1200	5	19.5	Effective stroke	mm	200~1100		
800	1300	6	20.7	Max load (H)	kg	75	35	
900	1400	6	21.9	Rated dynamic load**	F <sub>yd</sub>	N	50	50
1000	1500	7	23.2		F <sub>zd</sub>	N	750	350
1100	1600	7	24.4		M <sub>xd</sub>	N-m	55	60
					M <sub>yd</sub>	N-m	47	51
					M <sub>zd</sub>	N-m	47	51
				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 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.

## Model Number for KS140-FL

KS140	-20	P	-1100	A	FL	S2	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	10mm 20mm	P: Precision C: Normal		A: Standard	FL: Left	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor

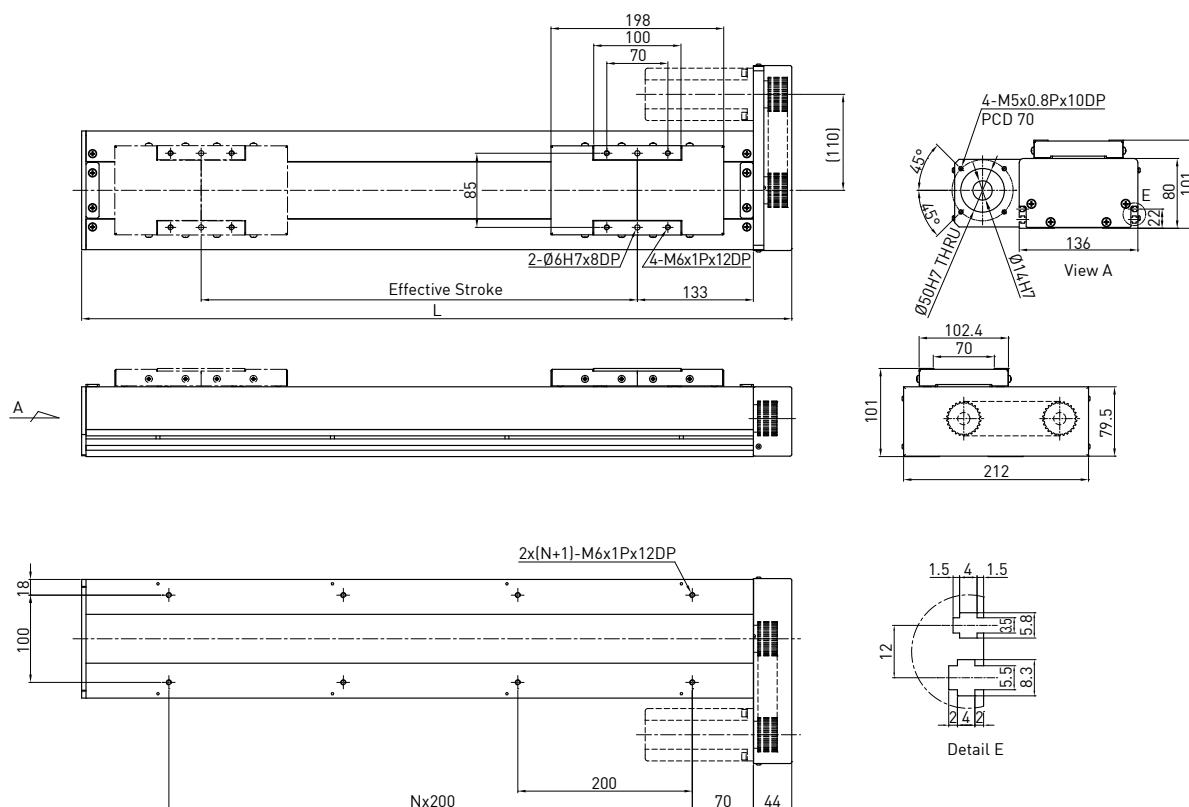


Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	200	
				Drive		Ball screw C7(normal)	
200	514	1	11.5	Lead	mm	10 20	
300	614	2	13.0	Rated RPM	RPM	3000 3000	
400	714	2	14.5	Max linear speed*	mm/sec	500 1000	
500	814	3	16.0	Rated thrust	N	280 140	
600	914	3	17.5	Repeatability	mm	±0.02	
700	1014	4	19.0	Effective stroke	mm	200~1100	
800	1114	4	20.5	Max load (H)	kg	75 35	
900	1214	5	22.0	Rated dynamic load** 	Fyd	N	50 50
1000	1314	5	23.5		Fzd	N	750 350
1100	1414	6	25.0		Mxd	N-m	55 60
					Myd	N-m	47 51
					Mzd	N-m	47 51
				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		

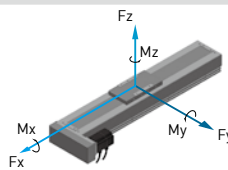
\* Vibration might occur when the effective stroke is longer than 800mm.  
The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
\*\* The load condition is based on 10,000km operation.  
\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## Model Number for KS140-FR

KS140	-20	P	-1100	A	FR	S2	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	10mm 20mm	P: Precision C: Normal		A: Standard	FR: Right	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



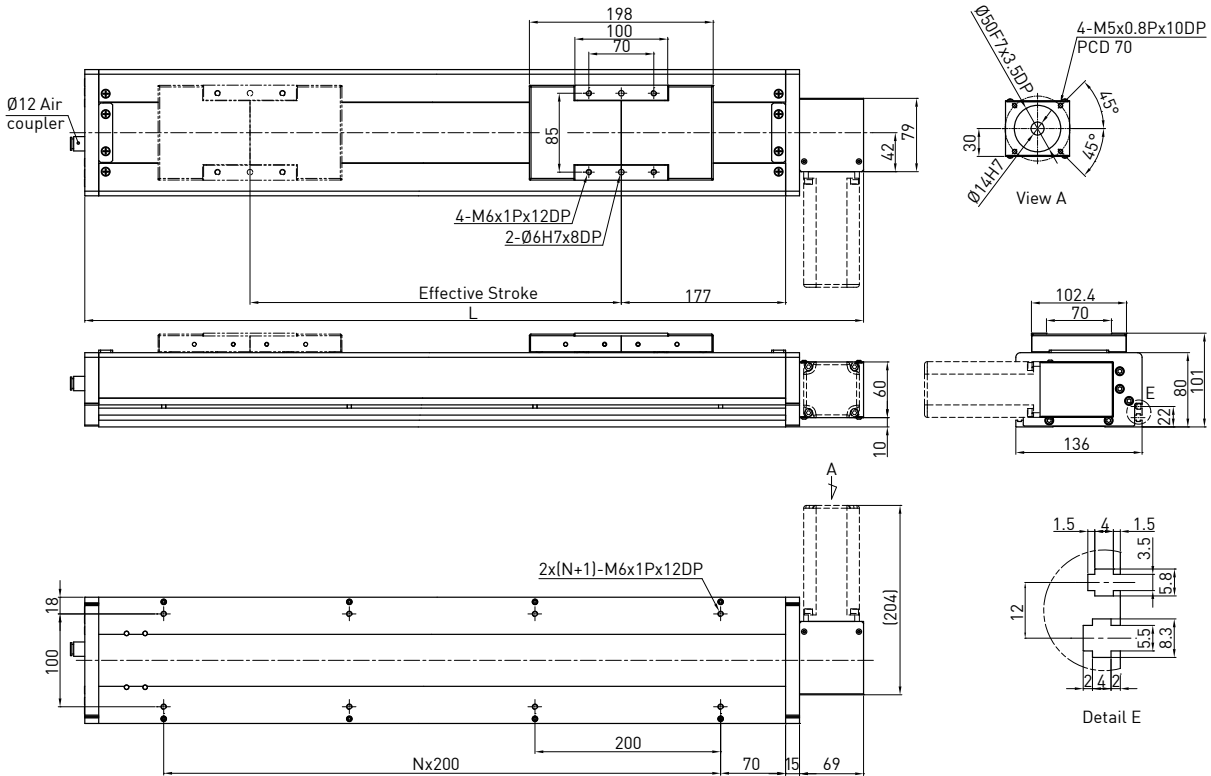
Effective stroke (mm)	L	N	Weight (kg)	AC motor output		W		
				Drive		200		
200	514	1	11.5	Lead	mm	10	20	
300	614	2	13.0	Rated RPM	RPM	3000	3000	
400	714	2	14.5	Max linear speed*	mm/sec	500	1000	
500	814	3	16.0	Rated thrust	N	280	140	
600	914	3	17.5	Repeatability	mm	±0.02		
700	1014	4	19.0	Effective stroke	mm	200-1100		
800	1114	4	20.5	Max load (H)	kg	75	35	
900	1214	5	22.0	Rated dynamic load**	F <sub>yd</sub>	N	50	50
1000	1314	5	23.5		F <sub>zd</sub>	N	750	350
1100	1414	6	25.0		M <sub>xd</sub>	N-m	55	60
					M <sub>yd</sub>	N-m	47	51
					M <sub>zd</sub>	N-m	47	51
				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 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.

## Model Number for KS140B-FL

<b>KS140</b>	<b>B</b>	<b>-120</b>	<b>C</b>	<b>-3000</b>	<b>A</b>	<b>FL</b>	<b>S2</b>	<b>M</b>
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
			C: Normal		A: Standard	FL: Left	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



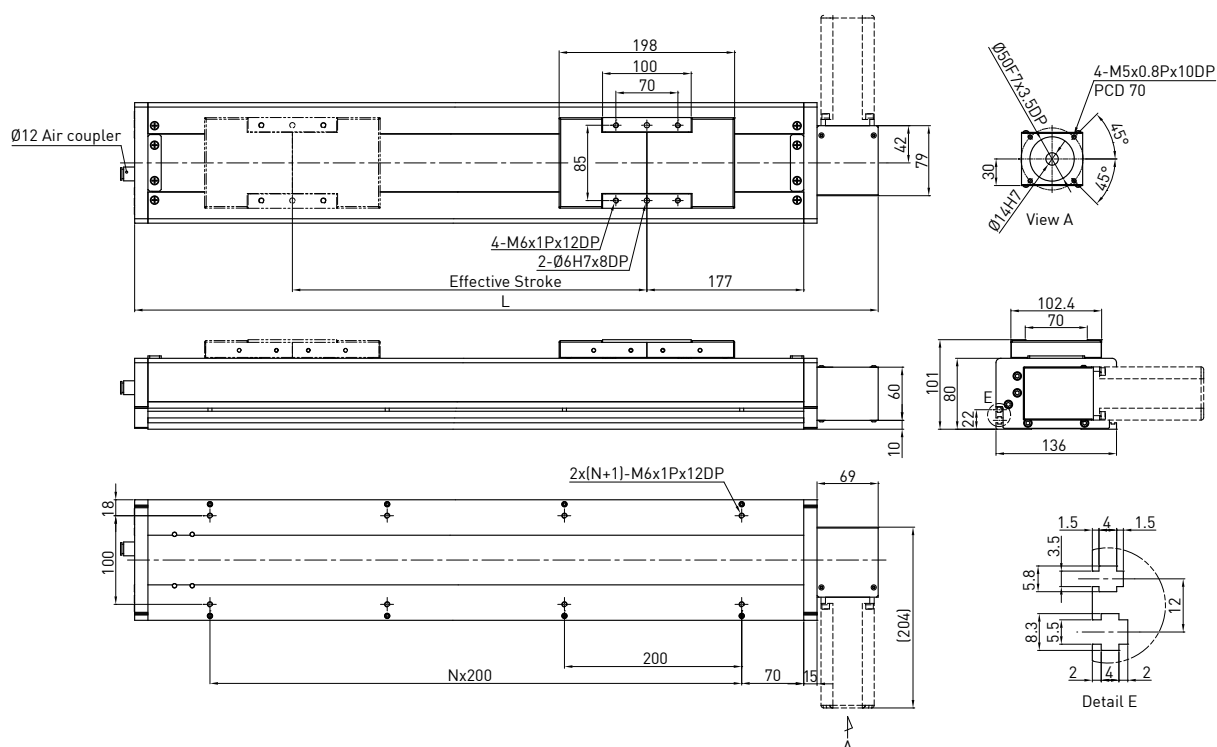
Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	200	
200	639	2	10.4	Drive		Timing Belt	
400	839	3	12.6	Pulley Perimeter	mm	120	
600	1039	4	14.8	Pulley RPM	RPM	900	
800	1239	5	17.0	Max linear speed	mm/sec	1800	
1000	1439	6	19.2	Rated thrust	N	67	
1200	1639	7	21.4	Repeatability	mm	±0.1	
1400	1839	8	23.6	Effective stroke	mm	200-3000	
1600	2039	9	25.8	Max load (H)	kg	15	
1800	2239	10	28.0	Rated dynamic load*	Fyd	N	50
2000	2439	11	30.2		Fzd	N	150
2200	2639	12	32.4		Mxd	N-m	67
2400	2839	13	34.6		Myd	N-m	53
2600	3039	14	36.8		Mzd	N-m	53
2800	3239	15	39.0	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			
3000	3439	16	41.2				

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

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

## Model Number for KS140B-FR

<b>KS140</b>	<b>B</b>	<b>-120</b>	<b>C</b>	<b>-3000</b>	<b>A</b>	<b>FR</b>	<b>S2</b>	<b>M</b>
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
			C: Normal		A: Standard	FR: Right	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



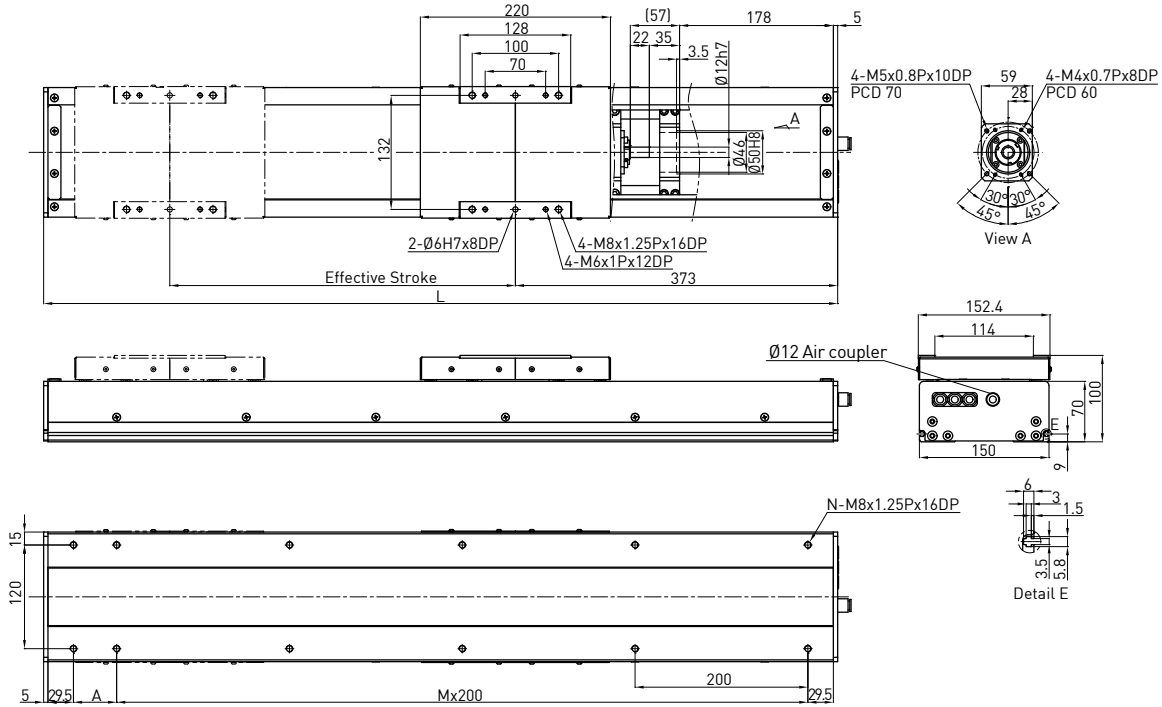
Effective stroke (mm)	L	N	Weight (kg)	AC motor output Drive	W	200 Timing Belt	
200	639	2	10.4	Pulley Perimeter	mm	120	
400	839	3	12.6	Pulley RPM	RPM	900	
600	1039	4	14.8	Max linear speed	mm/sec	1800	
800	1239	5	17.0	Rated thrust	N	67	
1000	1439	6	19.2	Repeatability	mm	±0.1	
1200	1639	7	21.4	Effective stroke	mm	200~3000	
1400	1839	8	23.6	Max load (H)	kg	15	
1600	2039	9	25.8	<b>Rated dynamic load*</b>	Fyd	N	50
1800	2239	10	28.0		Fzd	N	150
2000	2439	11	30.2		Mxd	N-m	67
2200	2639	12	32.4		Myd	N-m	53
2400	2839	13	34.6		Mzd	N-m	53
2600	3039	14	36.8				
2800	3239	15	39.0	<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			
3000	3439	16	41.2				

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

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

## Model Number for KS150-FI

KS150	-10	P	-1250	A	FI	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	10 mm 20 mm	C: Normal P: Precision		A: Standard	FI: Internal	S1: OMRON SX671 S2: OMRON SX674 S3: SUNX GX-F12A S4: SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor



Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output Drive	W	
							200	Ballscrew C7(normal)
150	669	200	2	8	13.96		mm	10 20
200	719	50	3	10	14.84		RPM	3000 3000
250	769	100	3	10	15.72		mm/sec	500 1000
300	819	150	3	10	16.6		N	280 140
350	869	200	3	10	17.48		mm	±0.02
400	919	50	4	12	18.36		mm	150~1250
450	969	100	4	12	19.24		kg	80 40
500	1019	150	4	12	20.12		N	50 50
550	1069	200	4	12	21		N	800 400
600	1119	50	5	14	21.88		N-m	56 63
650	1169	100	5	14	22.76		N-m	49 53
700	1219	150	5	14	23.64		N-m	49 53
750	1269	200	5	14	24.52			
800	1319	50	6	16	25.4			
850	1369	100	6	16	26.28			
900	1419	150	6	16	27.16			
950	1469	200	6	16	28.04			
1000	1519	50	7	18	28.92			
1050	1569	100	7	18	29.8			
1100	1619	150	7	18	30.68			
1150	1669	200	7	18	31.56			
1200	1719	50	8	20	32.44			
1250	1769	100	8	20	33.32			

Rated dynamic load**	Fzd		Mzd	
	N	kg	N-m	kg-m
	800	80	56	5.6
	400	40	49	4.9

Permitted load condition***	Fzd		Mzd	
	N	kg	N-m	kg-m
	800	80	56	5.6
	400	40	49	4.9

$F_{yd}$  N 50 50

$F_{zd}$  N 800 400

$M_{xd}$  N-m 56 63

$M_{yd}$  N-m 49 53

$M_{zd}$  N-m 49 53

**Permitted load condition\*\*\***

$$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$$

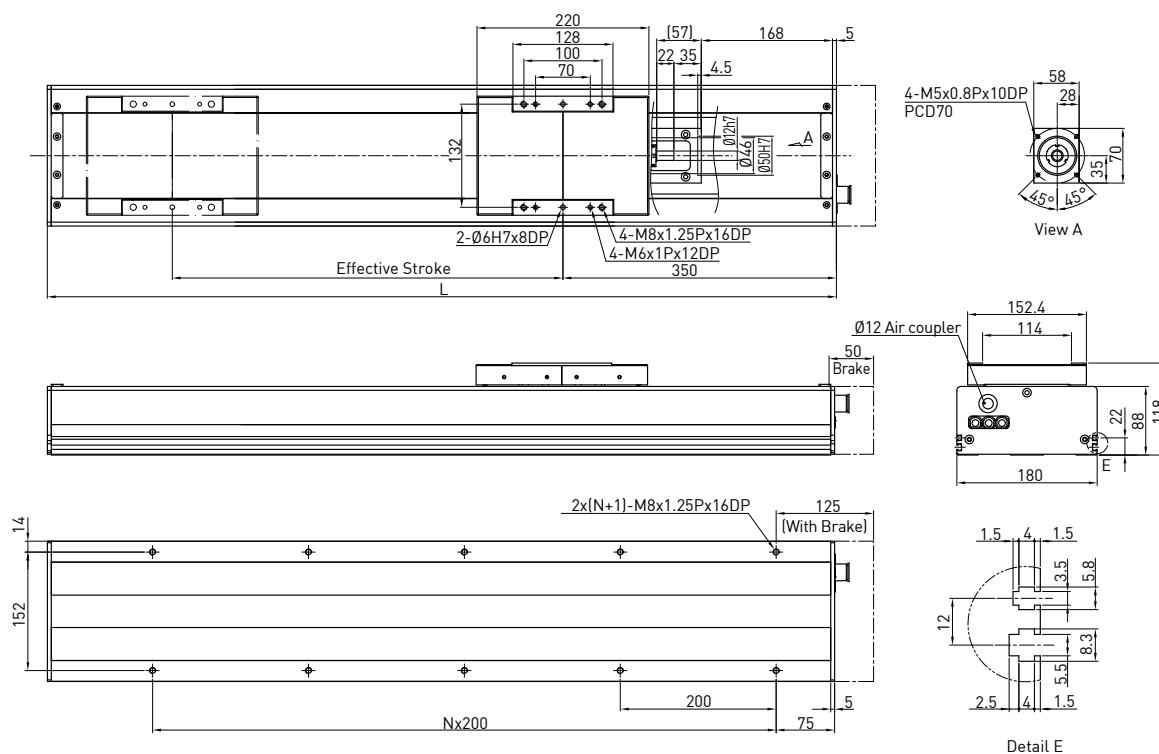
Fy, Fz, Mx, My, Mz are working loads

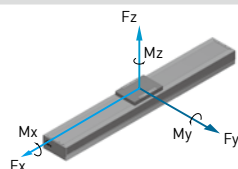
\* Vibration might occur when the effective stroke is longer than 700mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\* The load condition is based on 10,000km operation.  
 \*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## Model Number for KS180-FI

KS180	-20	P	-1200	A	FI	S2	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	10mm 20mm	P: Precision C: Normal		A: Standard	FI: Internal	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



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	Rated RPM	RPM	3000 3000
400	910	4	19.7	Max linear speed*	mm/sec	500 1000
500	1010	4	21.3	Rated thrust	N	560 280
600	1110	5	22.9	Repeatability	mm	±0.02
700	1210	5	24.4	Effective stroke	mm	200-1200
800	1310	6	26	Max load (H)	kg	110 50
900	1410	6	27.6	Rated dynamic load**	Fyd	N 50 50
1000	1510	7	29.2		Fzd	N 1100 500
1100	1610	7	30.8		Mxd	N-m 60 65
1200	1710	8	32.3		Myd	N-m 45 53
					Mzd	N-m 45 53
				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	

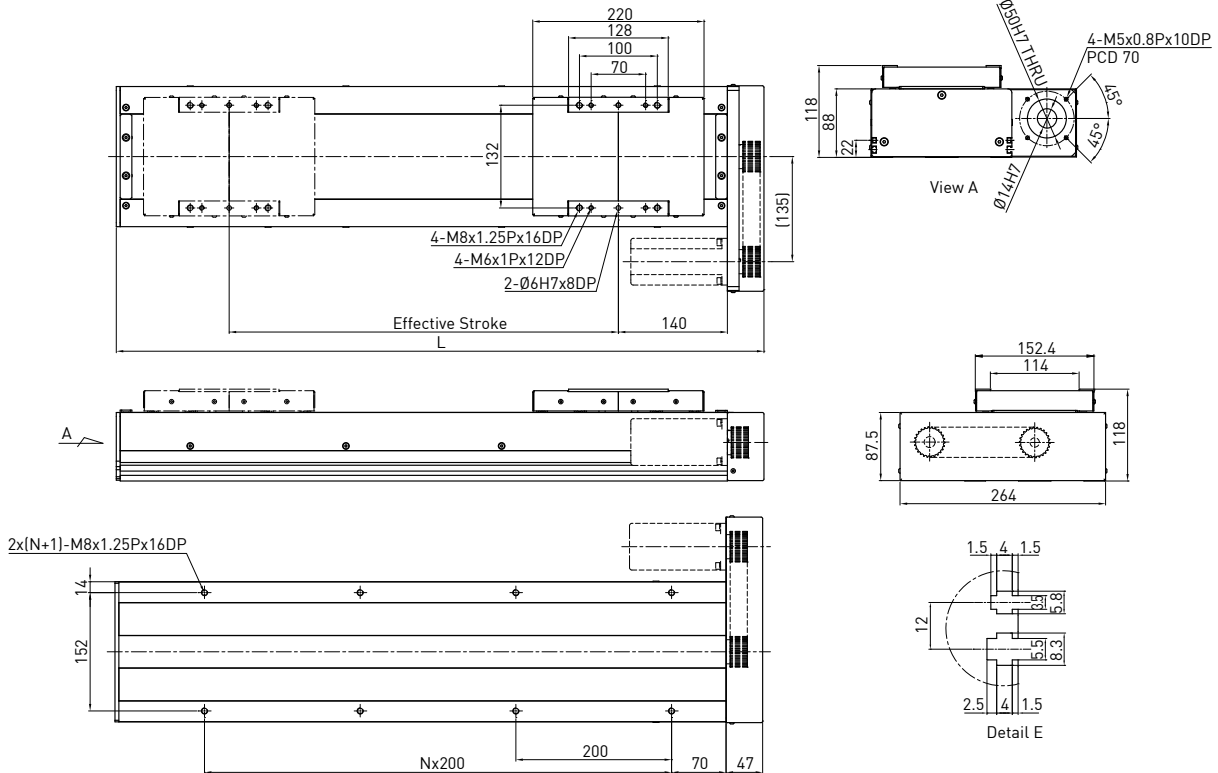


\* Vibration might occur when the effective stroke is longer than 800mm.  
The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
\*\* The load condition is based on 10,000km operation.  
\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.



## Model Number for KS180-FL

KS180	-20	P	-1200	A	FL	S2	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	10mm 20mm	P: Precision C: Normal		A: Standard	FL: Left	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor

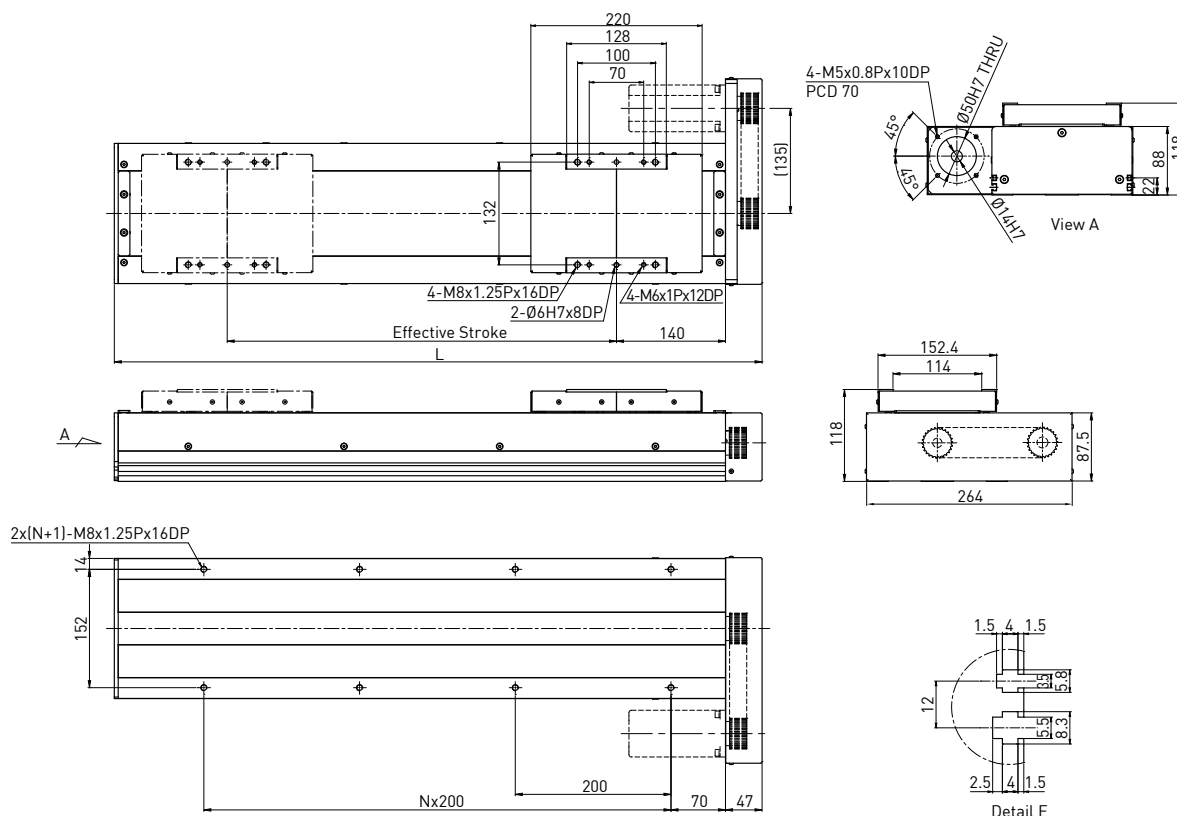


Effective stroke (mm)	L	N	Weight (kg)	AC motor output Drive	W	400		
200	532	1	11.3	Lead	mm	10	20	
300	632	2	12.3	Rated RPM	RPM	3000	3000	
400	732	2	13.3	Max linear speed*	mm/sec	500	1000	
500	832	3	14.3	Rated thrust	N	560	280	
600	932	3	15.3	Repeatability	mm	±0.02		
700	1032	4	16.3	Effective stroke	mm	200~1200		
800	1132	4	17.3	Max load (H)	kg	110	50	
900	1232	5	18.3		Fyd	N	50	50
1000	1332	5	19.3		Fzd	N	1100	500
1100	1432	6	20.3		Mxd	N-m	60	65
1200	1532	6	21.3		Myd	N-m	45	53
					Mzd	N-m	45	53
				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 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.

## Model Number for KS180-FR

KS180	-20	P	-1200	A	FR	S2	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	10mm 20mm	P: Precision C: Normal		A: Standard	FR: Right	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



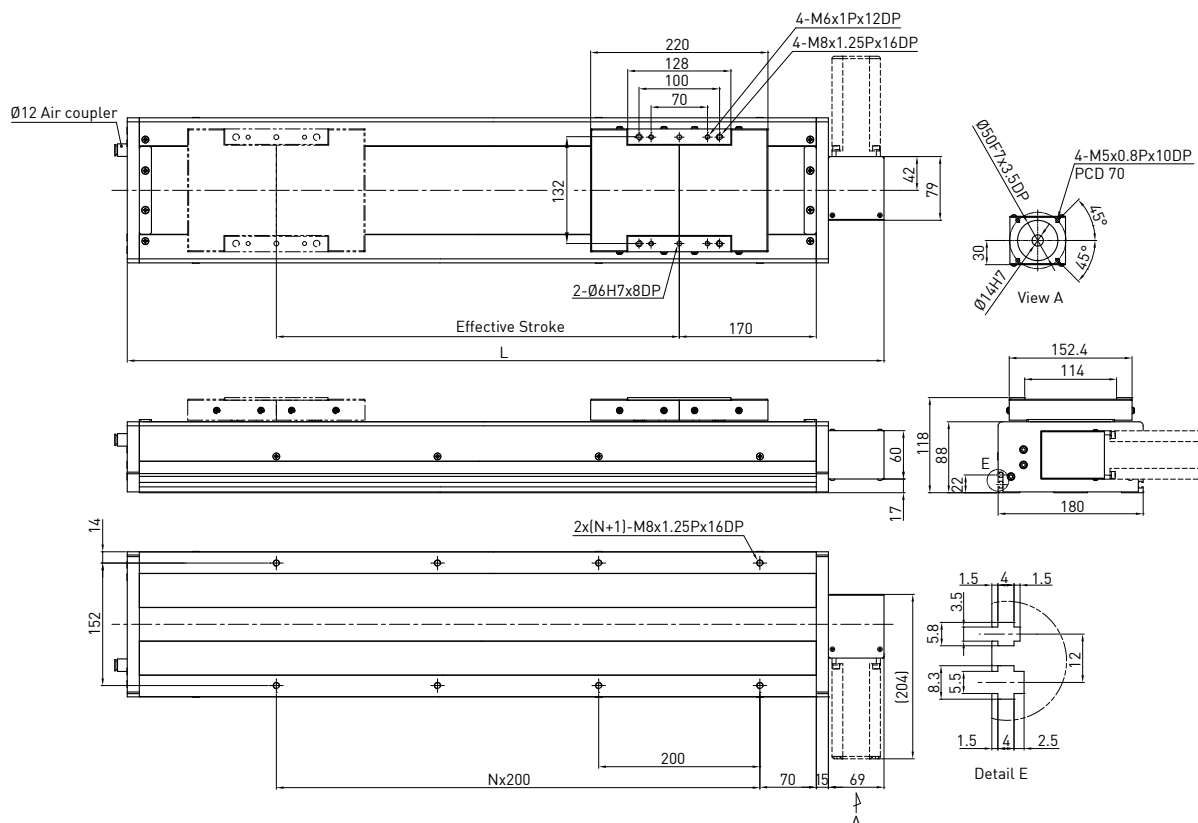
Effective stroke (mm)	L	N	Weight (kg)	AC motor output Drive	W	400	
200	532	1	11.3	Lead	mm	10 20	
300	632	2	12.3	Rated RPM	RPM	3000 3000	
400	732	2	13.3	Max linear speed*	mm/sec	500 1000	
500	832	3	14.3	Rated thrust	N	560 280	
600	932	3	15.3	Repeatability	mm	±0.02	
700	1032	4	16.3	Effective stroke	mm	200-1200	
800	1132	4	17.3	Max load (H)	kg	110 50	
900	1232	5	18.3		Fyd	N	50 50
1000	1332	5	19.3		Fzd	N	1100 500
1100	1432	6	20.3		Mxd	N-m	60 65
1200	1532	6	21.3		Myd	N-m	45 53
					Mzd	N-m	45 53
				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 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.



## Model Number for KS180B-FR

<b>KS180</b>	<b>B</b>	<b>-120</b>	<b>C</b>	<b>-3000</b>	<b>A</b>	<b>FR</b>	<b>S2</b>	<b>M</b>
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
			C: Normal		A: Standard	FR: Right	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



Effective stroke (mm)	L	N	Weight (kg)	AC motor output Drive	W	400	
200	639	2	14.2	Pulley Perimeter	mm	120	
400	839	3	17.0	Pulley RPM	RPM	900	
600	1039	4	19.8	Max linear speed	mm/sec	1800	
800	1239	5	22.6	Rated thrust	N	133	
1000	1439	6	25.4	Repeatability	mm	±0.1	
1200	1639	7	28.2	Effective stroke	mm	200~3000	
1400	1839	8	31.0	Max load (H)	kg	30	
1600	2039	9	33.8		Fyd	N	50
1800	2239	10	36.6		Fzd	N	300
2000	2439	11	39.4		Mxd	N-m	70
2200	2639	12	42.2		Myd	N-m	55
2400	2839	13	45.0		Mzd	N-m	55
2600	3039	14	47.8	<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			
2800	3239	15	50.6				
3000	3439	16	53.4				

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

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

# Single Axis Robot

## KU Series

### 5.1 Features

- Lightweight
- Dustproof
- High accuracy, high efficiency, high reliability
- Easy system installation and maintenance

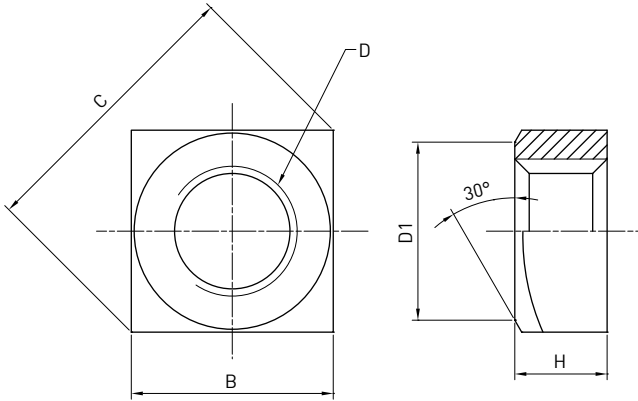
### 5.2 Applications

- Precision Industry & Semiconductor
- Inspection, Testing & Assembly equipment
- Optical & Medical equipment

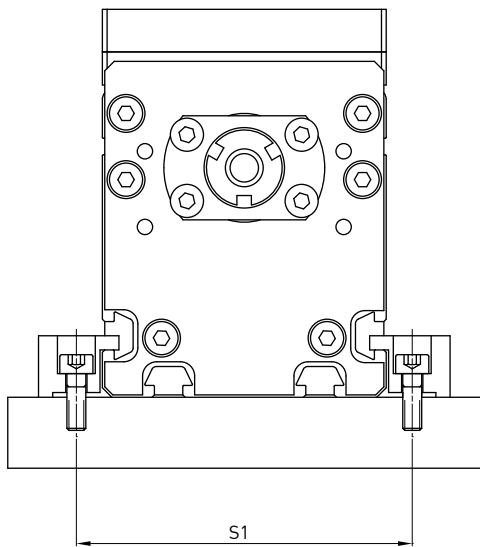


### 5.3 KU Mounting

#### Square nut



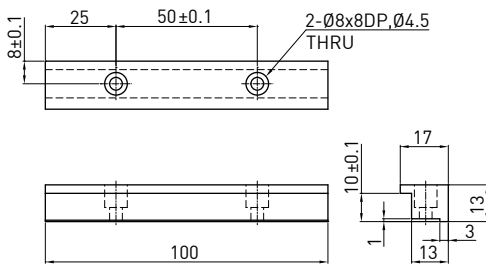
	B	C	D	D1	H
KU60	7	9.9	M4x0.7	6.8	3.2
KU80	8	11.3	M5x0.8	7.8	4



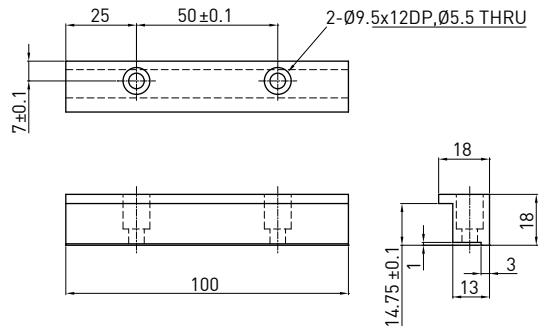
KU Model	S1	Screw
KU80	93	M5
KU60	71	M4

#### Fixed plate

##### •KU060



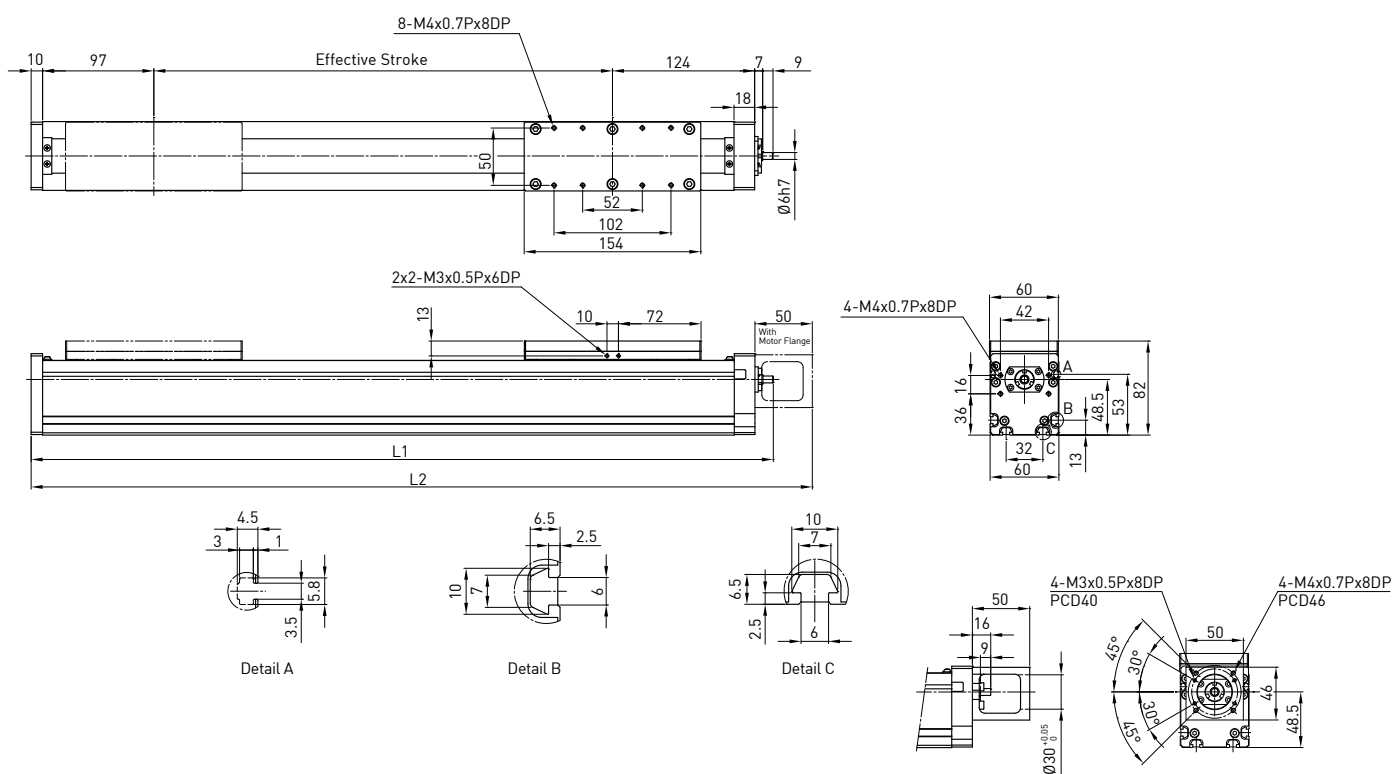
##### •KU080



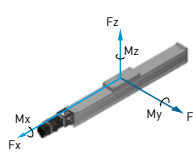
## 5.4 KU Series

### Model Number for KU060

KU060	-10	P	-600	A	F0	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	5 mm 10 mm	C: Normal  P: Precision		A: Standard	F0: 100W F: No Flange	S1: OMRON SX671 S2: OMRON SX674 S3: SUNX GX-F12A S4: SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor



Effective Stroke (mm)	L1	L2	Weight (kg)	AC motor output		W	
				100	100	100	100
				Drive		Ballscrew C7(normal)	
50	297	331	1	Lead	mm	5	10
100	347	381	1.5	Rated RPM	RPM	3000	3000
150	397	431	2	Max linear speed*	mm/sec	250	500
200	447	481	2.5	Rated thrust	N	280	140
250	497	531	3	Repeatability	mm	±0.02	
300	547	581	3.5	Effective stroke	mm	50-600	
350	597	631	4	Max load (H)	kg	30	20
400	647	681	4.5	Rated dynamic load**	F <sub>yd</sub>	N	50
450	697	731	5		F <sub>zd</sub>	N	300
500	747	781	5.5		M <sub>xd</sub>	N-m	10
550	797	831	6		M <sub>yd</sub>	N-m	8
600	847	881	6.5		M <sub>zd</sub>	N-m	8
				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		



Motor Adaptor Flange F0

\* Vibration might occur when the effective stroke is longer than 500mm.

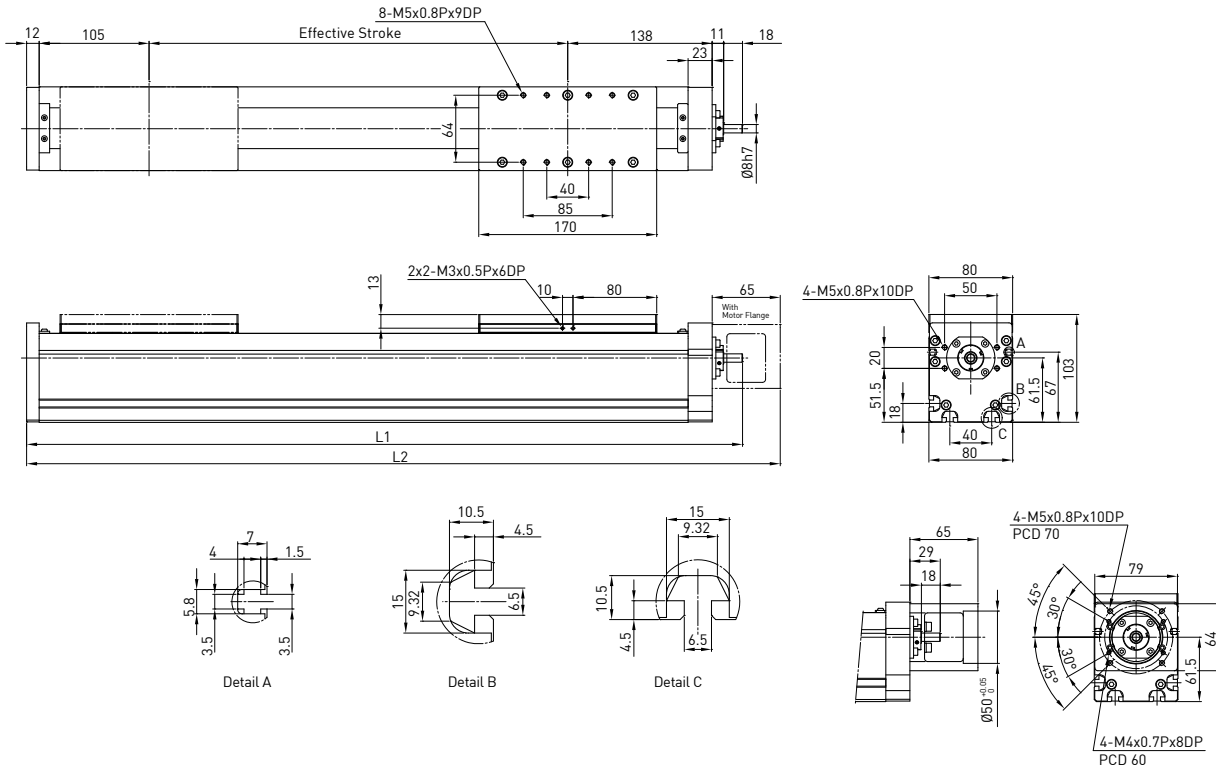
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

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

\*\*\* If used in a special condition, please contact HIWIN.

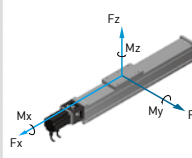
## Model Number for KU080

KU080	-10	P	-1100	A	F0	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal  P: Precision		A: Standard	F0: 200W  F: Without Flange	S1: OMRON SX671 S2: OMRON SX674 S3: SUNX GX-F12A S4: SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor  None: Without Motor



Motor Adaptor Flange F0

Effective Stroke (mm)	L1	L2	Weight (kg)	AC motor output			W				
				Drive	200		200				
100	384	420	7.04	Drive	Ball screw C7(normal)						
150	434	470	7.48	Lead	mm	5	10	20			
200	484	520	7.92	Rated RPM	RPM	3000	3000	3000			
250	534	570	8.36	Max linear speed*	mm/sec	250	500	1000			
300	584	620	8.8	Rated thrust	N	560	280	140			
350	634	670	9.24	Repeatability	mm	±0.02					
400	684	720	9.68	Effective stroke	mm	100-1100					
450	734	770	10.12	Max load (H)	kg	60	40	20			
500	784	820	10.56	Rated dynamic load**	F <sub>yd</sub>	N	50	50	50		
550	834	870	11.0		F <sub>zd</sub>	N	600	400	200		
600	884	920	11.44		M <sub>xd</sub>	N-m	11	12.5	14		
650	934	970	11.88		M <sub>yd</sub>	N-m	9	10	11		
700	984	1020	12.32		M <sub>zd</sub>	N-m	9	10	11		
750	1034	1070	12.76	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$						
800	1084	1120	13.2		F <sub>y</sub> 、F <sub>z</sub> 、M <sub>x</sub> 、M <sub>y</sub> 、M <sub>z</sub> are working loads						
850	1134	1170	13.64								
900	1184	1220	14.08								
950	1234	1270	14.52								
1000	1284	1320	14.96								
1050	1334	1370	15.4								
1100	1384	1420	15.84								



\* Vibration might occur when the effective stroke is longer than 550mm.  
 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 in a special condition, please contact HIWIN.



# Single Axis Robot

## KE Series

### 6.1 Features

- Compact and lightweight
- Easy system installation and maintenance
- MG guideway is made of stainless steel for anti-corrosion
- Closed design
- High accuracy, high efficiency, high reliability

### 6.2 Applications

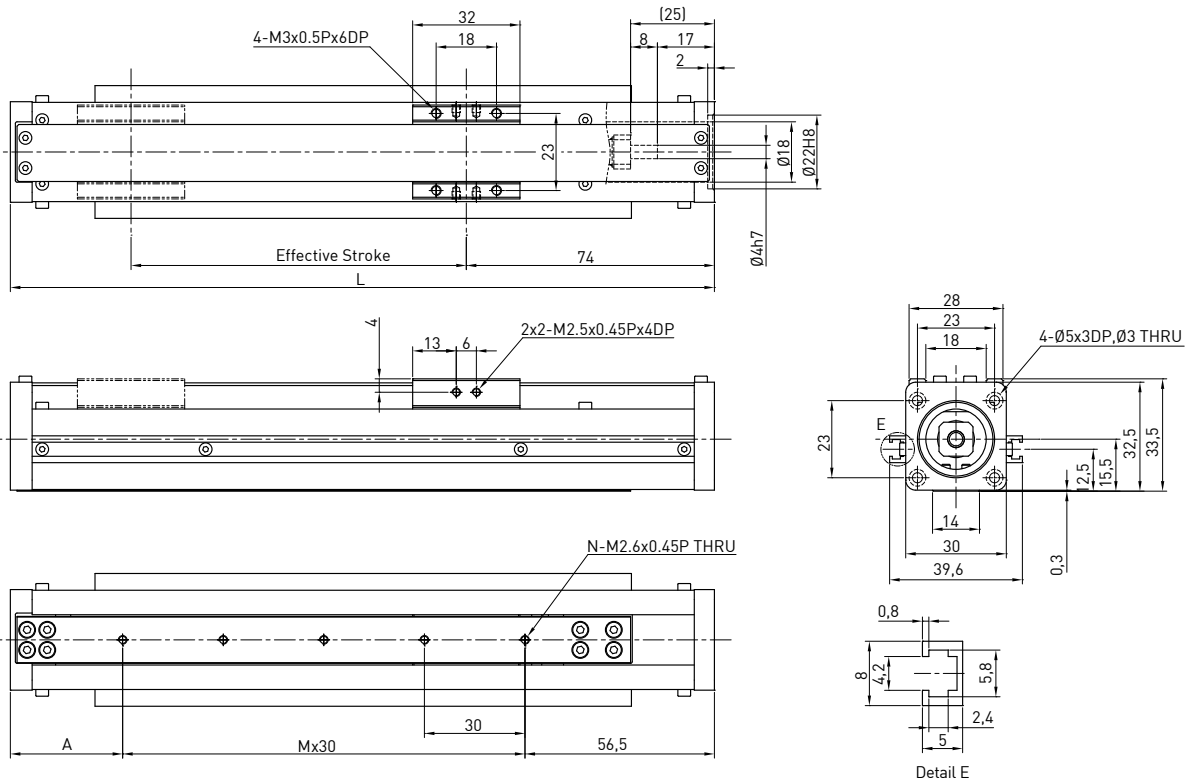
- Precision Industry & Semiconductor
- Inspection, Testing & Assembly equipment
- Optical & Medical equipment



## 6.3 KE Series

### Model Number for KE030

KE030	-1	C	-300	A	F0	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	1 mm	C: Normal P: Precision		A: Standard	F0 : Direct	S1:OMRON SX671 S2:OMRON SX674 S3:SUNX GX-F12A S4:SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor



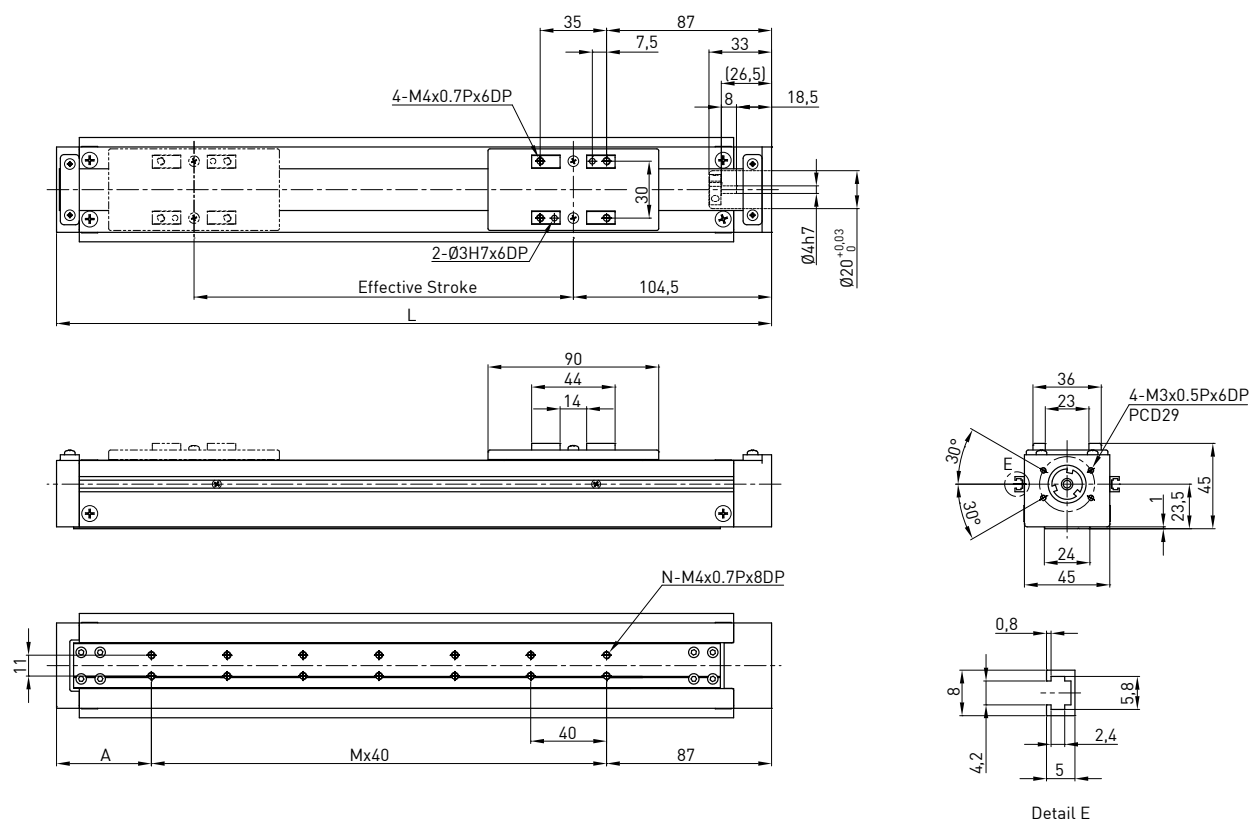
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	28 stepping motor	
50	160	43.5	2	3	0.2	Rated RPM	RPM	-	
100	210	33.5	4	5	0.5	Lead	mm	1.25	
150	260	23.5	6	7	0.8	Max linear speed	mm/sec	62.5	
200	310	43.5	7	8	1.1	Rated thrust	N	175	
250	360	33.5	9	10	1.4	Repeatability	mm	±0.02	
300	410	53.5	10	11	1.9	Effective stroke	mm	50-300	
						Max load (H)	kg	3	
							Fyd	N	4
					Fzd		N	30	
					Mxd		N-m	0.2	
					Myd		N-m	0.1	
					Mzd		N-m	0.1	
						Rated dynamic load*			
						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		

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

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

## Model Number for KE040

KE040	-10	C	-300	A	F0	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	2 mm 5 mm	C: Normal  P: Precision		A: Standard	F0 : Direct	S1:OMRON SX671 S2:OMRON SX674 S3:SUNX GX-F12A S4:SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor



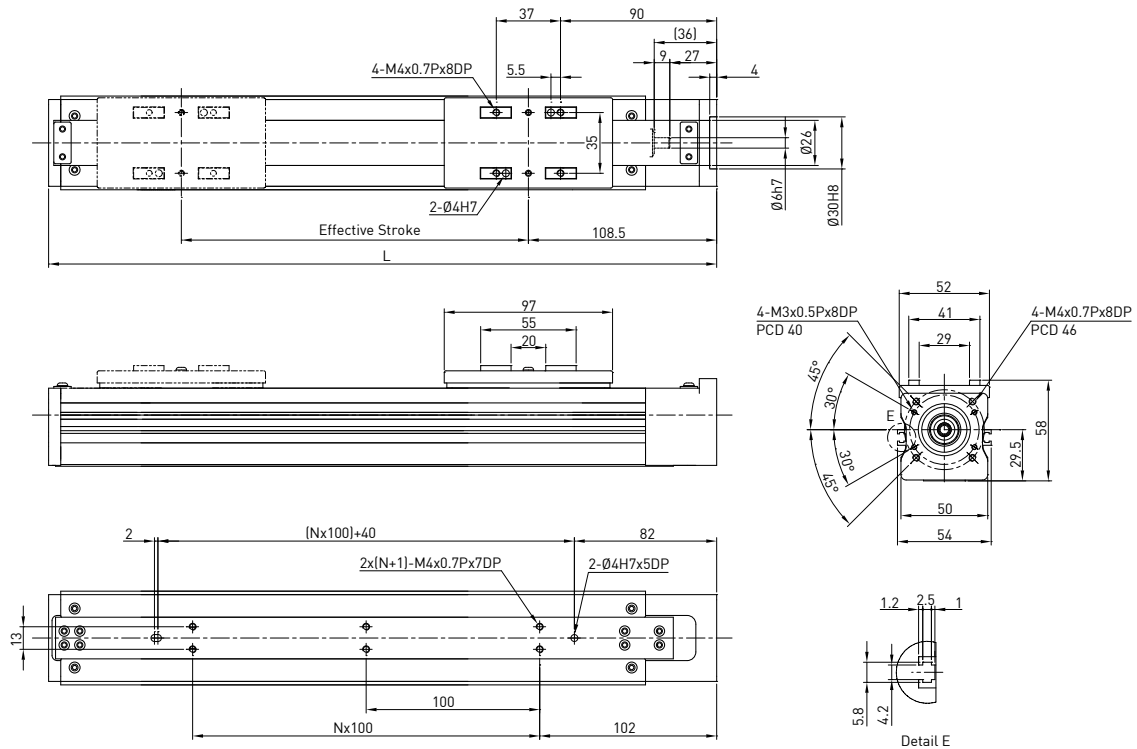
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	50
50	227	60	2	6	1	Rated RPM	RPM	3000 3000
100	277	70	3	8	1.3	Lead	mm	2 5
150	327	40	5	12	1.6	Max linear speed	mm/sec	100 250
200	377	50	6	14	1.9	Rated thrust	N	280 140
250	427	60	7	16	2.2	Repeatability	mm	±0.02
300	477	70	8	18	2.5	Effective stroke	mm	50~300
						Max load (H)	kg	6 4
							Fyd	N 10 10
					Fzd		N 60 30	
					Mxd		N-m 1 1	
					Myd		N-m 0.55 0.6	
					Mzd		N-m 0.55 0.5	
					Rated dynamic load*			
					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		

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

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

## Model Number for KE050 (Single Slider)

KE050	-04	C	-400	A	F0	S2	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
	4 mm	C: Normal		A: Standard	F0:Direct	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



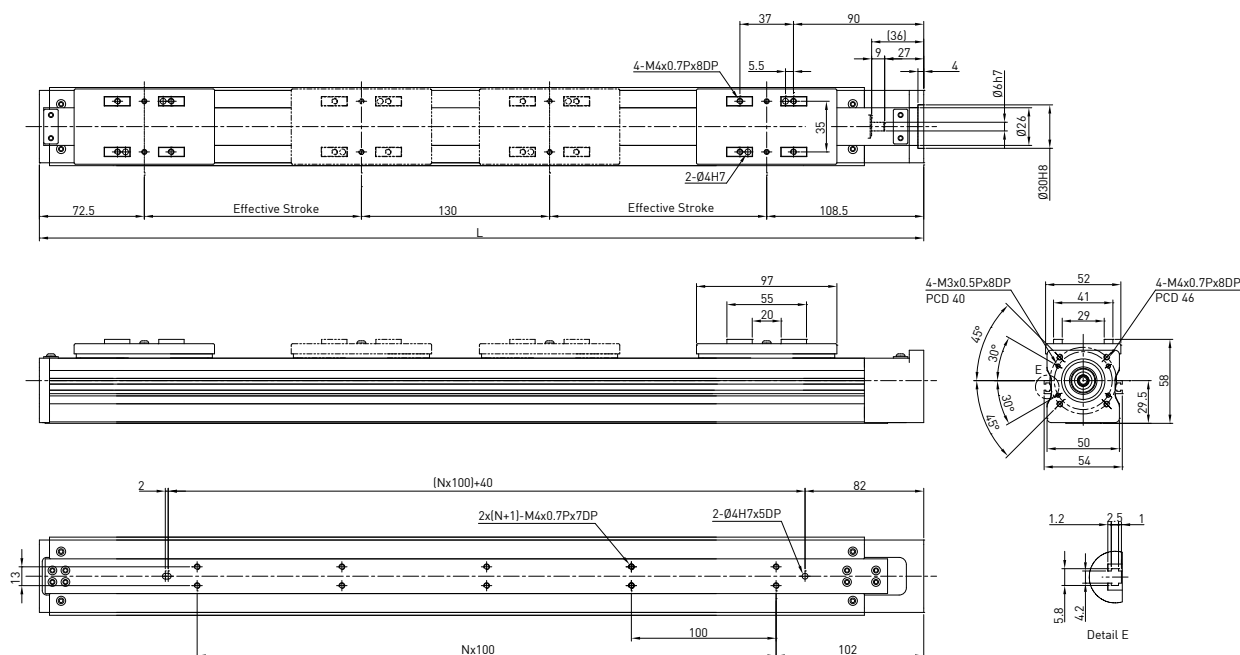
Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	50	
				Rated RPM	RPM	3000	
100	285	1	1.4	Lead	mm	4	
200	385	2	1.7	Max linear speed	mm/sec	200	
300	485	3	2	Rated thrust	N	175	
400	585	4	2.3	Repeatability	mm	±0.02	
				Effective stroke	mm	100~400	
				Max load (H)	kg	8	
					Fyd	N	10
					Fzd	N	80
					Mxd	N-m	1.5
					Myd	N-m	0.8
					Mzd	N-m	0.8
				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.

## Model Number for KE050 (Double Slider)

<b>KE050</b>	<b>D</b>	<b>-04</b>	<b>C</b>	<b>-250</b>	<b>A</b>	<b>F0</b>	<b>S2</b>	<b>M</b>
Model	Double Slider	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
		4mm	C: Normal		A: Standard	F0 :Direct	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



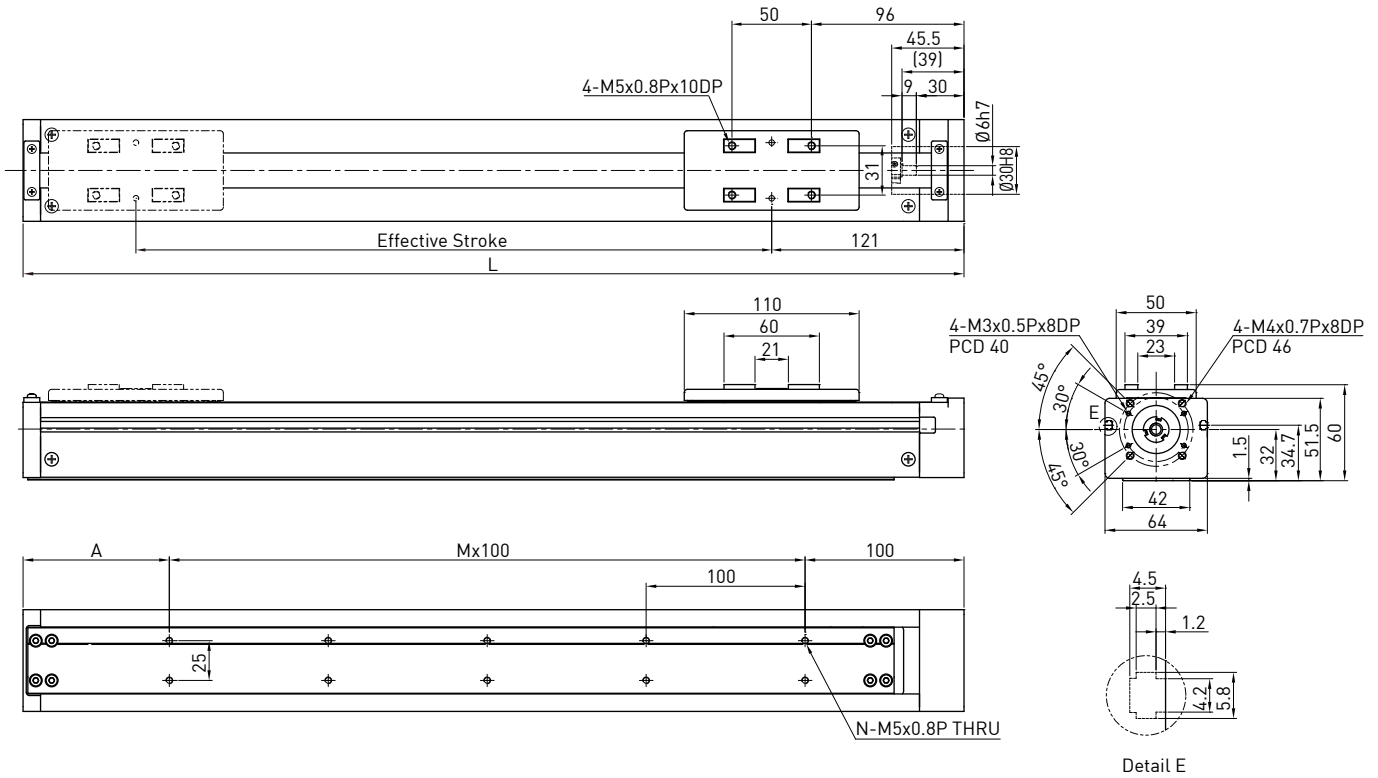
Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	50	
100	511	3	2.3	Rated RPM	RPM	3000	
150	611	4	2.5	Lead	mm	4	
200	711	5	2.8	Max linear speed	mm/sec	200	
250	811	6	3.0	Rated thrust	N	175	
				Repeatability	mm	±0.02	
				Effective stroke	mm	100~400	
				Max load (H)	kg	8	
				Rated dynamic load*	Fyd	N	10
					Fzd	N	80
					Mxd	N-m	1.5
					Myd	N-m	0.8
					Mzd	N-m	0.8
				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.

## Model Number for KE065

KE065	-10	C	-600	A	F0	S1	M
Model	Lead	Accuracy Grade	Effective Stroke	Slider Type	Flange F0	Limit Switch	Motor
	5 mm 10 mm	C: Normal P: Precision		A: Standard	F0: 100W	S1: OMRON SX671 S2: OMRON SX674 S3: SUNX GX-F12A S4: SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor



Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	
						W	100
						Rated RPM	RPM 3000 3000
50	242	42	1	4	2.5	Lead	mm 5 10
100	292	92	1	4	2.8	Max linear speed*	mm/sec 250 500
150	342	42	2	6	3.1	Rated thrust	N 280 140
200	392	92	2	6	3.4	Repeatability	mm ±0.02
250	442	42	3	8	3.7	Effective stroke	mm 50~600
300	492	92	3	8	4	Max load (H)	kg 15 8
350	542	42	4	10	4.3		Fyd N 10 10
400	592	92	4	10	4.6		Fzd N 150 80
450	642	42	5	12	4.9		Mxd N-m 4.4 4.7
500	692	92	5	12	5.2		Myd N-m 2.3 2.6
550	742	42	6	14	5.5		Mzd N-m 2.3 2.6
600	792	92	6	14	5.8		
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 550mm.

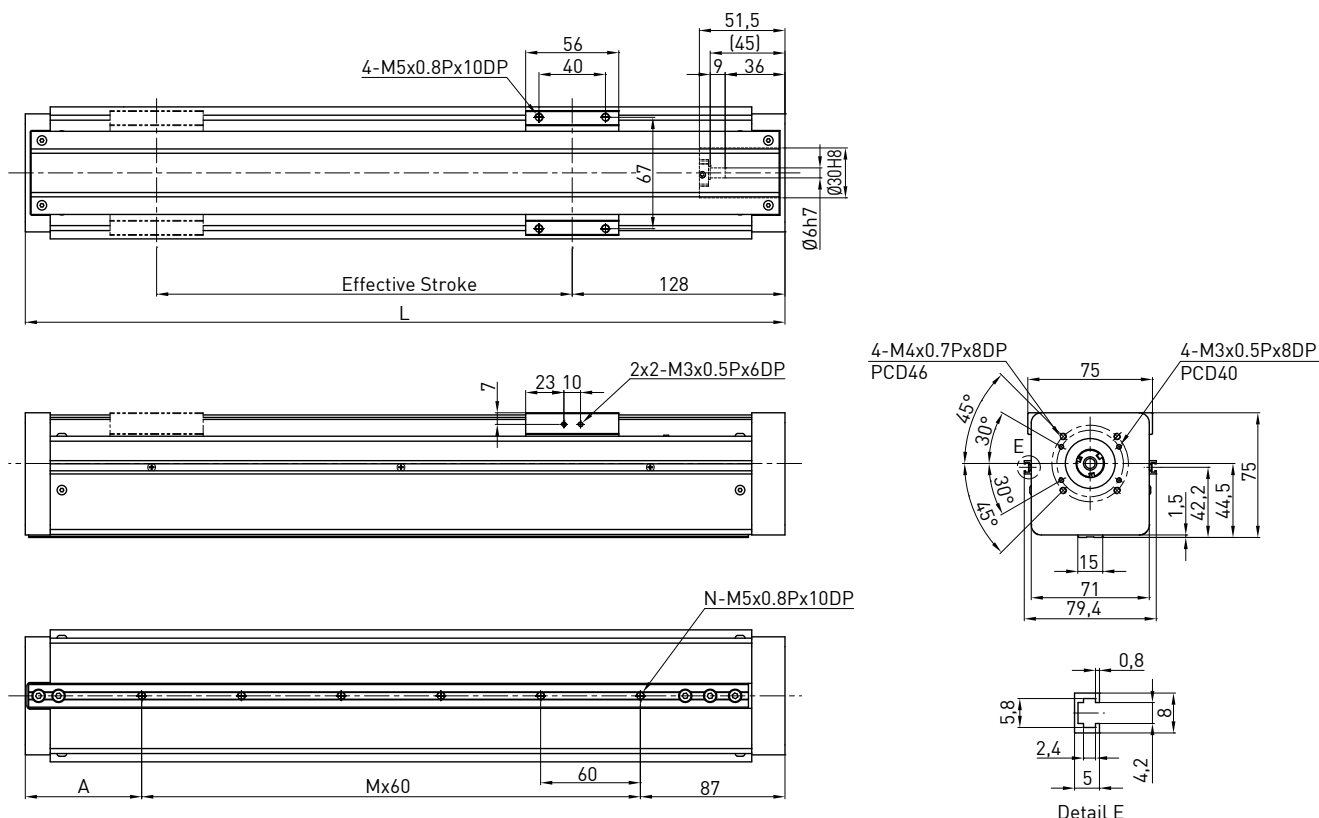
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

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

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

## Model Number for KE070

KE070	-10	C	-600	A	F0	S1	M
Model	Lead	Accuracy Grade	Effective Stroke	Slider Type	Flange F0	Limit Switch	Motor
	5 mm 10 mm	C: Normal P: Precision		A: Standard	F0: Direct	S1: OMRON SX671 S2: OMRON SX674 S3: SUNX GX-F12A S4: SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor

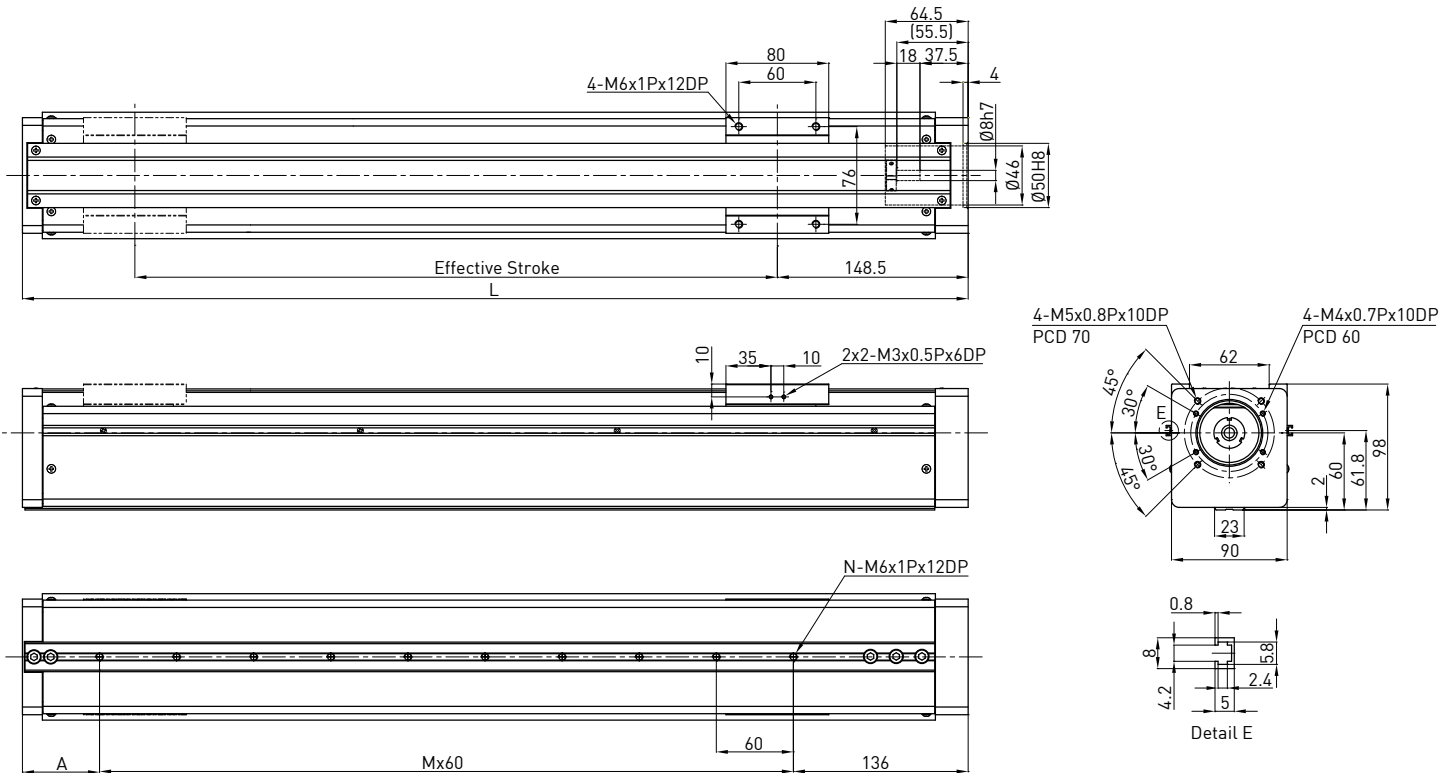


Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	100	
50	257	50	2	3	2.8	Rated RPM	RPM	3000 3000	
100	307	40	3	4	3.1	Lead	mm	5 10	
150	357	90	3	4	3.4	Max linear speed*	mm/sec	250 500	
200	407	80	4	5	3.7	Rated thrust	N	280 140	
250	457	70	5	6	4	Repeatability	mm	±0.02	
300	507	60	6	7	4.3	Effective stroke	mm	50-600	
350	557	50	7	8	4.6	Max load (H)	kg	20 15	
400	607	40	8	9	4.9		Fyd	N	10 10
450	657	90	8	9	5.2		Fzd	N	200 150
500	707	80	9	10	5.5		Mxd	N-m	3.5 3.5
550	757	70	10	11	5.8		Myd	N-m	2 2.1
600	807	60	11	12	6.1		Mzd	N-m	2 2.1
						Rated dynamic load**			
						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		

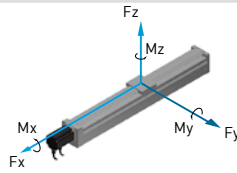
\* Vibration might occur when the effective stroke is longer than 550mm.  
 The maximum speed should be decreased by 15% for every 100mm of increased stroke.  
 \*\*The load condition is based on 10,000km operation.  
 \*\*\*If used on vertical axis or special condition , please contact HIWIN.

## Model Number for KE090

KE090	-10	C	-600	A	F0	S1	M
Model	Lead	Accuracy Grade	Effective Stroke	Slider Type	Flange F0	Limit Switch	Motor
	5 mm 10 mm	C: Normal P: Precision		A: Standard	F0: Direct	S1: OMRON SX671 S2: OMRON SX674 S3: SUNX GX-F12A S4: SUNX GX-F12A-P None: No Limit Switch	M: Supplied With Motor None: Without Motor



Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	200
50	286	90	1	2	6.7	Rated RPM	RPM	3000 3000
100	336	80	2	3	7	Lead	mm	5 10
150	386	70	3	4	7.3	Max linear speed	mm/sec	250 500
200	436	60	4	5	7.6	Rated thrust	N	560 280
250	486	50	5	6	7.9	Repeatability	mm	±0.02
300	536	40	6	7	8.2	Effective stroke	mm	50~600
350	586	90	6	7	8.5	Max load (H)	kg	25 23
400	636	80	7	8	8.8	Rated dynamic load*	F <sub>yd</sub>	N 10 10
450	686	70	8	9	9.1		F <sub>zd</sub>	N 250 230
500	736	60	9	10	9.4		M <sub>xd</sub>	N-m 13 12
550	786	50	10	11	9.7		M <sub>yd</sub>	N-m 7.1 7.3
600	836	40	11	12	10		M <sub>zd</sub>	N-m 7.1 7.3
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		

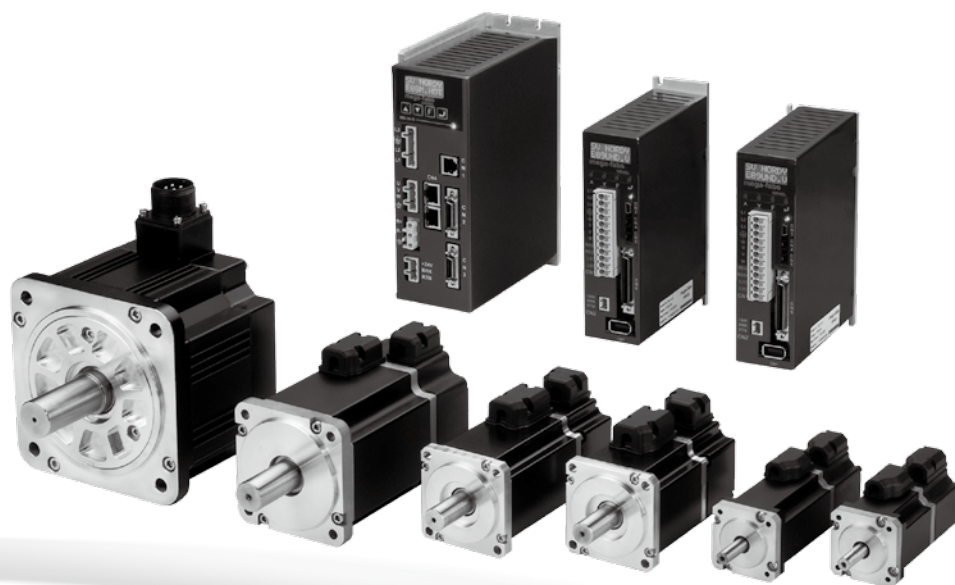


\*The load condition is based on 10,000km operation.

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

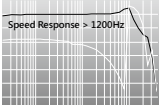


# Single Axis Robot Motor & Driver



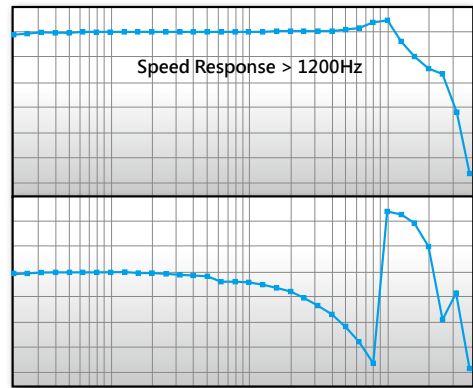
## 7.1 Features

# Excellent Performance



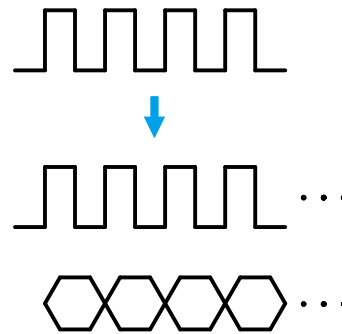
### Excellent high speed response

With the help of semiconductor high-end motion control algorithm and an advanced common gain concept, a high speed response is achieved, satisfying all motion control needs.



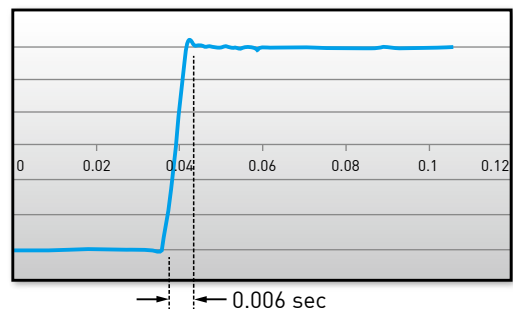
### 17bit High resolution encoder

Due to the advancement in serial encoder technology, a resolution of 131,072 count/rev is achieved. It guarantees the performance for the most demanding motions.



### High acceleration responses

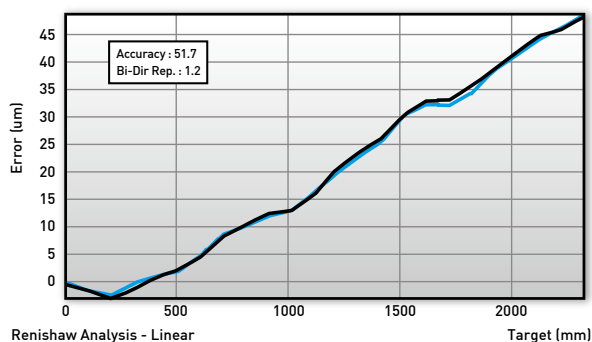
Using advanced WizAlg controller design tools, plus space vector current control technology, servo performance has been achieved to the highest level. To change motor speed from -3000 to +3000 rpm, it takes as low as 0.006 second.



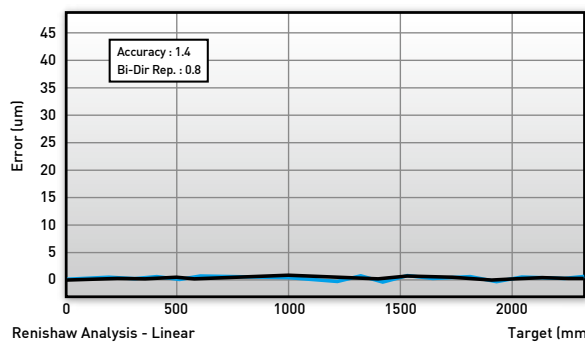


## Built-in accuracy improvement features

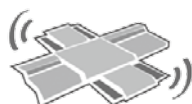
The D2 driver includes features to improve total positioning accuracy of the mechanical system. The table size can be up to 16000 points. It is implemented in all control modes to optimize system behavior.



Without compensation



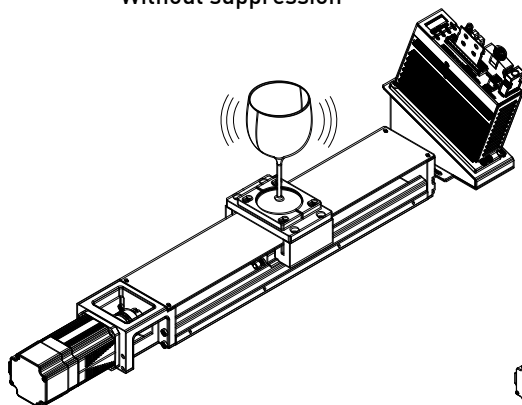
With compensation



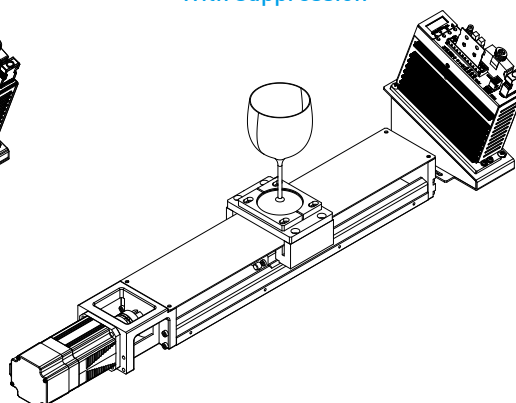
## Vibration Suppression Feature

The D2 driver can remove the vibration frequency that occurs during movement. It reduces vibrations caused by system's structure and improve the machine's production efficiency.

Without suppression



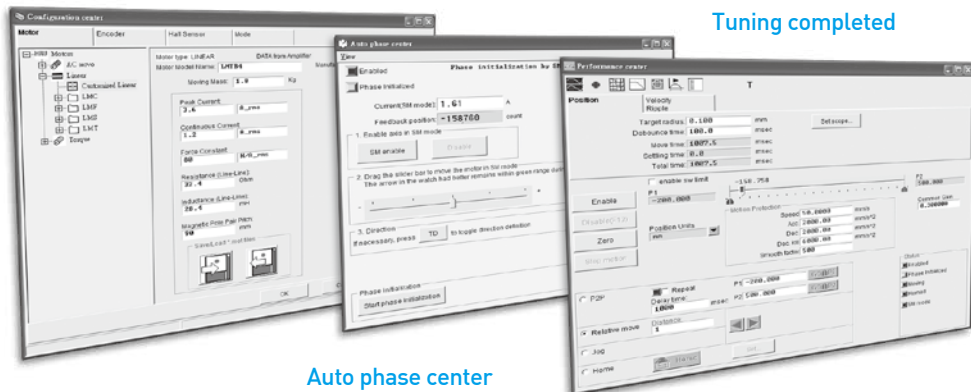
With suppression



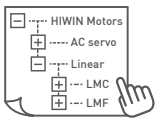
# Simple Operation

1 2 3  
Three Steps

## Simple setup

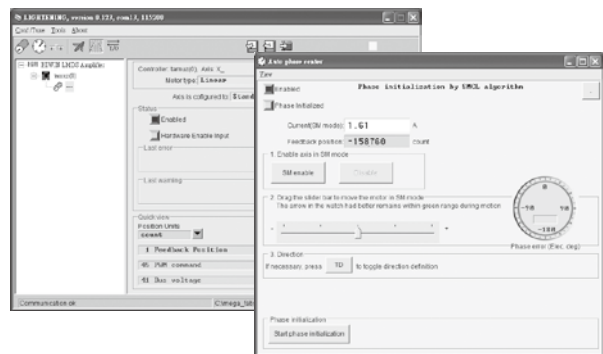


Auto phase center



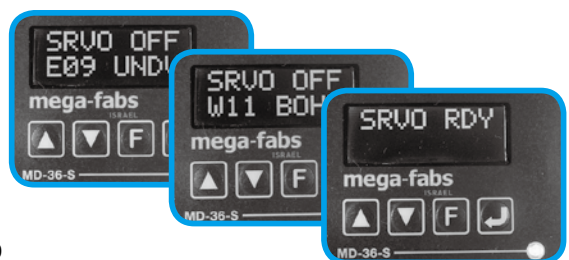
## Easy operation

Parameters are categorized according to features, only the necessary ones are shown at the right time. There is no confusing parameter list.



## LCD display

Without the need of a PC and the user's interface, the LCD display makes it possible to complete basic settings. The LCD display shows the necessary errors, warnings, and status information while providing the user with push buttons on the panel to set the gains and perform a test run.

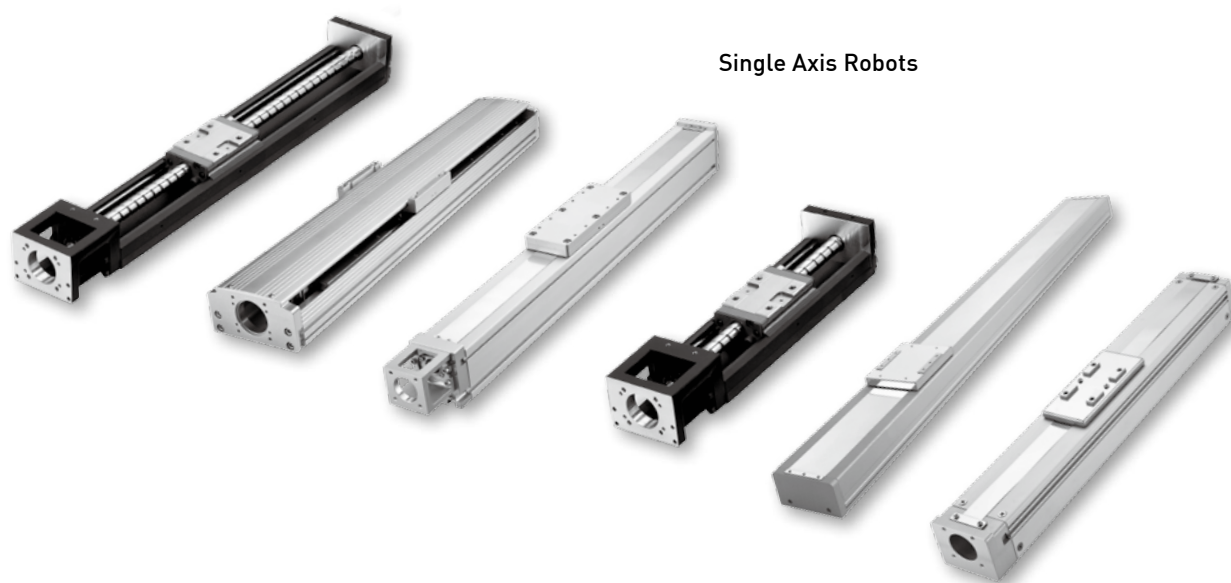


# Easy Integration

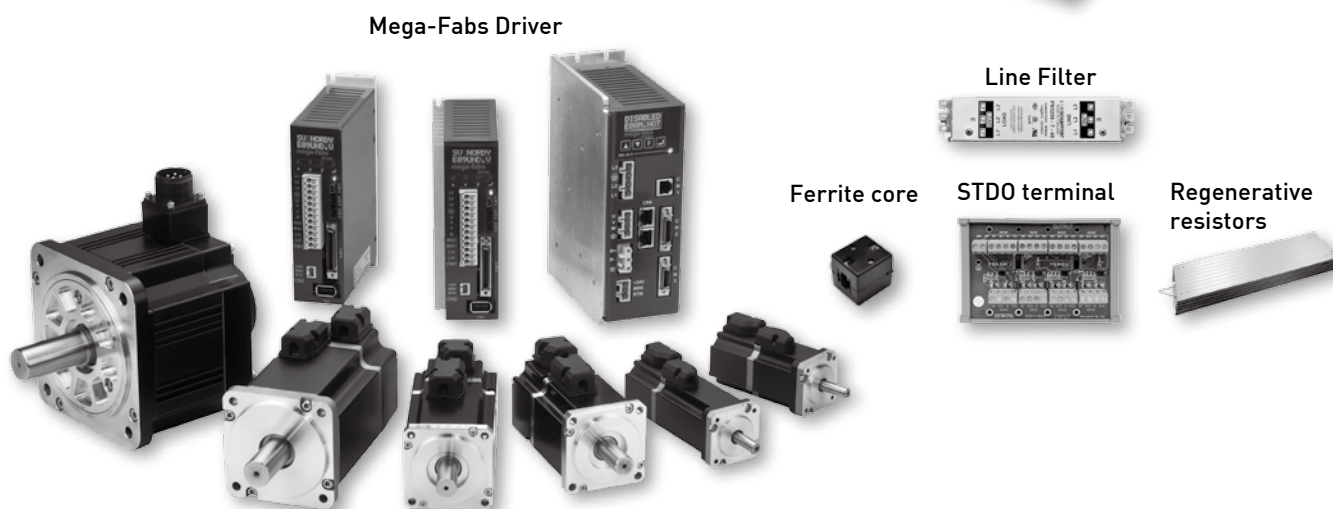


## The total solution

HIWIN provides positioning modules, motors, and the best servo driver solutions from mega-fabs. According to the customer's requirement we can incorporate all that is required for easy integration.



Single Axis Robots



Mega-Fabs Driver

Line Filter

Ferrite core

STD0 terminal

Regenerative resistors

AC servo Motor

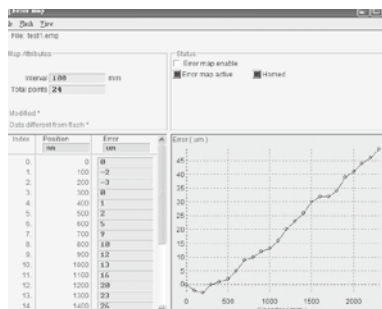
# Complete Tool Sets

Mega-Fabs drives provide a complete set of tools for motion control by offering a real-time oscilloscope, frequency analysis tools, gain scheduling tools, I/O settings, electronic gear tools, encoder output scale, and much more.



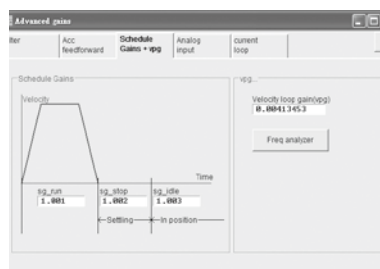
### Accuracy enhancement

To improve on the positioning accuracy of motion systems, the D2 driver features an error compensation function. By taking the measurements from a laser interferometer, the positioning error table can be built inside the D2, so that high positioning accuracy is achieved.



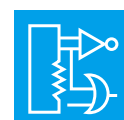
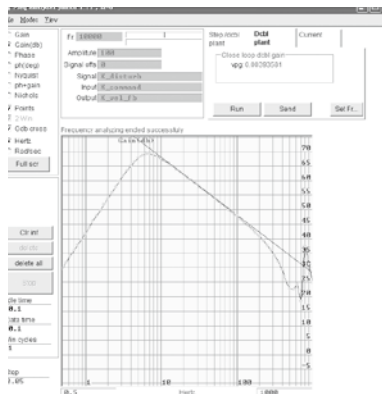
### Advanced gain scheduling feature

After setting gains through optimization tools, there is only one value to adjust: the common gain. During motion, the D2 driver provides a gain scheduling function. You can adjust the common gain according to different phases of motion, such as the moving phase, settling phase, and in-position phase.



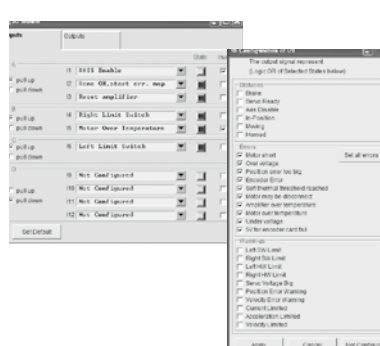
### Optimization tools

The D2 driver provides a powerful and easy to use tool for optimization. You can use the frequency analysis tools to display the real response in graph form. You can easily set the best gain value for the system based on the real response, so even first time users can easily get started.



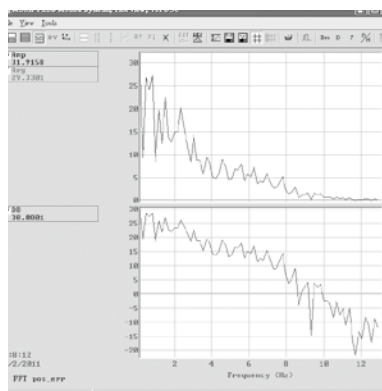
### Variety of I / O functions

In response to a number of different functions, you are free to configure the I / O pin functionality and adapt different hardware interfaces. This satisfies diverse requirements for different motion controllers with regards to their pin assignments and hardware interfaces.



### Analysis tools

To solve resonance problems, the D2 driver offers a filter design tool for improving the control performance by utilizing a Fast Fourier Transform (FFT) and other mathematical operations. You can use the functions to easily calculate the resonant frequency of the system, and to make the filter design more accurate.


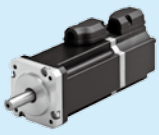

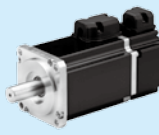
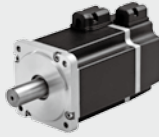



## 7.2 Application international safety standards



		Driver	Motor
CE Directives	EMC Directives	EN55011 EN61000-6-2 EN61000-6-4 EN61000-3-2 EN61000-3-3	EN55011 EN61000-6-2 EN61000-6-4
	Low-Voltage Directives	EN61800-5-1	EN60034-1 EN60034-5

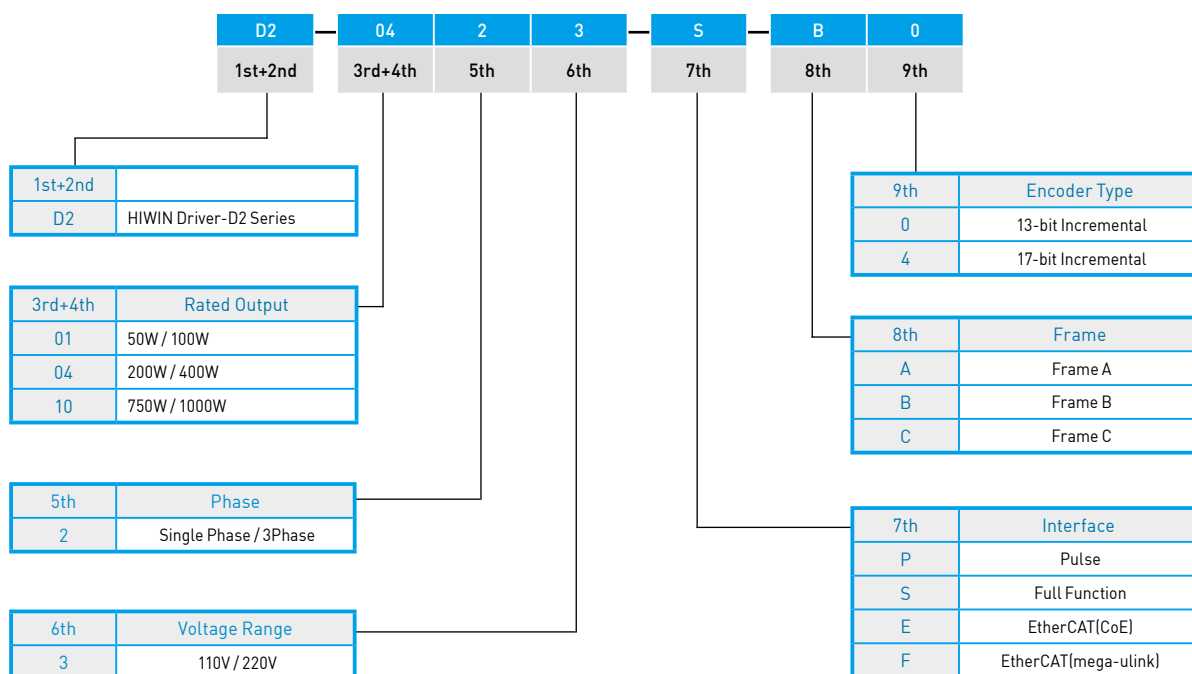
### 7.3 Motor line-up / Application

Motor	Voltage	Rated Output (W)	Rated Rotational Speed(Max Speed)(rpm)	Rotary Encoder		Enclosure Rating	Application
				13-bit	17-bit		
Low Inertia FRLS		220V	50W	3000 4500	☉	☉	IP54/IP65  ◆Semiconductor equipment ◆Packing machines ◆SMT machines ◆Food machines ◆LCD equipment
		220V	100W	3000 4500	☉	☉	
		220V	200W	3000 4500	☉	☉	
		220V	400W	3000 4500	☉	☉	
Middle Inertia FRMS FRMM		220V	750W	3000 4500	☉	☉	IP54/IP65  ◆Semiconductor equipment ◆Packing machines ◆SMT machines ◆Food machines ◆LCD equipment
		220V	1000W	2000 3000	☉	☉	

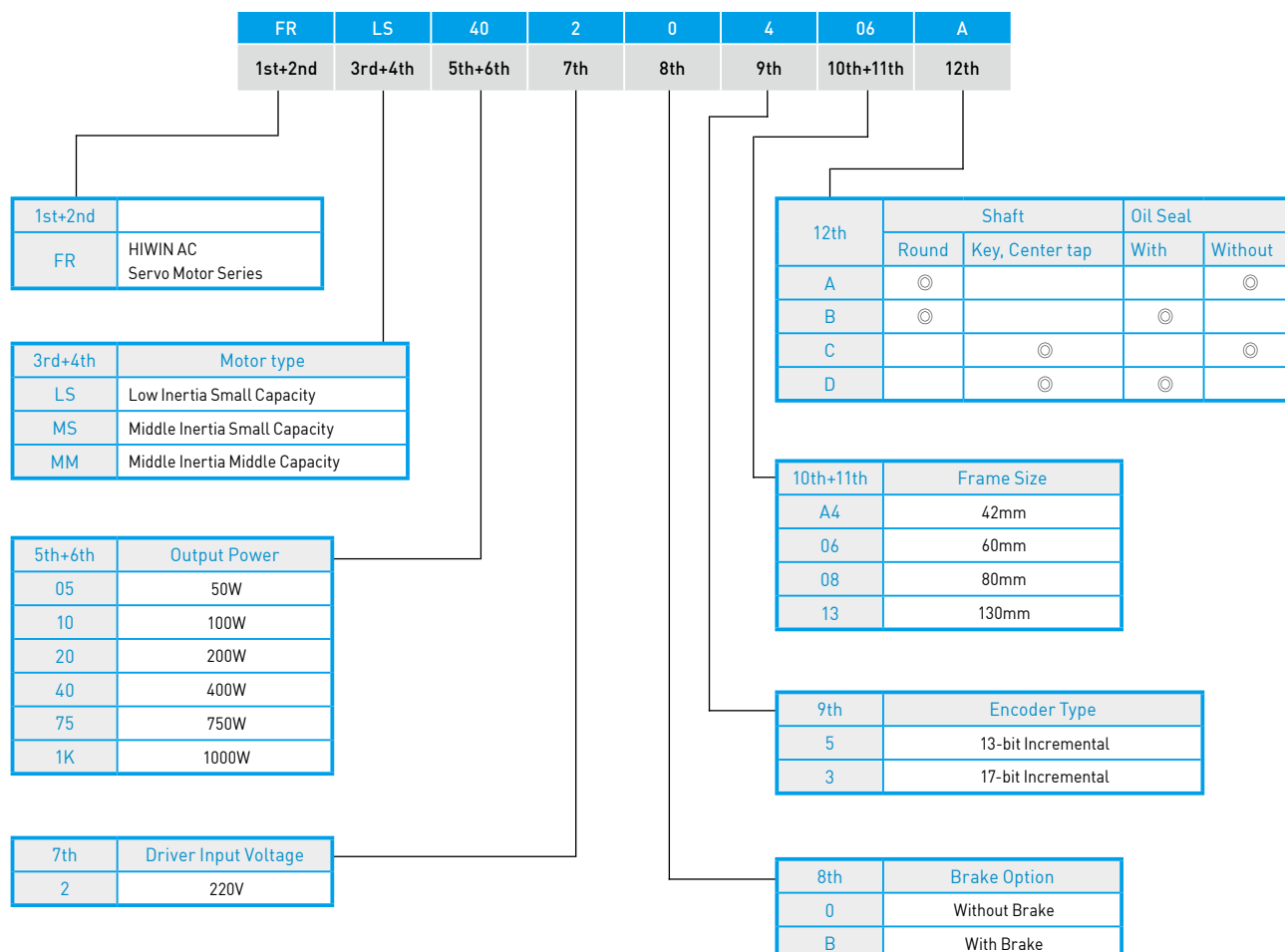


## 7.4 Model designation

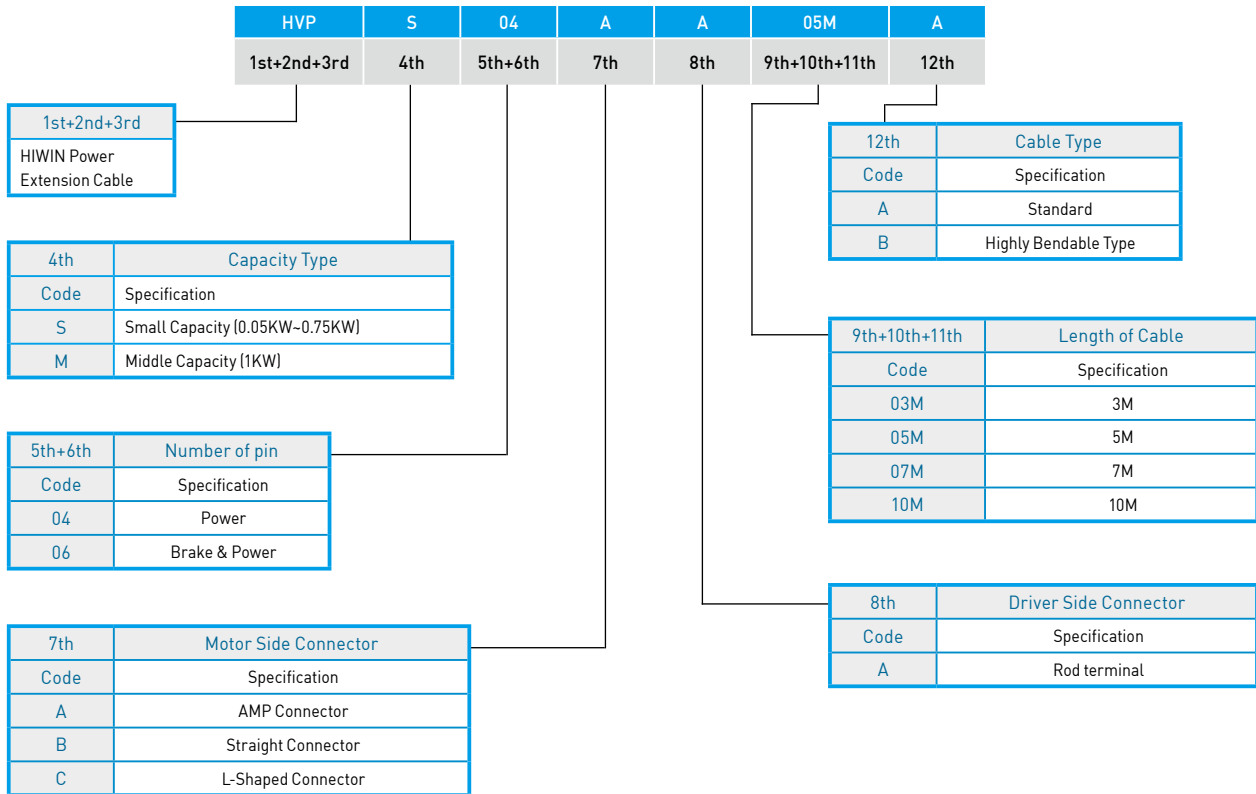
### Driver-D2 Series



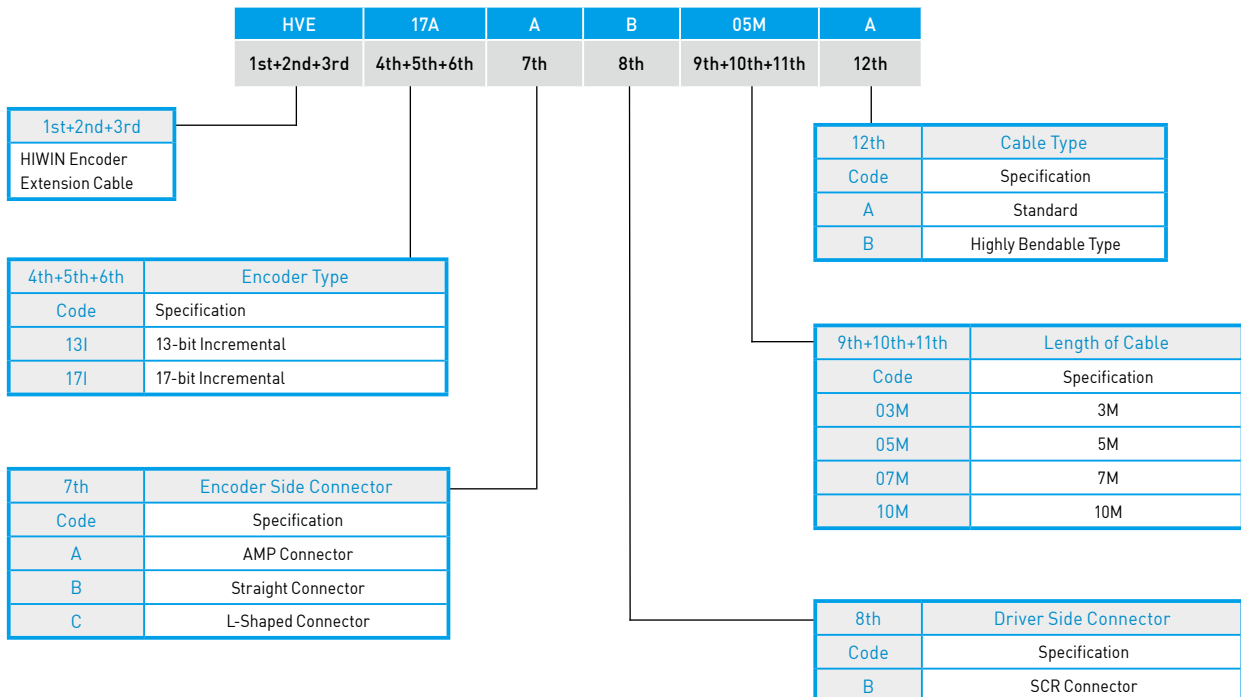
### Servo motor



## Motor cable & Brake cable

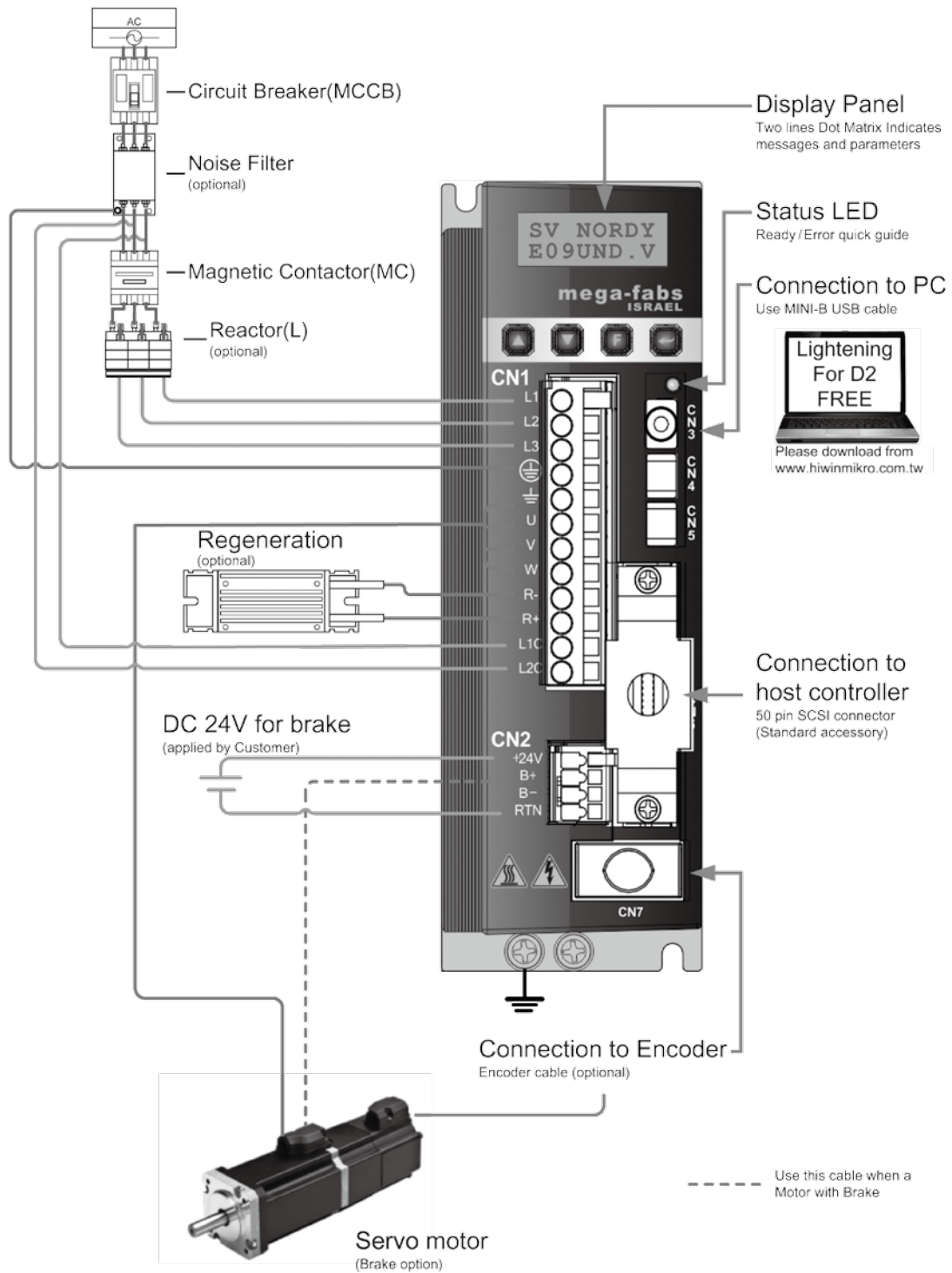


## Encoder cable



## 7.5 Wiring layout

### Connector type (110/220V: A to C- Frame)



## 7.6 Part Numbers and Options

### AC50W~AC750W-13bit Incremental

Motor				Driver			Power capacity (Rated load)					
Motor Series	Power supply	Output (W)	Part No. (Note 1)	Part No. (Full function type)	Part No. (Pulse type Only)	Frame						
Low Inertia	FRLS	single phase/ 3phase 220V	50	FRLS05205A4Δ	D2-0123-S-A0	D2-0123-P-A0	Frame A	Approx. 0.4kVA				
				FRLS052B5A4Δ								
			100	FRLS10205A4Δ								
				FRLS102B5A4Δ								
			200	FRLS2020506Δ					D2-0423-S-B0	D2-0423-P-B0	Frame B	Approx. 0.9kVA
				FRLS202B506Δ								
400	FRLS4020506Δ											
	FRLS402B506Δ											
Middle Inertia	FRMS	750	FRMS7520508Δ	D2-1023-S-C0	D2-1023-P-C0	Frame C	Approx. 1.8kVA					
			FRMS752B508Δ									

(Note 1) Δ : Shaft End & Oil Seal Specification (Please refer to p.129)

(Note 3) : EMC pack model (please refer to p.150)

### (Note 2) : Selection of cable for FRMS motor

#### ◆ Motor Cable(without brake)

**HVPS04AA** □ □ □ ◇

Cable Length

Cable Bendable Type

9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

Optional parts							
Motor cable(Note 2)		Encoder cable	D2 driver accessories				
without brake	with brake	13bit incremental (Note 2)	Control Signal Cable	1 phase EMC Pack (Note 3)	3 phase EMC Pack (Note 3)	External Regenerative Resistor	
HVPS04AA□□□◇	HVPS06AA□□□◇	HVE13IAB□□□◇	LMACK02D	D2-EMC1	D2-EMC2	050100700001	
				D2-EMC3			

◆ Motor Cable(with brake)

**HVPS06AA**□□□◇

Cable Length

Cable Bendable Type

9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

◆ Encoder Cable(13bit-Incremental)

**HVE13IAB**□□□◇

Cable Length

Cable Bendable Type

9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

# AC1KW-13bit Incremental

Motor				Driver			Power capacity (Rated load)	
Motor Series	Power supply	Output (W)	Part No. (Note 1)	Part No. (Full function type)	Part No. (Pulse type Only)	Frame		
Middle Inertia	FRMM	single phase/ 3phase 220V	1000	FRMM1K20513Δ	D2-1023-S-C0	D2-1023-P-C0	Frame C	Approx. 1.8kVA
				FRMM1K2B513Δ				

(Note 1) Δ : Shaft End & Oil Seal Specification (Please refer to p.129)  
 (Note 3) : EMC pack model (please refer to p.150)

## (Note 2) : Motor Cable (with brake & without brake)

HVPM04 ☆ A □ □ □ ◇

Motor Side Connector

7th	Motor Side Connector (Note 2)
Code	Specification
B	Straight Type
C	L-Shaped Type

Cable Bendable Type

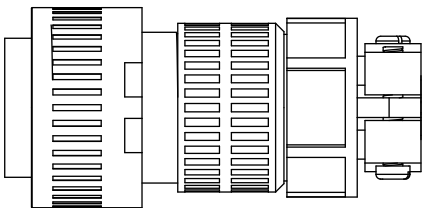
12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

Cable Length

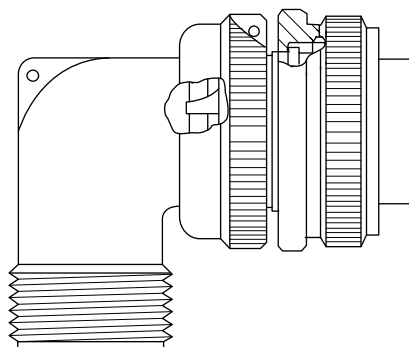
9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

### ◆ Motor Side Connector

● Straight Type



● L-Shaped Type



Optional parts						
Motor cable(Note 2)		Encoder cable	D2 driver accessories			External Regenerative Resistor
without brake	with brake	13bit incremental (Note 2)	Control Signal Cable	1 phase EMC Pack (Note 3)	3 phase EMC Pack (Note 3)	
HVPM04☆A□□□◇	HVPM06☆A□□□◇	HVE13I○B□□□◇	LMACK02D	D2-EMC3	D2-EMC2	050100700001

### ◆ Encoder Cable(13bit-Incremental)

HVE13I○B□□□◇

Hirose Connectors

7th	Encoder Side Connector(Note 3)
Code	Specification
B	Straight Type
C	L-Shaped Type

Cable Bendable Type

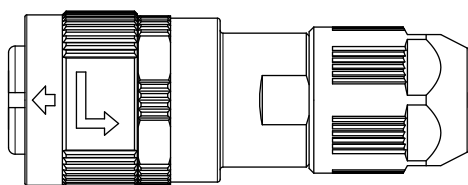
12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

Cable Length

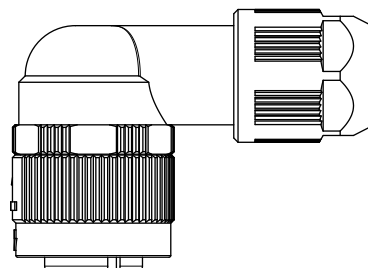
9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

### ◆ Encoder Side Connector

● Straight Type



● L-Shaped Type



## AC50W~AC750W-17bit Incremental

Motor				Driver			Power capacity (Rated load)					
Motor Series	Power supply	Output (W)	Part No. (Note 1)	Part No. (Full function type)	Part No. (Pulse type Only)	Frame						
Low Inertia	FRLS	single phase/ 3phase 220V	50	FRLS05203A4Δ	D2-0123-S-A4	D2-0123-P-A4	Frame A	Approx. 0.4kVA				
				FRLS052B3A4Δ								
			100	FRLS10203A4Δ								
				FRLS102B3A4Δ								
			200	FRLS2020306Δ					D2-0423-S-B4	D2-0423-P-B4	Frame B	Approx. 0.9kVA
				FRLS202B306Δ								
400	FRLS4020306Δ											
	FRLS402B306Δ											
Middle Inertia	FRMS	750	FRMS7520308Δ	D2-1023-S-C4	D2-1023-P-C4	Frame C	Approx. 1.8kVA					
			FRMS752B308Δ									

(Note 1) Δ : Shaft End & Oil Seal Specification (Please refer to p.129)

(Note 3) : EMC pack model (please refer to p.150)

### (Note 2) : Selection of cable for FRMS motor

#### ◆ Motor Cable(without brake)

**HVPS04AA** □ □ □ ◇

Cable Length

9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

Cable Bendable Type

12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type



Optional parts						
Motor cable(Note 2)		Encoder cable	D2 driver accessories			External Regenerative Resistor
without brake	with brake	17bit incremental (Note 2)	Control Signal Cable	1 phase EMC Pack (Note 3)	3 phase EMC Pack (Note 3)	
HVPS04AA□□□◇	HVPS06AA□□□◇	HVE17IAB□□□◇	LMACK02D	D2-EMC1	D2-EMC2	050100700001
				D2-EMC3		

◆ Motor Cable(with brake)

**HVPS06AA**□□□◇

Cable Length

Cable Bendable Type

9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

◆ Encoder Cable(17bit-Incremental)

**HVE17IAB**□□□◇

Cable Length

Cable Bendable Type

9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

# AC1KW-17bit Incremental

Motor				Driver			Power capacity (Rated load)	
Motor Series	Power supply	Output (W)	Part No. (Note 1)	Part No. (Full function type)	Part No. (Pulse type Only)	Frame		
Middle Inertia	FRMM	single phase/ 3phase 220V	1000	FRMM1K20313Δ	D2-1023-S-C4	D2-1023-P-C4	Frame C	Approx. 1.8kVA
				FRMM1K2B313Δ				

(Note 1) Δ : Shaft End & Oil Seal Specification (Please refer to p.129)  
 (Note 3) : EMC pack model (please refer to p.150)

## (Note 2) : Motor Cable (with brake & without brake)

**HVPM04** ☆ A □ □ □ ◇

Motor Side Connector

7th	Motor Side Connector(Note 2)
Code	Specification
B	Straight Type
C	L-Shaped Type

Cable Bendable Type

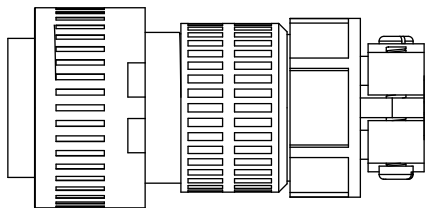
12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

Cable Length

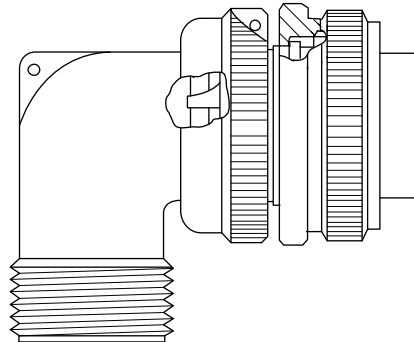
9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

### ◆ Motor Side Connector

● Straight Type

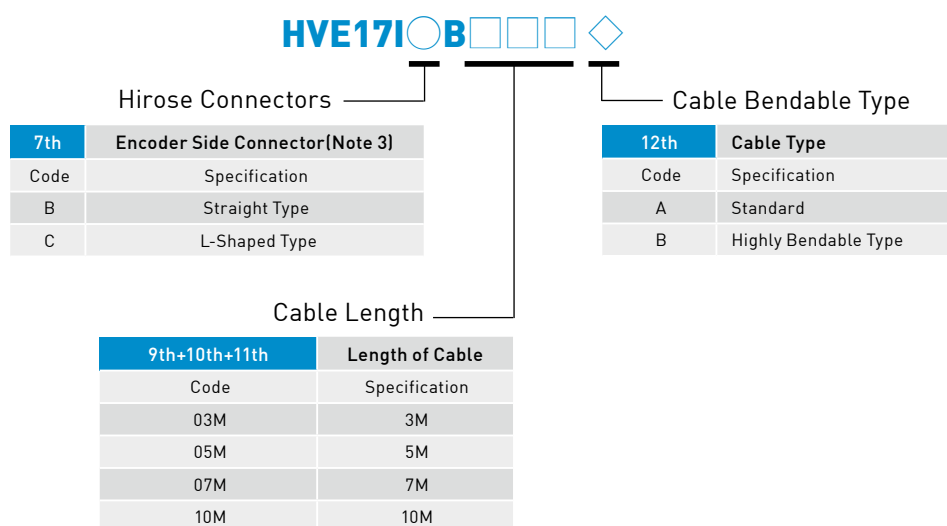


● L-Shaped Type



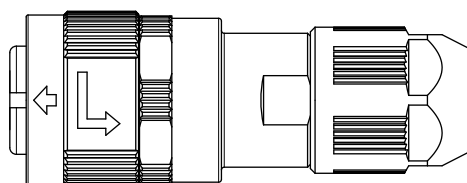
Optional parts							
Motor cable(Note 2)		Encoder cable	D2 driver accessories			External Regenerative Resistor	
without brake	with brake	17bit incremental (Note 2)	Control Signal Cable	1 phase EMC Pack (Note 3)	3 phase EMC Pack (Note 3)		
HVPM04☆A□□□◇	HVPM06☆A□□□◇	HVE17I○B□□□◇	LMACK02D	D2-EMC3	D2-EMC2	050100700001	

### ◆ Encoder Cable(17bit-Incremental)

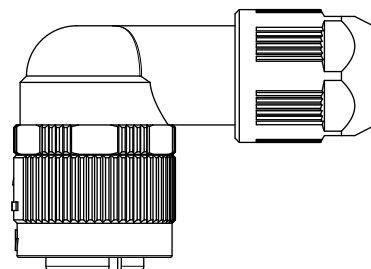


### ◆ Encoder Side Connector

● Straight Type



● L-Shaped Type



## 7.7 Servo Driver

### 7.7.1 Basic specifications for full function

Input power	220V	Main circuit	A to C-frame	Single/3-phase, 200 to 240V 50/60Hz
		Control circuit	A to C-frame	Single phase, 200 to 240V 50/60Hz
Environment	Temperature		Operation Temperature: 0°C~40°C (if over 55°C, forced ventilation is needed) Storage Temperature: -20°C~65°C	
	Humidity		0 to 90%RH	
	Altitude		Under 1000 Meters	
	Vibration		1G (10 to 500Hz)	
Control method				IGBT PWM space vector control
Encoder feedback				13-bit (10000 cnt/rev) incremental encoder, 9-wire serial 17-bit (131072 cnt/rev) incremental encoder, 5-wire serial
Parallel I/O connector	Control signal	Input	General purpose 9 inputs	
		Output	General purpose 4 outputs	
	Analog signal	Input	1 input (12bit A/D)	
		Output	2 outputs (Analog monitor: 2 outputs)	
	Pulse signal	Input	2 inputs (Low speed channel, High speed channel)	
		Output	4 outputs (Line driver: 3output, open collector: 1 output)	
Brake connector	Control signal	Output	Used for direct brake connection. (No need of extra relay for brake) Also programmable for general purpose output	
Communication function			USB	Connection with PC, 115200bps
Front panel				Dot matrix 8*2 characters LCD with 4 buttons LED(green, red)
Regeneration				A, B-frame: No built-in regenerative resistor (external ) C-frame: Built-in regenerative resistor (external resistor is also available)
Dynamic brake				External only (Option)
Control mode				Switching among the following modes is possible (1)Position control (2)Velocity control (3)Torque control (4)Position/Velocity control (5)Position/Torque control (6)Velocity/Torque control

## Functions

Position control	Control input		(1)Inhibit pulse command, (2)Clear position error, (3)Axis Enable, (4)Switch between 1 <sup>st</sup> and 2 <sup>nd</sup> CG, (5)Electronic Gear Select, (6)Left Limit Switch, (7)Switch between 1 <sup>st</sup> and 2 <sup>nd</sup> mode, (8)Clear Error, (9)Right Limit Switch etc.
	Control output		(1)Servo Ready, (2)Errors, (3)In-Position, (4)Zero Speed Detected etc.
	Pulse input	Max. command pulse frequency	Dedicated interface for Photo-coupler(single end input): 500kpps Dedicated interface for line driver(differential input): 4Mpps(16M cnt/s with AqB)
		Input pulse signal format	(1) Pulse and Direction, (2) Pulse Up/Pulse Down(3) Quadrature(AqB)
		Electronic gear (Division/Multiplication of command pulse)	Gear ratio: pulses/counts pulses: 1~2147483647, counts: 1~2147483647
		Smoothing filter	Smooth factor : 1~500 (0: no smoothing filter)
Vibration suppression filter(VSF)		VSF can remove the vibration frequency that occurs during movement. It can reduce the vibration caused by the system' s structure and improve the machine' s productivity.	
Velocity control	Control input		(1)Zero Speed Clamp, (2)Axis Enable, (3)Switch between 1st and 2nd CG, (4)Left Limit Switch, (5)Switch between 1st and 2nd mode, (6)Clear Error, (7)Right Limit Switch etc.
	Control output		(1)Servo Ready, (2)Errors, (3)In-Velocity, (4)Zero Speed Detected etc.
	PWM input	Velocity command input	Speed command input can be provided by means of duty cycle of PWM input. Parameter are used for scale setting and command polarity.
	Analog Input	Velocity command input	Speed command input can be provided by means of analog voltage. Parameter are used for scale setting and command polarity.
	Zero speed clamp		Zero speed clamp input is possible.
Torque control	Control input		(1)Zero Speed Clamp, (2)Axis Enable, (3)Switch between 1st and 2nd CG, (4)Left Limit Switch, (5)Switch between 1st and 2nd mode, (6)Clear Error, (7)Right Limit Switch etc.
	Control output		(1)Servo Ready, (2)Errors, (3)In-Velocity, (4)Zero Speed Detected etc.
	PWM input	Torque command input	Torque command input can be provided by means of duty cycle of PWM input. Parameter are used for scale setting and command polarity.
	Analog Input	Torque command input	Torque command input can be provided by means of analog voltage. Parameter are used for scale setting and command polarity.
	Speed limit function		Speed limit value with parameter is possible
Common	Auto tune		The Auto tune procedure runs automatically after started and identify the load inertia, so that no user setting is required. All necessary gains are set with one click from the LCD panel.
	Emulated encoder feedback output		Set up of any value is possible (frequency up to 18M cnt/s)
	Protective function		(1)Motor short detected, (2)Over voltage detected, (3)Position error too big, (4)Encoder error, (5)Soft-thermal threshold reached, (6)Motor maybe disconnected, (7)Amplifier over temperature, (8)Under voltage detected, (9)5V for encoder Card fail, (10)Phase initialization error, (11)Serial encoder communication error
	Error log		Errors and warnings are saved in non-volatile memory
	Error Mapping		Method: Established compensation table to compensate encoder error by linear interpolation
			Samples: Maximum 16,000 point
			Storage: Flash ROM, Disc file
		Unit: um, count	
		Activation: Activated internally by home complete, or activated externally by input signal	
Others		Friction compensation, Backlash compensation	

## 7.7.2 Basic specifications for pulse type

Input power	220V	Main circuit	A to C-frame	Single phase, 200 to 240V 50/60Hz
		Control circuit	A to C-frame	Single phase, 200 to 240V 50/60Hz
Environment	Temperature		Operation Temperature: 0°C~40°C (if over 55°C, forced ventilation is needed) Storage Temperature: -20°C~65°C	
	Humidity		0 to 90%RH	
	Altitude		Under 1000 Meters	
	Vibration		1G (10 to 500Hz)	
Control method				IGBT PWM space vector control
Encoder feedback				13-bit (10000 cnt/rev) incremental encoder, 9-wire serial 17-bit (131072 cnt/rev) incremental encoder, 5-wire serial
Parallel I/O connector	Control signal		Input	General purpose 9 inputs
			Output	General purpose 4 outputs
	Pulse signal		Input	2 inputs (Low speed channel, High speed channel)
			Output	4 outputs (Line driver: 3output, open collector: 1 output)
Brake connector	Control signal		output	Used for direct brake connection. (no need of extra relay for brake) Also programmable for general purpose output
Communication function			USB	Connection with PC, 115200bps
Front panel				Dot matrix 8*2 characters LCD with 4 buttons LED(green, red)
Regeneration				A, B-frame: No built-in regenerative resistor (external ) C-frame: Built-in regenerative resistor (external resistor is also available)
Dynamic brake				External only (Option)
Control mode				Position control only

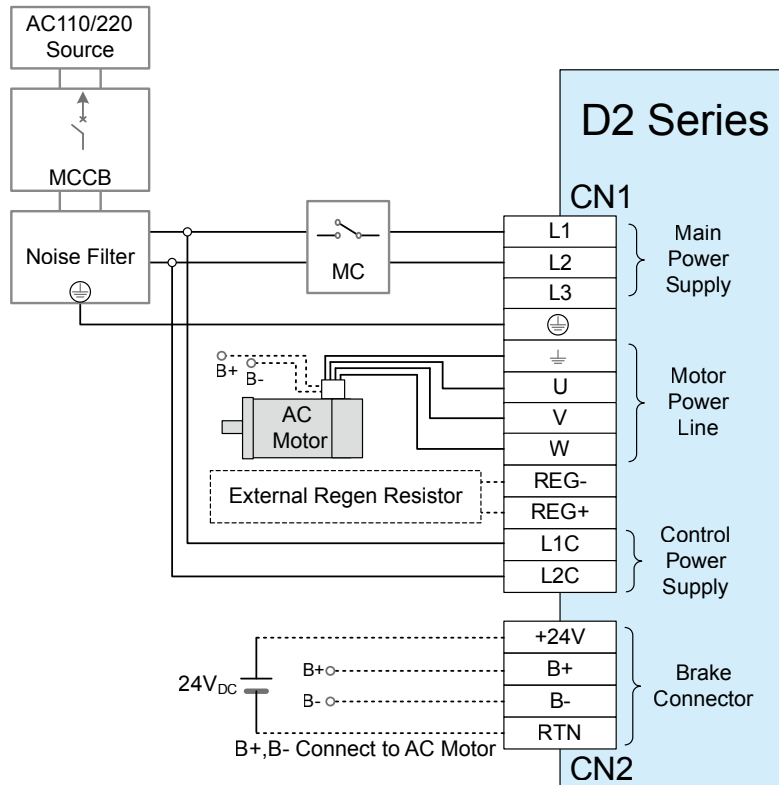
## Functions

Position control	Control input	(1)Inhibit pulse command, (2)Clear position error, (3)Axis Enable, (4)Switch between 1 <sup>st</sup> and 2 <sup>nd</sup> CG, (5)Electronic Gear Select, (6)Left Limit Switch, (7)Switch between 1 <sup>st</sup> and 2 <sup>nd</sup> mode, (8)Clear Error, (9)Right Limit Switch etc.	
	Control output	(1)Servo Ready, (2)Errors, (3)In-Position, (4)Zero Speed Detected etc.	
	Pulse input	Max. command pulse frequency	Dedicated interface for Photo-coupler(single end input): 500kpps Dedicated interface for line driver(differential input): 4Mpps(16M cnt/s with AqB)
		Input pulse signal format	(1) Pulse and Direction, (2) Pulse Up/Pulse Down, (3) Quadrature(AqB)
		Electronic gear (Division/Multiplication of command pulse)	Gear ratio: pulses/counts pulses: 1~2147483647, counts: 1~2147483647
	Smoothing filter	Smooth factor : 1~500 (0: no smoothing filter)	
Vibration suppression filter(VSF)	VSF can remove the vibration frequency that occurs during movement. It can reduce the vibration caused by the system' s structure and improve the machine' s productivity.		
Common	Auto tune	The Auto tune procedure runs automatically after started and identify the load inertia, so that no user setting is required. All necessary gains are set with one click from the LCD panel.	
	Emulated encoder feedback output	Set up of any value is possible (frequency up to 18M cnt/s)	
	Protective function	(1)Motor short detected, (2)Over voltage detected, (3)Position error too big, (4)Encoder error, (5)Soft-thermal threshold reached, (6)Motor maybe disconnected, (7)Amplifier over temperature, (8)Under voltage detected, (9)5V for encoder Card fail, (10)Phase initialization error, (11)Serial encoder communication error	
	Error log	Errors and warnings are saved in non-volatile memory	
	Error Mapping	Method: Established compensation table to compensate encoder error by linear interpolation	
		Samples: Maximum 16,000 point	
		Storage: Flash ROM, Disc file	
Unit: um, count			
Activation: Activated internally by home complete, or activated externally by input signal			
Others	Friction compensation, Backlash compensation		

# Wiring diagram

Wiring to Connector CN1 and CN2

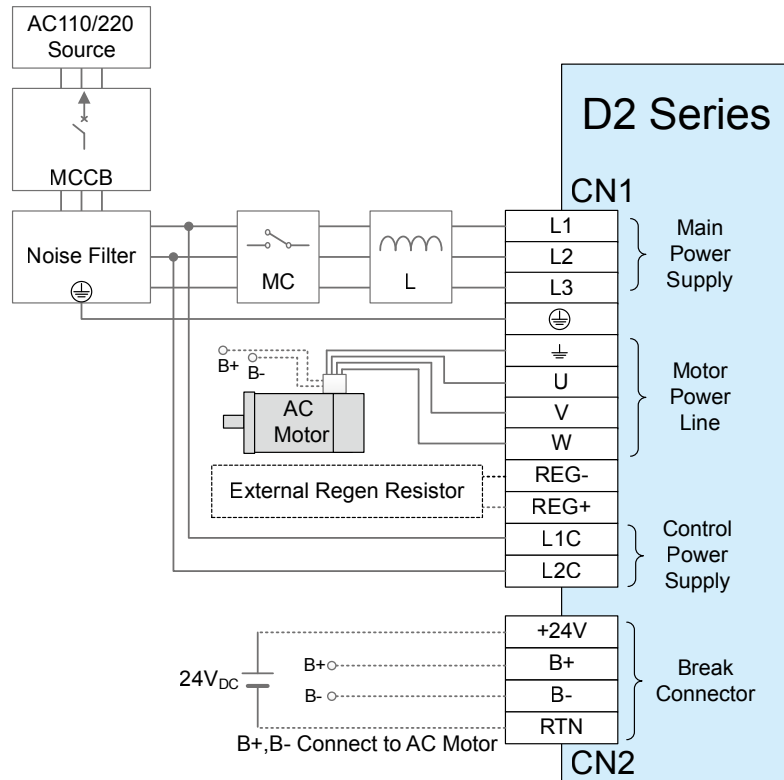
A. Single-phase(Brake without relay, using HIWIN motor)



----- : Optional connected (Brake, Regen)



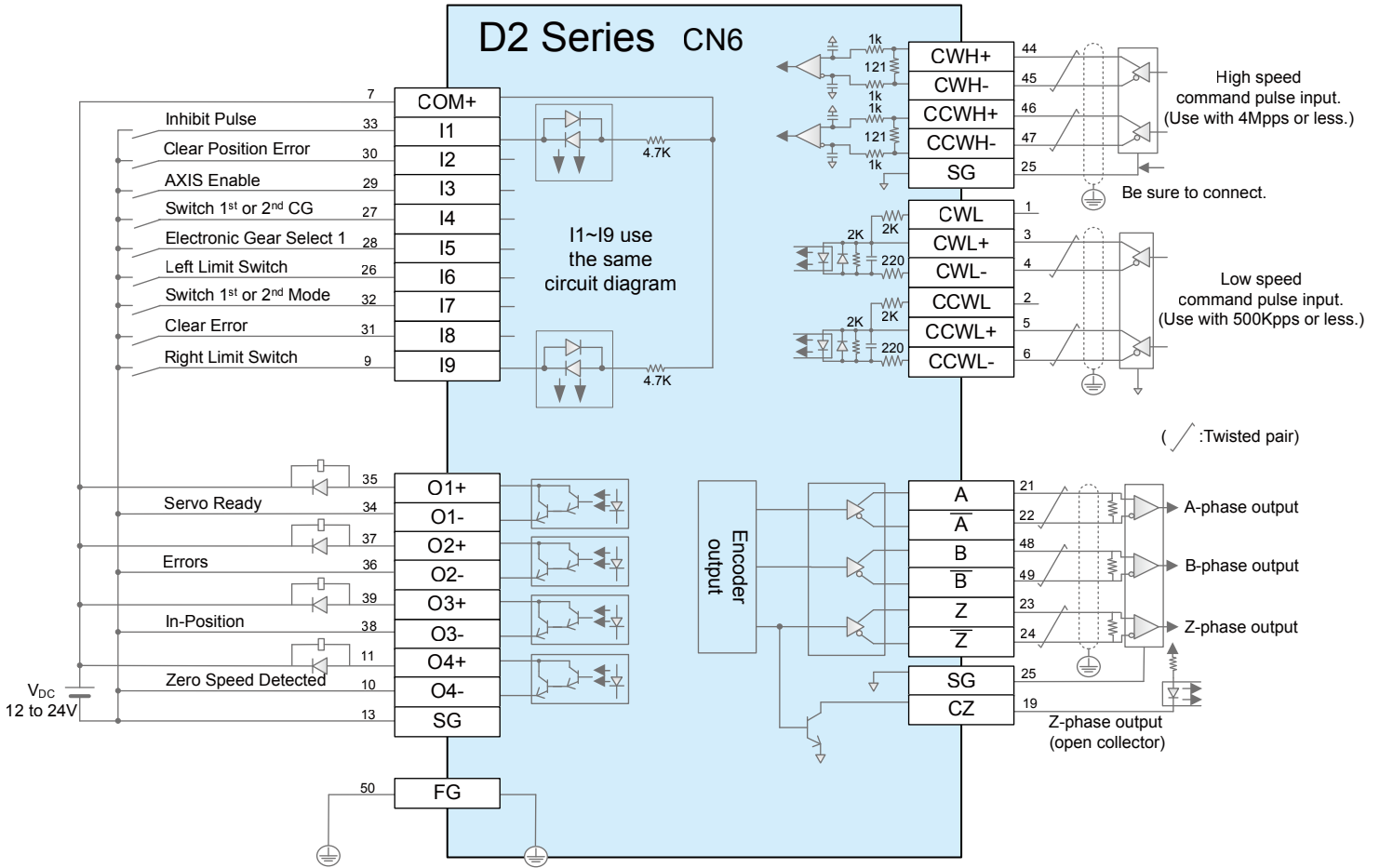
**B. Three-phase( Brake without relay, using HIWIN motor)**



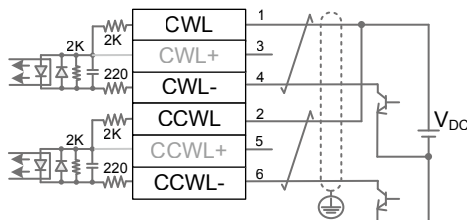
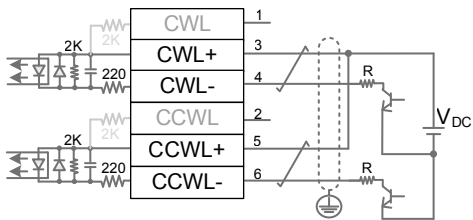
----- : Optional connected( Brake, Regen)

### 7.7.3 Control circuit

#### A. Wiring Example of Position Control Mode



Low speed command pulse input.(Use with 500Kpps or less.)



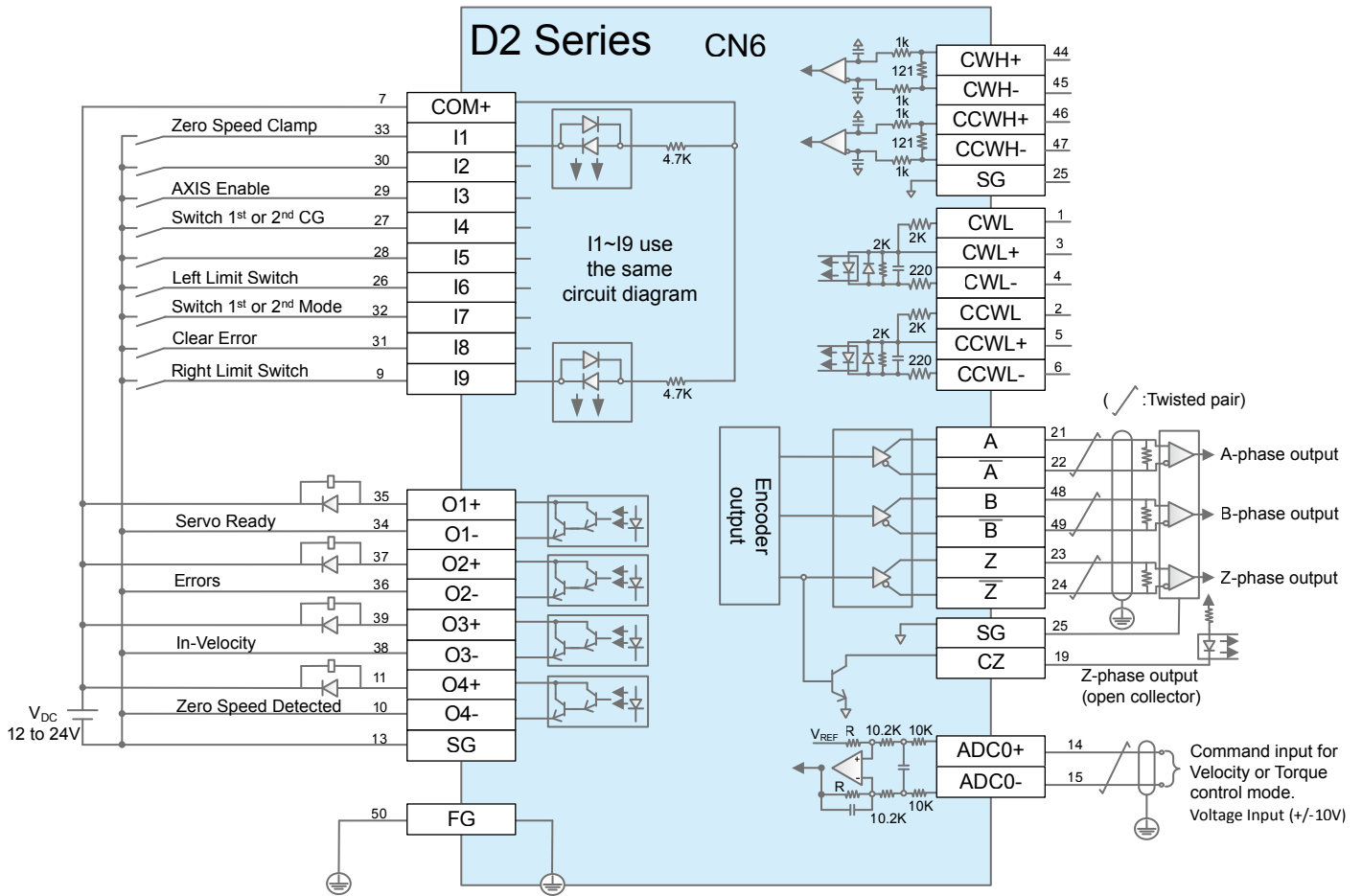
(2) When you do not use the external resistor with 24V power supply

V <sub>DC</sub>	Specifications of R
12V	1k ohm 1/2 W
24V	2k ohm 1/2 W

$$\frac{V_{DC} - 1.5}{R + 220} \approx 10\text{mA}$$

(1) When you use the external resistor with 12V and 24V power supply

**B. Wiring Example of Velocity/Torque Control Mode**



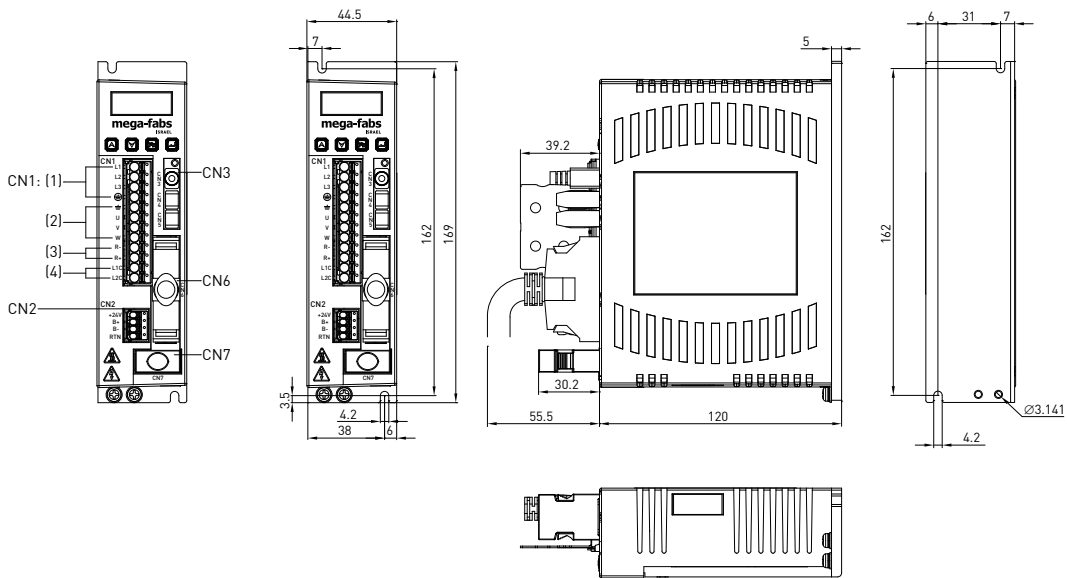
Velocity and Torque control Mode use the ADC0+(14) and ADC0-(15).

Velocity and Torque control Mode must be enabled from software(lightening)

## 7.7.4 Dimensions of driver

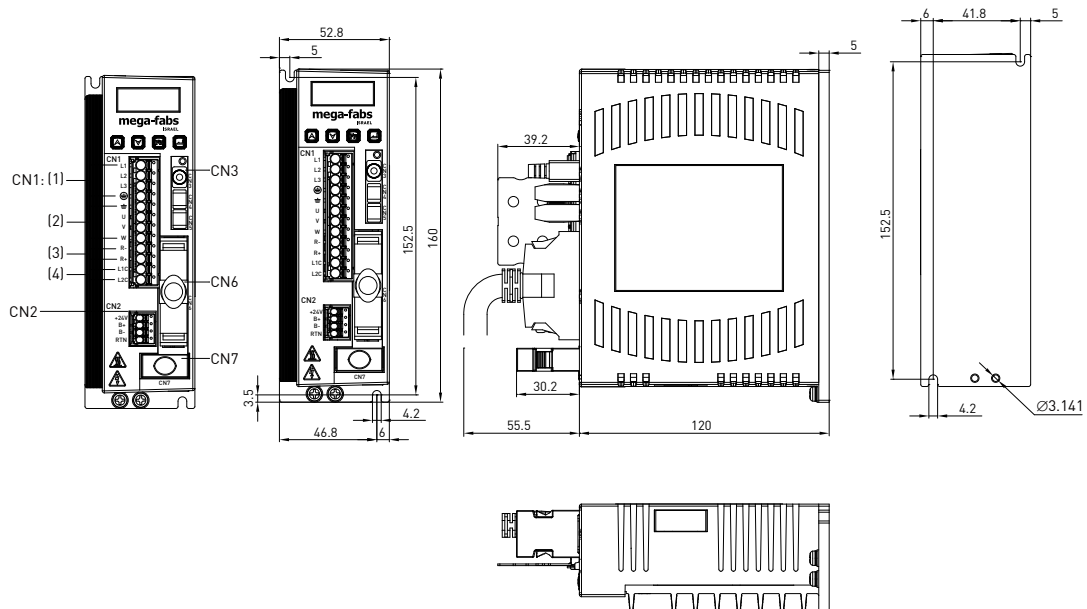
### ● Frame A

CN1:  
 [1]Main power input terminals  
 [2]Terminals for motor connection  
 [3]Terminals for external regenerative resistor  
 [4]Control power input terminals  
 CN2:For brake connection  
 CN3:USB connector  
 CN6:Interface connector  
 CN7:For encoder connection



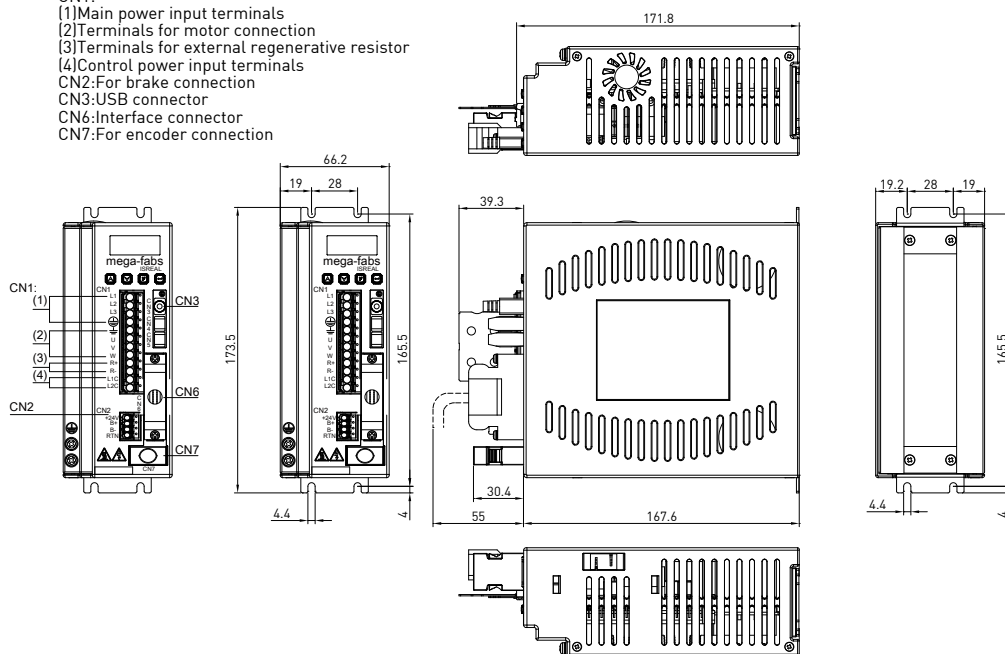
### ● Frame B

CN1:  
 [1]Main power input terminals  
 [2]Terminals for motor connection  
 [3]Terminals for external regenerative resistor  
 [4]Control power input terminals  
 CN2:For brake connection  
 CN3:USB connector  
 CN6:Interface connector  
 CN7:For encoder connection



● Frame C

- CN1:  
 (1) Main power input terminals  
 (2) Terminals for motor connection  
 (3) Terminals for external regenerative resistor  
 (4) Control power input terminals  
 CN2: For brake connection  
 CN3: USB connector  
 CN6: Interface connector  
 CN7: For encoder connection



## 7.7.5 Accessory composition

### Connector Kit

Part Name	Model	Description	Quantity
D2 driver connectors	D2-CK3	CN1: AC power, motor power, Regen resistor and control power connector: 12 pins, pitch 5mm. Wago 721-112/026-000	1
		CN2: Brake connector: 4pins, pitch 3.5mm. Wago734-104	1
		CN6: Control signal connector: 50 pins welded type. 3M 10150-3000PE+10350-52A0-008	1
		CN1 connector fixture: Wago 231-131	1
		CN2 connector fixture: Wago 734-230	1

### EMC Accessory Pack







Part Name	Model	Description	Quantity
D2 EMC accessory pack for single phase	D2-EMC1	Single phase filter FN2090-6-06 for 50W to 400W (Rated current:6A, leakage current: 0.67mA)	1
		EMI core KCF-130-B	2
	D2-EMC3	Single phase filter FN2090-10-06 for 750W and 1KW ( Rated current:10A, leakage current: 0.67mA)	1
		EMI core KCF-130-B	2
D2 EMC accessory pack for three phase	D2-EMC2	Three phase filter FN3025HL-20-71 ( Rated current:20A, leakage current:0.4mA)	1
		EMI core KCF-130-B	2

EMI core for all cables.(power cable, motor cable, encoder cable and control signal cable)

### Regenerative Resistor

Part Name	Model	Description
Regenerative resistor	050100700001	68Ω. Rated power 100W and peak 500W

### Motor line-up/ Environment

Motor		Voltage	Rated Output (W)	Rated Rotational Speed(Max Speed)(rpm)	Rotary Encoder		Enclosure Rating	Environment
					13-bit	17-bit		
Low Inertia	FRLS		220V	50W	3000 4500	☉	☉	<b>Ambient Temperature:</b> 0°C~40°C  <b>Storage Temperature:</b> -15°C~70°C  <b>Ambient Humidity:</b> 80% RH down  <b>Storage Humidity:</b> 80% RH down  <b>Storage Environment:</b> Indoor & keep off Causticity gas, Inflammable gas, oil and dust  <b>Elevation:</b> 1000m down  <b>Vibration Resistance:</b> 49m/s <sup>2</sup> down
			220V	100W	3000 4500	☉	☉	
			220V	200W	3000 4500	☉	☉	
			220V	400W	3000 4500	☉	☉	
Middle Inertia	FRMS		220V	750W	3000 4500	☉	☉	IP54/IP65
	FRMM		220V	1000W	2000 3000	☉	☉	

## 7.8 Servo Motor

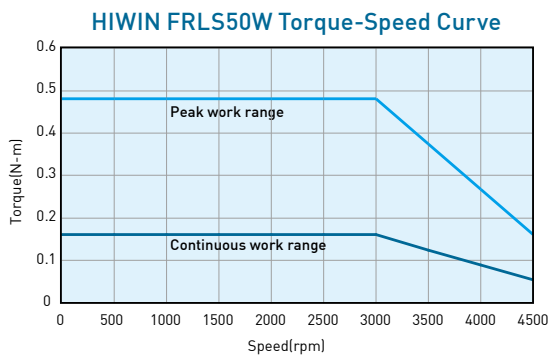
### 7.8.1 Model of AC Servo motor

#### AC 50W (Low inertia, Small capacity)

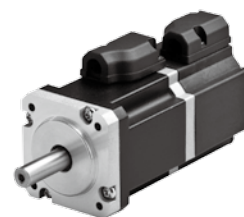
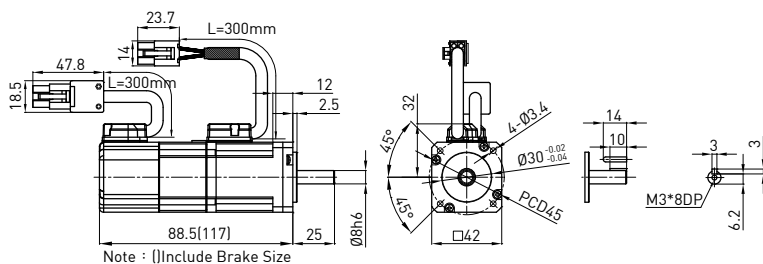
● Specifications

Parameter	Symbol	Unit	FRLS052□□A4□
Driver Input Voltage	V	V	AC220
Rated Power	W	W	50
Rated Torque	Tc	N.m	0.16
Rated Current	Ic	A(rms)	0.9
Peak Max. Torque	Tp	N.m	0.48
Peak Max. Current	Ip	A(rms)	2.7
Rated Speed	$\omega_c$	rpm	3000
No Load Max. Speed	$\omega_p$	rpm	4500
Torque Constant	Kt	N.m / Arms	0.178
Back EMF Constant	Ke	Vrms / krpm	10.74
Resistance (line to line)	R	$\Omega$	4.7
Inductance (line to line)	L	mH	4.7
Inertia of Rotating Parts (with brake)	J	$kg\cdot m^2(\times 10^{-4})$	0.02(0.022)
Weight(with brake)	M	kg	0.45(0.58)
Brake Keep Torque	Tb	N.m	0.32
Brake Voltage	V	V	DC24 $\pm$ 10%
Motor Insulation Grade	Class A		
Motor protect	Total enclosed, self-cooled, IP54/IP65 (Except for shaft and connector)		

● Torque-Speed Curve



● Dimensions



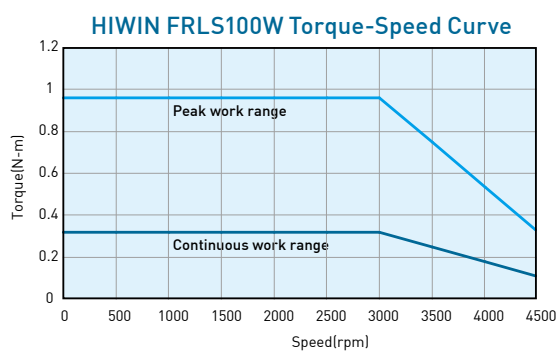


## AC 100W (Low inertia, Small capacity)

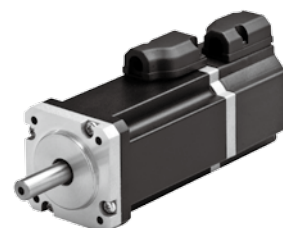
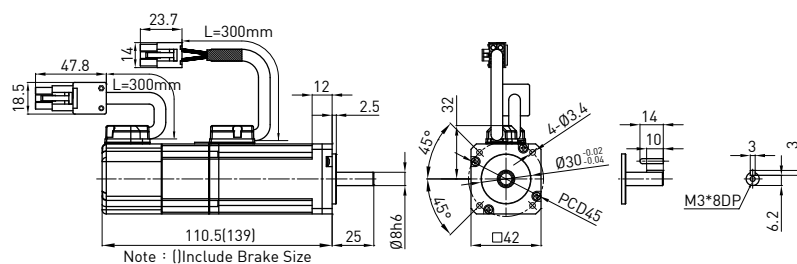
### ● Specifications

Parameter	Symbol	Unit	FRLS102□□A4□
Driver Input Voltage	V	V	AC220
Rated Power	W	W	100
Rated Torque	T <sub>c</sub>	N.m	0.32
Rated Current	I <sub>c</sub>	A(rms)	0.9
Peak Max. Torque	T <sub>p</sub>	N.m	0.96
Peak Max. Current	I <sub>p</sub>	A(rms)	2.7
Rated Speed	$\omega_c$	rpm	3000
No Load Max. Speed	$\omega_p$	rpm	4500
Torque Constant	K <sub>t</sub>	N.m / Arms	0.356
Back EMF Constant	K <sub>e</sub>	V <sub>rms</sub> / krpm	21.98
Resistance (line to line)	R	$\Omega$	8
Inductance (line to line)	L	mH	8.45
Inertia of Rotating Parts (with brake)	J	kg·m <sup>2</sup> (×10 <sup>-4</sup> )	0.036(0.038)
Weight(with brake)	M	kg	0.63(0.76)
Brake Keep Torque	T <sub>b</sub>	N.m	0.32
Brake Voltage	V	V	DC24±10%
Motor Insulation Grade	Class A		
Motor protect	Total enclosed, self-cooled, IP54/IP65 (Except for shaft and connector)		

### ● Torque-Speed Curve



### ● Dimensions

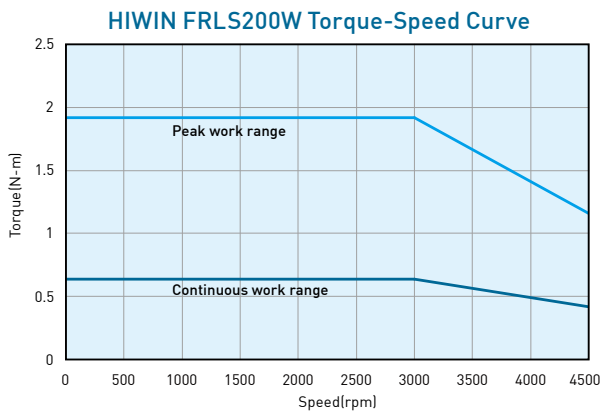


## AC 200W (Low inertia, Small capacity)

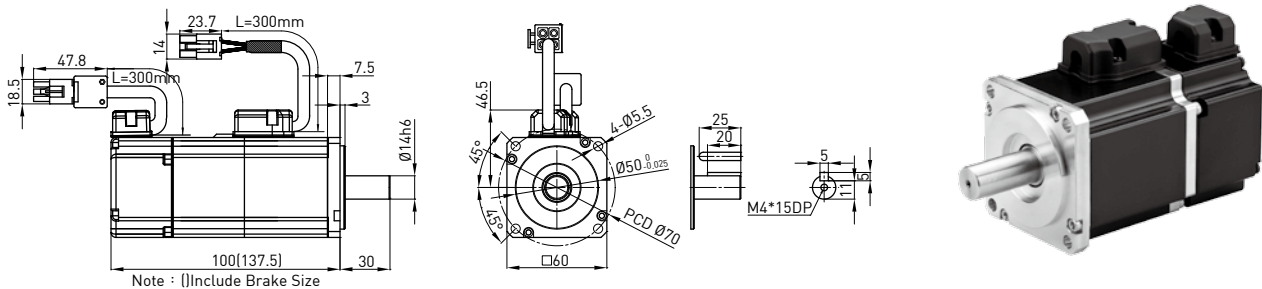
### ● Specifications

Parameter	Symbol	Unit	FRLS202□□06□
Driver Input Voltage	V	V	AC220
Rated Power	W	W	200
Rated Torque	Tc	N.m	0.64
Rated Current	Ic	A(rms)	1.7
Peak Max. Torque	Tp	N.m	1.92
Peak Max. Current	Ip	A(rms)	5.1
Rated Speed	$\omega_c$	rpm	3000
No Load Max. Speed	$\omega_p$	rpm	4500
Torque Constant	Kt	N.m / Arms	0.43
Back EMF Constant	Ke	Vrms / krpm	26
Resistance (line to line)	R	$\Omega$	4.3
Inductance (line to line)	L	mH	13
Inertia of Rotating Parts (with brake)	J	kg-m <sup>2</sup> ( $\times 10^{-4}$ )	0.17(0.21)
Weight (with brake)	M	kg	0.95(1.5)
Brake Keep Torque	Tb	N.m	1.3
Brake Voltage	V	V	DC24 $\pm$ 10%
Motor Insulation Grade	Class A		
Motor protect	Total enclosed, self-cooled, IP54/IP65 (Except for shaft and connector)		

### ● Torque-Speed Curve



### ● Dimensions

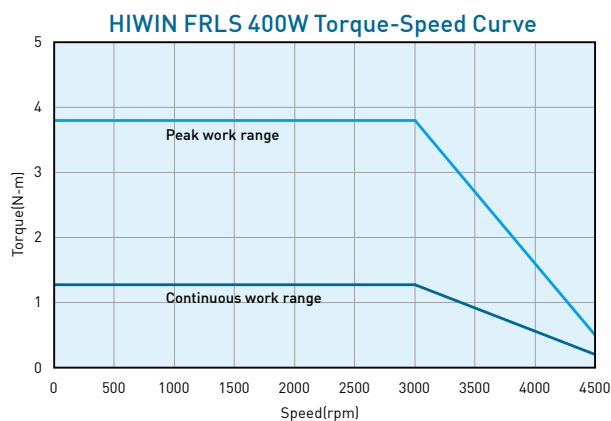


## AC 400W (Low inertia, Small capacity)

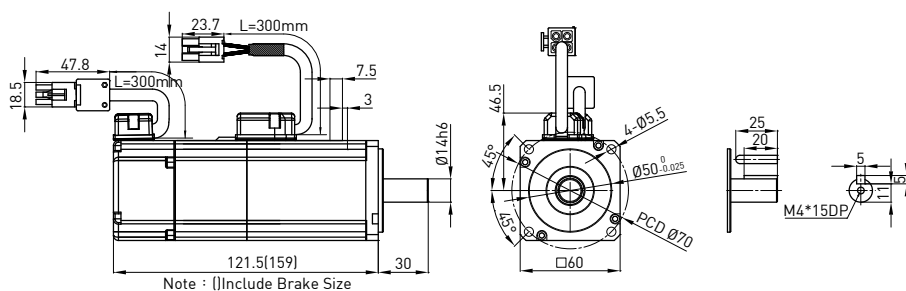
### ● Specifications

Parameter	Symbol	Unit	FRLS402□□06□
Driver Input Voltage	V	V	AC220
Rated Power	W	W	400
Rated Torque	Tc	N.m	1.27
Rated Current	Ic	A(rms)	2.5
Peak Max. Torque	Tp	N.m	3.81
Peak Max. Current	Ip	A(rms)	7.5
Rated Speed	$\omega_c$	rpm	3000
No Load Max. Speed	$\omega_p$	rpm	4500
Torque Constant	Kt	N.m / Arms	0.53
Back EMF Constant	Ke	Vrms / krpm	31.9
Resistance (line to line)	R	$\Omega$	3.5
Inductance (line to line)	L	mH	13
Inertia of Rotating Parts (with brake)	J	kg-m <sup>2</sup> ( $\times 10^{-4}$ )	0.27(0.31)
Weight (with brake)	M	kg	1.31(1.86)
Brake Keep Torque	Tb	N.m	1.3
Brake Voltage	V	V	DC24 $\pm$ 10%
Motor Insulation Grade	Class A		
Motor protect	Total enclosed, self-cooled, IP54/IP65 (Except for shaft and connector)		

### ● Torque-Speed Curve



### ● Dimensions

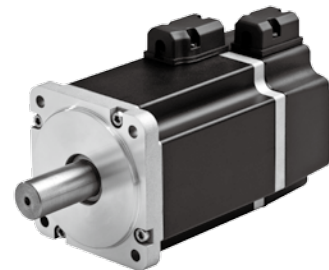
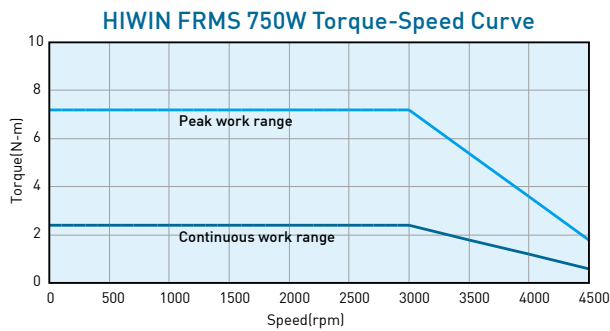


## AC 750W (Middle inertia, Small capacity)

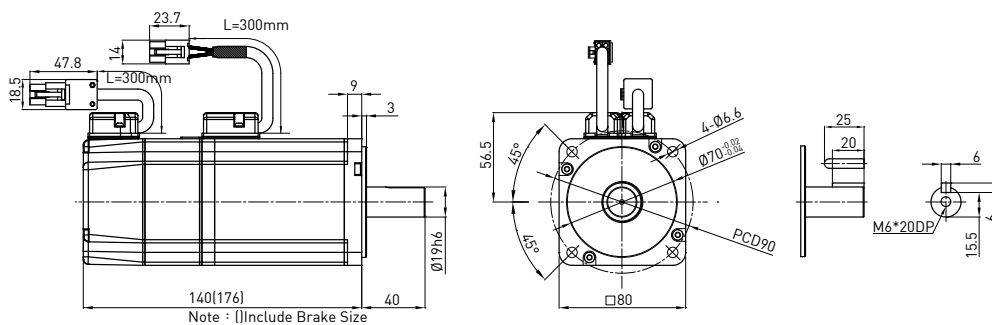
### ● Specifications

	Symbol	Unit	FRMS752□□08□
Driver Input Voltage	V	V	AC220
Rated Power	W	W	750
Rated Torque	Tc	N.m	2.4
Rated Current	Ic	A(rms)	5.1
Peak Max. Torque	Tp	N.m	7.2
Peak Max. Current	Ip	A(rms)	15.3
Rated Speed	$\omega_c$	rpm	3000
No Load Max. Speed	$\omega_p$	rpm	4500
Torque Constant	Kt	N.m / Arms	0.47
Back EMF Constant	Ke	Vrms / krpm	28.4
Resistance (line to line)	R	$\Omega$	0.813
Inductance (line to line)	L	mH	3.4
Inertia of Rotating Parts (with brake)	J	kg-m <sup>2</sup> ( $\times 10^{-4}$ )	1.4(1.46)
Weight (with brake)	M	kg	2.66(3.32)
Brake Keep Torque	Tb	N.m	2.4
Brake Voltage	V	V	DC24 $\pm$ 10%
Motor Insulation Grade	Class A		
Motor protect	Total enclosed, self-cooled, IP54/IP65 (Except for shaft and connector)		

### ● Torque-Speed Curve



### ● Dimensions

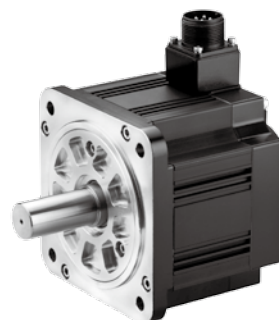
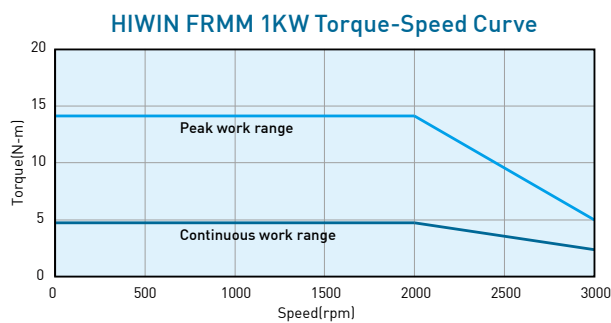


## AC 1KW (Middle inertia, Middle capacity)

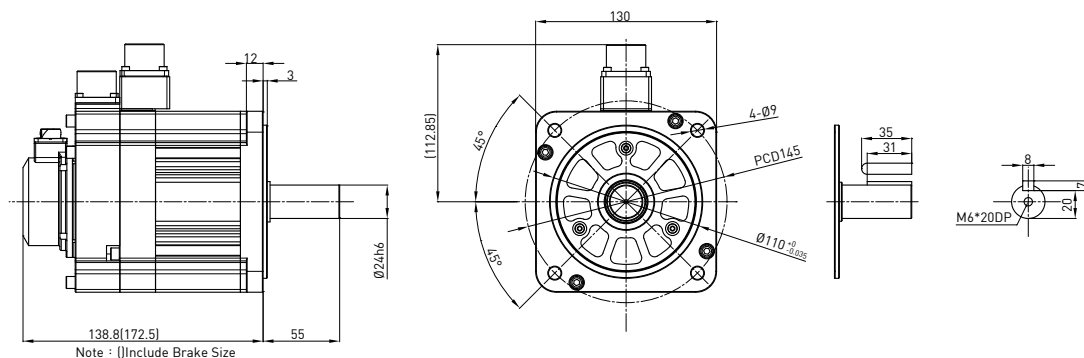
### ● Specifications

	Symbol	Unit	FRMM1K2□□13□
Driver Input Voltage	V	V	AC220
Rated Power	W	W	1000
Rated Torque	Tc	N.m	4.77
Rated Current	Ic	A(rms)	5.1
Peak Max. Torque	Tp	N.m	14.3
Peak Max. Current	Ip	A(rms)	15.3
Rated Speed	$\omega_c$	rpm	2000
No Load Max. Speed	$\omega_p$	rpm	3000
Torque Constant	Kt	N.m / Arms	0.94
Back EMF Constant	Ke	Vrms / krpm	54.7
Resistance (line to line)	R	$\Omega$	0.81
Inductance (line to line)	L	mH	8
Inertia of Rotating Parts (with brake)	J	kg-m <sup>2</sup> ( $\times 10^{-4}$ )	7.6(8.7)
Weight (with brake)	M	kg	5.4(6.2)
Brake Keep Torque	Tb	N.m	10
Brake Voltage	V	V	DC24 $\pm$ 10%
Motor Insulation Grade	Class A		
Motor protect	Total enclosed, self-cooled, IP54/IP65 (Except for shaft and connector)		

### ● Torque-Speed Curve



### ● Dimensions



## 7.8.2 Encoder Types

### 13-bit Incremental

**Encoder Specifications**

- 10000 pulse/rev
- Work temperature for -20°C~+85°C.
- 200KHz frequency response.
- Work voltage DC+5V±5%.
- RoHs.

### 17-bit Incremental

**Encoder Specifications**

- 131072 pulse/rev
- Work temperature for -10°C~ +85°C.
- 13MHz frequency response.
- Work voltage DC+5V±5%.
- RoHs.

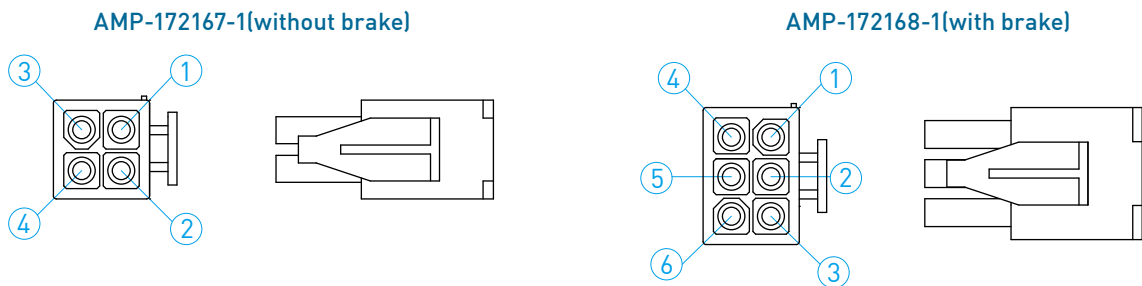
## 7.8.3 Motor Power Connector & Encoder Connector

### 7.8.3.1 Motor Power Connector

● Small Capacity Series(AC50W~AC750W)

Signal	Color	AMP-172167-1 (without brake)	AMP-172168-1 (with brake)
U	Red	3	3
V	White	2	2
W	Black	1	1
GND	Green	4	4
B+	Black	--	5
B-	White	--	6

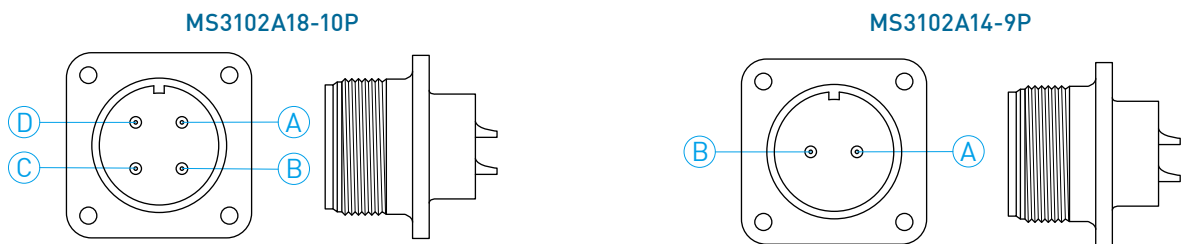
Connector Pin Position Definition(without brake & with brake)



● Middle Capacity Series(AC1KW)

Signal	Color	MS3102A18-10P	MS3102A14-9P
U	Red	A	--
V	White	B	--
W	Black	C	--
GND	Green	D	--
B+	Black	--	A
B-	Black	--	B

Connector Pin Position Definition(without brake & with brake)

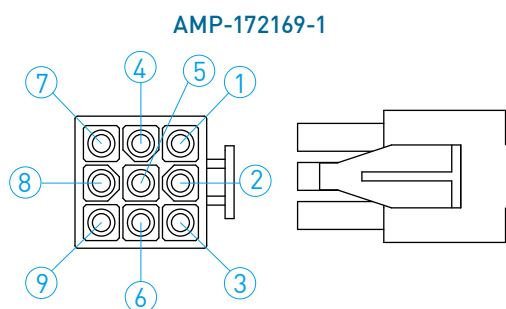


Note: When using the brake, two connectors must be used simultaneously.

### 7.8.3.2 Encoder Connector

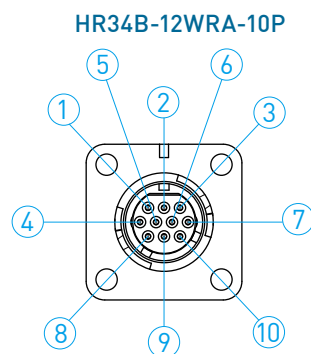
#### 13-bit Incremental : AC50W~AC750W

Function	Signal	AMP-172169-1
Power	5V±5%	1
	0V	2
Incremental Signal	A +	3
	A -	4
	B +	5
	B -	6
Reference signal	Z +	7
	Z -	8
Shielding	Shielding	9



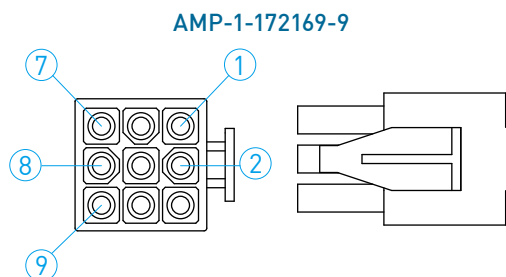
#### 13-bit Incremental : AC1KW

Function	Signal	HR34B-12WRA-10P
Power	5V±5%	1
	0V	2
Incremental Signal	A +	3
	A -	4
	B +	5
	B -	6
Reference signal	Z +	7
	Z -	8
Shielding	Shielding	9



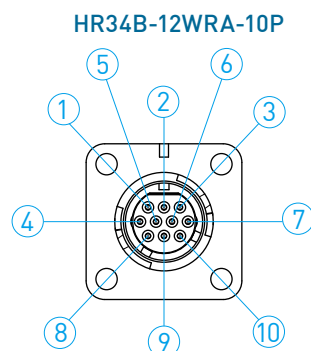
#### 17-bit Incremental : AC50W~AC750W

Function	Signal	AMP-1-172169-9
Power	5V±5%	1
	0V	2
Serial Data Signal	SD +	7
	SD -	8
Shielding	Shielding	9



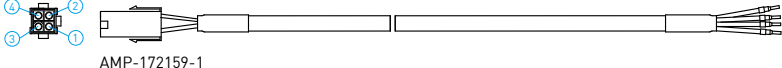
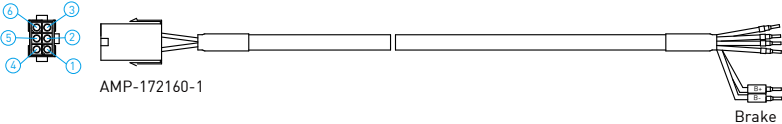
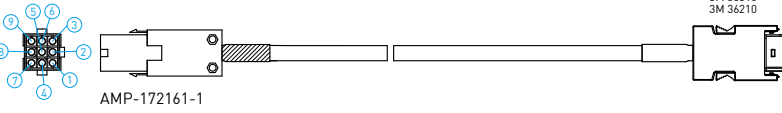
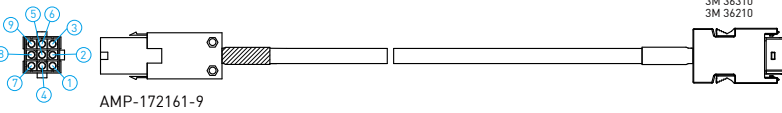
#### 17-bit Incremental : AC50W~AC750W

Function	Signal	HR34B-12WRA-10P
Power	5V±5%	1
	0V	2
Serial Data Signal	SD +	7
	SD -	8
Shielding	Shielding	9



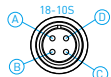
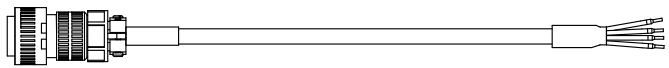

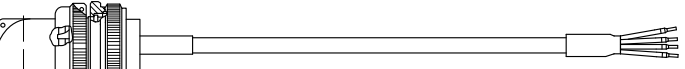
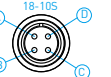
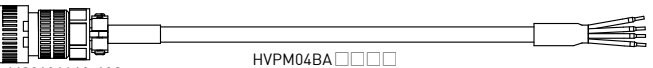
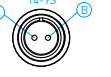

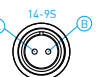
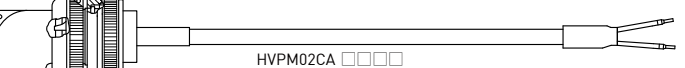

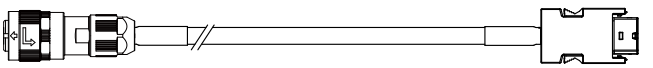

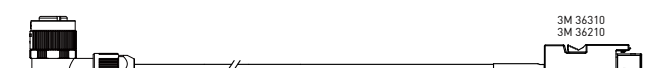

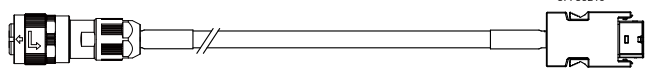


## 7.8.4 AC Servo Motor Accessories

### Small Capacity

Name	Type	Connect	Description
AC Servo Motor Power Cable	HVPS04AA□□□A HVPS04AA□□□B (highly bendable)	CN1	 <p>AMP-172159-1</p>
AC Servo Motor Power Cable (Brake)	HVPS06AA□□□A HVPS06AA□□□B (highly bendable)		 <p>AMP-172160-1</p> <p>Brake</p>
AC Servo Motor Encoder Cable (13bit-Incremental)	HVE13IAA□□□A HVE13IAA□□□B (highly bendable)	CN7	 <p>AMP-172161-1</p> <p>3M 36310 3M 36210</p>
AC Servo Motor Encoder Cable (17bit-Incremental)	HVE17IAA□□□A HVE17IAA□□□B (highly bendable)		 <p>AMP-172161-9</p> <p>3M 36310 3M 36210</p>

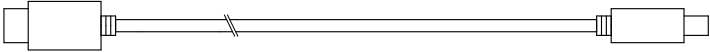
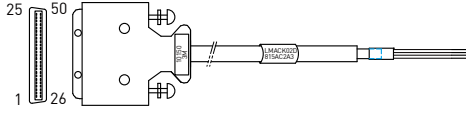


## Middle Capacity

Name	Type	Connect	Description	
AC Servo Motor	HVPM04BA□□□A	CN1	  MS3106A18-10S	
	HVPM04BA□□□B (Highly Bendable)			
Power Cable	HVPM04CA□□□A		  MS3108A18-10S	
	HVPM04CA□□□B (Highly Bendable)			
AC Servo Motor	HVPM06BA□□□A	CN1	  MS3106A18-10S HVPM04BA □□□□	
	HVPM06BA□□□B (Highly Bendable)			  MS3106A14-9S HVPM02BA □□□□
	Power Cable (with brake)		HVPM06CA□□□A	
			HVPM06CA□□□B (Highly Bendable)	  MS3108A14-9S HVPM02CA □□□□
AC Servo Motor	HVE13IBA□□□A	CN7	  HR34B-12WPE-10S 3M 36310 3M 36210	
	HVE13IBA□□□B (Highly Bendable)			
Encoder Cable (13bit-Incremental)	HVE13ICA□□□A		  HR34B-12WLPE-10S 3M 36310 3M 36210	
	HVE13ICA□□□B (Highly Bendable)			
AC Servo Motor	HVE17IBA□□□A	CN7	  HR34B-12WPE-10S 3M 36310 3M 36210	
	HVE17IBA□□□B (Highly Bendable)			
Encoder Cable (17bit-Incremental)	HVE17ICA□□□A		  HR34B-12WLPE-10S 3M 36310 3M 36210	
	HVE17ICA□□□B (Highly Bendable)			

Note: For middle capacity motors with brake, please remember to use the power cable and brake cable simultaneously.

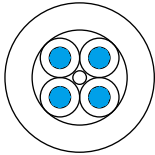
## Driver Cable

Name	Type	Connect	Description
Mini USB Cable	051700800366	CN3	 <p>A technical drawing of a Mini USB cable. It features a standard USB-A connector on the left and a Mini USB-B connector on the right. The cable is shown with a break in the middle to indicate its length.</p>
Interface Cable	HE00815AC200	CN6	 <p>A technical drawing of an interface cable. On the left, there is a 26-pin D-sub connector with pins numbered 1, 25, 26, and 50. The cable is connected to a 6-pin D-sub connector on the right. The cable has a break in the middle and is labeled 'EMACOS'.</p>

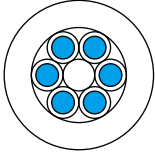
## 7.8.5 Power & Encoder External Cables

### 7.8.5.1 Power Cables

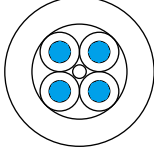
Cable Specification : Small Capacity type(without brake)

Items	HVPS04AA□□□A	HVPS04AA□□□B
Specification	UL2517(Rated Tem. :105°C) AWG18×4C	UL2517(Rated Tem. :105°C) AWG18×4C
Finished Dimensions	8.0 dia. mm	
Internal Configuration		
Standard Length	Cable Length:3m, 5m, 7m, 10m	

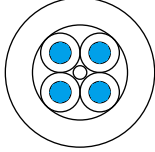
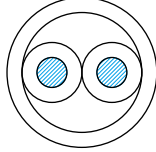
Cable Specification : Small Capacity type(with brake)

Items	HVPS06AA□□□A	HVPS06AA□□□B
Specification	UL2517(Rated Tem. :105°C) AWG18×6C	UL2517(Rated Tem. :105°C) AWG18×6C
Finished Dimensions	10.0 dia. mm	
Internal Configuration		
Standard Length	Cable Length:3m, 5m, 7m, 10m	

### Cable Specification : Middle Capacity type(without brake)

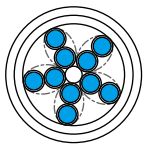
Items	HVPS04BA□□□A	HVPS04BA□□□B
Specification	UL2586(Rated Tem. :105°C) AWG14×4C	UL2586(Rated Tem. :105°C) AWG14×4C
Finished Dimensions	10.5 dia. mm	
Internal Configuration		
Standard Length	Cable Length:3m, 5m, 7m, 10m	

### Cable Specification: Middle Capacity type(with brake)

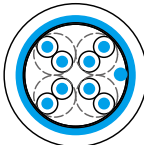
Items	HVPM04□A□□□A HVPM04□A□□□B	HVPS02□A□□□A HVPS02□A□□□A
Specification	UL2586(Rated Tem. :105°C) AWG14×4C	UL2517(Rated Tem. :105°C) AWG18×2C
Finished Dimensions	10.5 dia. mm	7.0 dia. mm
Internal Configuration		
Standard Length	Cable Length:3m, 5m, 7m, 10m	

## 7.8.5.2 Encoder Cables

### Cable Specification : Small Capacity type

Items	HVE□□□AB□□□A	HVE□□□AB□□□B
Specification	UL2464(Rated Tem. :80°C) AWG24×5P	UL2464(Rated Tem. :80°C) AWG24×5P
Finished Dimensions	8.0 dia. mm	
Internal Configuration		
Standard Length	Cable Length:3m, 5m, 7m, 10m	

### Cable Specification: Middle Capacity type

Items	HVE□□□BB□□□A	HVE□□□BB□□□B
Specification	UL2464(Rated Tem. :80°C) AWG24×4P	UL2464(Rated Tem. :80°C) AWG24×4P
Finished Dimensions	7.0 dia. mm	
Internal Configuration		
Standard Length	Cable Length:3m, 5m, 7m, 10m	

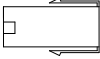
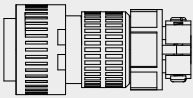
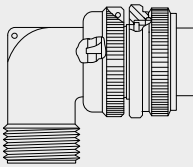
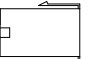
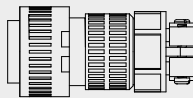
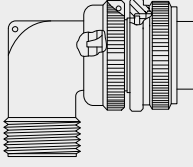
### 7.8.5.3 Highly Bendable Test

Testing Conditions	Bending Angle( $\theta$ )	Left-Right 90 degree
	Bending Radius(R)	Diameter of 12.5 times
	Bending Velocity	30 times(one minute)
	Weight(W)	100 g
Bending Life	Number of bends(with weight)	3,000,000 cycles
	Number of bends(with no weight)	5,000,000 cycles
Highly Bendable Test	<p>bending radius 1 cycle:a→b→a→c→a</p>	

Note: Bending life with the recommended bending radius R under the following testing conditions.

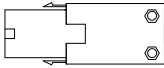

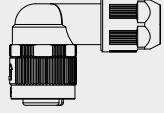
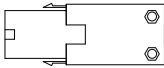

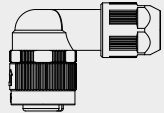
## 7.8.5.4 Selecting extension cables

● Power Extension Cable

Name	Servomotor Rate Output	Shape	Length	Order No.	
				Standard Type	Highly Bendable Type*
Power Extension Cable (without Brake)	50W-750W		3m	HVPS04AA03MA	HVPS04AA03MB
			5m	HVPS04AA05MA	HVPS04AA05MB
			7m	HVPS04AA07MA	HVPS04AA07MB
			10m	HVPS04AA10MA	HVPS04AA10MB
	1KW		3m	HVPM04BA03MA	HVPM04CA03MB
			5m	HVPM04BA05MA	HVPM04CA05MB
			7m	HVPM04BA07MA	HVPM04CA07MB
			10m	HVPM04BA10MA	HVPM04CA10MB
			3m	HVPM04CA03MA	HVPM04CA03MB
			5m	HVPM04CA05MA	HVPM04CA05MB
			7m	HVPM04CA07MA	HVPM04CA07MB
			10m	HVPM04CA10MA	HVPM04CA10MB
Power Extension Cable (with Brake)	50W-750W		3m	HVPS06AA03MA	HVPS06AA03MB
			5m	HVPS06AA05MA	HVPS06AA05MB
			7m	HVPS06AA07MA	HVPS06AA07MB
			10m	HVPS06AA10MA	HVPS06AA10MB
	1KW		3m	HVPM02BA03MA	HVPM06BA03MB
			5m	HVPM02BA05MA	HVPM06BA05MB
			7m	HVPM02BA07MA	HVPM06BA07MB
			10m	HVPM02BA10MA	HVPM06BA10MB
			3m	HVPM02CA03MA	HVPM06CA03MB
			5m	HVPM02CA05MA	HVPM06CA05MB
			7m	HVPM02CA07MA	HVPM06CA07MB
			10m	HVPM02CA10MA	HVPM06CA10MB

\*1: Use Highly Bendable cables for movable sections such as robot arms.

## ● Encoder Extension Cable

Name	Servomotor Rate Output	Shape	Length	Order No.	
				Standard Type	Highly Bendable Type*
13-bit Encoder Extension Cable	50W~750W		3m	HVE13IAB03MA	HVE13IAB03MB
			5m	HVE13IAB05MA	HVE13IAB05MB
			7m	HVE13IAB07MA	HVE13IAB07MB
			10m	HVE13IAB10MA	HVE13IAB10MB
	1KW		3m	HVE13IBB03MA	HVE13IBB03MB
			5m	HVE13IBB05MA	HVE13IBB05MB
			7m	HVE13IBB07MA	HVE13IBB07MB
			10m	HVE13IBB10MA	HVE13IBB10MB
			3m	HVE13ICB03MA	HVE13ICB03MB
			5m	HVE13ICB05MA	HVE13ICB05MB
			7m	HVE13ICB07MA	HVE13ICB07MB
			10m	HVE13ICB10MA	HVE13ICB10MB
17-bit Encoder Extension Cable	50W~750W		3m	HVE17IAB03MA	HVE17IAB03MB
			5m	HVE17IAB05MA	HVE17IAB05MB
			7m	HVE17IAB07MA	HVE17IAB07MB
			10m	HVE17IAB10MA	HVE17IAB10MB
	1KW		3m	HVE17IBB03MA	HVE17IBB03MB
			5m	HVE17IBB05MA	HVE17IBB05MB
			7m	HVE17IBB07MA	HVE17IBB07MB
			10m	HVE17IBB10MA	HVE17IBB10MB
			3m	HVE17ICB03MA	HVE17ICB03MB
			5m	HVE17ICB05MA	HVE17ICB05MB
			7m	HVE17ICB07MA	HVE17ICB07MB
			10m	HVE17ICB10MA	HVE17ICB10MB

\*1: Use Highly Bendable cables for movable sections such as robot arms.



## 7.8.6 Safety Precautions

Thank you for purchasing HIWIN's AC servo motor. Installation and operation of the motor must be in accordance with the HIWIN manual. Before using the servo motor, please read these safety instructions and precautions carefully.

### ★ Unpacking instructions

1. Before using the servo motor, please read these safety instructions and precautions carefully. HIWIN is not responsible for any damage, accident, or injury caused by incorrect handling.
2. Examine the appearance of the motor for any unusual marks or damage from shipment.
3. Inspect the wires for damage.
4. Do not disassemble the motor. Since the product design has been based on structure calculations, computer simulations, and prototype testing, do not disassemble the product without the permission of HIWIN engineers.
5. Supervise children when handling this product.
6. People with psychosomatic illness or insufficient experience should not handle this product, unless under the direct supervision of managers or product narrators.

If any items are damaged or incorrect, please contact your distributor or HIWIN sales representative.

### ★ Safety instructions

1. The product can only be repaired by HIWIN engineers. Please send the product back to us if there is any unusual phenomenon.
2. Do not hold the motor by its wire harness or shaft.
3. Do not hit the motor or shaft. Shock can damage the encoder inside the motor.
4. Do not apply loads to the motor shaft that are in excess of the specified value.
5. Protect the motor and encoder from high electrical noise, vibration, and extreme temperatures.
6. Do not change the motor parts or disassemble the screws. HIWIN will not be responsible for any damages, injuries, or accidents that may occur.

### ★ Wiring instructions

1. Ensure the specified power input value before using the product, and verify that the proper power supply is being used.
2. Before operation, please ensure that the motor, brake, and encoder are connected correctly. Incorrect wiring may cause abnormal motor operation or even cause permanent damage to the motor.
3. To avoid voltage coupling and electrical noise on the encoder, ensure adequate separation of the motor power wires and the encoder wires.
4. Ensure that the motor ground wire is connected to the ground terminal on the servo drive.
5. Do not perform a dielectric voltage-withstand test on any encoder terminal. The test may cause damage to the encoder.

### ★ Operation instructions

1. Higher than maximum specified current may cause demagnetization of magnetic components inside the motor.
2. The AC servo motor is designed to operate through a dedicated servo drive. Do not connect to a commercial power source (100/200V AC, 50/60 HZ). The motor will not operate correctly and may cause permanent damage.
3. The motor must be operated within its specified range.

4. Attention should be given to ensure adequate cooling and ventilation of the motor during operation.
5. For long term use, the motor shaft should be resupplied with proper and sufficient oil during the period of operation.
6. If any abnormal odor, noise, smoke, temperature rise or vibration is detected, stop the motor immediately. Remove power from the servo drive and isolate the motor.

### ★ Motor International Standard

#### CE Certification

LVD : EN60034-1	EMC : EN55011
EN60034-5	EN61000-6-2
	EN61000-6-4

### ★ Maintenance and Storage instructions

1. Do not store the product in an inflammable environment or that with chemical agents.
2. Store the product in a place without humidity, dust, harmful gases, or liquids.
3. The motor shaft opening is neither waterproof nor oil-proof. Do not install the motor in an environment where there is harmful gas, liquid, excessive moisture, or water vapor.
4. Do not store the servo motor where it will be subjected to vibration or shock in excess of the specified limit.
5. The storage and transportation temperature of this product: -10°C~+50°C
6. Clean : Wipe with Alcohol (70%)
7. Before shipping, the motor shaft is coated with antirust oil to protect the motor shaft against rust formation. However, the material of the motor shaft is not entirely rust-proof. When the motor storage time has exceeded six months, please inspect and examine the motor shaft and resupply with proper and sufficient antirust oil at least once every three months thereafter.
8. Product abandoned : Follow the local laws and regulations for recycling.

A one year guarantee is provided from the date of delivery. For product damage caused by improper operation (Please refer to the notes and instructions in this operation manual). HIWIN will not be held responsible for replacing or maintaining the product as a result of any natural disasters that may occur during this period.



**Warning :** For the proper use of the HIWIN AC servo motor read these safety precautions carefully before installation, operation, and maintenance.



**Warning :** Do not touch the motor during operation to avoid being burned.

Caution : Please read these safety precautions before using the product.

Caution : Do not alter the product without the permission of the manufacturer.

Caution : Remove the broken power line buckle carefully.

Caution : The product cannot be used in an inflammable environment.

Caution : Remove the power before cleaning.

Caution : Overload can cause the motor temperature to rise.

Caution : There may be potential difficulties in ensuring electromagnetic compatibility in other environments.

Caution : Do not hit the shaft and encoder ends.

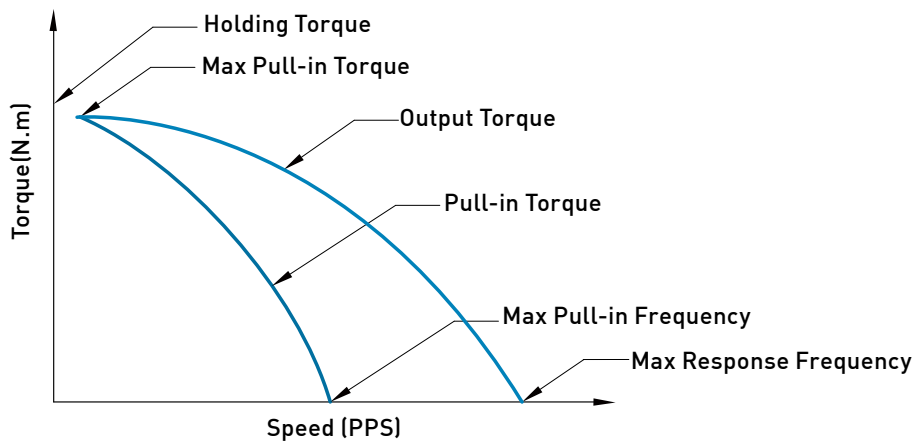
## 7.9 Step Motor

### Two Phase Step Motor

#### Step Motor Ordering Information

Product	Model	Phase/Shaft	Type	Step Angle	Voltage	Serial number
Brushless Motor	ST:	0 : 2S (2 phase/single axis) 1 : 2D (2 phase/double axis)	1X : ST40 2X : ST55	0 : F (step angle 1.8 meh.)	24V	01~99

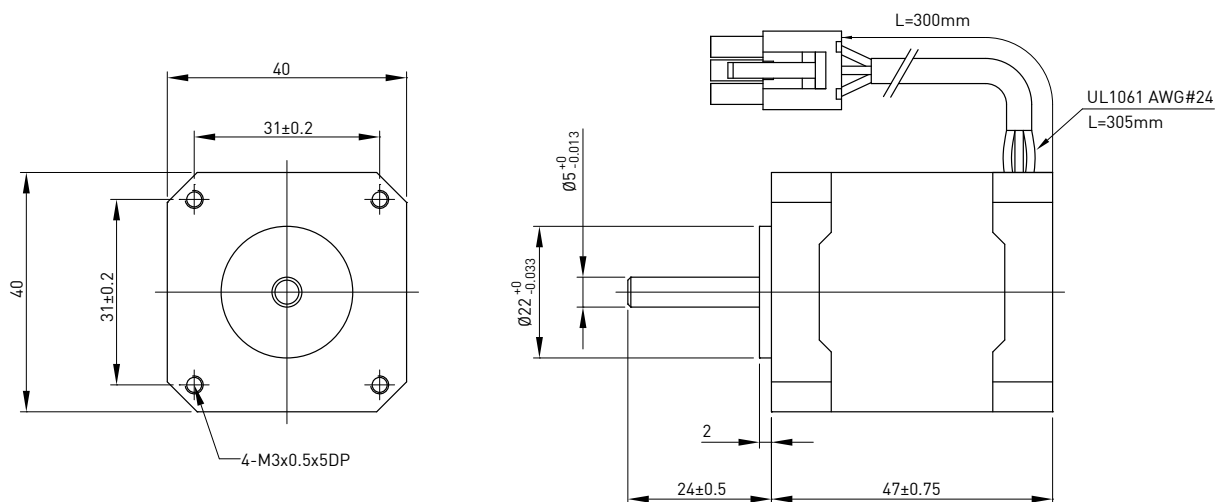
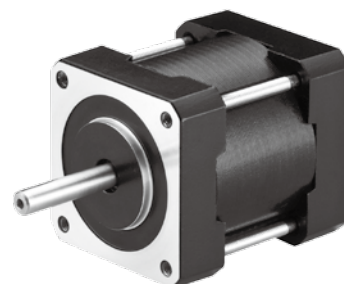
#### Characteristic Curves



- **Pull-in Torque**  
It is the maximum torque at given speeds that the motor can start, stop or reverse with the input pulses. Motor can start, stop or reverse in synchronism under starting torque curve, this region called self-start region.
- **Max. pull-in torque**  
The max. motor torque that can start, stop or reverse when the starting frequency is less than 10pps.
- **Max. starting frequency**  
Max. input pulse frequency when the motor is at no load. Motor can start and stop immediately.
- **Pull-out Torque**  
Maximum torque at given speeds that the motor can generate while running. If the motor runs outside of this curve, it will stall.
- **Max. response frequency**  
The frequency of motor that no output torque and motor can not start and stop immediately.
- **Holding Torque**  
Amount of torque that the motor produces when it has rated current flowing through the windings but the motor is at rest.

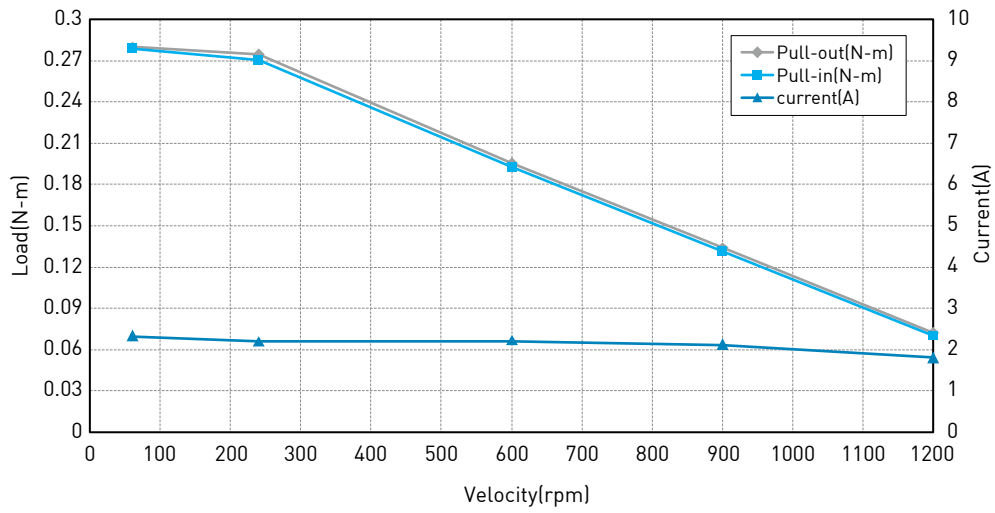
## 7.9.1 Model of Step Motor

### 40mm Step Angle 1.8° ST40 Series

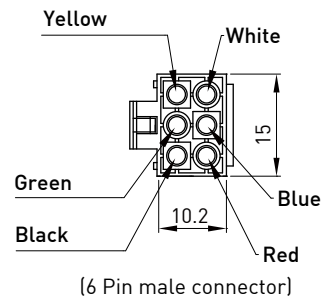
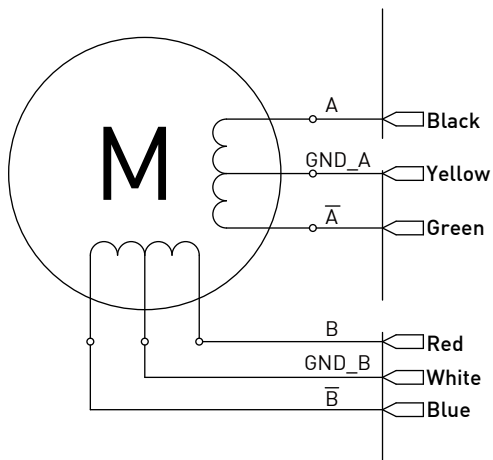


Model	Winding Type	Holding Torque	Current	Resistance	Inductance	Rotor Inertia	Leads	Motor Length	Input Voltage
Single axis		N.m	A/phase	Ω/phase	mH/phase	g-cm <sup>2</sup>		(L)mm	Vdc
FRST01102401	Single Pole	0.27	0.95	3.3	3.5	19	6	47	4

● Torque- Speed Curve



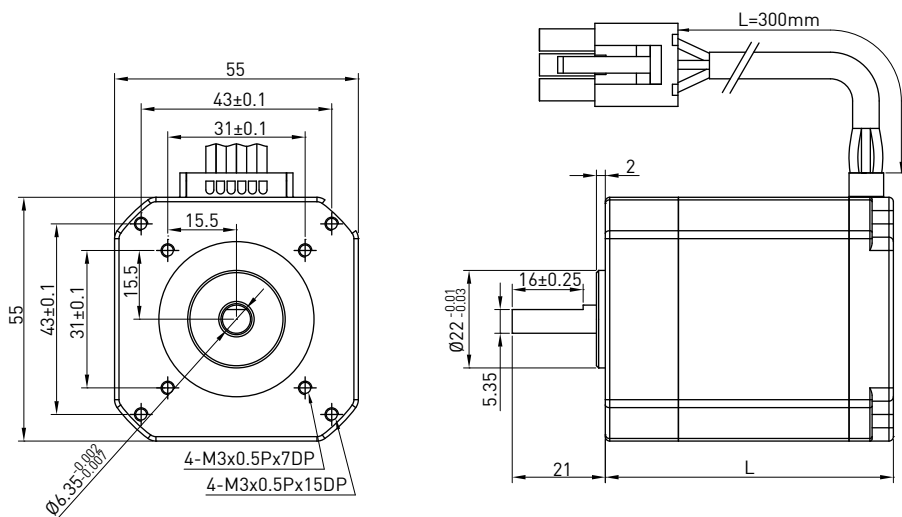
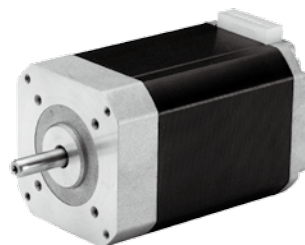
● Wiring Diagram



Notice:

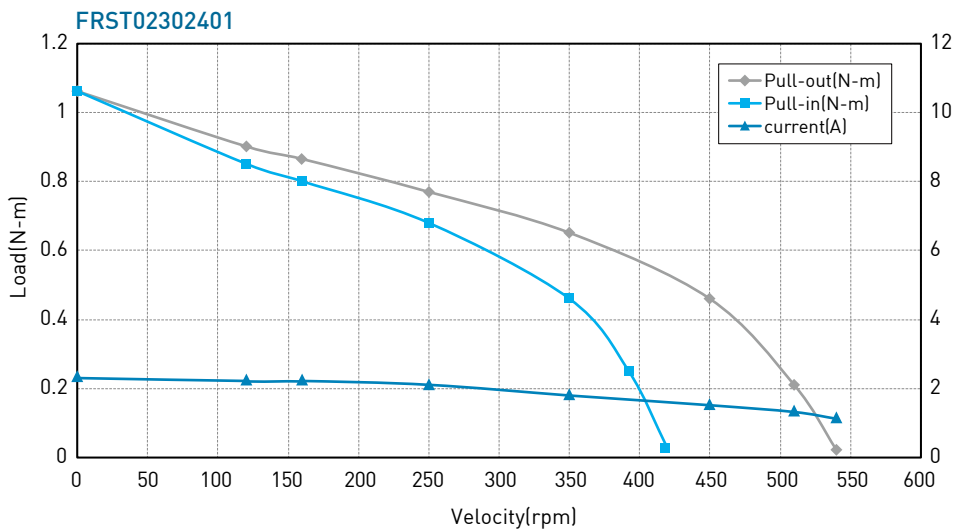
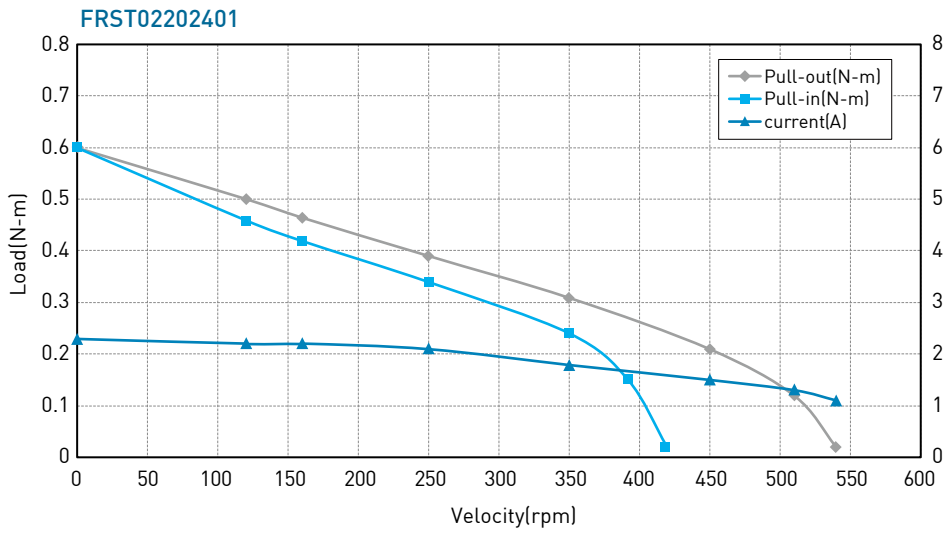
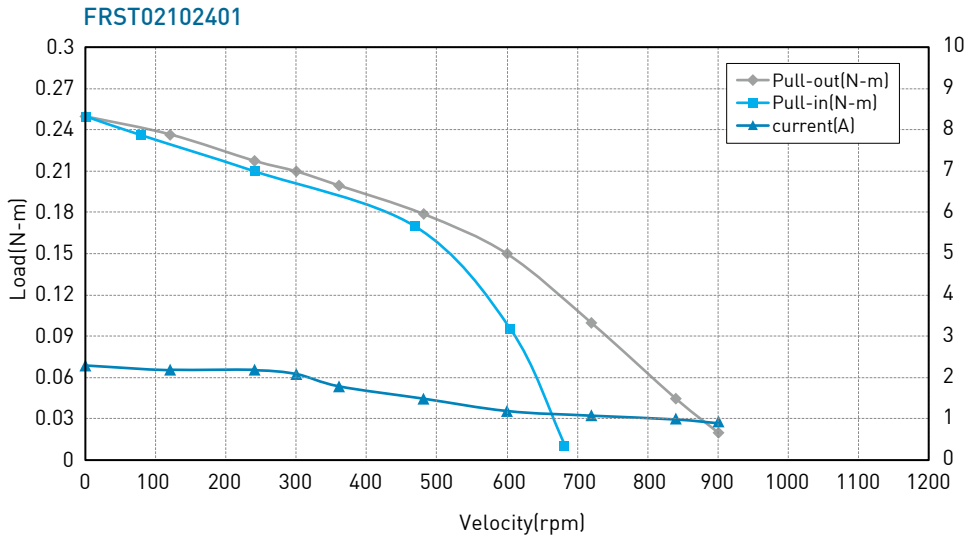
- ★ Please use the wire which is larger than 0.5mm<sup>2</sup> and as short as possible for power and motor connection.
- ★ Support 2 phase stepping motor (6 lead wire).

## 55mm Step Angle 1.8° ST55 Series

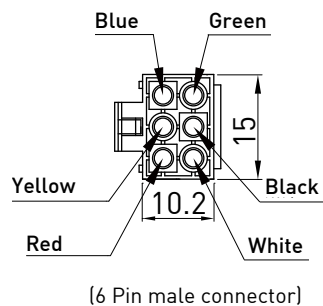
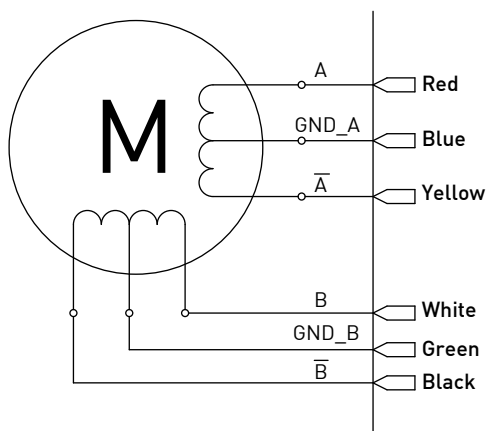


Model		Winding Type	Holding torque	Current	Resistance	Inductance	Rotor Inertia	Leads	Motor Length (L)mm	Input Voltage
Single axis	Double axis									
			N.m	A/phase	Ω/phase	mH/phase	g-m2			Vdc
FRST02102401	FRST12102401	Single Pole	0.25	1.3	2.8	3.3	90	6	50.5	3
FRST02202401	FRST12202401	Single Pole	0.6	1.3	4.0	7.0	171	6	65	4
FRST02302401	FRST12302401	Single Pole	1.05	1.2	5.6	13.0	290	6	87	5.3

● Torque- Speed Curve



● Wiring Diagram



Notice:

- ★ Please use the wire which is larger than  $0.5\text{mm}^2$  and as short as possible for power and motor connection.
- ★ Support 2 phase stepping motor (6 lead wire).

## 7.9.2 Step Driver (STD-24A)

### Specifications

- 2 phase stepping motor (6 lead wire)
- Micro-stepping drive function
- Constant output current 0.2A~2A
- Max Frequency response 150000Hz
- Support Pulse/Direction Pulse (1P)
- Support CW/CCW Pulse (2P)
- Support Quadrature Pulse (A/B)
- Additional Positive/Negative pole limit control
- Motor exciting release
- RoHS certificate
- CE certified



### Connect and Setting

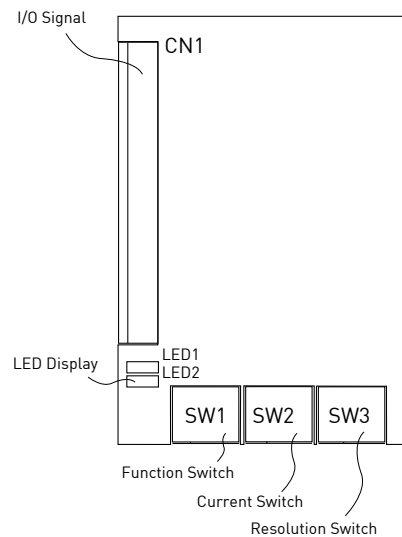
#### 1. LED State

- LED display

Display	Color	function
LED1	Red	Power light
LED2	Green	State light

- State light Information

Drive State	LED State
Forward	low speed flash (0.5s/per)
Reverse	high speed flash (0.2s/per)
Limit Input	low speed flash (1s/per)
Exciting release	dark
Stand by	light

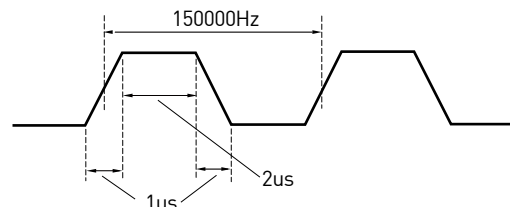
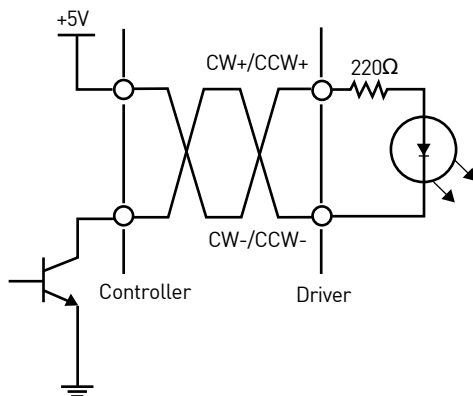




## 2. Input / Output

Interface	Pin	Input / Output	Mark
(CN1)	1	Power Input	DC24V
	2		Power Input
	3	Motor connect	COM A
	4	Motor connect	COM B
	5	Motor connect	A +
	6	Motor connect	A -
	7	Motor connect	B +
	8	Motor connect	B -
	9	Pulse single Input	CW -
	10	Pulse single Input	CW +
	11	Pulse single Input	CCW -
	12	Pulse single Input	CCW +
	13	Control single	MF
	14	Control single	LSF
	15	Control single	LSR
	16	No use	NC

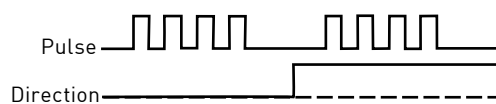
### ● Input Pulse Single Wiring Diagram



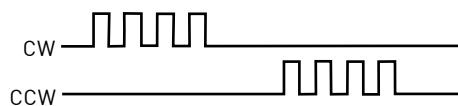
#### Notice:

- ※ Please use the wire which is larger than 0.5mm<sup>2</sup> and as short as possible for power and motor connection.
- ※ Pulse width please corresponds to the sketch.
- ※ These signal types are accepted by driver :

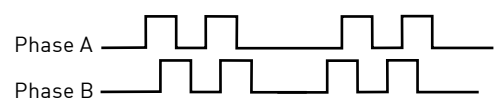
#### A. Pulse/Direction (1P)



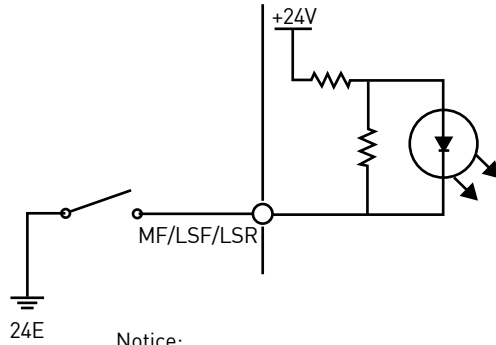
#### B. CW/CCW (2P)



#### C. Quadrature (A/B)



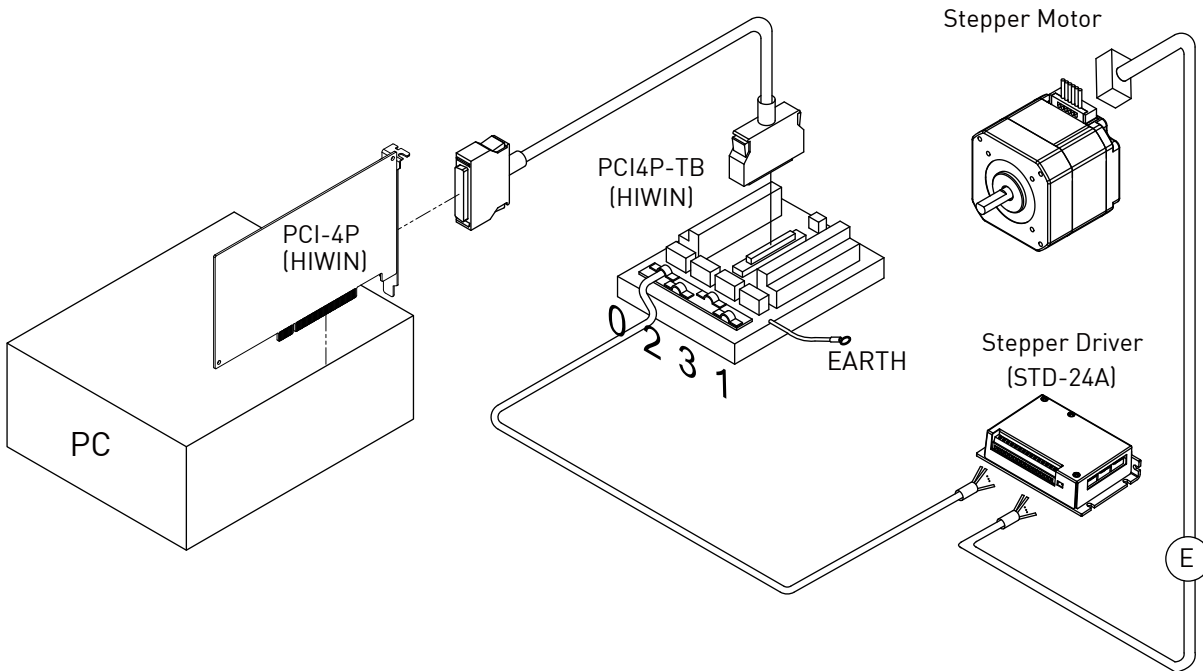
● Limit Input \ Motor Disable Wiring Diagram



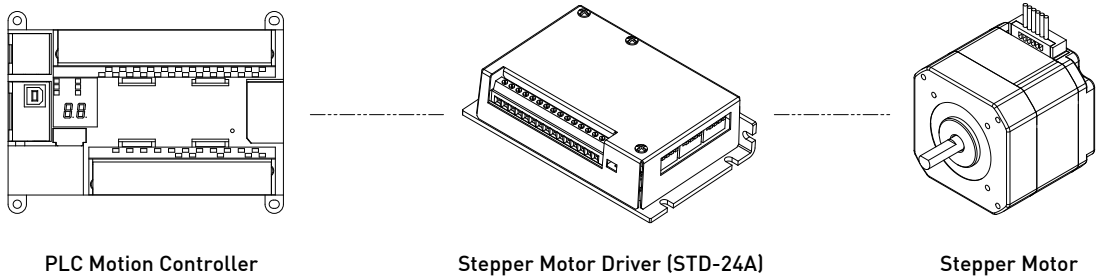
Notice:

- ※ The function was triggered by closing the switch (ON).
- ※ The forward limit signal is ON , motor will not rotate even receiving forward pulse command. Furthermore, The reverse limit signal is ON , motor will not rotate even receiving reverse pulse command.
- ※ Motor release signal is ON, exciting release.

**HIWIN PCI-4P Wiring Example**



**PLC Wiring Example**

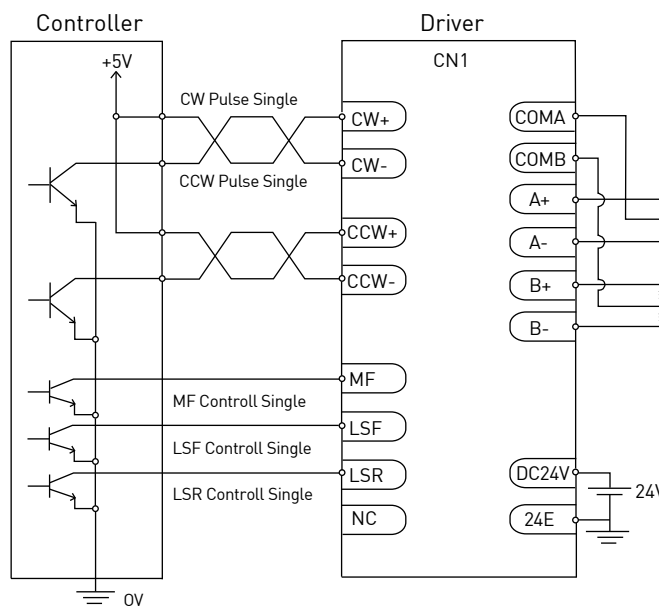


PLC Motion Controller

Stepper Motor Driver (STD-24A)

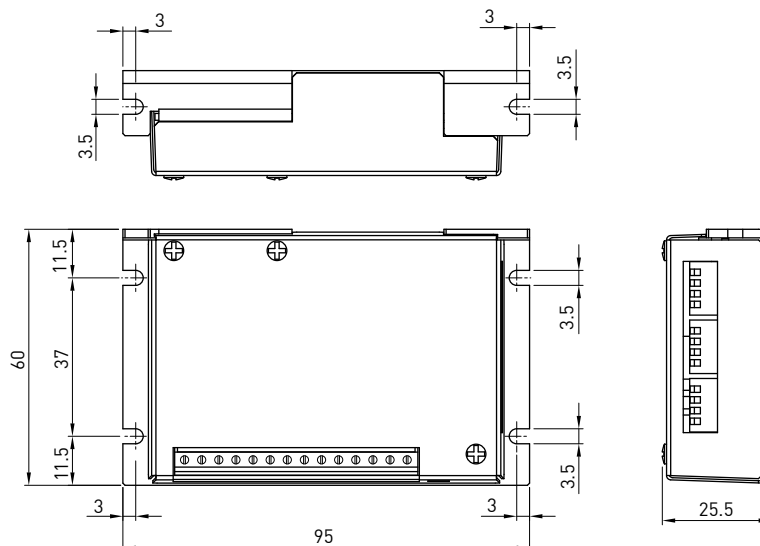
Stepper Motor

## Connect Diagram



Notice:  
 ※ Please input DC+5V pulse.  
 ※ Please use twisted line or shading line as signal line which is as short as possible.

## Size Diagram



## Stepping Motor Accessories

Name	Type	Connect	Description	Signal	Color	7007-6RH	Cord-end sleeve terminal
(E) Stepping Motor External Cable	HV00FRSTP□□A	MOTOR OUTPUTS		COM A	Blue	1	COM A
				A-	Yellow	2	A-
				A+	Red	3	A+
				COM B	Green	4	COM B
				B-	Black	5	B-
				B+	White	6	B+

### List A

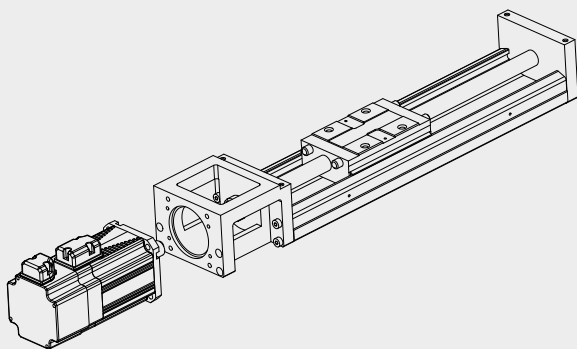
□□	30	50	70	A0
L (m)	3	5	7	10

## 7.10 HIWIN Robot and Motor adaptor Flange

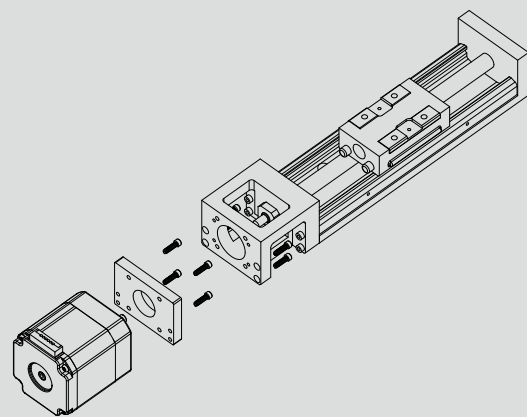
### Motor Flange List

Model	Motor Type								
	AC 50W	AC 100W	AC 200W	AC 400W	AC 750W	ST40-11	ST55-21	ST55-22	ST55-23
KK30	-	-	-	-	-	-	-	-	-
KK40	F2	F2	-	-	-	F3	F3	F3	F3
KK50	F2	F2	-	-	-	F3	F3	F3	F3
KK60	F2	F2	-	-	-	F5	F5	F5	F5
KK80	F3	F3	F0	F0	-	-	-	-	-
KK86	F3	F3	F0	F0	-	-	-	-	-
KK100	-	-	F0	F0	F1	-	-	-	-
KK130	-	-	F1	F1	F2	-	-	-	-
SK60	F2	F2	-	-	-	F5	F5	F5	F5
SK86	F3	F3	F0	F0	-	-	-	-	-
KA100	F1	F1	-	-	-	-	-	-	-
KA136	F3	F3	F0	F0	-	-	-	-	-
KA170	-	-	F0	F0	F1	-	-	-	-
KA200	-	-	F1	F1	F0	-	-	-	-
KS100	-	-	-	-	-	-	-	-	-
KS140	-	-	F0	F0	-	-	-	-	-
KS180	-	-	-	-	-	-	-	-	-
KU60	KA100-F1	KA100-F1	-	-	-	-	-	-	-
KU80	KK86-F3	KK86-F3	F0	F0	-	-	-	-	-
KE50	KA100-F1	KA100-F1	-	-	-	-	-	-	-
KE65	KA100-F1	KA100-F1	-	-	-	-	-	-	-

Robot connect Servo Motor



Robot connect Stepping Motor



## 7.11 Selecting servo motor capacity guide

### Guide for motor selection

#### 1. Definition of mechanism to be driven by the motor.

Define detail dimension of individual mechanical components (ex: ball screw length, lead and pulley diameter)

Typical servo mechanisms are listed as follow:

[Ball screw mechanism]

[Belt mechanism]

[Rack and pinion mechanism]

[Reduction gear mechanism]

#### 2. Definition of operating pattern (motion velocity profile).

The operating pattern can be defined by the following parameters: acceleration/deceleration time, constant-velocity time, stop time, cycle time, travel distance.

#### 3. Calculation of load inertia and motor inertia ratio.

Calculate load inertia for each mechanical component. (Refer to “General inertia calculation method” described later.)

Then, divide the calculated load inertia by the inertia of the selected motor the check the inertia ratio. Note that the ratio should less than 15, if the selected motor is less than 750W. If the power of selected motor is higher than 1000W, the ratio should less than 10.

#### 4. Calculation of motor velocity.

Calculate that motor velocity from the moving distance, acceleration/deceleration time and constant-velocity time.

#### 5. Calculation of torque.

Calculate the required motor torque from the load inertia, acceleration/deceleration time and constant-velocity time.

#### 6. Calculation of motor

Select a motor that meets the above 3 to 5 requirements.

## 7.11.1 Variable descriptions related to motor selection

### 1. Torque

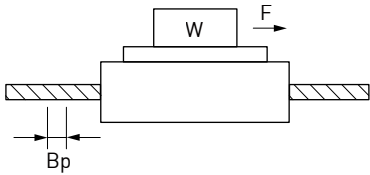
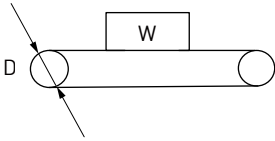
#### (1) Peak torque

Peak torque indicates the maximum torque that the motor requires during operation (mainly in acceleration and deceleration steps). The reference value is 80% or less of the maximum motor torque. If the torque is a negative value, a regenerative discharge resistor may be required.

#### (2) Traveling torque, stop holding torque

Traveling torque indicates the torque that the motor requires for a long time. Stop holding torque indicates the amount of torque required for a motor to remain in a fixed position.

Formulas for the traveling torque are shown below for each mechanism.

<p><b>Ballscrew mechanism</b></p> 	<p><b>Traveling torque</b></p> $T_f = \frac{B_p}{2\pi B_{eff}} \mu g W + F$
<p><b>Belt mechanism</b></p> 	<p><b>Traveling torque</b></p> $T_f = \frac{D}{2\pi B_{eff}} \mu g W + F$

List of variables :

W : Workpiece weight [kg]

B<sub>p</sub> : Lead [m]

D : Pulley diameter [m]

F : External force [N]

B<sub>eff</sub> : Mechanical efficiency

μ : Coefficient of friction

g: Gravity 9.8[m/s<sup>2</sup>]

#### (3) Effective torque

Effective torque indicates a root-mean-square value of the total torque required for running and stopping the motor per unit time. The reference value is approximately 80% or less of the rated motor torque.

$$T_{rms} = \sqrt{\frac{T_a^2 \times t_a + T_f^2 \times t_b + T_d^2 \times t_d}{t_c}}$$

T<sub>a</sub>: Acceleration torque [N-m]

T<sub>f</sub>: Traveling torque [N-m]

T<sub>d</sub>: Deceleration torque [N-m]

t<sub>c</sub>: Cycle time [s] (Run time + Stop time)

t<sub>a</sub>: Acceleration time [s]

t<sub>b</sub>: Constant-velocity time [s]

t<sub>d</sub>: Deceleration time [s]

### 2. Motor velocity

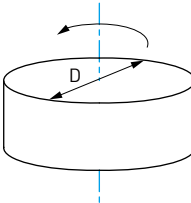
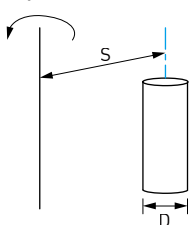
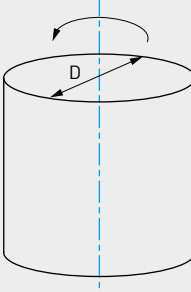
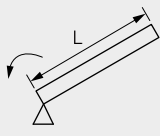
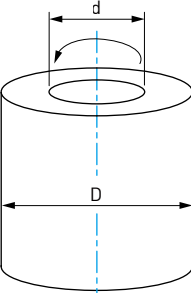
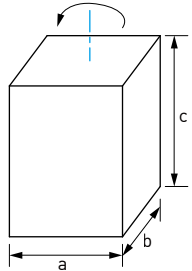
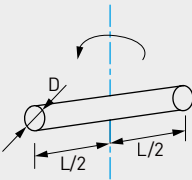
Maximum velocity of the motor during operation: The reference value is the rated velocity or a lower value.

When the motor operates at the maximum velocity, you must pay attention to the motor torque and it's temperature rise.

### 3. Load inertia and motor inertia ratio

Inertia is the force to retain the current moving condition. The inertia ratio is calculated by dividing the load inertia by the motor inertia. Generally, for motors with 750W or lower capacity, the inertia ratio should be 15 or less. For motors with 1000W or higher capacity, the inertia ratio should be 10 or less. If the system needs quicker response, a lower inertia ratio is required.

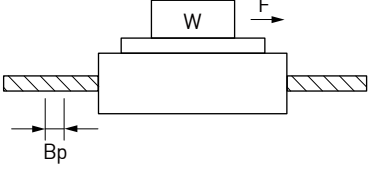
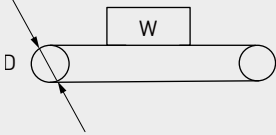
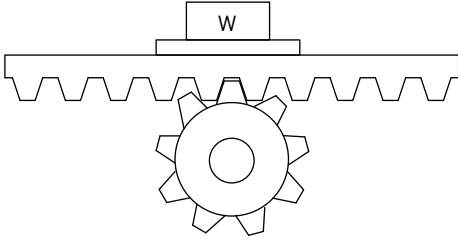
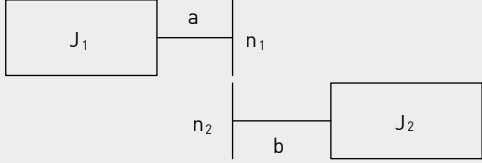
## 7.11.2 General inertia calculations for various rigid objects of uniform composition

Shape	J calculation formula	Shape	J calculation formula
Disk 	$J = \frac{1}{8} MD^2$	Separated rod 	$J = \frac{1}{8} MD^2 + M S^2$
Solid cylinder 	$J = \frac{1}{8} MD^2$	Straight rod 	$J = \frac{1}{3} ML^2$
Hollow cylinder 	$J = \frac{1}{8} M(D^2 + d^2)$	Prism 	$J = \frac{1}{12} M(a^2 + b^2)$
Uniform rod 	$J = \frac{1}{48} M(3D^2 + 4L^2)$		

List of variables :  
 J : Inertia [kg·m<sup>2</sup>]  
 M : Mass [kg]  
 D : Outer diameter [m]  
 d : Inner diameter [m]  
 L : Length [m]  
 a, b, c : Side length [m]  
 S : Distance [m]

If mass [M [kg]] is unknown, calculate it with the following formula :  
 Mass M[kg] = Density ρ [kg/m<sup>3</sup>] Volume V[m<sup>3</sup>]  
 Density of each material  
 Iron ρ = 7.9 × 10<sup>3</sup> [kg/m<sup>3</sup>]  
 Brass ρ = 8.5 × 10<sup>3</sup> [kg/m<sup>3</sup>]  
 Aluminum ρ = 2.8 × 10<sup>3</sup> [kg/m<sup>3</sup>]

### 7.11.3 Equivalent inertia calculations for different mechanisms

Mechanism	J calculation formula
Ballscrew 	$J = J_B + \frac{MB_P^2}{4\pi^2}$
Belt(Conveyor) 	$J = \frac{1}{4} W_b D^2$ <p>*Excluding drum J</p>
Rack and pinion 	$J = J_p + (M_r + W_r) \frac{D^2}{4}$
Reduction gear 	$J = J_1 + \left(\frac{n_2}{n_1}\right)^2 J_2$ <p>Inertia on shaft "a"</p>

List of variables:

J : Inertia [kg-m<sup>2</sup>]

J<sub>B</sub> : J of ballscrew

J<sub>P</sub> : J of pinion

M : Mass [kg]

M<sub>r</sub> : Mass of rack [kg]

W<sub>b</sub> : Workpiece weight on belt [kg]

W<sub>r</sub> : Workpiece weight on rack [kg]

P : Lead

D : Drum diameter [m]

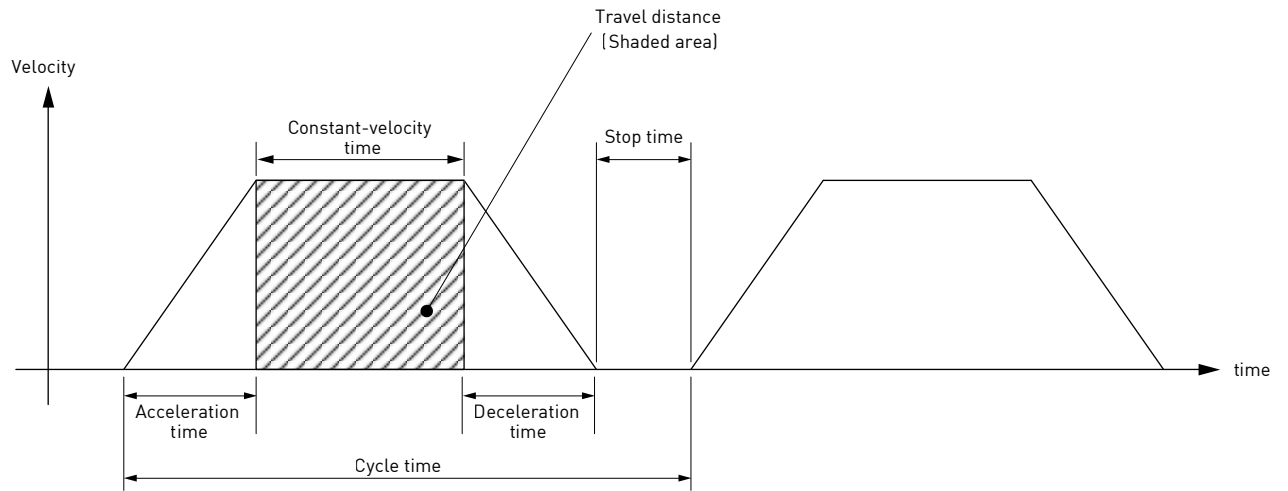
n<sub>1</sub> : Rotational speed of "a" shaft [r/min]

n<sub>2</sub> : Rotational speed of "b" shaft [r/min]

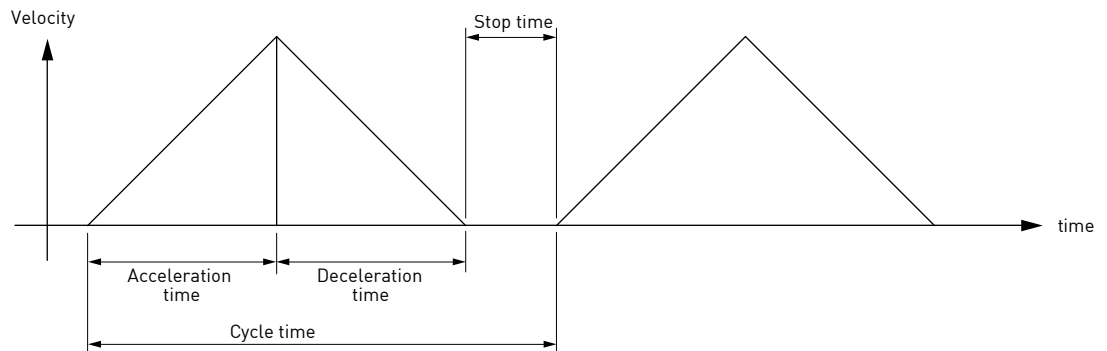


## 7.11.4 Operating pattern (motion velocity profile)

### Trapezoidal profile



### Triangle profile



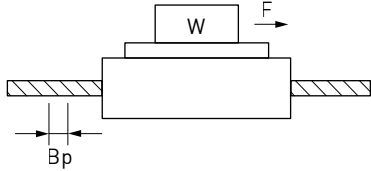
List of variables:

- ta: Acceleration time
- tb: Constant velocity time
- td: Deceleration time
- tc: Cycle time

## Example of motor selection

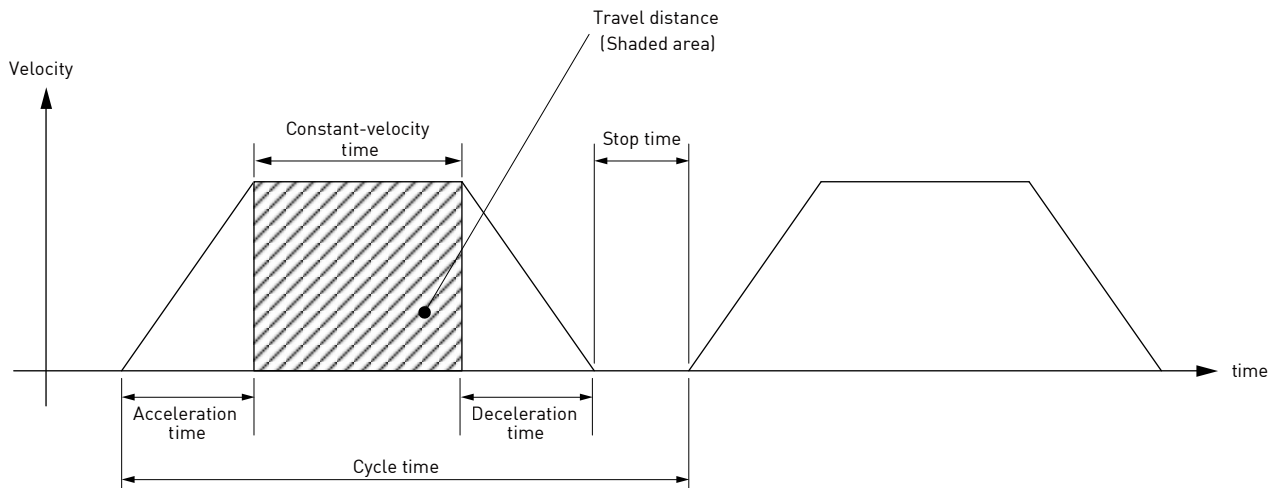
To drive a ballscrew mechanism

### 1. Example of motor selection for driving ball screw mechanism



Workpiece weight  $W = 10$  [kg]  
 Ballscrew length  $B_L = 0.5$  [m]  
 Ballscrew diameter  $B_D = 0.02$  [m]  
 Ballscrew lead  $B_P = 0.02$  [m]  
 Ballscrew efficiency  $B_{eff} = 0.9$   
 Travel distance  $0.3$  [m]  
 Coupling inertia  $J_C = 10 \times 10^{-6}$  [kg·m<sup>2</sup>]

### 2. Running pattern(velocity profile)



Acceleration time  $t_a = 0.1$  [s]  
 Constant-velocity time  $t_b = 0.8$  [s]  
 Deceleration time  $t_d = 0.1$  [s]  
 Cycle time  $t_c = 2$  [s]  
 Travel distance  $0.3$ [m]

### 3. Ballscrew weight

$$\begin{aligned}
 B_W &= \rho \times \pi \times \frac{B_D^2}{2} \times B_L \\
 &= 7.9 \times 10^3 \times \pi \times \frac{0.02^2}{2} \times 0.5 \\
 &= 1.24 \text{ [kg]}
 \end{aligned}$$

**4. Load inertia**

$$\begin{aligned}
 J_L &= J_C + J_B = J_C + \frac{1}{8} B_W \times B_D^2 + \frac{W \times B_P^2}{4 \pi^2} \\
 &= 0.00001 + \frac{1.24 \times 0.02^2}{8} + \frac{10 \times 0.02^2}{4 \pi^2} \\
 &= 1.73 \times 10^{-4} \text{ [kg} \cdot \text{m}^2]
 \end{aligned}$$

**5. Provisional motor selection**

Choose Hiwin 200W servo motor :  $J_M = 0.14 \times 10^{-4} \text{ [kg} \cdot \text{m}^2]$

**6. Calculation of inertia ratio**

$$\frac{J_L}{J_M} = \frac{1.73 \times 10^{-4}}{0.14 \times 10^{-4}} = 12.3$$

The inertia ratio is less than 30.

**7. Calculation of maximum velocity (Vmax)**

$$\frac{1}{2} \times t_a \times V_{\max} + t_b \times V_{\max} + \frac{1}{2} \times t_d \times V_{\max} = \text{Travel distance}$$

$$\frac{1}{2} \times 0.1 \times V_{\max} + 0.8 \times V_{\max} + \frac{1}{2} \times 0.1 \times V_{\max} = 0.3$$

$$V_{\max} = 0.334 \text{ [m/s]}$$

**8. Calculation of motor velocity (N [r/min])**

Ball screw lead  $B_P = 0.02 \text{ [m]}$

$$N = \frac{V_{\max}}{B_P} = \frac{0.334}{0.02} = 16.7 \text{ [rad/s]} = 1002 \text{ [rpm]}$$

1002[rpm] is less than 3000[rpm] [rated velocity of Hiwin 200W servo motor]

### 9. Calculation of torque

Traveling torque

$$T_f = \frac{B_p}{2\pi B_{\text{eff}}} (\mu g W + F) = \frac{0.02}{2\pi \cdot 0.9} (0.1 \times 9.8 \times 10 + 0) = 0.035 \text{ [N-m]}$$

Acceleration torque

$$\begin{aligned} T_a &= \frac{(J_L + J_M)}{t_a} + \text{Traveling torque} \\ &= \frac{(1.73 \times 10^{-4} + 0.14 \times 10^{-4}) \times 2\pi \times 1.67}{0.1} + 0.035 \\ &= 0.231 \text{ [N-m]} \end{aligned}$$

Deceleration torque

$$\begin{aligned} T_d &= \frac{(J_L + J_M)}{t_d} - \text{Traveling torque} \\ &= \frac{(1.73 \times 10^{-4} + 0.14 \times 10^{-4}) \times 2\pi \times 1.67}{0.1} - 0.035 \\ &= 0.161 \text{ [N-m]} \end{aligned}$$

### 10. Verification of maximum torque

$T_a = 0.231 \text{ [N-m]}$  is less than  $1.91 \text{ [N-m]}$  (Maximum torque of Hiwin 200W servo motor)

### 11. Verification of effective torque

$$\begin{aligned} T_{\text{rms}} &= \sqrt{\frac{T_a^2 \times t_a + T_f^2 \times t_b + T_d^2 \times t_d}{t_c}} \\ &= \sqrt{\frac{0.231^2 \times 0.1 + 0.035^2 \times 0.8 + 0.161^2 \times 0.1}{2}} \\ &= 0.067 \text{ [N-m]} \end{aligned}$$

$0.067 \text{ [N-m]}$  is less than  $0.64 \text{ [N-m]}$  (rated torque of Hiwin 200W servo motor)

### 12. Evaluation

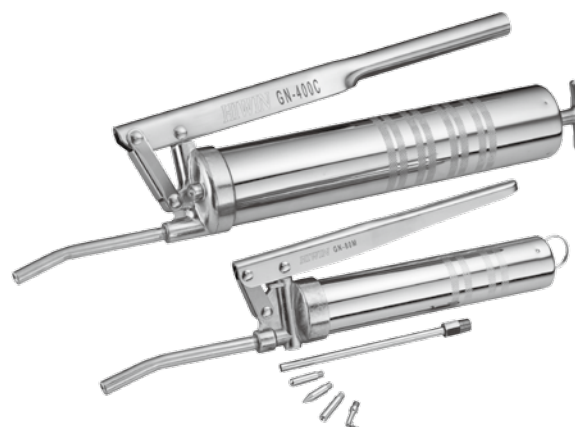
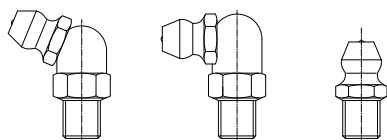
Judging from the inertia ratio calculated above, a 200W motor is acceptable, although the torque margin is significantly large.

# Single Axis Robot Lubricating Device

## 8.1 Grease Gun Unit

HIWIN offers different capacities and packages for grease gun reload, depending on various requirements. The grease gun could not only be equipped with normal grease nozzle, but also be replaced with other nozzles for other kinds of grease nipples.

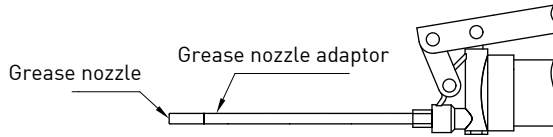
Grease Nipple: M6, PT1/8



Model no.	GN-80M	GN-400C
Dimensions		
Spec.	<ol style="list-style-type: none"> <li>Working pressure: 15 MPa</li> <li>Output: 0.5~0.6 c.c./Stroke</li> <li>Weight: 520 g(grease excluded)</li> <li>Grease reload: 70 g flexible tube or 120 ml bulk loading</li> </ol>	<ol style="list-style-type: none"> <li>Working pressure: 15 MPa</li> <li>Output: 0.8~0.9 c.c./Stroke</li> <li>Weight: 1150 g (grease excluded)</li> <li>Grease reload: 14 o.z. cartridge pipe or 400 ml bulk loading</li> </ol>

## 8.2 Grease Nozzle Kit (Model no. GNZ-05-BOX)



HIWIN's grease nozzle kit offers various styles to adapt to different types of grease nipples.



### 8.2.1 Grease Nozzle Adaptor

Model no.	Dimensions
GT-PT1/8-M5	

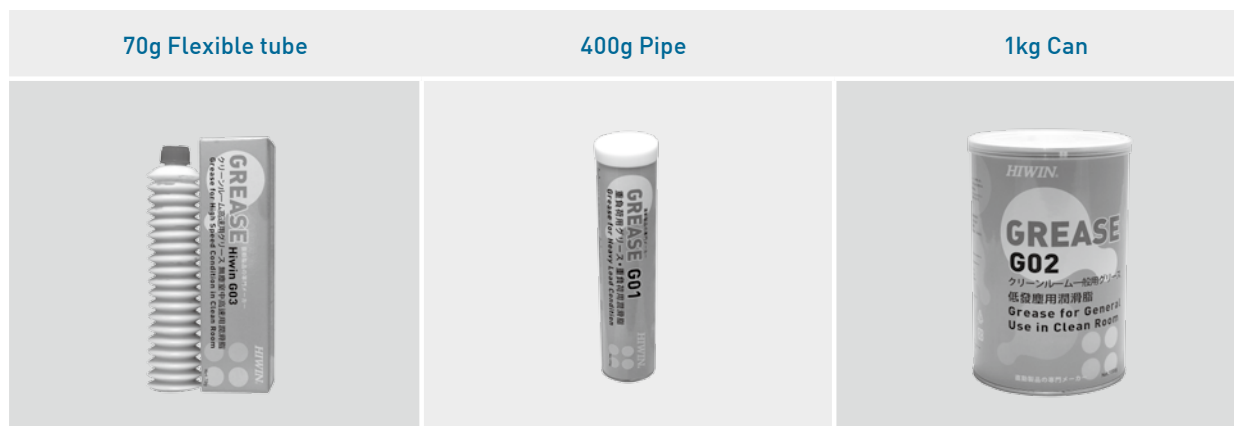
### 8.2.2 Grease Nozzle

Model no.	Dimensions	Lubricating Type
GNZ-L-M5		Minimized grease hole
GNZ-P-M5		Minimized grease hole
GNZ-R-M5		Dent Nipple (DIN3405) 
GNZ-C-M5		Nipple (M3, M4 Thread) 

## 8.3 Grease

HIWIN offers various lubricants based on the user's environment such as a general purpose grease, heavy load, low particle emitting, high speed, etc. Depending on the user's re-lubrication interval, choices for different capacities and packages of grease are available.

### 8.3.1 Packaging



#### ○ HIWIN G01 Grease for Heavy-loading

##### Features:

1. Excellent wear and pressure resistance under heavy load conditions
2. Low friction in low temperatures
3. Water resistant
4. Available for use in central lubrication systems

##### Basic Properties:

Color	Light yellow	
Base Oil	Mineral oil	
Consistency Enhancer	Polyurea	
Additive	Solid lubricant	
Service Temp. (°C)	-15~115	
NLGI-grade (0.1mm)	310-340	
Viscosity (cst)	40°C	500
	100°C	30
Drop Point (°C)	> 170	

#### ○ HIWIN G02 Grease for Low Particle-emission

##### Features:

1. Low particle emission rate a suitable for clean room environments
2. Wear resistant
3. For long term usage and wide temperature ranges
4. Consisting of synthetic hydrocarbon oil and special calcium soap to resist against oxidation and corrosion

##### Basic Properties:

Color	Beige	
Base Oil	Synthetic hydrocarbon oil	
Consistency Enhancer	Special calcium soap	
Service Temp. (°C)	-30~140	
NLGI-grade (0.1mm)	265-295	
Viscosity (cst)	40°C	100
	100°C	15
Drop Point (°C)	> 180	

○ **HIWIN G03 Grease for Low Particle-emitting (High Speed)**

**Features:**

1. Low particle emission rate suitable for clean room environments
2. Wear resistant
3. For long term usage and wear resistance under high speed conditions

**Basic Properties:**

Color	Beige	
Base Oil	Synthetic hydrocarbon oil	
Consistency Enhancer	Special calcium soap	
Service Temp. (°C)	-45~125	
NLGI-grade (0.1mm)	265-295	
Viscosity (cst)	40°C	30
	100°C	5.9
Drop Point (°C)	> 210	

○ **HIWIN G05 Grease for General Purpose**

**Features:**

1. Wear resistant
2. Low friction
3. Long-life
4. Low oxidation tendency
5. Water resistant
6. Corrosion resistant

**Basic Properties:**

Color	Brown	
Base Oil	Mineral oil	
Consistency Enhancer	Lithium soap	
Service Temp. (°C)	-15~120	
NLGI-grade (0.1mm)	2	
Viscosity (cst)	40°C	200
	100°C	190
Drop Point (°C)	190	

○ **HIWIN G04 Grease for High Speed**

**Features:**

1. Wear resistant under high speed conditions
2. Low friction under high speed conditions
3. Water resistant

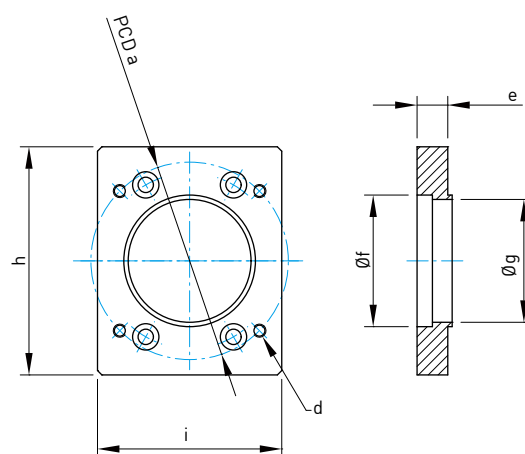
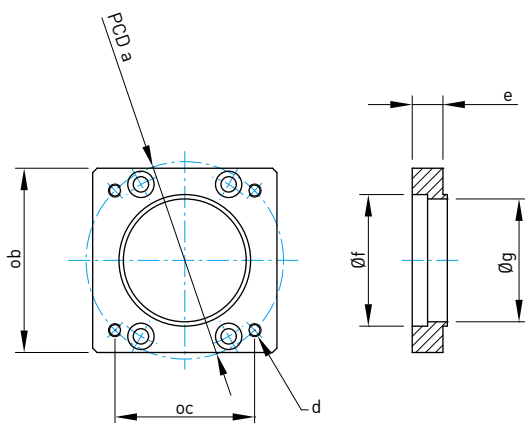
**Basic Properties:**

Color	Beige	
Base Oil	Ester / PAO	
Consistency Enhancer	Lithium soap	
Service Temp. (°C)	-35~120	
NLGI-grade (0.1mm)	260-280	
Viscosity (cst)	40°C	25
	100°C	6
Drop Point (°C)	> 225	



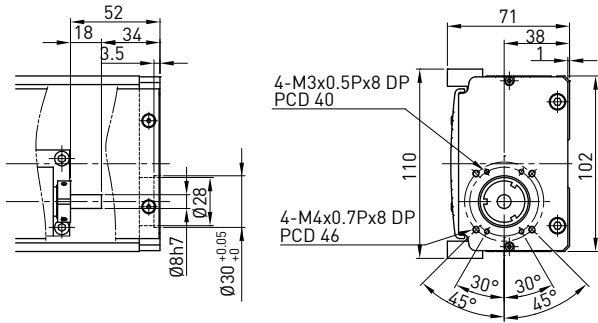
## Appendix 1: Motor Adaptor Flange List

Model no.	Flange Selection	Flange dimensions								
		a	b	c	d	e	f	g	h	i
KA100	F1	45	42	-	M3	7	30H8	28	-	-
KA136	F1	70	62	-	M4	10	50H8	46	-	-
	F2	46	62	-	M4	8	30H8	-	-	-
	F3	45	62	-	M3	8	30H8	-	-	-
	F4	90	80	-	M5	12	70H8	46	-	-
	F5	-	62	50	M4	8	36H8	46	-	-
	F6	-	62	47.14	M4	8	38.1H8	46	-	-
KA170	F1	90	80	-	M6	12	70H8	46	-	-
	F2	90	80	-	M5	12	70H8	46	-	-
	F3	-	82	70	M6	12	60H8	46	-	-
	F4	-	82	69.58	M6	12	73.06H8	46	-	-
KA200	F1	70	-	-	M5	12	70H8	60	73	92
	F2	90	-	-	M5	12	70H8	60	80	92

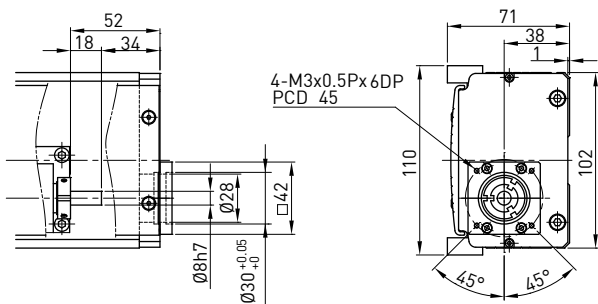


## KA100

### Motor Adaptor Flange F0

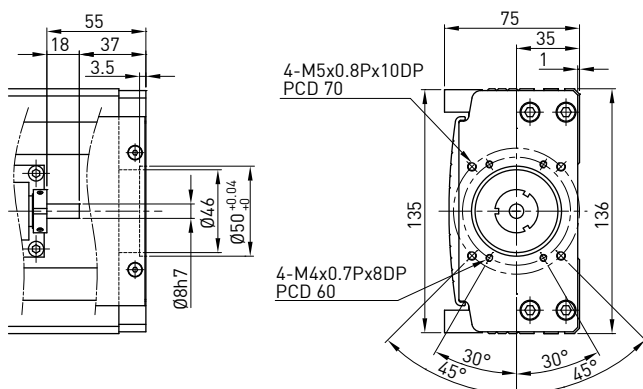


### Motor Adaptor Flange F1

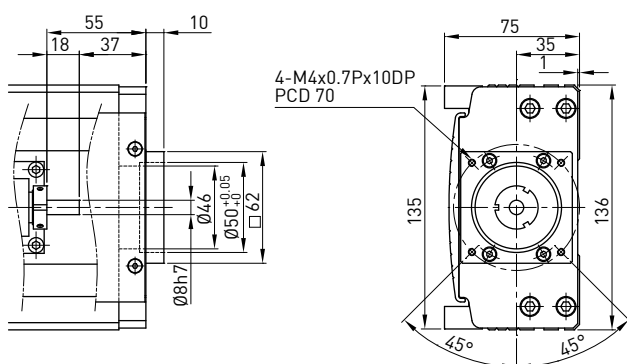


## KA136

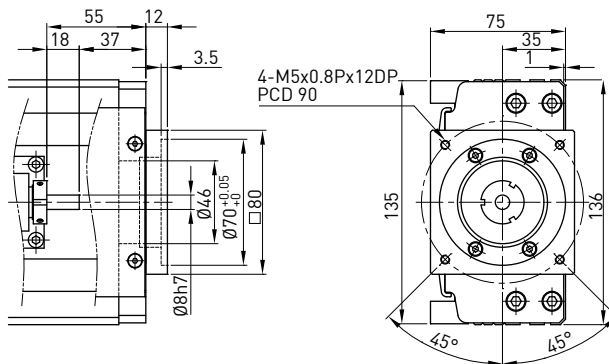
Motor Adaptor Flange F0



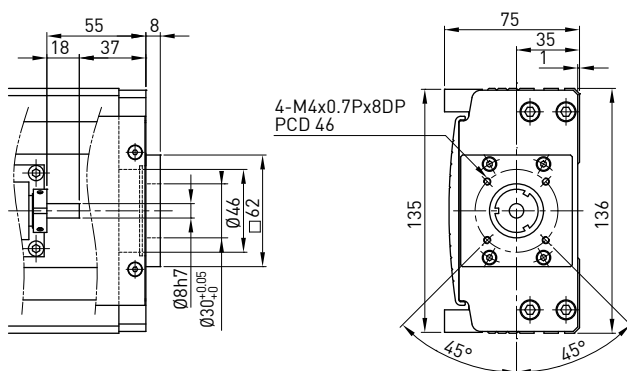
Motor Adaptor Flange F1



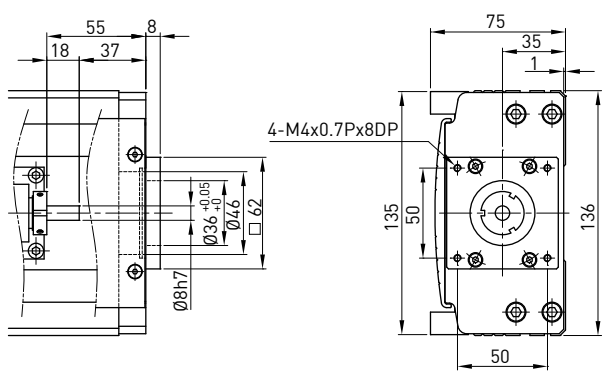
Motor Adaptor Flange F4



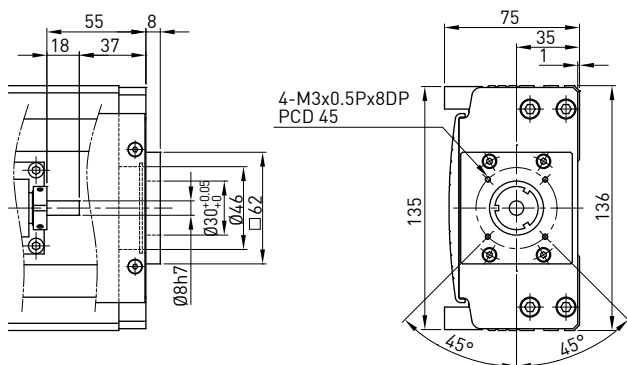
Motor Adaptor Flange F2



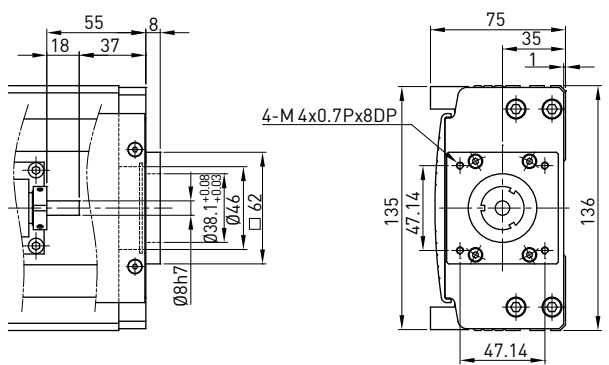
Motor Adaptor Flange F5



Motor Adaptor Flange F3

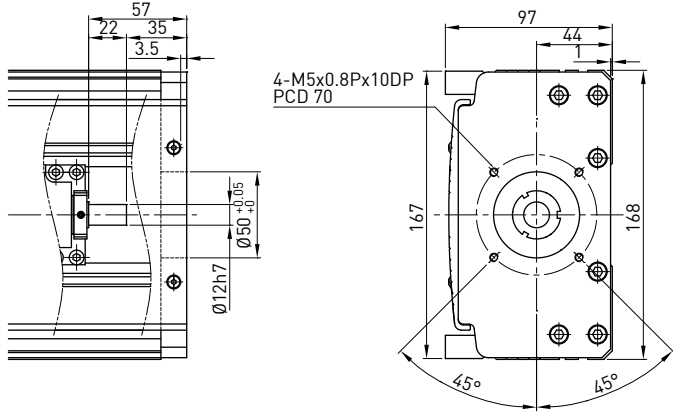


Motor Adaptor Flange F6

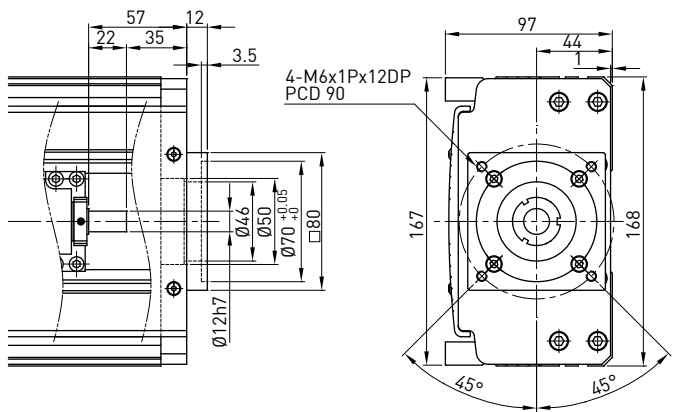


# KA170

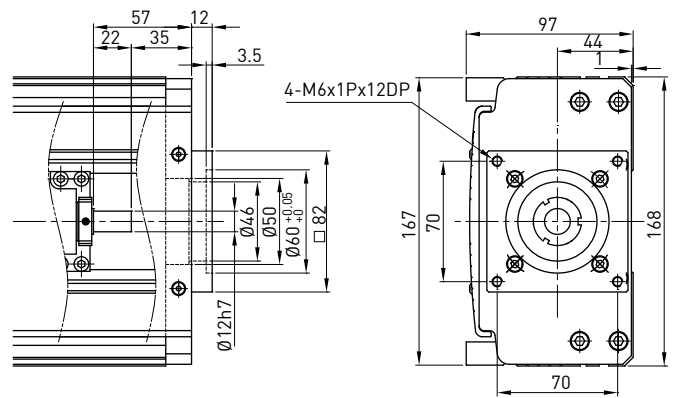
**Motor Adaptor Flange F0**



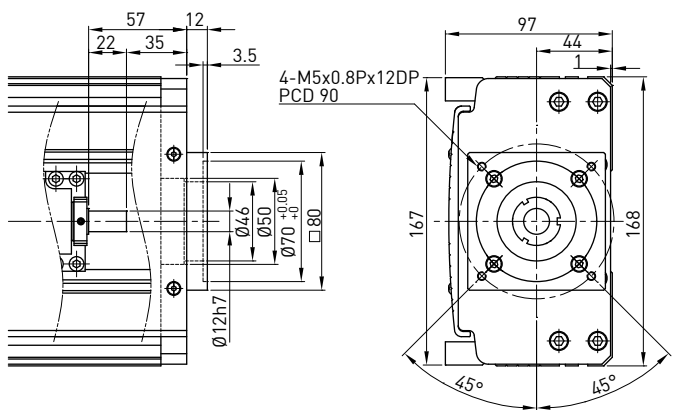
**Motor Adaptor Flange F1**



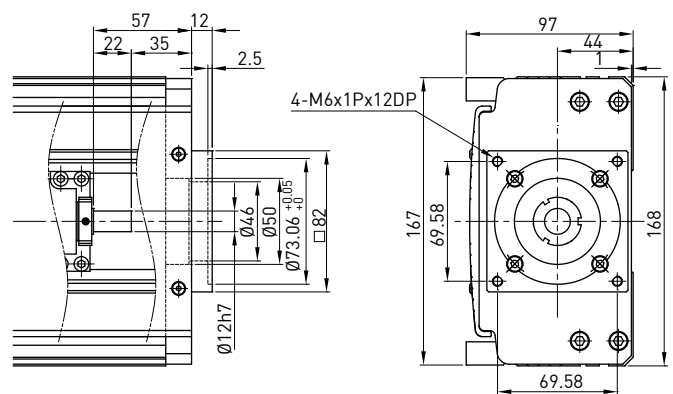
**Motor Adaptor Flange F3**



**Motor Adaptor Flange F2**

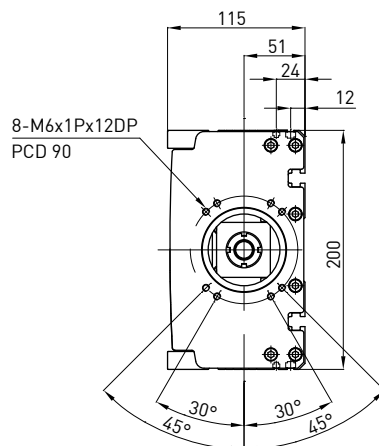
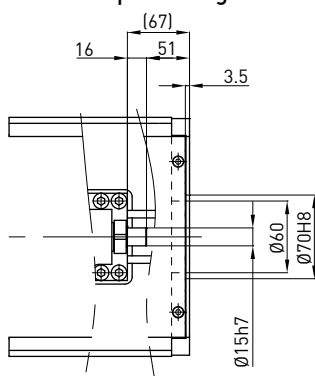


**Motor Adaptor Flange F4**

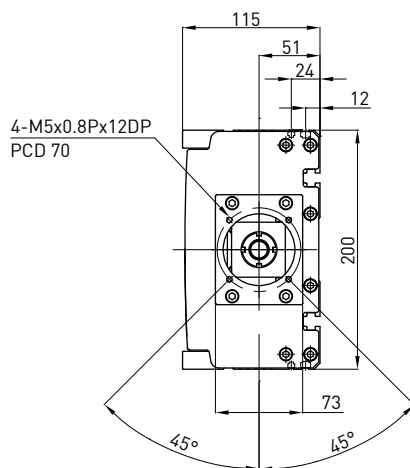
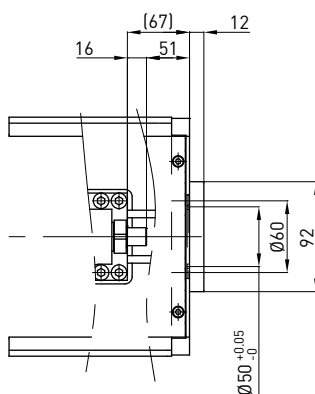


## KA200

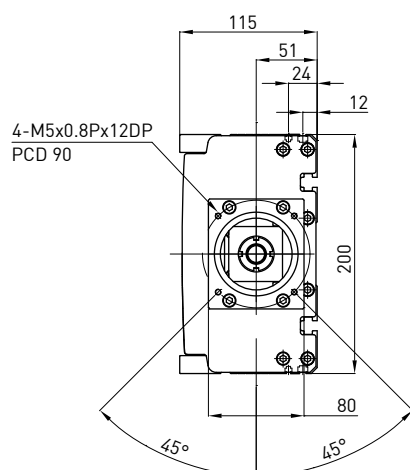
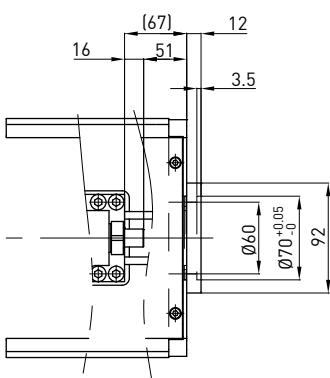
Motor Adaptor Flange F0



Motor Adaptor Flange F1



Motor Adaptor Flange F2



## Appendix 2: Motor Selection

### HIWIN Mikrosystem Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection											+Brake Weight (kg)	Drive	Weight (kg)	Voltage
			KA100	KA136	KA170	KA200	KS100	KS140	KS180	KU060	KU080	KE050	KE065				
50W	FRLS05203A4A	0.45	F1	F3	-	-	KA100-F1	-	-	KA100-F1	KK136-F3	KA100-F1	KA100-F1	0.58	D2-0123-S-A0	1.25	220V
100W	FRLS10203A4A	0.63	F1	F3	-	-	KA100-F1	-	-	KA100-F1	KK136-F3	KA100-F1	KA100-F1	0.76		1.25	220V
200W	FRLS2020306A	0.95	-	F0	F0	F1	-	F0	F0	-	F0	-	-	1.50	D2-0423-S-B0	1.25	220V
400W	FRLS4020306A	1.31	-	F0	F0	F1	-	F0	F0	-	F0	-	-	1.86		1.25	220V
750W	FRMS7520308A	2.66	-	-	F1	F0	-	-	-	-	-	-	-	3.32	D2-1023-S-C0	1.25	220V

### Mitsubishi Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection											+Brake Weight (kg)	Drive	Weight (kg)	Voltage
			KA100	KA136	KA170	KA200	KS100	KS140	KS180	KU060	KU080	KE050	KE065				
30W	HC-PQ033	0.32	F0	F2	-	-	F0	-	-	F0	KK86-F2	F0	F0			0.6	220V
50W	HF-KP053	0.35	F0	F2	-	-	F0	-	-	F0	KK86-F2	F0	F0	0.75	MR-J3S-10A	0.8	220V
100W	HF-KP13	0.56	F0	F2	-	-	F0	-	-	F0	KK86-F2	F0	F0	0.89	MR-J3S-10A	0.8	220V
200W	HF-KP23	0.94	-	F0	F0	F1	-	F0	F0	-	F0	-	-	1.6	MR-J3S-20A	0.8	220V
400W	HF-KP43	1.5	-	F0	F0	F1	-	F0	F0	-	F0	-	-	2.1	MR-J3S-40A	1	220V
750W	HF-KP73	2.9	-	-	F1	F0	-	-	-	-	-	-	-	4	MR-J3S-70A	1.4	220V

### Panasonic Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection											+Brake Weight (kg)	Drive	Weight (kg)	Voltage
			KA100	KA136	KA170	KA200	KS100	KS140	KS180	KU060	KU080	KE050	KE065				
50W	MSMD5AZP1	0.32	F1	F3	-	-	KA100-F1	-	-	KA100-F1	KK86-F3	F1	KA100-F1	0.53	MADDT1105	0.8	110V
50W	MSMD5AZP1	0.32	F1	F3	-	-	KA100-F1	-	-	KA100-F1	KK86-F3	F1	KA100-F1	0.53	MADDT1205	0.8	220V
100W	MSMD011P1	0.47	F1	F3	-	-	KA100-F1	-	-	KA100-F1	KK86-F3	F1	KA100-F1	0.68	MADDT1107	0.8	110V
100W	MSMD012P1	0.47	F1	F3	-	-	KA100-F1	-	-	KA100-F1	KK86-F3	F1	KA100-F1	0.68	MADDT1205	0.8	220V
200W	MSMD021P1	0.82	-	F1	-	-	-	-	-	-	KK86-F1	-	-	1.3	MADDT2110	1.1	110V
200W	MSMD022P1	0.82	-	F1	-	-	-	-	-	-	KK86-F1	-	-	1.3	MADDT1207	0.8	220V
400W	MSMD041P1	1.2	-	F1	-	-	-	-	-	-	KK86-F1	-	-	1.7	MADDT3120	1.5	110V
400W	MSMD042P1	1.2	-	F1	-	-	-	-	-	-	KK86-F1	-	-	1.7	MADDT2210	1.1	220V
750W	MSMD082S1	2.3	-	F4	F2	F2	-	-	-	-	KK86-F4	-	-	3.1	MADDT3520	1.5	220V

### Yasukawa Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection											Brake (-1+C)	Drive	Weight (kg)	Remarks
			KA100	KA136	KA170	KA200	KS100	KS140	KS180	KU060	KU080	KE050	KE065				
50W	SGMAV-A5ADA61	0.3	F0	F2	-	-	F0	-	-	F0	KK86-F2	F0	F0		SGDV-R70A01A	0.9	with key
50W	SGMAV-A5ADA2C	0.3	F0	F2	-	-	F0	-	-	F0	KK86-F2	F0	F0				no key
50W	SGMAV-A5ADA21	0.3	F0	F2	-	-	F0	-	-	F0	KK86-F2	F0	F0	0.75			Mid inertia
100W	SGMAV-A5ADA64	0.4	F0	F2	-	-	F0	-	-	F0	KK86-F2	F0	F0	0.89	SGDV-R90A01A	0.9	
200W	SGMAV-A5ADA65	0.9	-	F0	F0	F1	-	F0	F0	-	F0	-	-	1.6	SGDV-1R6A01A	0.9	
400W	SGMAV-A5ADA66	1.2	-	F0	F0	F1	-	F0	F0	-	F0	-	-	2.1	SGDV-2R8A01A	1	
750W	SGMAV-A5ADA67	2.6	-	-	F1	F0	-	-	-	-	-	-	-	4	SGDV-5R5A01A	1.5	

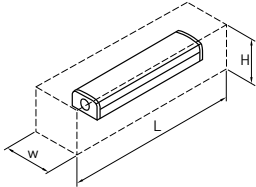
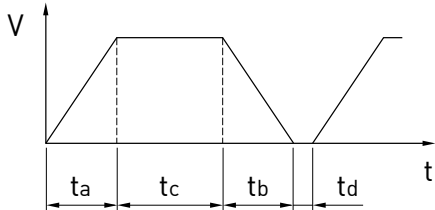
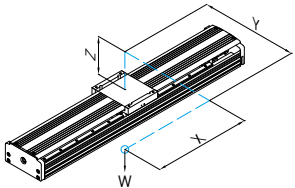
## Oriental Step Motor

Series	Model	Flange Selection											Built in Motor	Weight (kg)	Built in Motor	Weight (kg)
		KA100	KA136	KA170	KA200	KS100	KS140	KS180	KU060	KU080	KE050	KE065				
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	-	-	-	KK86-F6	-	-	KK86-F6	-	-	PK264-02A	0.45	CSD2120-P	0.12
	CSK266-AP	-	F6	-	-	-	KK86-F6	-	-	KK86-F6	-	-	PK266-02A	0.7	CSD2120-P	0.12
	CSK268-AP	-	F6	-	-	-	KK86-F6	-	-	KK86-F6	-	-	PK268-02A	1	CSD2120-P	0.12
	CSK296-AP	-	-	-	-	-	-	-	-	-	-	-	PK296-03A	1.7	CSD2145P	0.2
	CSK299-AP	-	-	-	-	-	-	-	-	-	-	-	PK299-03A	2.8	CSD2145P	0.2
	CSK2913-AP	-	-	-	-	-	-	-	-	-	-	-	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	-	-	-	KK86-F5	-	-	KK86-F5	-	-	PK564NAW	0.6	DFC5114P	0.2
	CFK566AP2	-	F5	-	-	-	KK86-F5	-	-	KK86-F5	-	-	PK566NAW	0.8	DFC5114P	0.2
	CFK569AP2	-	F5	-	-	-	KK86-F5	-	-	KK86-F5	-	-	PK569NAW	1.3	DFC5114P	0.2
	CFK566HAP2	-	F5	-	-	-	KK86-F5	-	-	KK86-F5	-	-	PK566HNAW	0.8	DFC5128P	0.22
	CFK569HAP2	-	F5	-	-	-	KK86-F5	-	-	KK86-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	-	-	-	KK86-F6	-	-	KK86-F6	-	-	PK264-02	0.45	UDK2120	0.47
	UMK266A	-	F6	-	-	-	KK86-F6	-	-	KK86-F6	-	-	PK266-02	0.7	UDK2120	0.47
	UMK268A	-	F6	-	-	-	KK86-F6	-	-	KK86-F6	-	-	PK268-02	1	UDK2120	0.47
RK 5 phase	RK543AA	-	-	-	-	-	-	-	-	-	-	-	PK543W	0.25	RKD507-A	0.4
	RK544AA	-	-	-	-	-	-	-	-	-	-	-	PK544W	0.3	RKD507-A	0.4
	RK545AA	-	-	-	-	-	-	-	-	-	-	-	PK545W	0.4	RKD507-A	0.4
	RK566AA	-	F5	-	-	-	KK86-F5	-	-	KK86-F5	-	-	PK566W	0.8	RKD514L-A	0.85
	RK569AA	-	F5	-	-	-	KK86-F5	-	-	KK86-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

# HIWIN Single Axis Robot Inquiry Form

Date: / /

Company		Dept.	
Name		Title	
Tel		E-Mail	
Fax		Address	

1. Tentative "K" model	
2. Effective stroke(mm)	
3. Positioning accuracy (mm)	
4. Repeatability (mm)	
5. Installation Method	<input type="checkbox"/> horizontal <input type="checkbox"/> vertical <input type="checkbox"/> upside down <input type="checkbox"/> incline <input type="checkbox"/> side installation <input type="checkbox"/> XY axis <input type="checkbox"/> XZ axis <input type="checkbox"/> XYZ axis <input type="checkbox"/> Gate <input type="checkbox"/> others (Please provide a drawing)
6. Special environment	<input type="checkbox"/> high temperature ____°C <input type="checkbox"/> low temperature ____°C <input type="checkbox"/> vibration <input type="checkbox"/> oil <input type="checkbox"/> water <input type="checkbox"/> clean room <input type="checkbox"/> corrosive chemical <input type="checkbox"/> humid <input type="checkbox"/> dust <input type="checkbox"/> others_____
7. Space limit(mm)	L _____ xW _____ xH _____ . 
8. Screw lead(mm)	_____mm
9. Max speed / acceleration	
10. Motor operation	 <div style="float: right;">           Max speed V= ____mm/s            ta= ____sec            tb= ____sec            tc= ____sec            td= ____sec         </div>
11. Load(kg)	_____kg( _____N)
12. Load direction	<input type="checkbox"/> offset <input type="checkbox"/> Pitching <input type="checkbox"/> Yawing <input type="checkbox"/> Rolling X _____ xY _____ xZ _____.      X= _____mm      Y= _____mm      Z= _____mm 
13. Expected service life	
14. Accessories	<input type="checkbox"/> motor <input type="checkbox"/> driver <input type="checkbox"/> coupling <input type="checkbox"/> limit switch <input type="checkbox"/> decelerator <input type="checkbox"/> XY connector <input type="checkbox"/> cable protection chain <input type="checkbox"/> others_____
15. Other comments	
16. Purpose	<input type="checkbox"/> transport <input type="checkbox"/> automatic dispenser <input type="checkbox"/> loader/unloader <input type="checkbox"/> testing equipment <input type="checkbox"/> transmit <input type="checkbox"/> others_____