



# Single Axis Robot

Technical Information



TAIWAN EXCELLENCE  
GOLD AWARD 2013

### Crossed Roller Bearings



TAIWAN EXCELLENCE  
SILVER AWARD 2006

### Torque Motor

Direct drive Motor



TAIWAN EXCELLENCE  
GOLD AWARD 2014, 2012, 2011,  
2009, 2008, 2005  
SILVER AWARD 2006, 2001, 1993

### Ballscrews

Ground/Rolled

- Super T Series
- High Speed [High Dm-N Value/Super S Series]
- For Heavy-Load Drive
- Ecological & Economical lubrication Module E2
- Rotating Nut (R1)
- Energy-Saving & Thermal-Controlling (C1)
- Recirculation Divide Series



AC Servo Motors  
AC Servo Drives



TAIWAN EXCELLENCE  
GOLD AWARD 2004

### Linear Motor

- Coreless Type (LMC)



TAIWAN EXCELLENCE 2002

### Linear Actuator

- LAN for Hospital
- LAM for Industrial
- LAS Compact Size
- LAK Controller



TAIWAN EXCELLENCE  
GOLD AWARD 2010, 2003

### Single Axis Robot

- For Semiconductor & Electronic (KK Series)
- For Automation (KS, KA Series)



TAIWAN EXCELLENCE  
SILVER AWARD 2009

### Linear Motor

Air Bearing Platform



TAIWAN EXCELLENCE  
GOLD AWARD 2008

SILVER AWARD 2007, 2002

### Linear Guideway

- HG/EG/RG/MG Type
- Ecological & Economical lubrication Module E2
- Low Noise (Q1)
- Air Jet (A1)



Positioning  
Measurement System



TAIWAN EXCELLENCE 2004

### Positioning Guideway



Linear Motor X-Y Robot  
Linear Motor Gantry

# Single Axis Robot

## Technical Information

### General Overview

P. 1



### KK Series

P. 9



### SK Series

P. 41



### KA Series

P. 53



### KS Series

P. 89



### KU Series

P. 109



### KE Series

P. 113



### Motor & Drive

P. 121



### Grease

P. 189

### Appendix

P. 193

# Single Axis Robot General Overview

## Warning

Single Axis Robots have both electrical and mechanical components, for safety, please read and follow all of the related precautions before selection and use. HIWIN is not held responsible for any malfunctions, damages, or accidents caused by the misuse of the product.

## Personal Safety

- Single Axis Robots are designed for industrial purposes only.
- During operation, the user should stay clear of the Single Axis Robots mechanical range of motion to avoid possible injury.
- When the motor power is ON, people with pacemakers should keep away at least one meter to avoid any disturbance.
- To prevent fires, Single Axis Robots should not be placed near the ignition of flammable gases.

## Storage and Installation

- Avoid any possible collisions or dropping of the product.
- When storing, it is recommended that the product be well packed and laid down flat. Do not expose the product to hot, cold or humid conditions.
- Do not disassemble or modify the products to avoid possible malfunctions or accidents.
- During installation, ensure the product is fixed correctly to avoid any loosening caused by vibrations.
- Take care when selecting the correct coupling and motor hardware for installation and be aware of the alignment to the centerline of the shaft when tightening the screws. Do not force the install.

## Operation

- The operation conditions need to be within the rated values as shown in the technical information.
- Avoid dust, debris and any foreign objects from entering the ball return system.
- Operational temperature should be under 80 °C. In high temperature environments above 80°C, please contact HIWIN sales.
- Confirm first with HIWIN sales if the product can be used in a special environment, such as: vacuum, vibration, clean room, corrosive chemicals, organic solvents, extreme high or low temperatures, humidity, liquid splashes, oil drops or mist, high salt, heavy load, vertical or cantilever installations.
- For vertical installations, when loaded, there is a possibility that the slider may fall. We recommend to adding proper braking and ensure functionality before operation.

## Maintenance

- Lubricate the product before the initial use. Note the type of grease used and avoid mixing different types together.
- For normal operating conditions, it is recommended to check the operation every 100km, clean and supply grease onto the rail and shaft.

## Introduction

The HIWIN Single Axis Robot module utilizes professional standard manufacturing technology developed over the years, with the ball screw and magnetic slide design module developed and produced by ourselves, HIWIN it is applicable to all types of automation equipment due to its features of easy installation, small size, high-precision and various specifications.



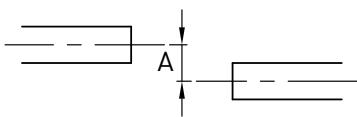
## Features

- Complete selection of Single Axis Robots and accessories.  
Drive Type: ballscrew, toothed belt  
AC motor output: 30W~750W servo motor or stepping motor  
Motor connection type (depends on available space): direct, bottom, internal, left, right  
Max stroke: Max stroke on belt is 3000mm, minimum stroke on KK, KA and KE is smaller than 100mm.
- Easy installation and maintenance.
- Customized designs available.
- Easy transformation into a multi-axis robot.

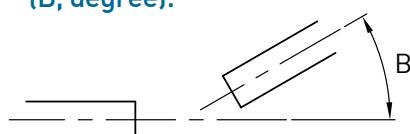
## Installation guide for motor flange, motor and coupling

- Three types of displacement may exist while installing the ballscrew with motor axis, which are shown as below.

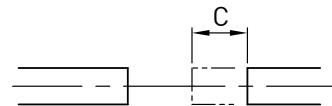
### 1. Radial displacement (A):



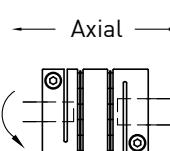
### 2. Angular displacement (B, degree):



### 3. Axial displacement(C):

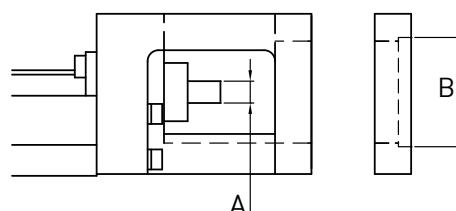


- Confirmation of axial alignment:



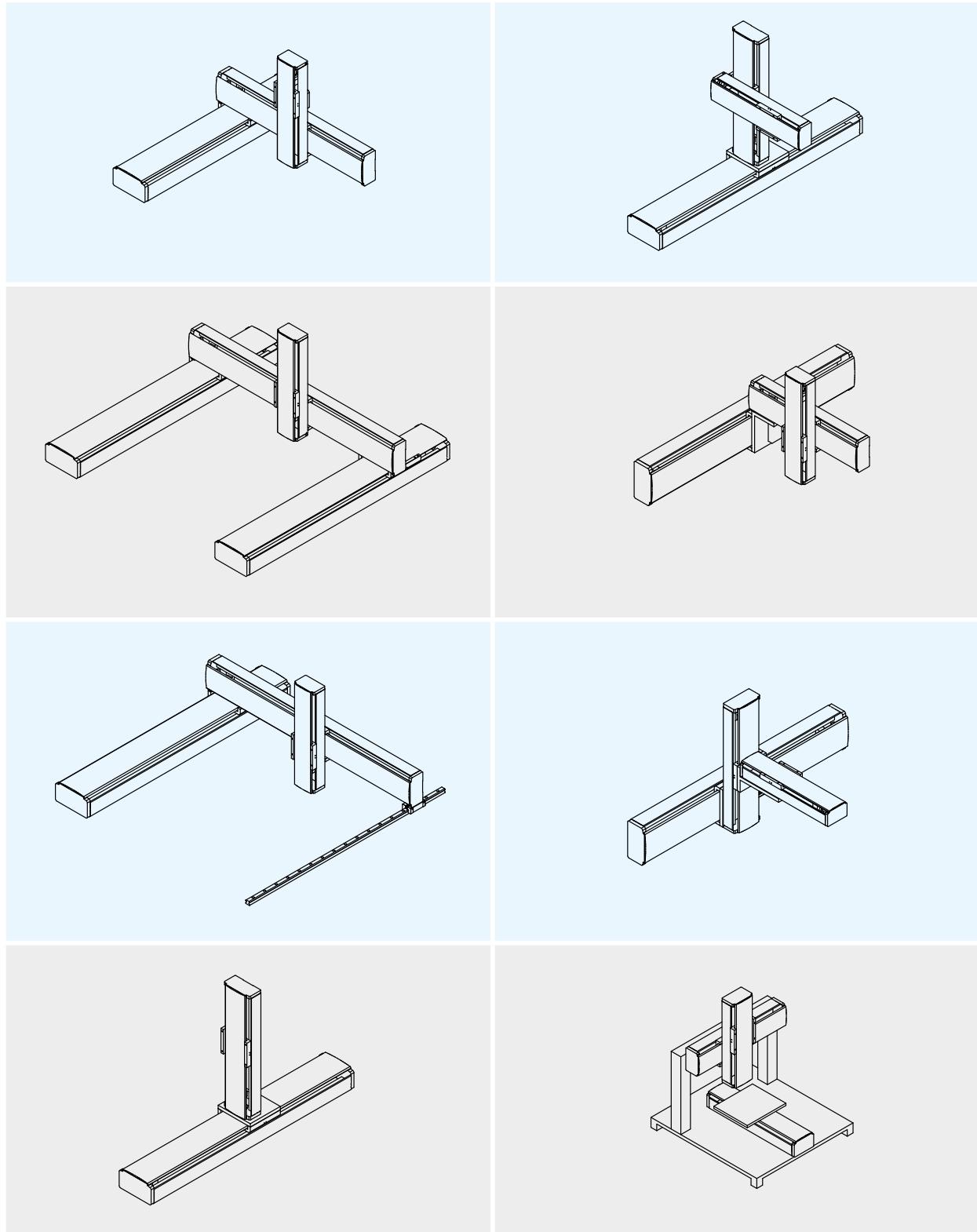
When the ballscrew shaft and motor are connected by a coupling, turn the coupling to confirm if it is capable of rotating without restrictions. This will ensure the concentricity of both axes. The illustration is shown as left.

- The use of a motor mounting jig might be necessary to make sure the ballscrew spindle end (A) and the positioning hole of the motor flange (B) are concentric. The illustration is shown below.



- Precaution:

1. During motor flange mounting, the displacement between ballscrew spindle end and the positioning hole of the motor flange should be controlled and also within the allowable displacement range of the chosen coupling.
2. The ballscrew spindle end could break if the displacement is beyond the allowable range limit or the coupling is mounted incorrectly.
3. Make sure the allowable displacement of the coupling is sufficient for your application, HIWIN recommends a Disk Type coupling. Please contact HIWIN with any questions regarding coupling installation or selection.



## Applications

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

## Classification

SPEC	KK High-precision	SK SynchMotion type	KA Lightweight	KS Advanced dustproof	KU High-rigidity dustproof	KE Basic dustproof
30	●					●
40	●					●
50	●					●
60	●	●			●	
65						●
70						●
80	●				●	
86	●	●				
90			●	●		●
100	●		●	●		
120			●	●		
130	●					
136			●			
140				●		
150			●	●		
170			●			
180				●		
200			●			

Note: KA100/136/170 and KS100/140/180 can also be belt driven for applications requiring high speed and long stroke.

## System Components

Single Axis Robot components include a motor, drive, and upper controller as demonstrated below. Our customers may choose from Hiwin's selection of excellent servo motors, stepping motors, and drives.



## Selection Process

When choosing an Single Axis Robot based on different conditions and restrictions, you may refer to the following selection process:

<b>1. User requirements</b>	<b>5. Motor load calculation</b>
<ul style="list-style-type: none"> <li><input type="radio"/> Effective stroke</li> <li><input type="radio"/> Location restrictions (width, height, length)</li> <li><input type="radio"/> Installation (horizontal, vertical, side mount)</li> <li><input type="radio"/> Position of gravity, center of loading</li> <li><input type="radio"/> Operating conditions (lead, speed, acceleration and deceleration, duty cycle)</li> <li><input type="radio"/> Environment (high temperature, vibration, oil, water, corrosion)</li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> Maximum speed</li> <li><input type="radio"/> Motor resolution</li> <li><input type="radio"/> Motor torque calculation</li> </ul>
<b>2. Demand for precision</b>	<b>6. Operation analysis</b>
<ul style="list-style-type: none"> <li><input type="radio"/> Position accuracy</li> <li><input type="radio"/> Repeatability</li> <li><input type="radio"/> Running parallelism</li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> Acceleration</li> <li><input type="radio"/> Actual operation mode (V-T diagram)</li> </ul>
<b>3. Configuration</b>	<b>7. Other accessories</b>
<ul style="list-style-type: none"> <li><input type="radio"/> Single axis</li> <li><input type="radio"/> Multi-axis</li> <li><input type="radio"/> Special combination</li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> The use of related accessories (limit switches, adapter plate, retractable sheath, the slip ring protection tube)</li> </ul>
<b>4. Motor selection</b>	<b>8. Final confirmation</b>
<ul style="list-style-type: none"> <li><input type="radio"/> AC servo motor</li> <li><input type="radio"/> Stepper motor</li> <li><input type="radio"/> With or without brake (included, plug-in)</li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> Conditions of use should be confirmed</li> <li><input type="radio"/> Price, deadline</li> <li><input type="radio"/> Alteration</li> <li><input type="radio"/> Special requirements</li> </ul>

For preliminary selection, you may refer to the following Single Axis Robot characteristics:

	<b>KK</b>	<b>KA</b>	<b>KS</b>	<b>KU</b>	<b>KE</b>
Precision	Great (repeatability, positioning, parallelism)	Normal (repeatability)	Normal (repeatability)	Normal (repeatability)	Normal (repeatability)
Load	Heavy	Medium	Medium	Medium	Low
Weight	Heavy	Light	Light	Light	Light
Customized (stroke, plateform)	Yes	Yes	Yes	Yes	Yes
Stiffness	Good (steel structure)	Normal (aluminum alloy base)	Normal (aluminum alloy base)	Normal (aluminum alloy base)	Low(guide way base)
Cover	Aluminum	Aluminum	Stainless	Stainless	Stainless
Cleanliness	Normal	Normal	Great (with vacuum )	Good	Good
Dust-proof	Normal	Normal	Good (fully covered)	Good (fully covered)	Good (fully covered)
Drive component	Ballscrew (heavy load, good precision)	Ballscrew, belt (long stroke, high speed)	Ballscrew, belt (long stroke, high speed)	Ballscrew (heavy load, good precision)	Ballscrew (good precision)
Connection between motor and ballscrew	Direct, by side belt	Direct, by side belt	Direct, by side belt	Direct	Direct
Inside motor location	No	Yes	Yes	No	No
Bellow	Yes (standard)	Yes (customized)	No	No	No
Mounting	Top	Bottom (or top)	Bottom	Any position (bottom, side)	Bottom

## Precision

### 1. Positioning accuracy

The maximum difference (absolute value) between the actual arrival distance and the reaching distance based on the original setting.

### 2. Repeatability of round-trip position (precision)

The maximum difference in the entire cycle. The difference in the positioning value measured from a setting position during the round trip movement of the Single Axis Robot's slider.

### 3. Running parallelism

- (1) The parallelism between Single Axis Robot module platform plane and module installation plane. Position the scale at the center of the slider, and then put the pointer on the installation plane. Finally, take the maximum deviation value measured in the full stroke as the result.
- (2) The parallelism between Single Axis Robot module platform and the installation datum. Position the scale at the center of the slider, and put the pointer on the installation datum. Finally, take the maximum deviation value measured in the full stroke as the result.

## Speed

### 1. Maximum linear velocity

The Single Axis Robot's maximum linear velocity (V) is calculated from the ballscrew speed (S) multiplied by the lead (L)  
 $V \text{ (mm/sec)} = S \text{ (rpm)} \div 60 \times L \text{ (mm)}$

### 2. Maximum rotational speed

The maximum allowable rotational speed of the ballscrew is decided by its critical rotational speed. If the ballscrew speed exceeds its critical speed it may result in resonance. Hence, the critical speed is related to the ballscrew length, the critical speed can help to determine the ballscrews effective stroke and total length.

The maximum allowable rotational speed of the ballscrew is calculated as follows:

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

Np = the maximum allowable rotation speed (rpm)  
Mf = breakdown of the assembly mounting type; KA uses fixed-support type; Mf=0.689  
dr = screw root diameter (mm)  
Lt = screw span between bearings (mm)

### 3. Acceleration/Deceleration

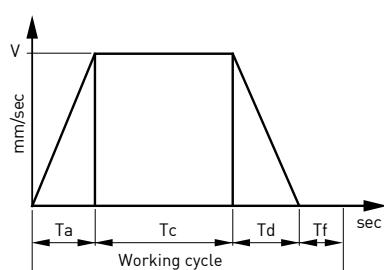
Speed is specified as the working speed of the sliding table. The sliding table must accelerate to the designated speed as it moves to its target position, in opposite, it must decelerate before it comes to a stop.

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

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

### 4. Working cycle

The SR system's working cycle is determined by the operator. The below diagram illustrates how the working cycle is generally calculated. The variables include acceleration time Ta, constant speed time Tc, deceleration time Td, and idling time Tf.



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

## Motor Loading Calculation

1. Confirm the moving conditions required by the loading mechanism, including acceleration, deceleration, the weight of the mechanism and it's movement.

2. Momentum loading calculation:

Momentum calculation for loads moving along a straight line

$$J_L = W \times \left( \frac{V}{2 \times \pi \times N \times 10} \right)^2 = W \times \left( \frac{\Delta S}{20 \times \pi} \right)^2$$

$J_L$  : Momentum of load, calculated to the motors axial output ( $\text{kg.cm}^2$ )

$V$  : Velocity of load along a straight line( $\text{mm/min}$ )

$\Delta S$  : Displacement of load per motor rotation( $\text{mm}$ )

$W$  : Weight of load ( $\text{kg}$ )

$N$  : Rotational speed of motor[ $\text{r/min}$ ]

3. Select suitable specification of motor with the proportional principle per the momentums between load and motor.

4. Calculate the acceleration and deceleration torques per the momentum of the selected motor combined with the momentum of the load.

$$\text{Acceleration torque: } T_a = \frac{(J_L + J_M) \times N}{9.55 \times 10^4 \times T_{psa}}$$

$$\text{Deceleration torque: } T_d = \frac{(J_L + J_M) \times N}{9.55 \times 10^4 \times T_{psd}}$$

$J_L$  : Momentum of load, calculated to the motors axial output ( $\text{kg.cm}^2$ )

$J_M$  : Momentum of motor ( $\text{kg.cm}^2$ )

$N$  : Rotational speed of motor ( $\text{r/min}$ )

$T_{psa}$  : Acceleration/deceleration time(s)

$T_{psd}$  : time (s)

5. Per the loads, installation methods, friction coefficients, and motor efficiency, calculate the torque at uniform motion.

$$T_L = \frac{F \times V}{2 \times 10^3 \times \pi \times \eta \times N} = \frac{F \times \Delta S}{2 \times 10^3 \times \pi \times \eta}$$

$F$  : Axial force moving along a straight line

$$F = FC + \mu \times (W \times g + FO)$$

$T_L$  : Load torque ( $\text{N.m}$ )

$FC$  : External force exerted in the axial direction ( $\text{N}$ )

$FO$  : External positive pressure exerted by the load onto the Single Axis Robot ( $\text{N}$ )

$W$  : Load (including sliding platform) ( $\text{kg}$ )

$\mu$  : Friction coefficient

$\eta$  : Mechanical efficiency

$V$  : Velocity of load in a straight line ( $\text{mm/min}$ )

$N$  : Rotational speed of motor ( $\text{r/min}$ )

$g$  : Gravity ( $9.8\text{m/s}^2$ )

$\Delta S$  : Displacement of load per motor rotation ( $\text{mm}$ )

6. The maximum output torque of the selected motor should be larger than the sum of the acceleration torque and load torque; if this condition is not met, the model number needs to be changed and calculated until the requirement is satisfied.

7. Obtain the continuous effective torque per the load torque, acceleration torque, deceleration torque, and continuous torque.

$$T_{RMS} = \sqrt{\frac{T_a^2 \times T_{psa} + T_L^2 \times t_c + T_d^2 \times T_{psd} + T_{LH}^2 \times t_h}{T_f}}$$

$T_{psa}$  : Acceleration time  $t_c$  : Constant speed time

$T_{psd}$  : Deceleration time  $t_h$  : Stop time

$T_f$  : Cycle time  $T_a$  : Acceleration torque

$T_L$  : Load torque  $T_d$  : Deceleration torque

$T_{LH}$  : Continuous torque (horizontal movement,  $T_{LH}=0$ )

8. The rated output torque of the selected motor should be larger than the continuous effective torque; if this condition is not met, the model number needs to be changed and calculated until the requirement is compliant.

## Installation

If the ballscrew is used in the vertical direction (Z axis), the load should be within the maximum value indicated for vertical loading. Vertical installation using timing belts is forbidden.

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

## Service life

For horizontal, side or slope (less than 30 degrees) orientation, the service life is dependent on the guideway, as for vertical orientation, the service life is dependent on the ballscrew or fixed bearing whichever one is shorter.

The listed dynamic load ( $F_y, F_z, M_x, M_y, M_z$ ) is based on a service life of 10,000km of travel. If the load is less than the loading condition ( $F_y/F_{yd} + F_z/F_{zd} + M_x/M_{xd} + M_y/M_{yd} + M_z/M_{zd} \leq 1$ ), the service life could be extended. If the load is over, the service life will be less than 10,000km. To ensure long term use, it is recommended that the loading be within the listed range.

## Maintenance

All the related accessories, ballscrew and guideway need to be maintained. After every 3 months or 100km travel distance, it is recommended to add grease to the ballscrew and guideway. Clean any dust or debris from the system. Replace the grease if there is any color change. If you have any further questions, please contact HIWIN.

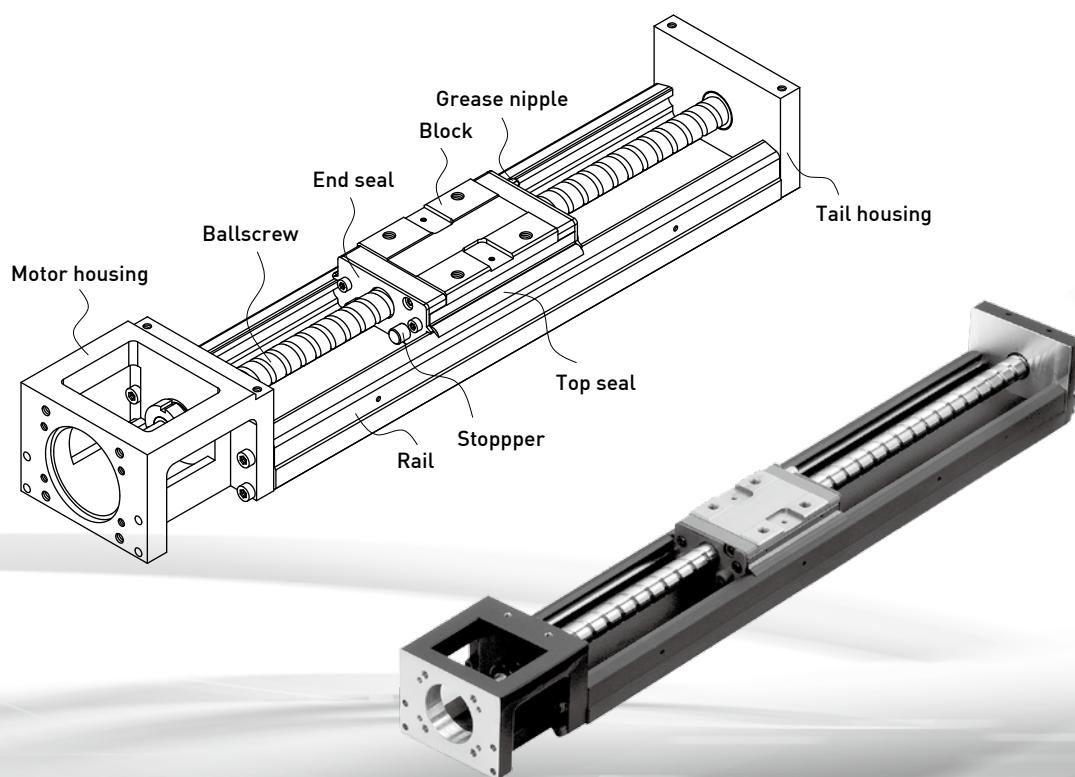
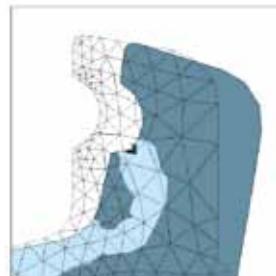
# Single Axis Robot

## KK Series

The HIWIN KK Single Axis Robot is driven by a ballscrew while a guideway slides on an optimized U-rail to achieve higher accuracy and greater stiffness.

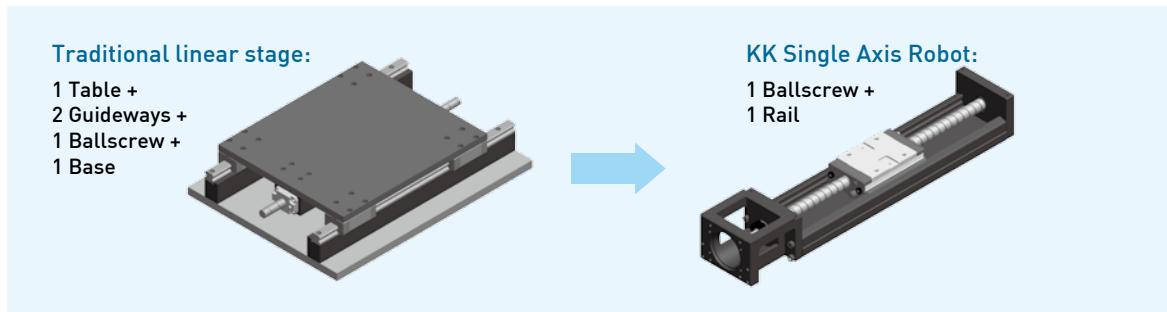
### 1.1 Features

- An integrated system
- Easy installation and maintenance
- Compact and lightweight
- High accuracy
- High stiffness
- Complete line of accessories



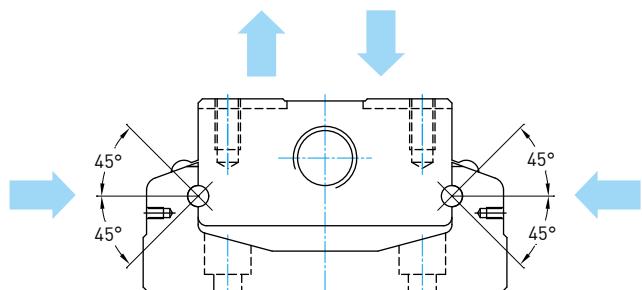
### 1.1.1 Modularization

The KK Single Axis Robot integrating a ballscrew and guideway forms a modularized product. The modularized design can help customers save time, cost and system inspection. Therefore, installation efficiency and a space-saving design are also promoted.



### 1.1.2 Equivalent Load

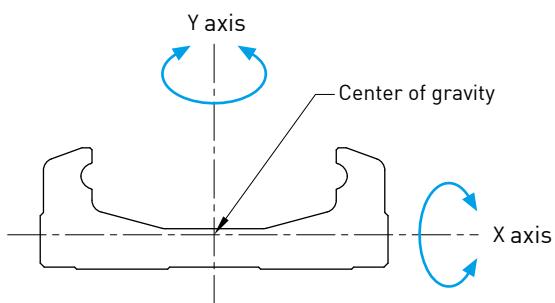
The gothic arch contact design sustains load from all directions and offers high rigidity and accuracy.



### 1.1.3 High Stiffness

Using finite element analysis on the U-shaped cross section allows the volume and rigidity to be made balanced, therefore, a high rigidity rail, compact design and a light weight design are also accomplished simultaneously.

Moment of inertia		Unit:mm <sup>4</sup>
Model no.	I <sub>x</sub>	I <sub>y</sub>
KK30	7.554 x 10 <sup>2</sup>	12.726 x 10 <sup>43</sup>
KK40	3.533 x 10 <sup>3</sup>	5.317 x 10 <sup>4</sup>
KK50	9.6 x 10 <sup>3</sup>	1.34 x 10 <sup>5</sup>
KK60	2.056 x 10 <sup>4</sup>	2.802 x 10 <sup>5</sup>
KK80	6.711 x 10 <sup>4</sup>	8.444 x 10 <sup>5</sup>
KK86	7.445 x 10 <sup>4</sup>	1.134 x 10 <sup>6</sup>
KK100	1.296 x 10 <sup>5</sup>	2.035 x 10 <sup>6</sup>
KK130	2.546 x 10 <sup>5</sup>	5.073 x 10 <sup>6</sup>



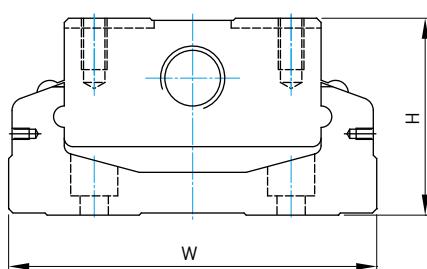
I<sub>x</sub> : Moment of inertia computed about X axis

I<sub>y</sub> : Moment of inertia computed about Y axis

### 1.1.4 Various Specification

KK Single Axis Robots of various specifications are developed, providing customers with different choices relating to space and loading conditions.

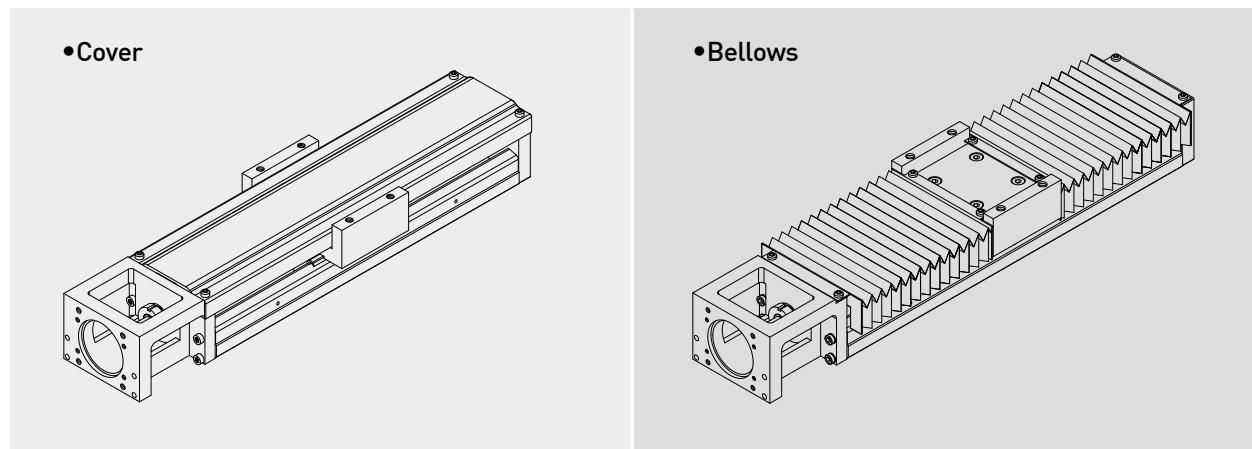
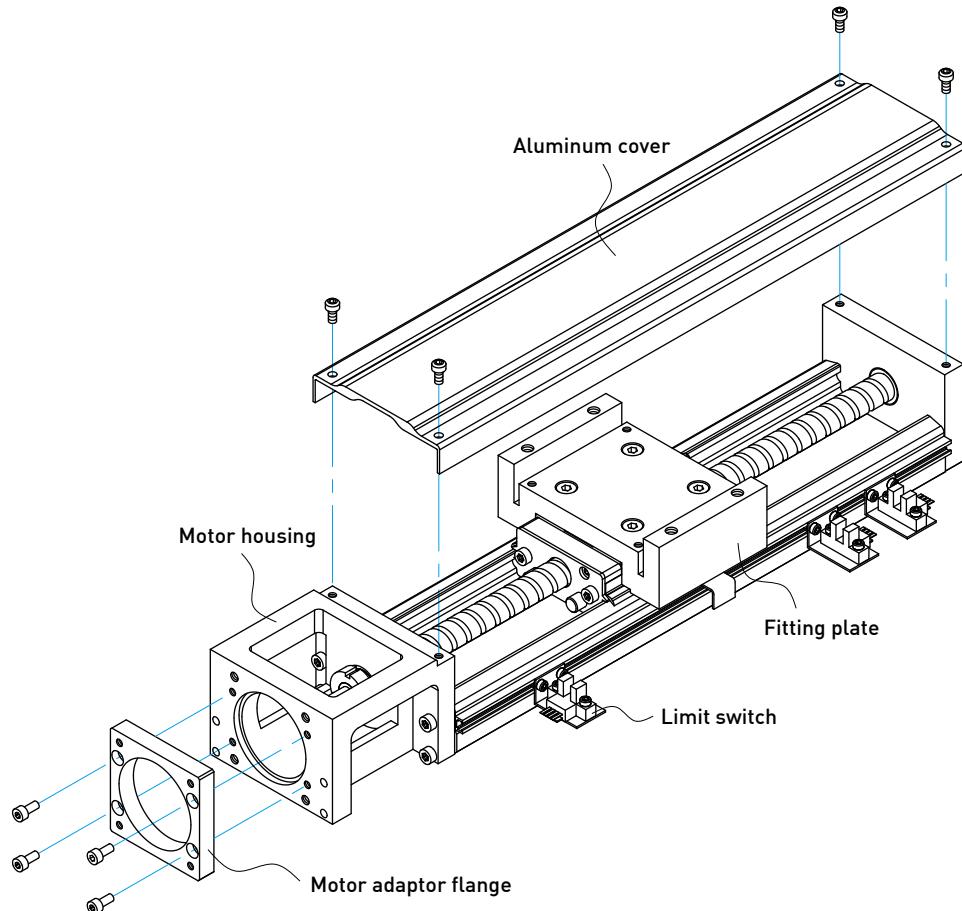
Model no.	W	H
KK30	30	15
KK40	40	20
KK50	50	26
KK60	60	33
KK80	80	45
KK86	86	46
KK100	100	55
KK130	130	65



## 1.2 Accessories

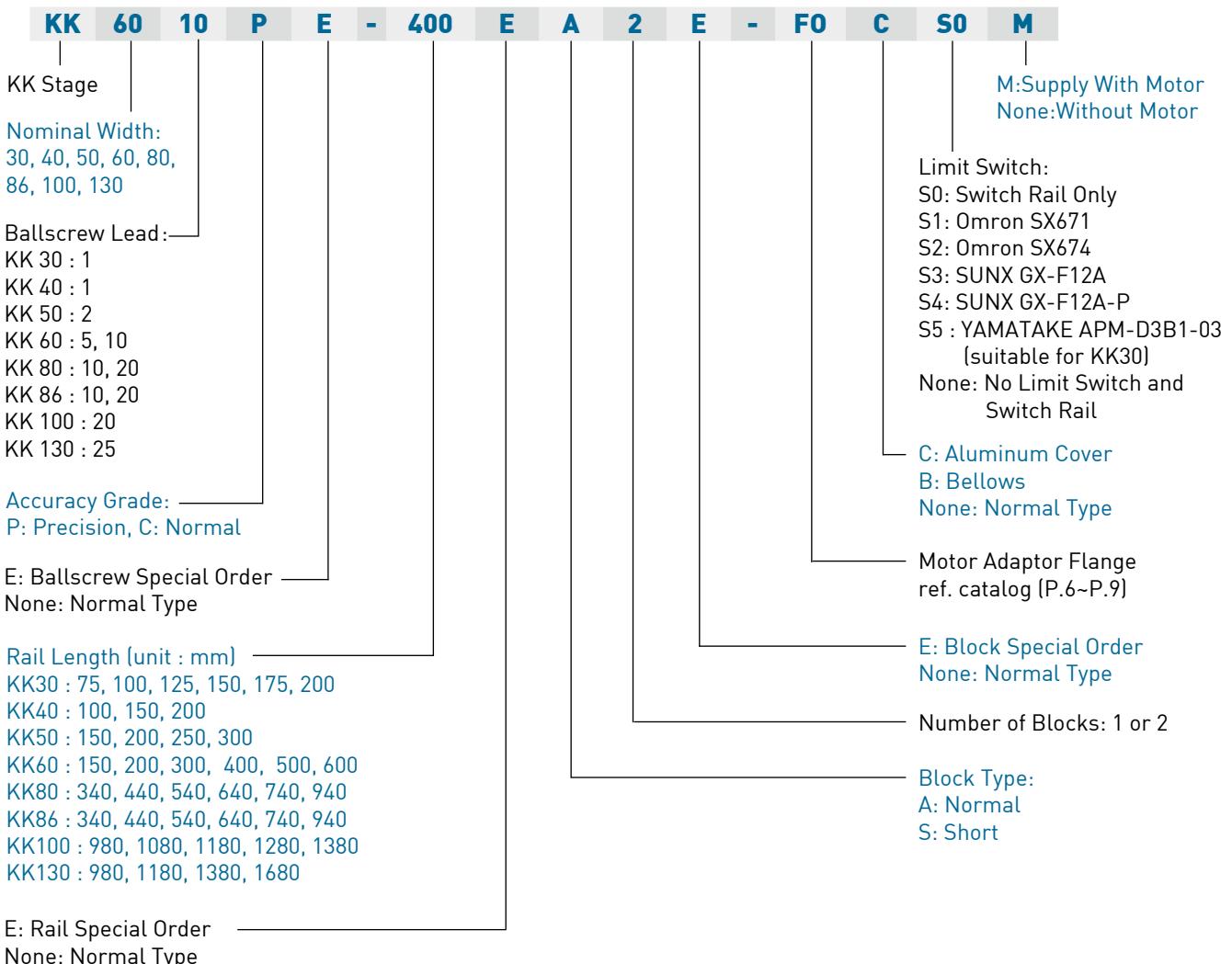
Accessories of KK Single Axis Robot are also supported for specific demands, such as an aluminum cover, bellows, motor adaptor flange and limit switchs.

- Aluminum cover and bellow: contamination protection
- Motor adaptor flange: connection for different types of motors
- Limit switchs: starting point, positioning and other safety matters

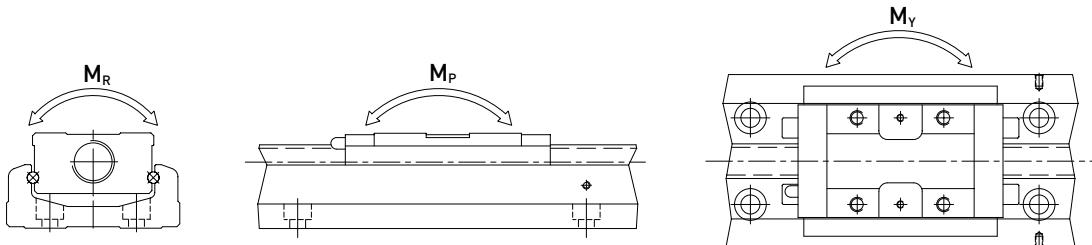


## 1.3 Model Number of KK Series

Example: KK6010P-400A1-F1CS0



## 1.4 Specifications



## 1.5 Accuracy Grade

Unit : mm

Model	Rail Length	Repeatability		Accuracy		Running Parallelism		Starting Torque(N-cm)	
		Precision	Normal	Precision	Normal	Precision	Normal	Precision	Normal
KK30	75	$\pm 0.003$	$\pm 0.004$	0.02	0.04	0.01	0.02	1.2	0.8
	100								
	125								
	150								
	175								
	200								
KK40	100	$\pm 0.003$	$\pm 0.01$	0.02	-	0.01	-	1.2	0.8
	150								
	200								
KK50	150	$\pm 0.003$	$\pm 0.01$	0.02	-	0.01	-	4	2
	200								
	250								
	300								
KK60	150	$\pm 0.003$	$\pm 0.01$	0.02	-	0.01	-	15	7
	200								
	300								
	400	$\pm 0.003$	$\pm 0.01$	0.025	-	0.015	-	15	7
	500								
	600								
KK80	340	$\pm 0.003$	$\pm 0.01$	0.025	-	0.015	-	15	10
	440								
	540								
	640								
	740	$\pm 0.003$	$\pm 0.01$	0.03	-	0.02	-	17	10
	940	$\pm 0.003$	$\pm 0.01$	0.04	-	0.03	-	25	10
KK86	340	$\pm 0.003$	$\pm 0.01$	0.025	-	0.015	-	15	10
	440								
	540								
	640								
	740	$\pm 0.003$	$\pm 0.01$	0.03	-	0.02	-	17	10
	940	$\pm 0.003$	$\pm 0.01$	0.04	-	0.03	-	25	10
KK100	980	$\pm 0.005$	$\pm 0.01$	0.035	-	0.025	-	17	12
	1080	$\pm 0.005$	$\pm 0.01$	0.04	-	0.03	-	20	12
	1180	$\pm 0.005$	$\pm 0.01$	0.04	-	0.03	-	23	15
	1280	$\pm 0.005$	$\pm 0.01$	0.045	-	0.035	-	25	
	1380			0.05		0.04		27	18
KK130	980	$\pm 0.005$	$\pm 0.01$	0.035	-	0.025	-	25	15
	1180			0.04		0.03		25	15
	1380								
	1680	$\pm 0.007$	$\pm 0.012$	0.05	-	0.04	-	27	18

## 1.6 Maximum Speed Limit

Model	Ballscrew Lead (mm)	Rail Length (mm)	Speed (mm/sec)	
			Precision	Normal
KK30	01	75	160	160
		100	160	160
		125	160	160
		150	160	160
		175	160	160
		200	160	160
KK40	01	100	190	190
		150	190	190
		200	190	190
KK50	02	150	270	270
		200	270	270
		250	270	270
		300	270	270
KK60	05	150	550	390
		200	550	390
		300	550	390
		400	550	390
		500	550	390
		600	340	340
	10	150	1100	790
		200	1100	790
		300	1100	790
		400	1100	790
		500	1100	790
		600	670	670
KK80	10	340	740	520
		440	740	520
		540	740	520
		640	740	520
		740	740	520
		940	610	430
		340	1480	1050
	20	440	1480	1050
		540	1480	1050
		640	1480	1050
		740	1480	1050
		940	1220	870
		340	740	520
		440	740	520
KK86	10	540	740	520
		640	740	520
		740	740	520
		940	610	430
		340	1480	1050
		440	1480	1050
	20	540	1480	1050
		640	1480	1050
		740	1480	1050
		940	1220	870
		340	740	520
		440	740	520
KK100	20	980	1120	800
		1080	980	800
		1180	750	750
		1280	630	630
		1380	530	530
KK130	25	980	1120	800
		1180	1120	800
		1380	830	800
		1680	550	550

## 1.7 Life Calculations

### 1.7.1 Service Life

Under repeated stress between the raceway and the rolling elements, pitting and flaking will occur as it reaches fatigue failure. The service life of the KK Single Axis Robot is defined as the distance traveled before any failure of the raceway or rolling elements appear.

### 1.7.2 Nominal Life (L)

The service life varies greatly even when the KK units are manufactured in the same way or operated under the same conditions. For this reason, nominal life is used as the criteria for predicting the service life of a KK unit.

### 1.7.3 Nominal Life Calculation

The calculating formulas are divided into two parts, guideway and ballscrew. The smaller value of the two would be the recommended nominal life of the KK unit.

Nominal life formulas for both the guideway and ballscrew depend on several parameters and are shown below.

#### Guideway

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

$L$  : Life Rating (km)  
 $f_t$  : Contact Coefficient (ref. Table 1)  
 $f_w$  : Loading Coefficient (ref. Table 2)

$C$  : Basic Dynamic Load Rating (N)  
 $P_n$  : Calculated Loading (N)

Table 1

Block Type	Contact Coefficient $f_t$
A1, S1	1.0
A2, S2	0.81

Table 2

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

#### Ballscrew and Bearing

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

$L$  : Life Rating (rev.)  
 $f_w$  : Loading Coefficient (ref. Table 2)

$C_a$  : Basic Dynamic Load Rating (N)  
 $P_{a,n}$  : Axial Loading (N)

## 1.8 Lubrication

Insufficient lubrication of the guideway would lead to a reduction of the service life.

The lubricant provides the following functions:

- Reducing rolling friction and avoiding abrasion
- Providing a lubricating film and extending the service life
- Anti-rusting

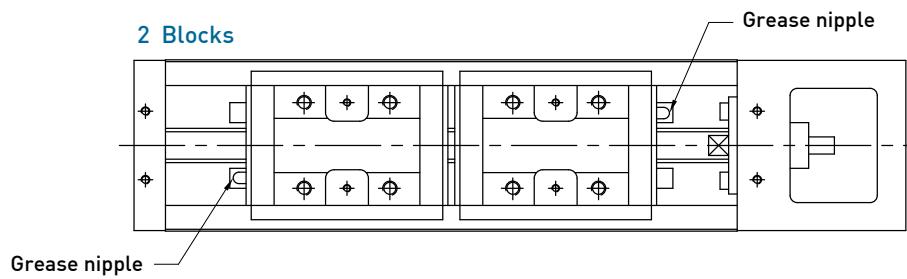
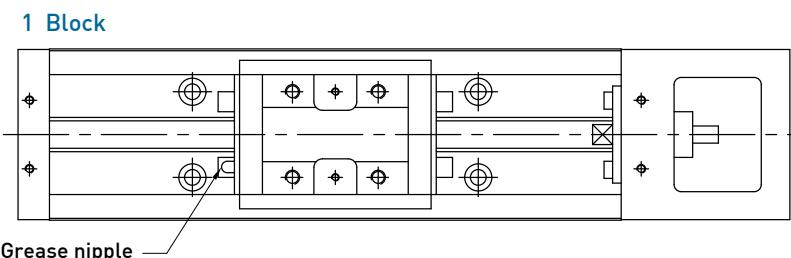
### 1.8.1 Lubricating Grease

Re-lubricating the KK Single Axis Robot every 100km is recommended. Generally, grease is applied for speeds under 60 m/min. For operating speeds over 60 m/min, a grease with a higher viscosity should be used.

$$T = \frac{100 \times 1000}{V_e \times 60} \quad T : \text{Lubricating frequency (hrs)}$$

$V_e$  : Speed (m/min)

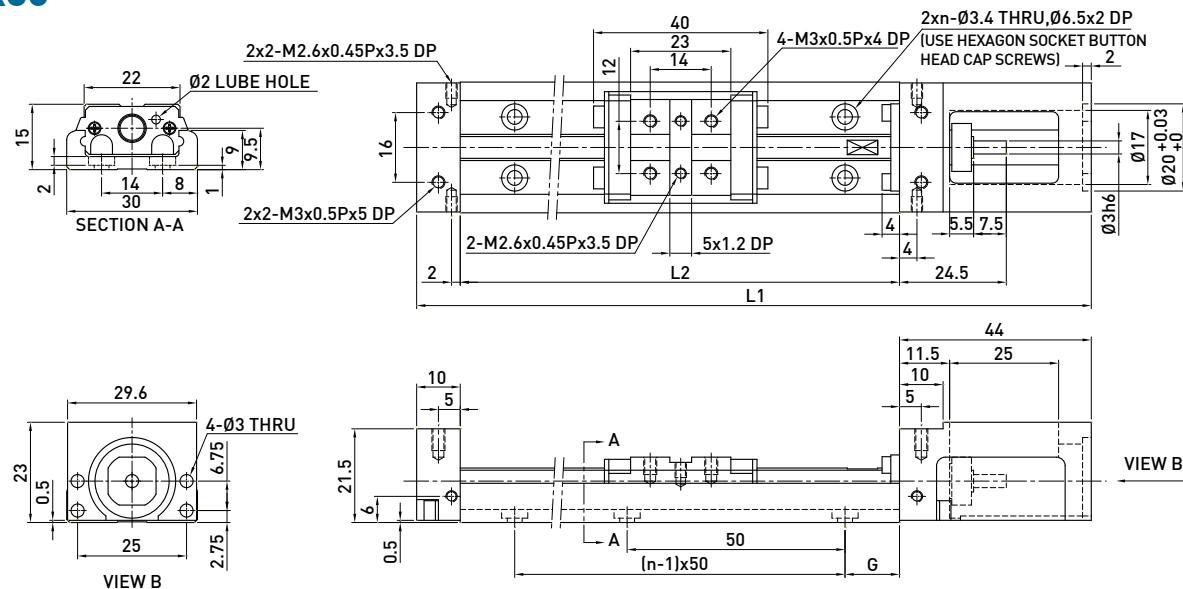
### 1.8.2 Grease Nipple



## 1.9 Dimensions

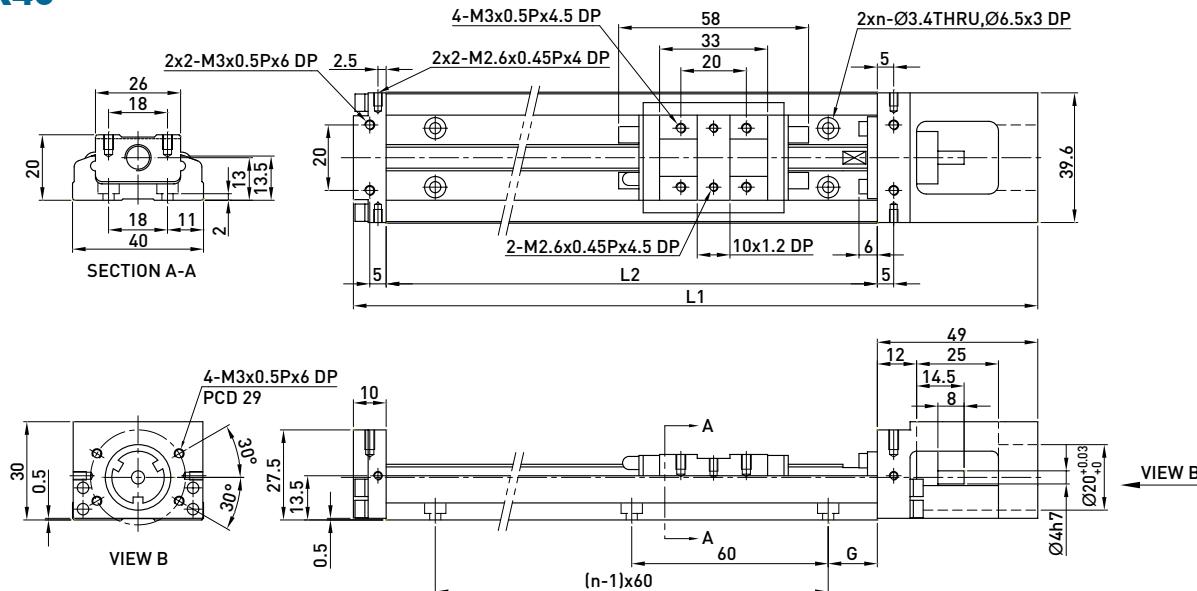
### 1.9.1 Without cover

#### KK30



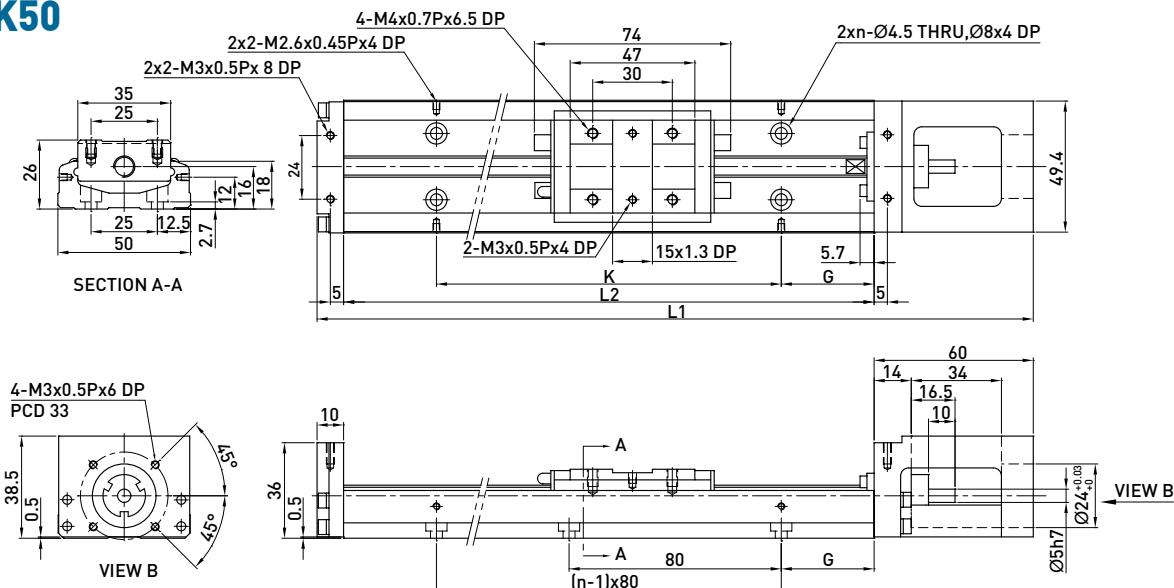
Rail Length L2 [mm]	Total Length L1 [mm]	Maximum Stroke (mm)		G (mm)	n	Mass (kg)	
		A1 Block	A2 Block			A1 Block	A2 Block
75	129	31	-	12.5	2	0.2	-
100	154	56	-	25	2	0.23	-
125	179	81	45	12.5	3	0.26	0.3
150	204	106	70	25	3	0.29	0.33
175	229	131	95	12.5	4	0.32	0.36
200	254	156	120	25	4	0.35	0.39

#### KK40



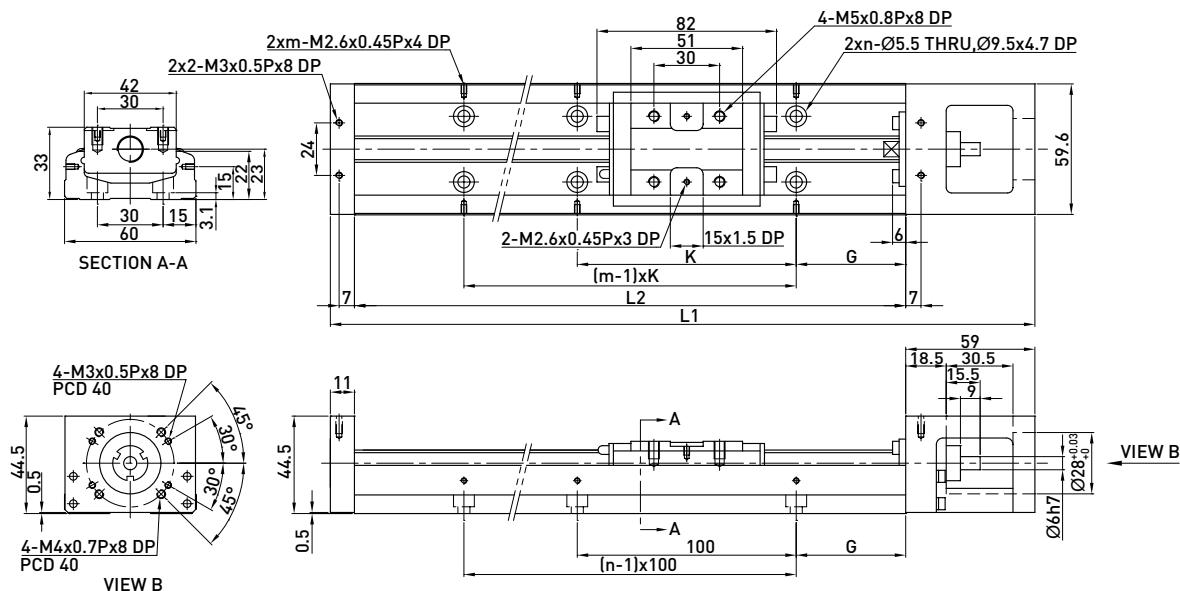
Rail Length L2 [mm]	Total Length L1 [mm]	Maximum Stroke (mm)		G (mm)	n	Mass (kg)	
		A1 Block	A2 Block			A1 Block	A2 Block
100	159	36	-	20	2	0.48	-
150	209	86	34	15	3	0.6	0.67
200	259	136	84	40	3	0.72	0.79

## KK50



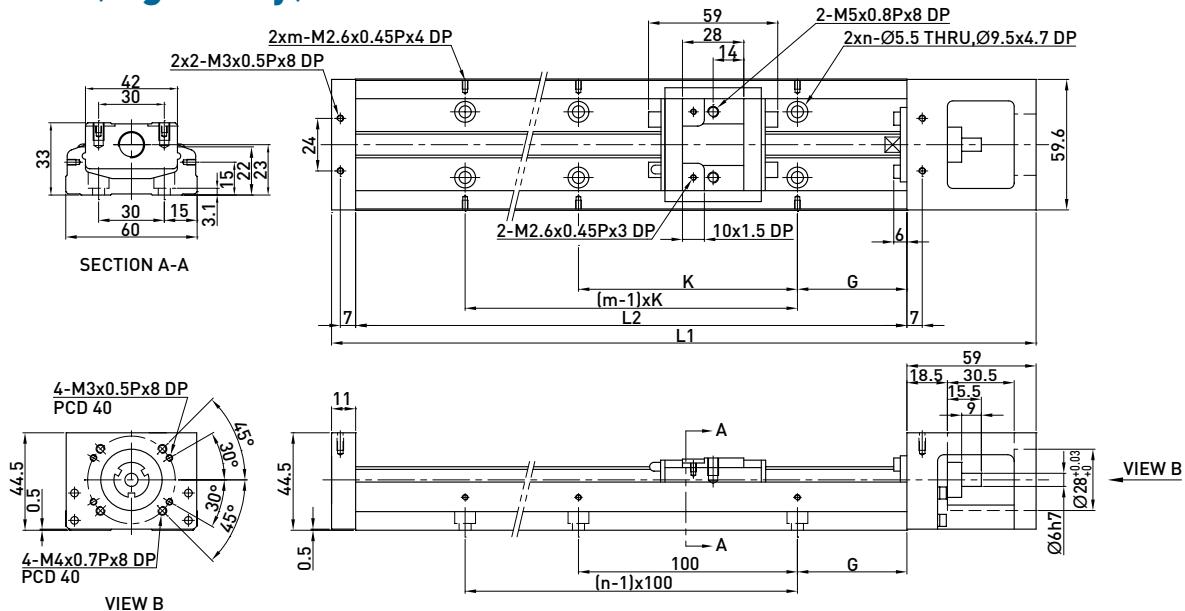
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
150	220	70	-	35	80	2	1	-
200	270	120	55	20	160	3	1.2	1.4
250	320	170	105	45	160	3	1.4	1.6
300	370	220	155	30	240	4	1.6	1.8

## KK60 (Standard)



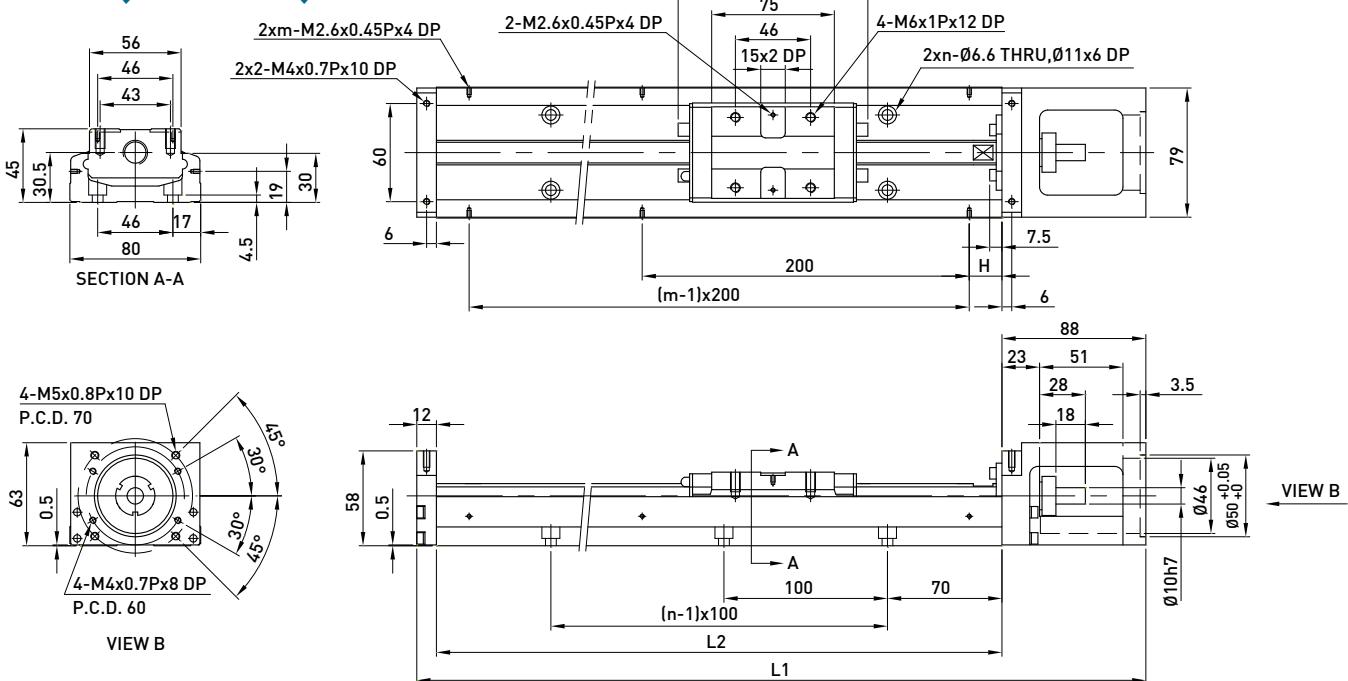
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
150	220	60	-	25	100	2	2	1.5	-
200	270	110	-	50	100	2	2	1.8	-
300	370	210	135	50	200	3	2	2.4	2.7
400	470	310	235	50	100	4	4	3	3.3
500	570	410	335	50	200	5	3	3.6	3.9
600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

Note: Special ballscrew spindle end of 8 mm diameter is available, please contact hiwin if necessary.

**KK60 (Light Duty)**

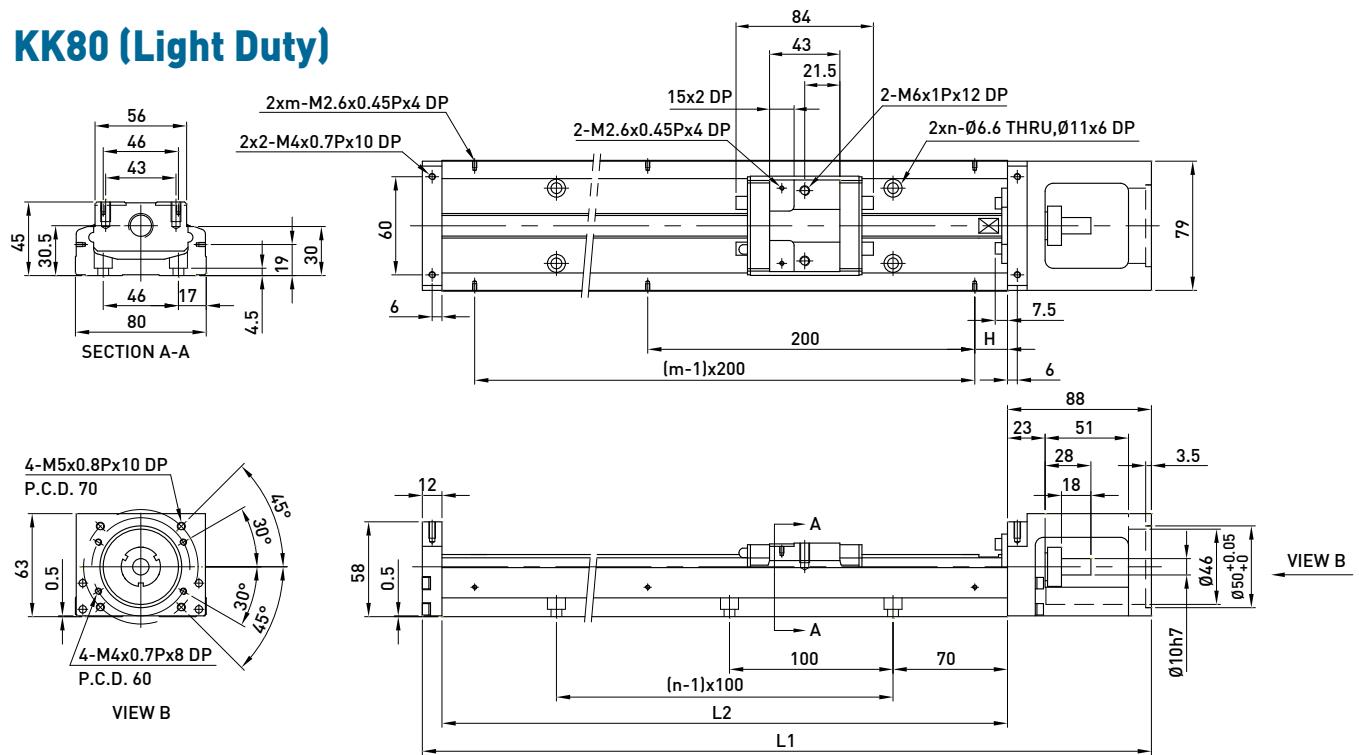
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		G (mm)	K (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block					S1 Block	S2 Block
150	220	85	34	25	100	2	2	1.4	1.6
200	270	135	84	50	100	2	2	1.7	1.9
300	370	235	184	50	200	3	2	2.3	2.5
400	470	335	284	50	100	4	4	2.9	3.1
500	570	435	384	50	200	5	3	3.5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

Note: Special ballscrew spindle end of 8 mm diameter is available, please contact hiwin if necessary.

**KK80 (Standard)**

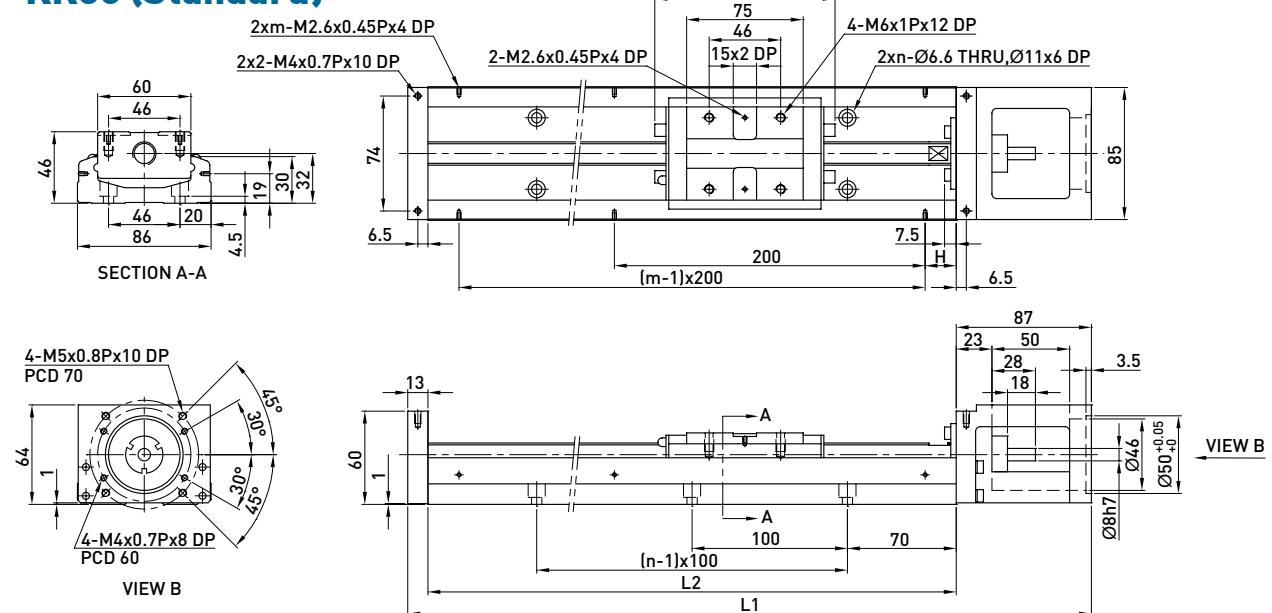
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
340	440	216.5	108.5	70	3	2	5.3	6
440	540	316.5	208.5	20	4	3	6.5	7.2
540	640	416.5	308.5	70	5	3	7.6	8.3
640	740	516.5	408.5	20	6	4	8.8	9.5
740	840	616.5	508.5	70	7	4	10	10.7
940	1040	816.5	708.5	70	9	5	12.4	13.1

## KK80 (Light Duty)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block				S1 Block	S2 Block
340	440	248.5	172.5	70	3	2	5	5.4
440	540	348.5	272.5	20	4	3	6.2	6.6
540	640	448.5	372.5	70	5	3	7.3	7.7
640	740	548.5	472.5	20	6	4	8.5	8.9
740	840	648.5	572.5	70	7	4	9.7	10.1
940	1040	848.5	772.5	70	9	5	12.1	12.5

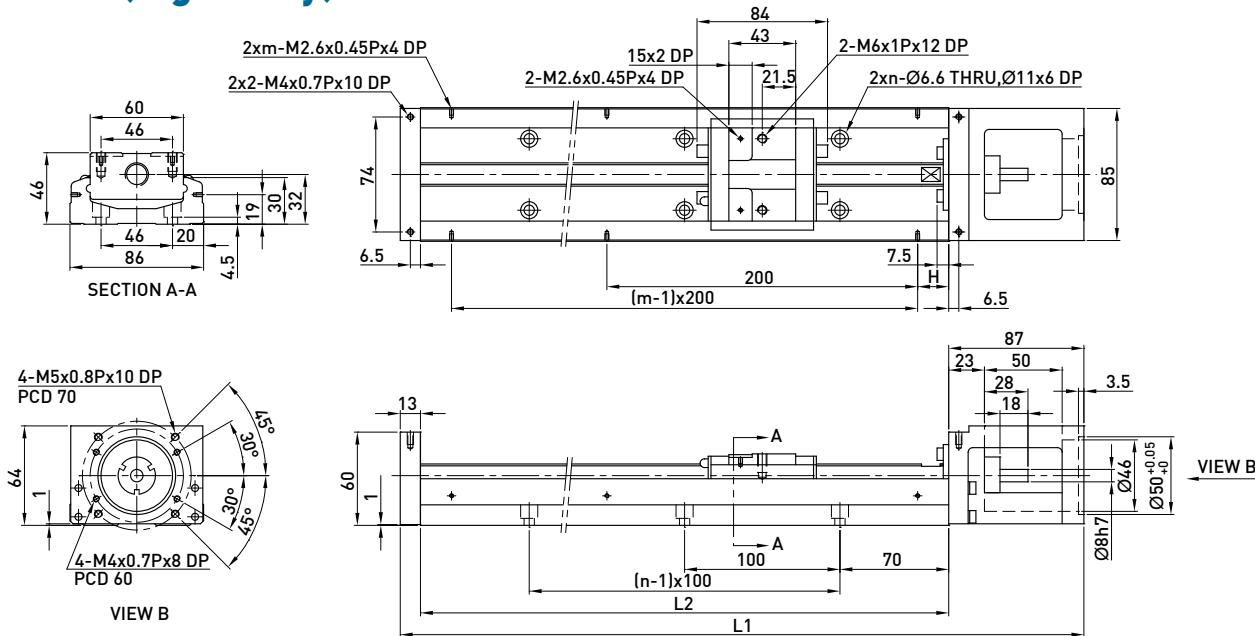
## KK86 (Standard)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
340	440	216.5	108.5	70	3	2	5.7	6.5
440	540	316.5	208.5	20	4	3	6.9	7.7
540	640	416.5	308.5	70	5	3	8.0	8.8
640	740	516.5	408.5	20	6	4	9.2	10.0
740	840	616.5	508.5	70	7	4	10.4	11.2
940	1040	816.5	708.5	70	9	5	11.6	12.4

Note: Special ballscrew spindle end of 10 mm diameter is available, please contact hiwin if necessary.

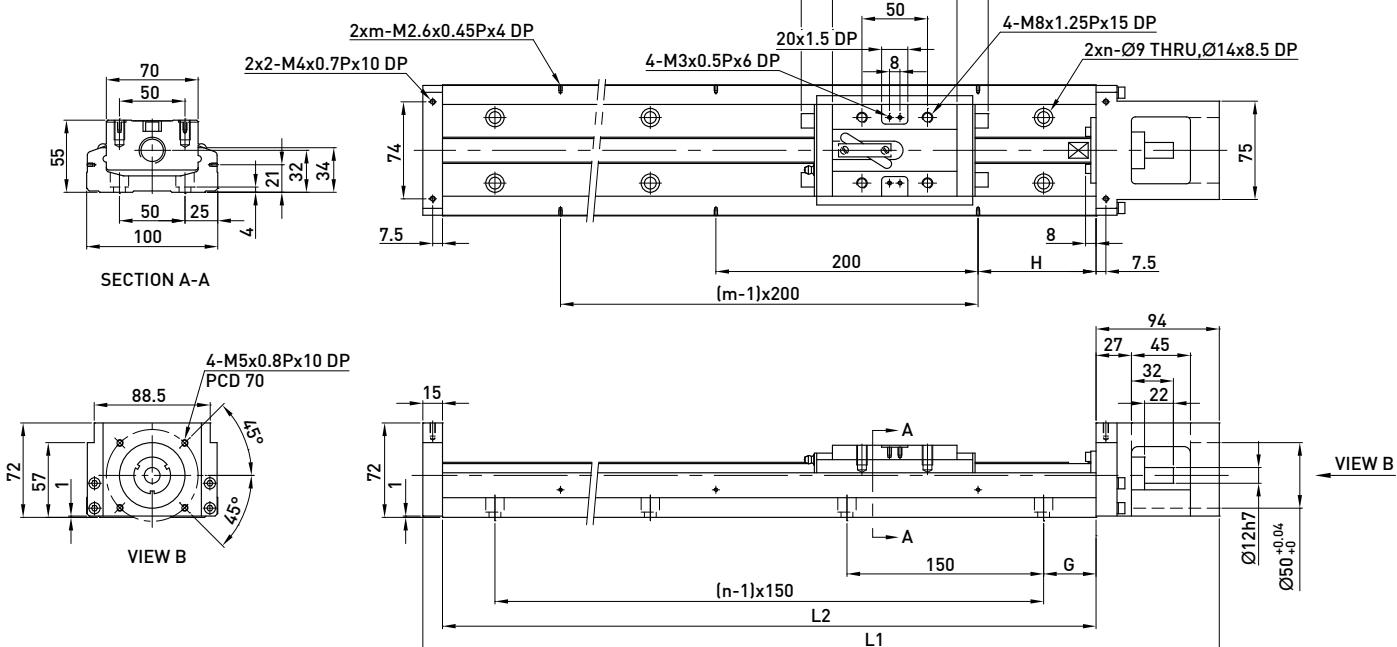
## KK86 (Light Duty)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block				S1 Block	S2 Block
340	440	248.5	172.5	70	3	2	5.4	5.9
440	540	348.5	272.5	20	4	3	6.6	7.1
540	640	448.5	372.5	70	5	3	7.7	8.2
640	740	548.5	472.5	20	6	4	8.9	9.4
740	840	648.5	572.5	70	7	4	10.1	10.6
940	1040	848.5	772.5	70	9	5	11.3	11.8

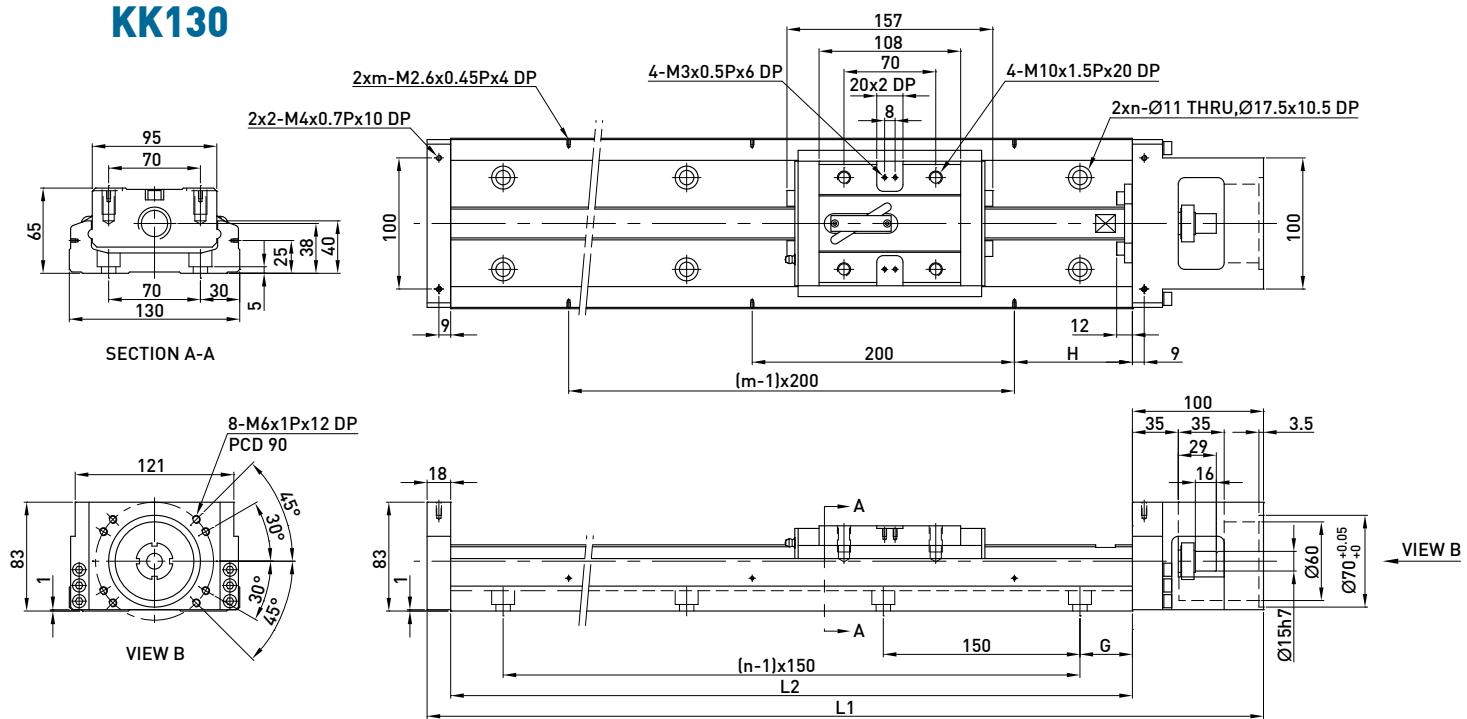
Note: Special ballscrew spindle end of 10 mm diameter is available, please contact hiwin if necessary.

## KK100



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

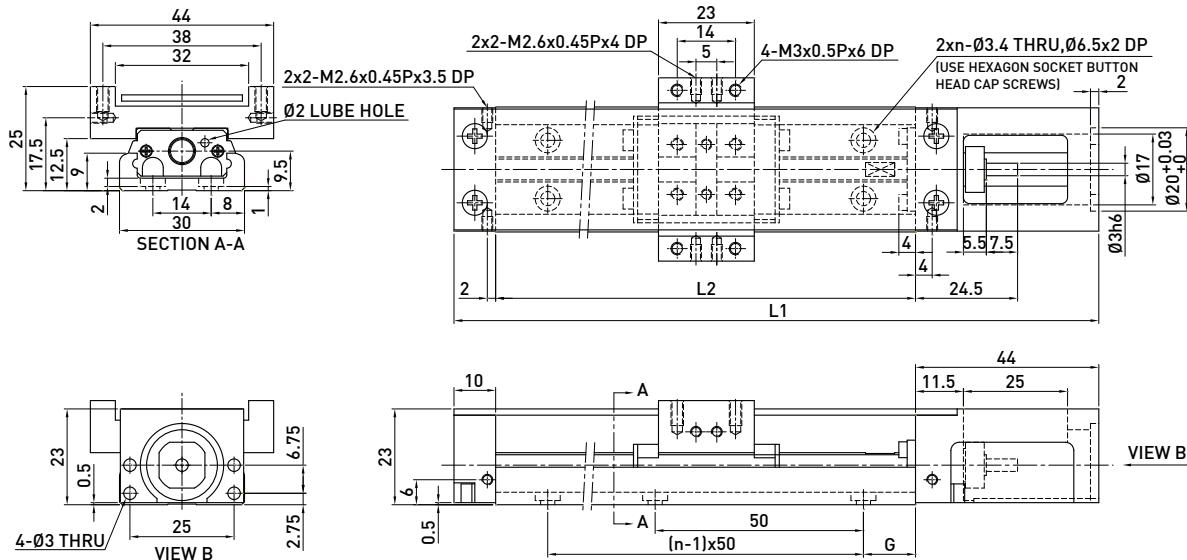
## KK130



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

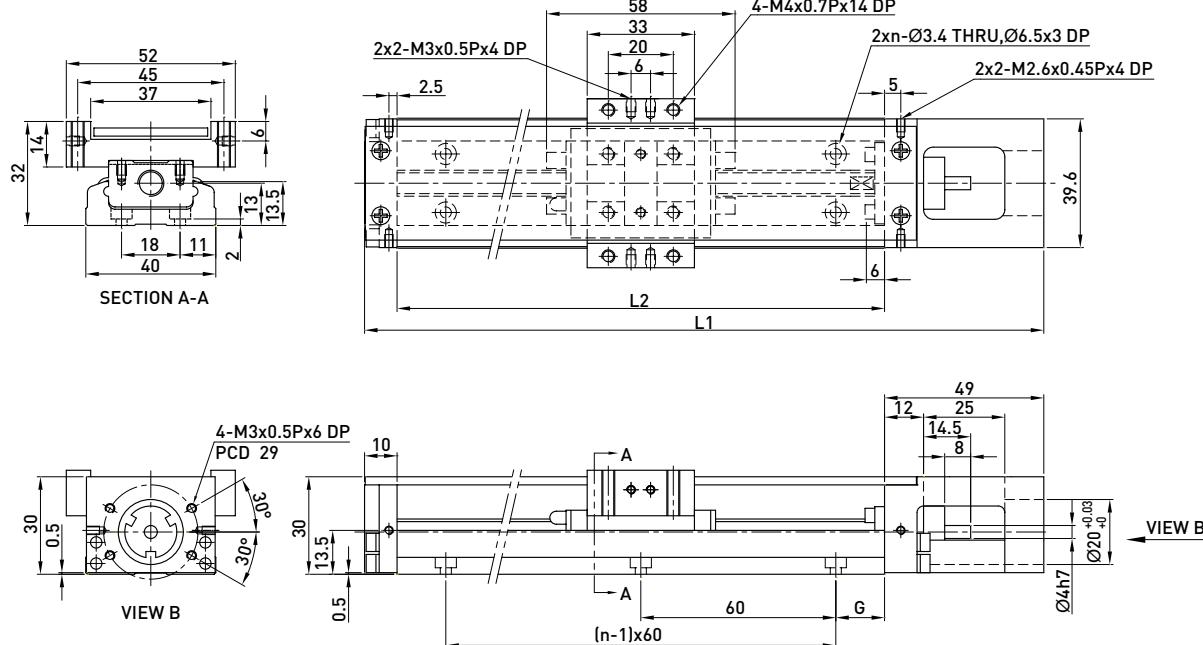
## 1.9.2 With cover

### KK30



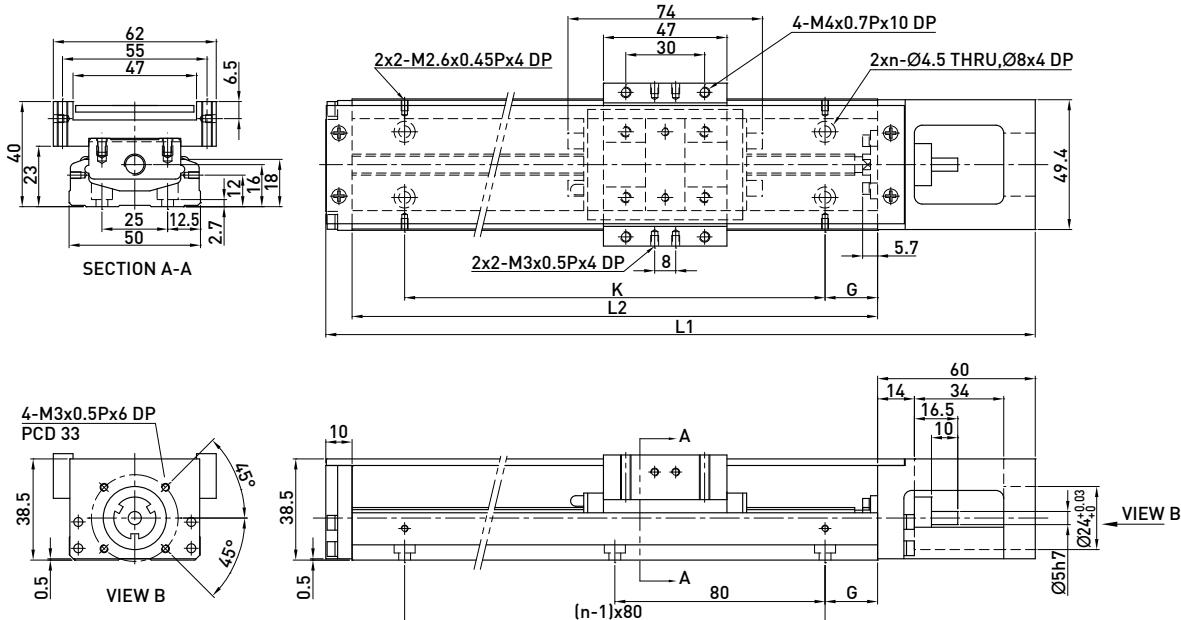
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke [mm]		G (mm)	n	Mass (kg)	
		A1 Block	A2 Block			A1 Block	A2 Block
75	129	31	-	12.5	2	0.2	-
100	154	56	-	25	2	0.23	-
125	179	81	45	12.5	3	0.26	0.3
150	204	106	70	25	3	0.29	0.33
175	229	131	95	12.5	4	0.32	0.36
200	254	156	120	25	4	0.35	0.39

### KK40



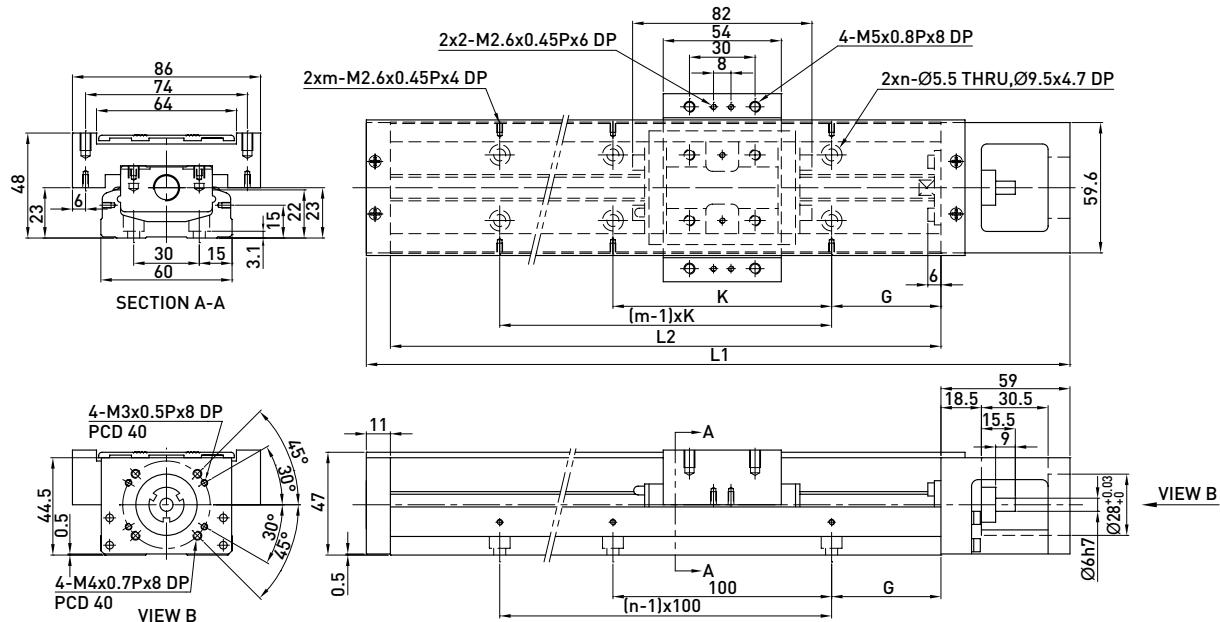
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke [mm]		G (mm)	n	Mass (kg)	
		A1 Block	A2 Block			A1 Block	A2 Block
100	159	36	-	20	2	0.55	-
150	209	86	34	15	3	0.68	0.76
200	259	136	84	40	3	0.82	0.89

## KK50



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

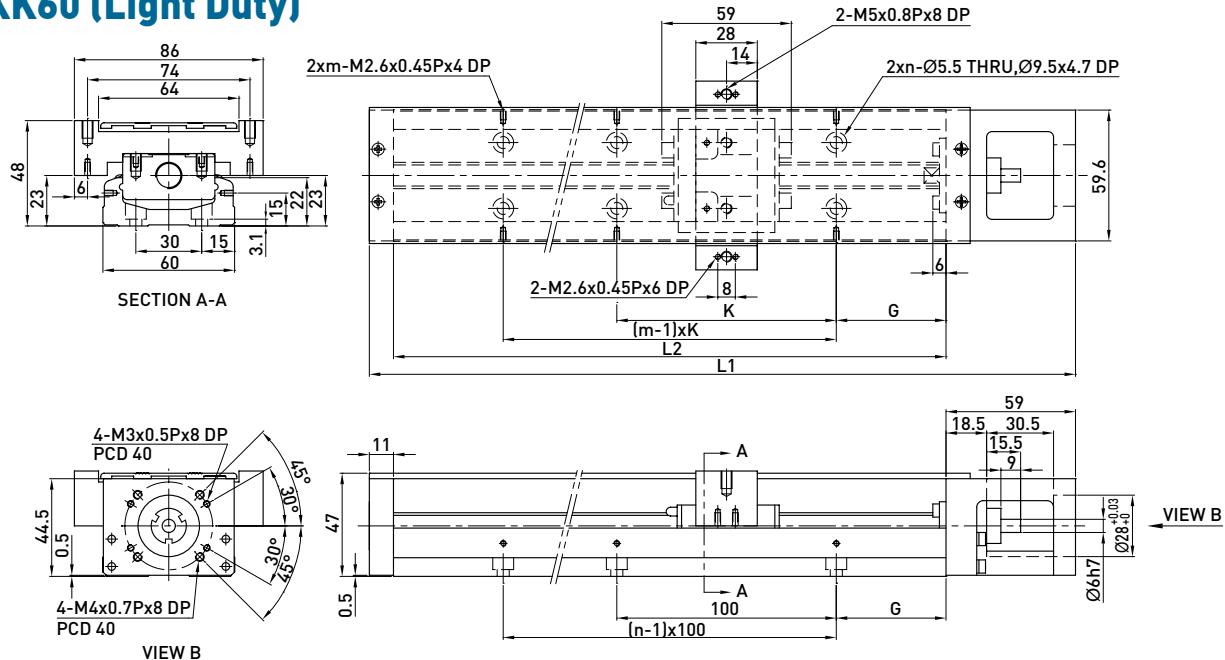
## KK60 (Standard)



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

Note: Special ballscrew spindle end of 8 mm diameter is available, please contact hiwin if necessary.

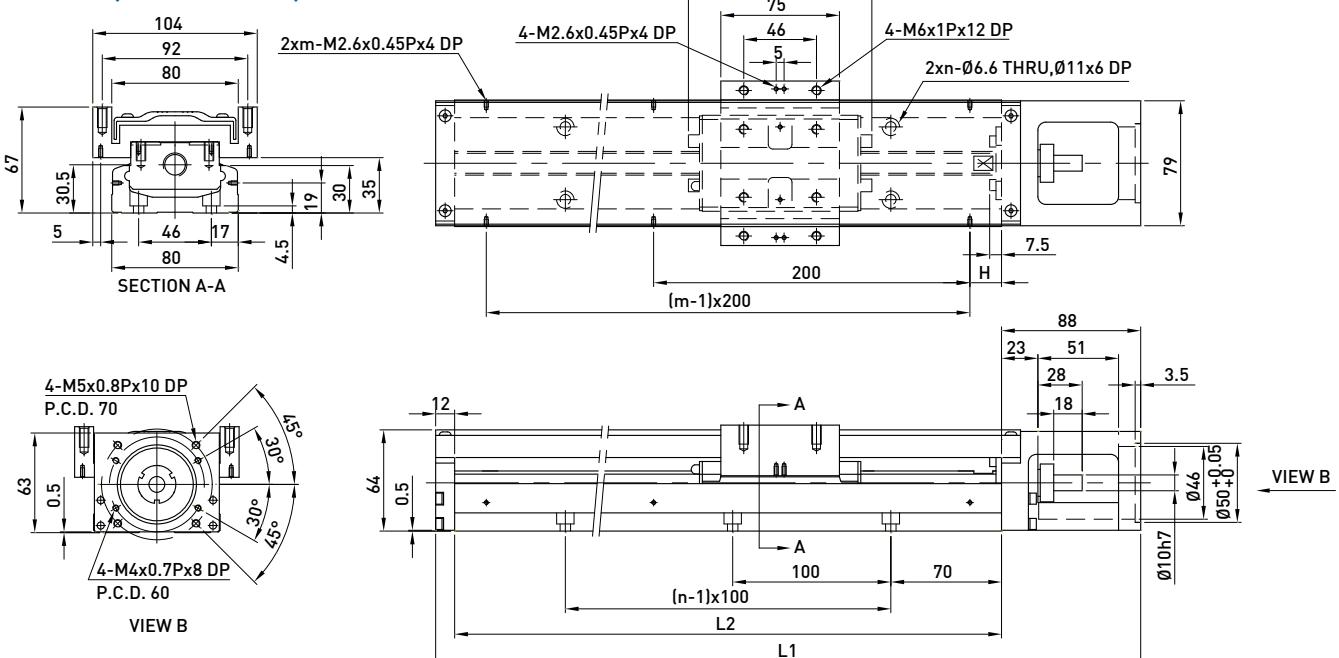
## KK60 (Light Duty)



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

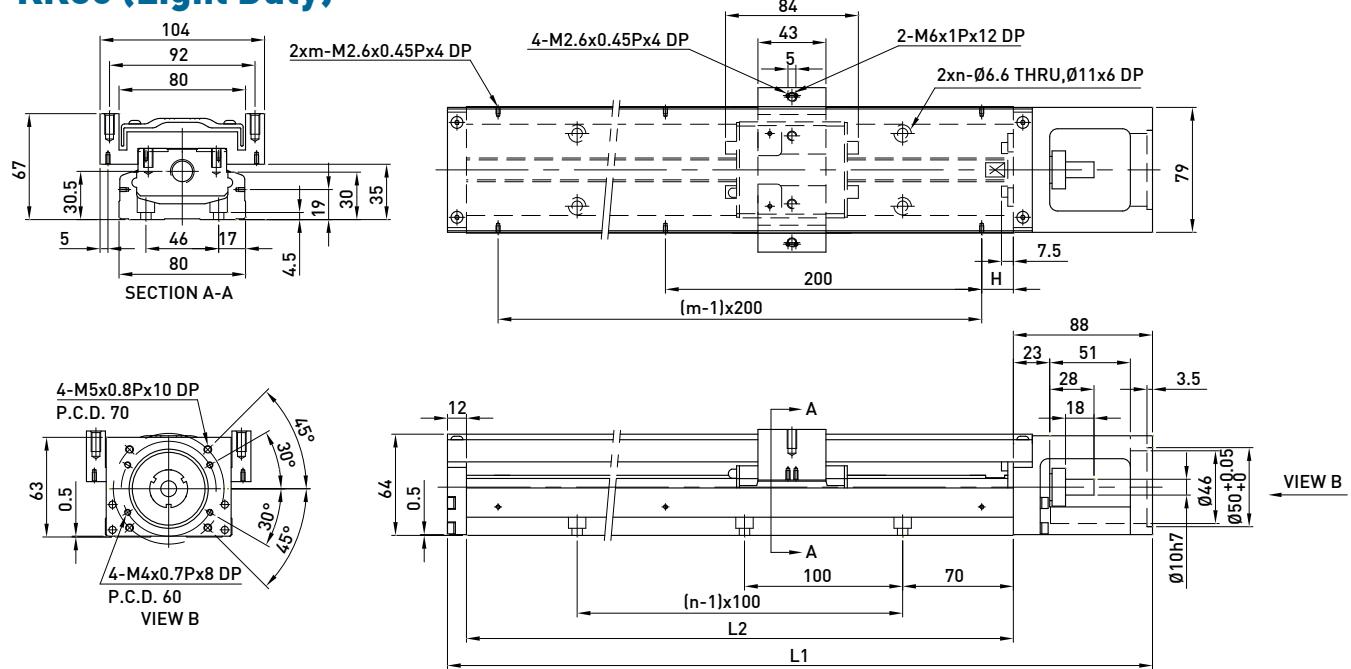
Note: Special ballscrew spindle end of 8 mm diameter is available, please contact hiwin if necessary.

## KK80 (Standard)



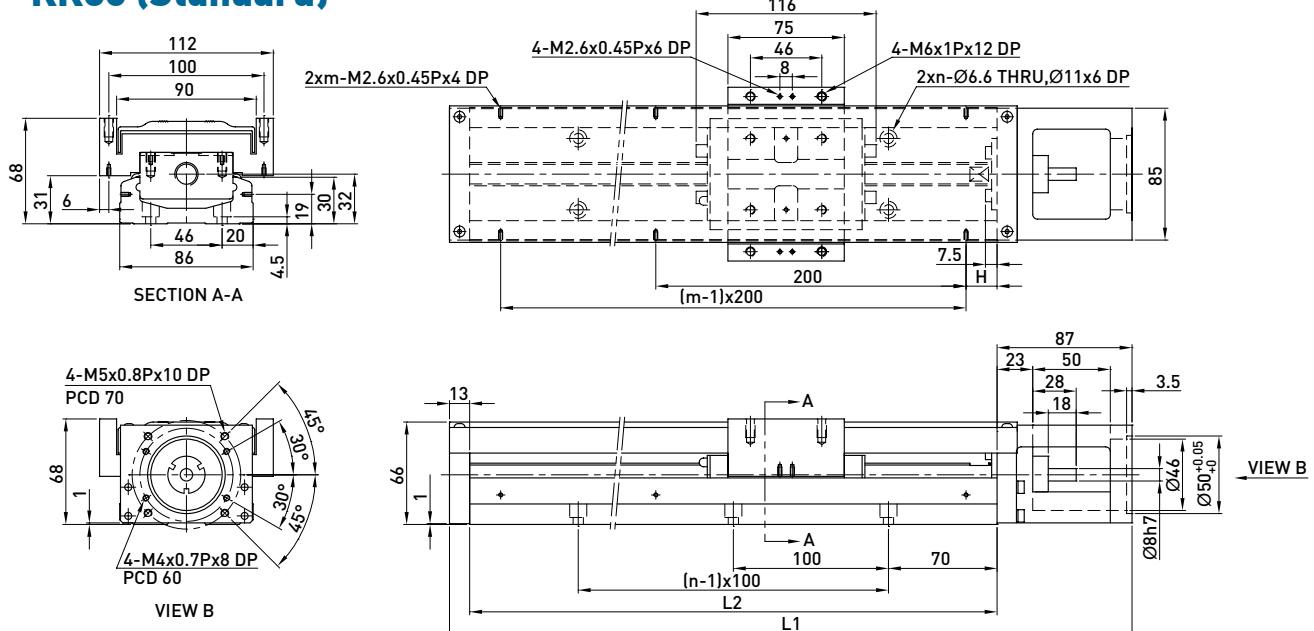
Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
340	440	216.5	108.5	70	3	2	6	7.1
440	540	316.5	208.5	20	4	3	7.2	8.3
540	640	416.5	308.5	70	5	3	8.4	9.5
640	740	516.5	408.5	20	6	4	9.7	10.8
740	840	616.5	508.5	70	7	4	10.9	12
940	1040	816.5	708.5	70	9	5	13.5	14.6

## KK80 (Light Duty)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block				S1 Block	S2 Block
340	440	248.5	172.5	70	3	2	5.5	6.1
440	540	348.5	272.5	20	4	3	6.8	7.4
540	640	448.5	372.5	70	5	3	7.9	8.5
640	740	548.5	472.5	20	6	4	9.2	9.8
740	840	648.5	572.5	70	7	4	10.5	11.1
940	1040	848.5	772.5	70	9	5	13	13.6

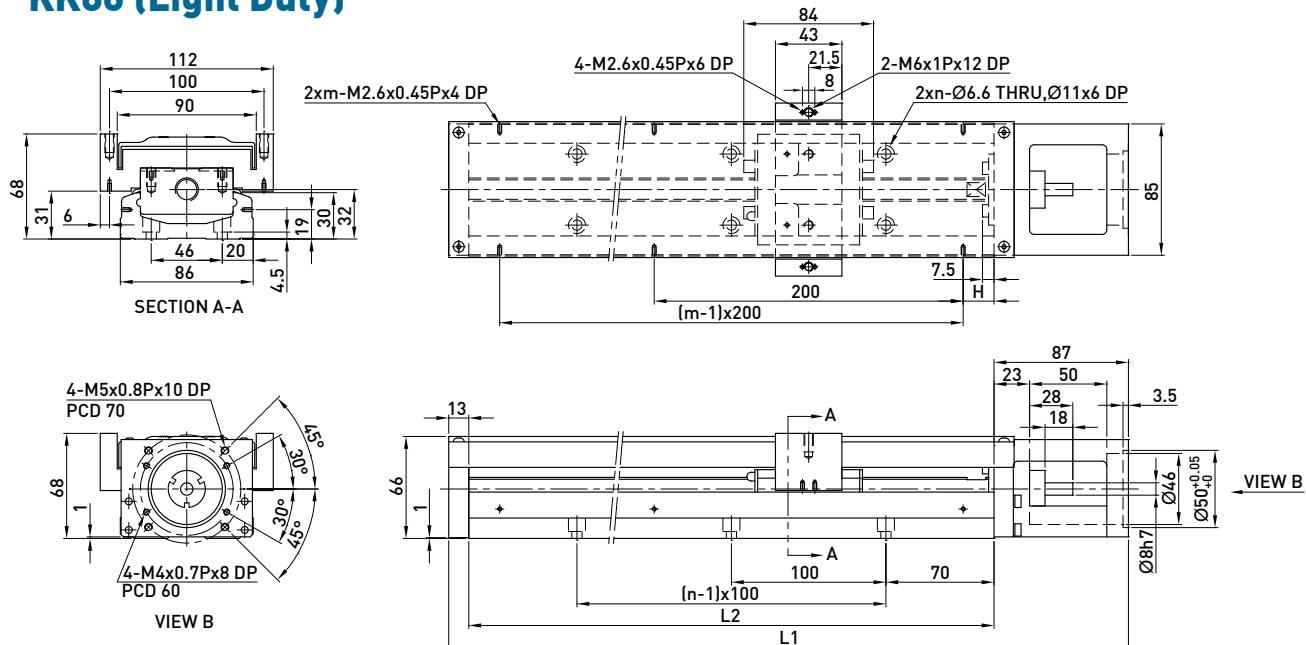
## KK86 (Standard)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
340	440	216.5	108.5	70	3	2	6.5	7.3
440	540	316.5	208.5	20	4	3	7.8	8.6
540	640	416.5	308.5	70	5	3	9.0	9.8
640	740	516.5	408.5	20	6	4	10.3	11.3
740	840	616.5	508.5	70	7	4	11.6	12.4
940	1040	816.5	708.5	70	9	5	13.0	13.8

Note: Special ballscrew spindle end of 10 mm diameter is available, please contact hiwin if necessary.

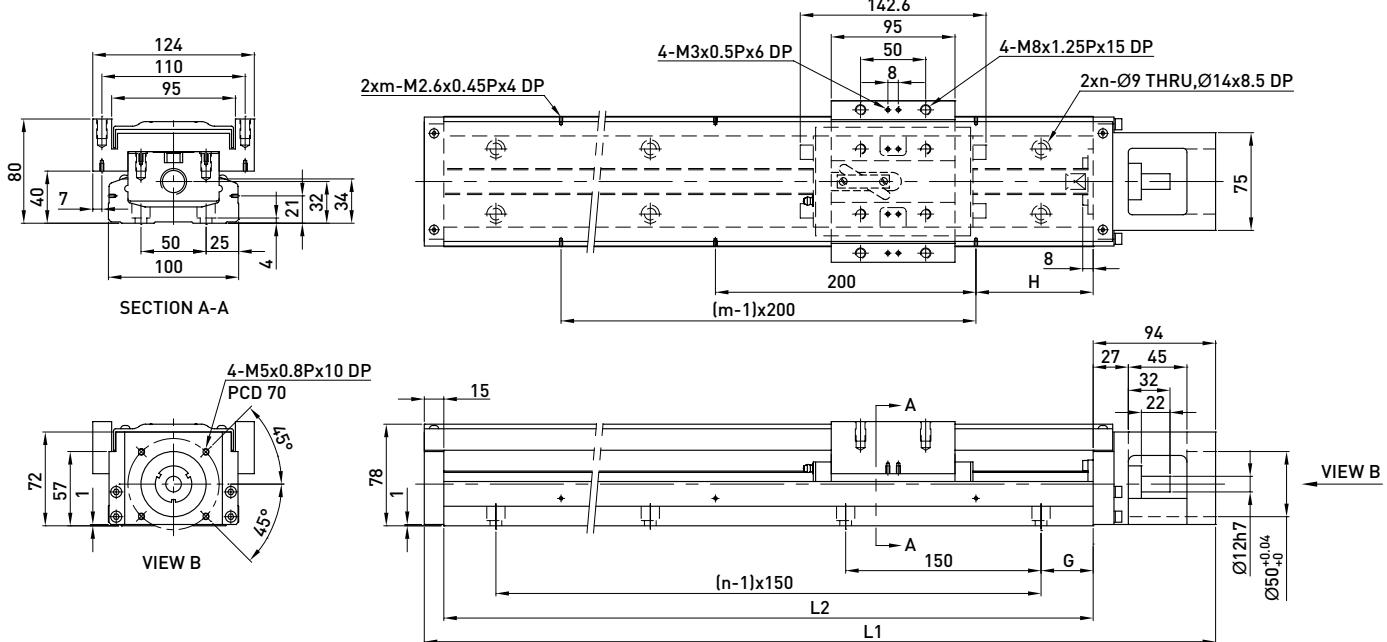
## KK86 (Light Duty)



Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		S1 Block	S2 Block				S1 Block	S2 Block
340	440	248.5	172.5	70	3	2	6.3	7.1
440	540	348.5	272.5	20	4	3	7.6	8.4
540	640	448.5	372.5	70	5	3	8.8	9.6
640	740	548.5	472.5	20	6	4	10.1	11.1
740	840	648.5	572.5	70	7	4	11.4	12.2
940	1040	848.5	772.5	70	9	5	12.8	13.6

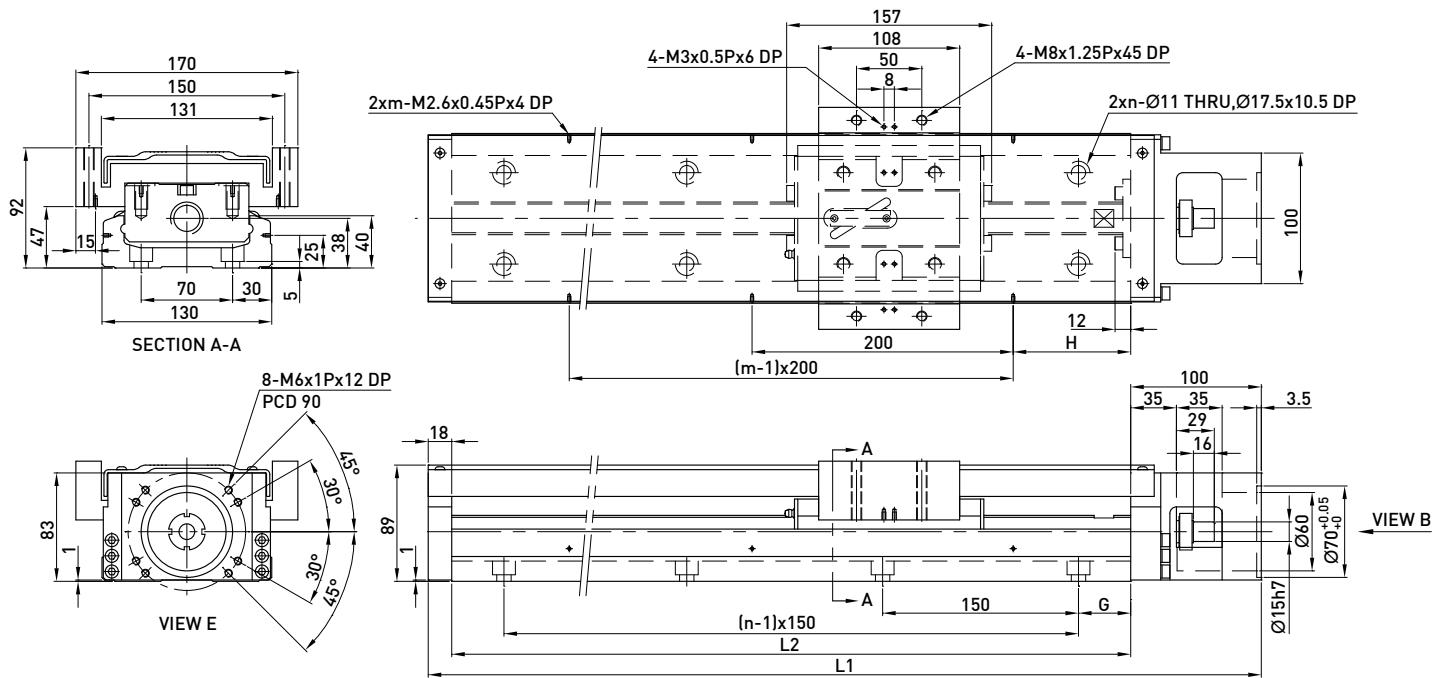
Note: Special ballscrew spindle end of 10 mm diameter is available, please contact hiwin if necessary.

## KK100



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

## KK130



Rail Length $L_2$ (mm)	Total Length $L_1$ (mm)	Maximum Stroke (mm)		G (mm)	H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block					A1 Block	A2 Block
980	1098	811	659	40	90	7	5	31.9	35.9
1180	1298	1011	859	65	90	8	6	37.1	41.1
1380	1498	1211	1059	90	90	9	7	42.2	46.2
1680	1798	1511	1359	90	40	11	9	49.9	53.9

## 1.10 Motor Housing and Motor Adaptor Flange

### 1.10.1 Motor Selection

#### HIWIN Mikrosystem Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection								+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			KK30	KK40	KK50	KK60	KK80	KK86	KK100	KK130				
100W	FRAC101022	0.6	-	F2	F2	F2	F3	F3	-	-	-	MD-36-S	1.25	220V
200W	FRAC102022	1	-	-	-	-	F0	F0	F0	F1	-			220V
400W	FRAC104022	1.45	-	-	-	-	F0	F0	F0	F1	-			220V
750W	FRAC107522	2.66	-	-	-	-	-	-	F1	F2	-			220V

#### Mitsubishi Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection								+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			KK30	KK40	KK50	KK60	KK80	KK86	KK100	KK130				
10W	HC-AQ0135D	0.19	F1	-	-	-	-	-	-	-	0.29	M2-JR-03A5	0.2	
20W	HC-AQ0235D	0.22	F1	-	-	-	-	-	-	-	0.32	M2-JR-03A5	0.2	
50W	HF-KP053	0.35	-	F1	F1	F1	F2	F2	-	-	0.75	MR-J3S-10A	0.8	220V
100W	HF-KP13	0.56	-	F1	F1	F1	F2	F2	-	-	0.89	MR-J3S-10A	0.8	220V
200W	HF-KP23	0.94	-	-	-	-	F0	F0	F0	F1	1.6	MR-J3S-20A	0.8	220V
400W	HF-KP43	1.5	-	-	-	-	F0	F0	F0	F1	2.1	MR-J3S-40A	1	220V
750W	HF-KP73	2.9	-	-	-	-	-	-	F1	F2	4	MR-J3S-70A	1.4	220V

#### Panasonic Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection								+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			KK30	KK40	KK50	KK60	KK80	KK86	KK100	KK130				
50W	MSMD5AZP1	0.32	-	F2	F2	F2	F3	F3	-	-	0.53	MADDT1105	0.8	110V
50W	MSMD5AZP1	0.32	-	F2	F2	F2	F3	F3	-	-	0.53	MADDT1205	0.8	220V
100W	MSMD011P1	0.47	-	F2	F2	F2	F3	F3	-	-	0.68	MADDT1107	0.8	110V
100W	MSMD012P1	0.47	-	F2	F2	F2	F3	F3	-	-	0.68	MADDT1205	0.8	220V
200W	MSMD021P1	0.82	-	-	-	-	F1	F1	-	-	1.3	MADDT2110	1.1	110V
200W	MSMD022P1	0.82	-	-	-	-	F1	F1	-	-	1.3	MADDT1207	0.8	220V
400W	MSMD041P1	1.2	-	-	-	-	F1	F1	-	-	1.7	MADDT3120	1.5	110V
400W	MSMD042P1	1.2	-	-	-	-	F1	F1	-	-	1.7	MADDT2210	1.1	220V
750W	MSMD082S1	2.3	-	-	-	-	F4	F4	F2	F4	3.1	MADDT3520	1.5	220V

#### Yasukawa Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection								+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			KK30	KK40	KK50	KK60	KK80	KK86	KK100	KK130				
10W	SGMMV-A1A2A21	0.13	F2	-	-	-	-	-	-	-	0.215	SGDV-R90A01A	0.9	220V
20W	SGMMV-A2A2A21	0.17	F2	-	-	-	-	-	-	-	0.27	SGDV-R90A01A	0.9	220V
50W	SGMAV-A5ADA61	0.3	-	F1	F1	F1	F2	F2	-	-		SGDV-R70A01A	0.9	with key
50W	SGMAV-A5ADA2C	0.3	-	F1	F1	F1	F2	F2	-	-		SGDV-R70A01A	0.9	no key
50W	SGMAV-A5ADA21	0.3	-	F1	F1	F1	F2	F2	-	-	0.75	SGDV-R70A01A	0.9	Mid inertia
100W	SGMAV-01ADA64	0.4	-	F1	F1	F1	F2	F2	-	-	0.89	SGDV-R90A01A	0.9	
200W	SGMAV-02ADA65	0.9	-	-	-	-	F0	F0	F0	F1	1.6	SGDV-R16A01A	0.9	
400W	SGMAV-04ADA66	1.2	-	-	-	-	F0	F0	F0	F1	2.1	SGDV-R28A01A	1	
750W	SGMAV-08ADA67	2.6	-	-	-	-	-	-	F1	F2	4	SGDV-5R5A01A	1.5	

## HIWIN Mikosystem Step Motor

Series	Model	Flange Selection								Weight (kg)	Built in Motor	Weight (kg)	Remarks
		KK30	KK40	KK50	KK60	KK80	KK86	KK100	KK130				
ST40	FRST011024	-	F3	F3	F5	-	-	-	-	0.3			single axis
ST55	FRST021024	-				-	-	-	-	0.55			
	FRST022024	-	F3	F3	F5	-	-	-	-	0.8			single axis
	FRST023024	-				-	-	-	-	1.18			
	FRST121024	-				-	-	-	-	0.58			
	FRST122024	-	F3	F3	F5	-	-	-	-	0.83			axis of symmetry
	FRST123024	-				-	-	-	-	0.21			

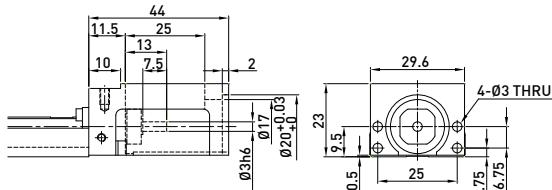
## Oriental Step Motor

Series	Model	Flange Selection								Built in Motor	Weight (kg)	Built in Drive	Weight (kg)
		KK30	KK40	KK50	KK60	KK80	KK86	KK100	KK130				
CSK 2 phase	CSK243-AP	-	F3	F3	F5	-	-	-	-	PK243-01A	0.21	CSD2109-P	0.12
	CSK244-AP	-	F3	F3	F5	-	-	-	-	PK244-01A	0.27	CSD2112-P	0.12
	CSK245-AP	-	F3	F3	F5	-	-	-	-	PK245-01A	0.35	CSD2112-P	0.12
	CSK264-AP	-	-	-	F4	F6	F6	-	-	PK264-02A	0.45	CSD2120-P	0.12
	CSK266-AP	-	-	-	F4	F6	F6	-	-	PK266-02A	0.7	CSD2120-P	0.12
	CSK268-AP	-	-	-	F4	F6	F6	-	-	PK268-02A	1	CSD2120-P	0.12
	CSK296-AP	-	-	-	-	-	-	F4	F3	PK296-03A	1.7	CSD2145P	0.2
	CSK299-AP	-	-	-	-	-	-	F4	F3	PK299-03A	2.8	CSD2145P	0.2
	CSK2913-AP	-	-	-	-	-	-	F4	F3	PK2913-02A	3.8	CSD2140P	0.2
CSK 5 phase	CSK523-AP	F3	-	-	-	-	-	-	-	PK523A	0.1	SD5103P3	0.04
CFKII 5 phase micro stepping	CFK543AP2	-	F3	F3	F5	-	-	-	-	PK543NAW	0.21	DFC5107P	0.2
	CFK544AP2	-	F3	F3	F5	-	-	-	-	PK544NAW	0.27	DFC5107P	0.2
	CFK545AP2	-	F3	F3	F5	-	-	-	-	PK545NAW	0.35	DFC5107P	0.2
	CFK564AP2	-	-	-	-	F5	F5	-	-	PK564NAW	0.6	DFC5114P	0.2
	CFK566AP2	-	-	-	-	F5	F5	-	-	PK566NAW	0.8	DFC5114P	0.2
	CFK569AP2	-	-	-	-	F5	F5	-	-	PK569NAW	1.3	DFC5114P	0.2
	CFK566HAP2	-	-	-	-	F5	F5	-	-	PK566HNAW	0.8	DFC5128P	0.22
	CFK569HAP2	-	-	-	-	F5	F5	-	-	PK569HNAW	1.3	DFC5128P	0.22
	CFK596HAP2	-	-	-	-	-	-	F3	-	PK596HNAW	1.7	DFC5128P	0.22
	CFK599HAP2	-	-	-	-	-	-	F3	-	PK599HNAW	2.8	DFC5128P	0.22
UMK 2 phase	CFK5913HAP2	-	-	-	-	-	-	F3	-	PK5913HNAW	3.8	DFC5128P	0.22
	UMK243A	-	F3	F3	F5	-	-	-	-	PK243-01	0.21	UDK2109	0.47
	UMK244A	-	F3	F3	F5	-	-	-	-	PK244-01	0.27	UDK2112	0.47
	UMK245A	-	F3	F3	F5	-	-	-	-	PK245-01	0.35	UDK2112	0.47
	UMK264A	-	-	-	F4	F6	F6	-	-	PK264-02	0.45	UDK2120	0.47
RK 5 phase	UMK266A	-	-	-	F4	F6	F6	-	-	PK266-02	0.7	UDK2120	0.47
	UMK268A	-	-	-	F4	F6	F6	-	-	PK268-02	1	UDK2120	0.47
	RK543AA	-	F3	F3	F5	-	-	-	-	PK543W	0.25	RKD507-A	0.4
	RK544AA	-	F3	F3	F5	-	-	-	-	PK544W	0.3	RKD507-A	0.4
	RK545AA	-	F3	F3	F5	-	-	-	-	PK545W	0.4	RKD507-A	0.4
RK 5 phase	RK566AA	-	-	-	-	F5	F5	-	-	PK566W	0.8	RKD514L-A	0.85
	RK569AA	-	-	-	-	F5	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
ASC a-step	RK5913AA	-	-	-	-	-	-	F3	-	PK5913W	3.8	RKD514H-A	0.85
	ASC34AK	F3	-	-	-	-	-	-	-	ASM34AK	0.15	ASD10A-K	0.25

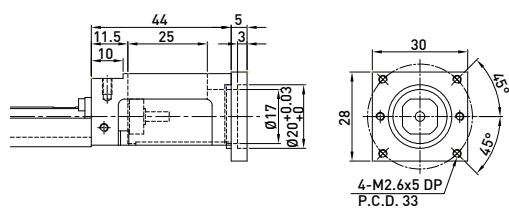
## 1.10.2 Motor Housing and Motor Adaptor Flange

### KK30

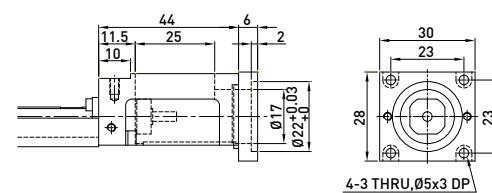
**Motor Housing F0**



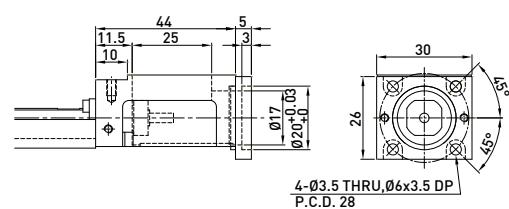
**Motor Adaptor Flange F1**



**Motor Adaptor Flange F3**

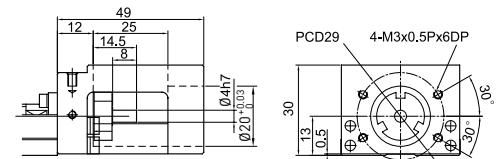


**Motor Adaptor Flange F2**

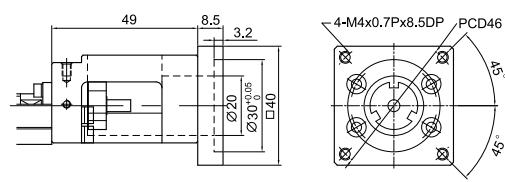


### KK40

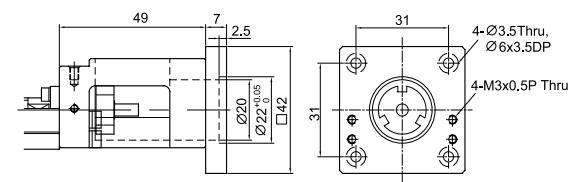
**Motor Housing F0**



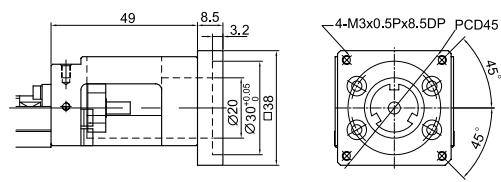
**Motor Adaptor Flange F1**



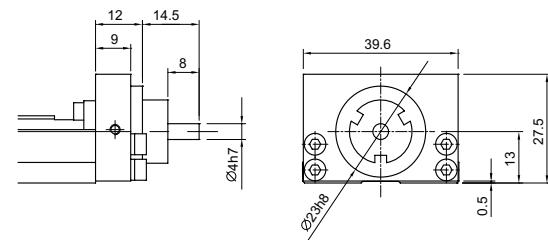
**Motor Adaptor Flange F3**



**Motor Adaptor Flange F2**

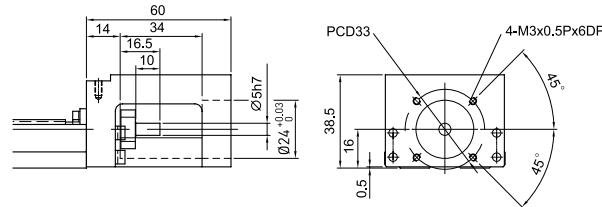


**Mount Housing H0**

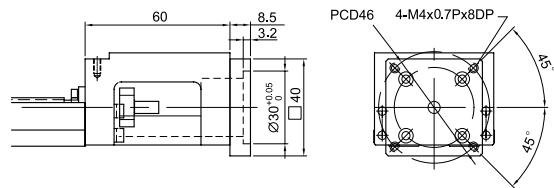


## KK50

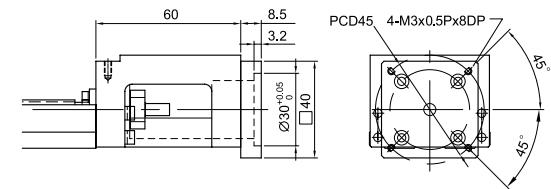
Motor Housing F0



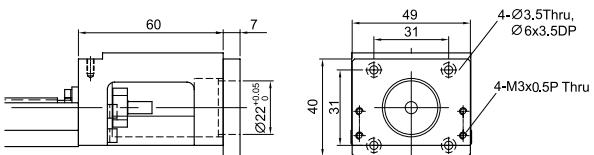
Motor Adaptor Flange F1



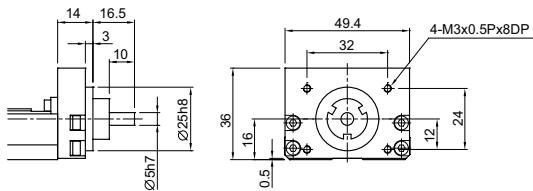
Motor Adaptor Flange F2



Motor Adaptor Flange F3

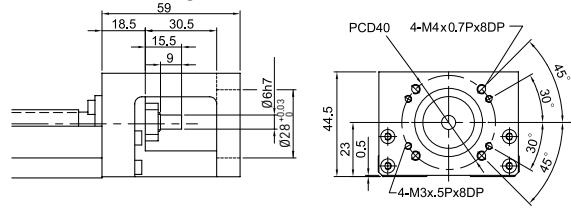


Mount Housing H0

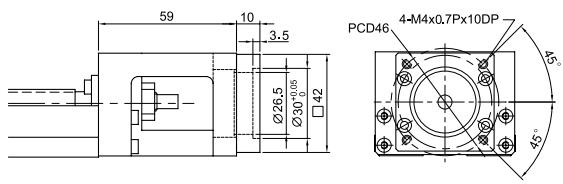


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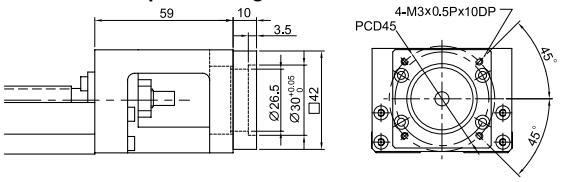
Motor Housing F0



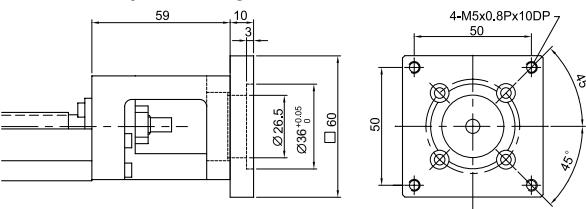
Motor Adaptor Flange F1



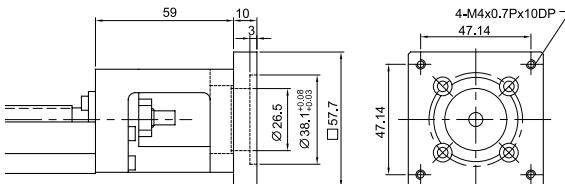
Motor Adaptor Flange F2



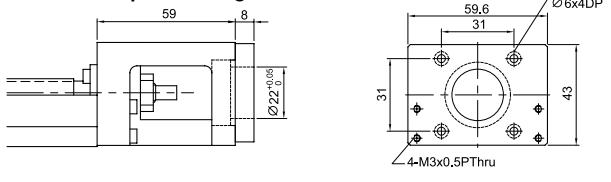
Motor Adaptor Flange F3



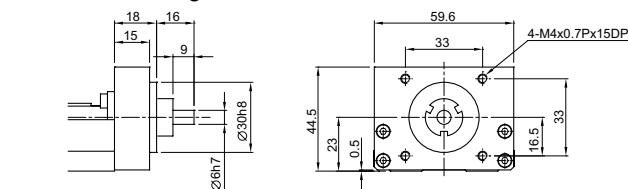
Motor Adaptor Flange F4



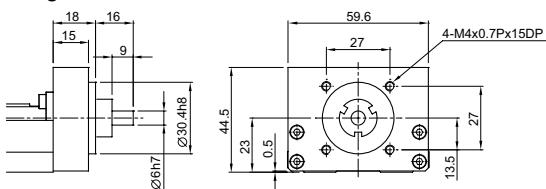
Motor Adaptor Flange F5



Mount Housing H0

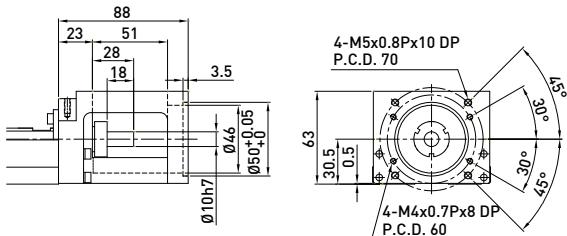


Mount Housing H1

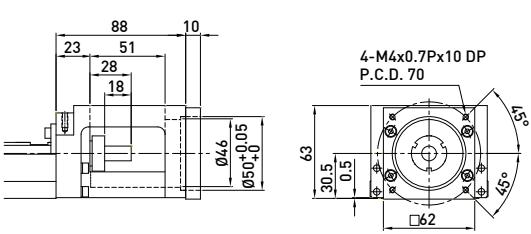


## KK80

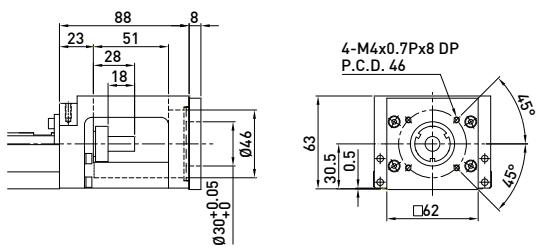
**Motor Housing F0**



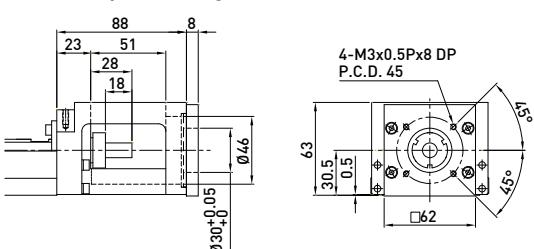
**Motor Adaptor Flange F1**



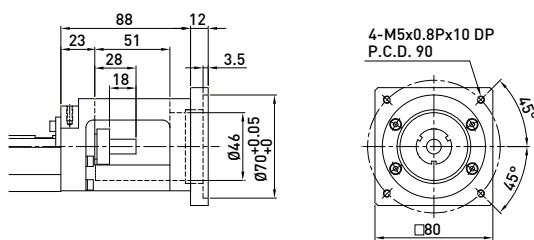
**Motor Adaptor Flange F2**



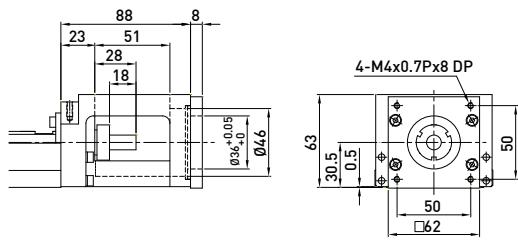
**Motor Adaptor Flange F3**



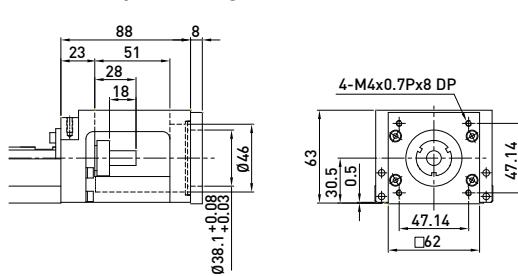
**Motor Adaptor Flange F4**



**Motor Adaptor Flange F5**

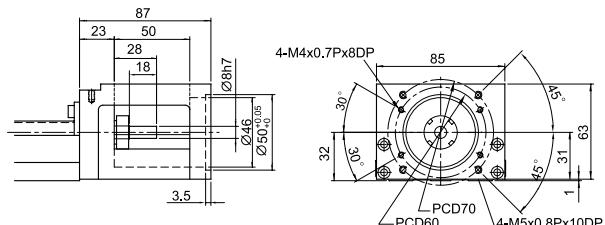


**Motor Adaptor Flange F6**

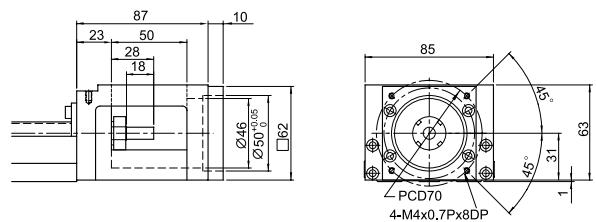


## KK86

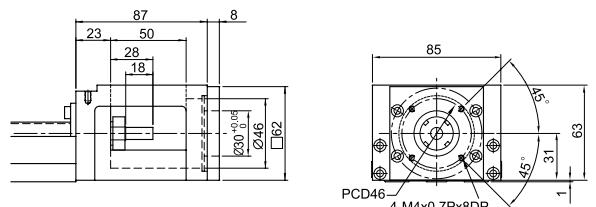
**Motor Housing F0**



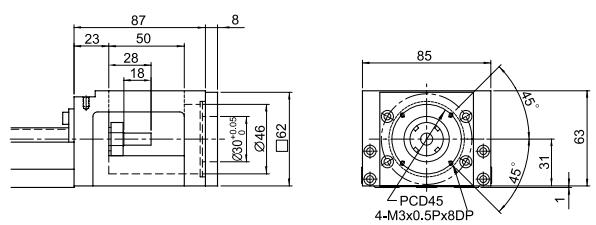
**Motor Adaptor Flange F1**



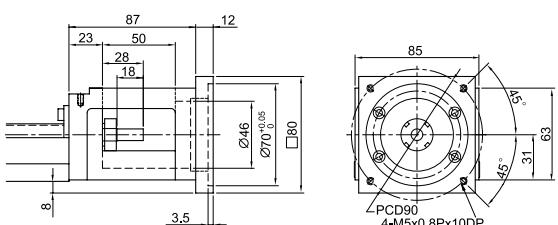
**Motor Adaptor Flange F2**



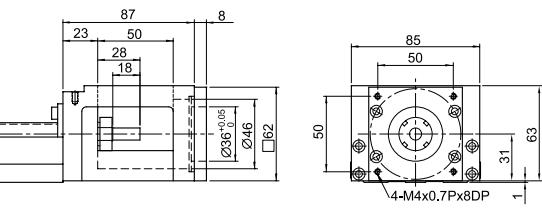
**Motor Adaptor Flange F3**



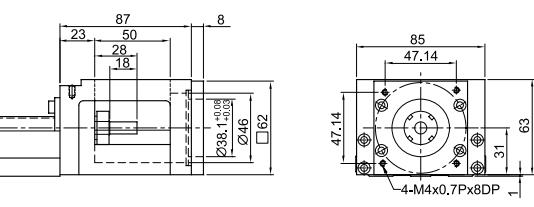
**Motor Adaptor Flange F4**



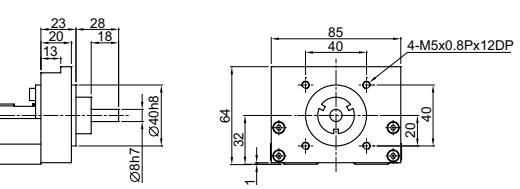
**Motor Adaptor Flange F5**



**Motor Adaptor Flange F6**

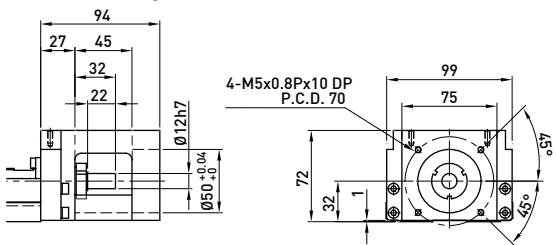


**Mount Housing H0**

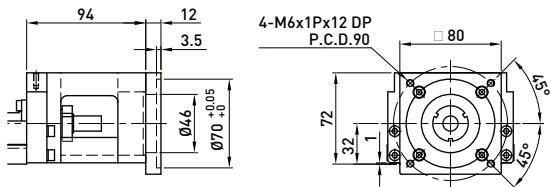


## KK100

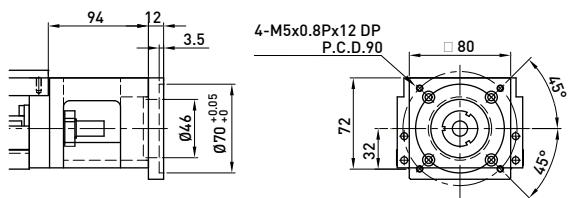
**Motor Housing F0**



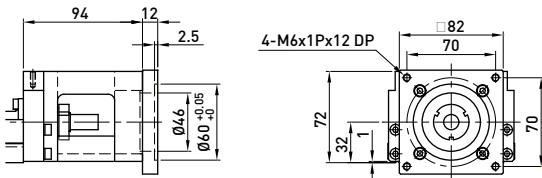
**Motor Adaptor Flange F1**



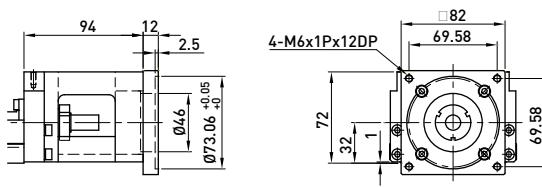
**Motor Adaptor Flange F2**



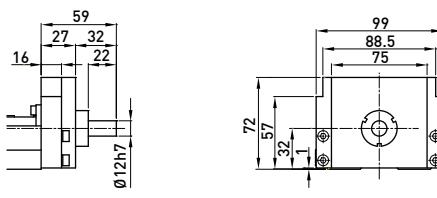
**Motor Adaptor Flange F3**



**Motor Adaptor Flange F4**

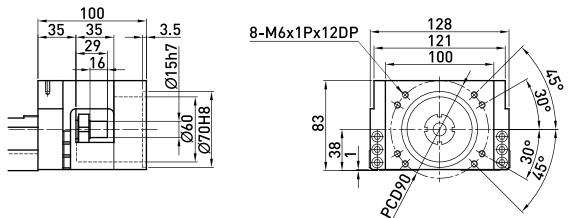


**Mount Housing H0**

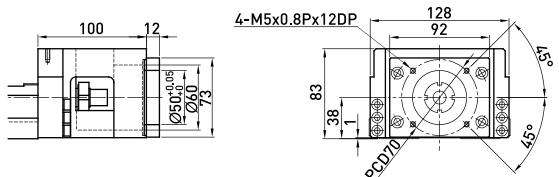


## KK130

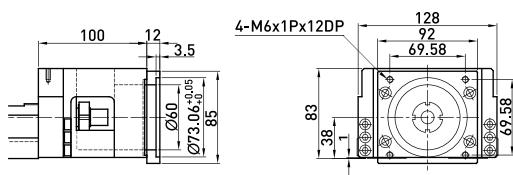
**Motor Housing F0**



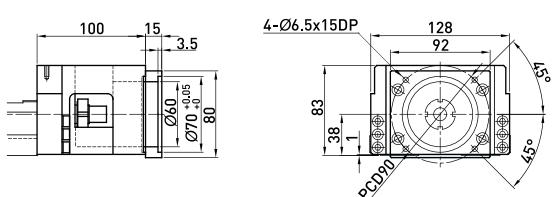
**Motor Adaptor Flange F1**



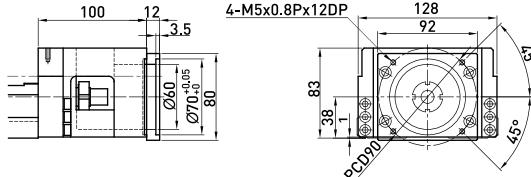
**Motor Adaptor Flange F3**



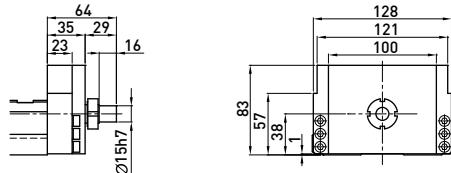
**Motor Adaptor Flange F2**



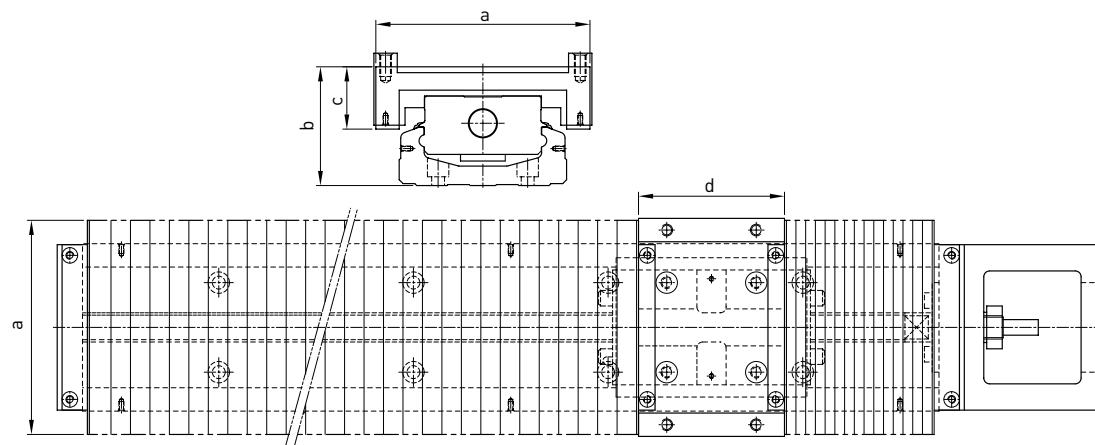
**Motor Adaptor Flange F4**



**Mount Housing H0**



## 1.11 Optional Accessories

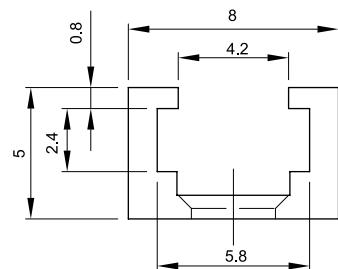


Unit : mm

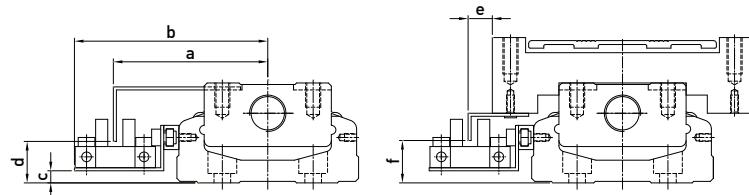
Nominal Width	Rail Length	Stroke	Min.	Max.	a	b	c	d
KK30	75	22	15	37	47	22.5	15.5	23
	100	37	20	57				
	125	52	25	77				
	150	67	30	97				
	175	82	35	117				
	200	97	40	137				
KK40	100	35	16	51	60	29.5	19	33
	150	63	27	90				
	200	93	37	130				
KK50	150	60	21.5	81.5	62	37	19	47
	200	95	29	124				
	250	130	36.5	166.5				
	300	160	46.5	206.5				
KK60	150	56	16	80	84	45.5	24	54
	200	106	20	126				
	300	166	40	206				
	400	234	56	290				
	500	306	70	376				
	600	366	90	456				
KK80	340	181	42	223	106	62.5	34.5	75
	440	257	54	311				
	540	333	66	399				
	640	409	78	487				
	740	485	90	575				
	940	649	108	757				
KK86	340	188	36	224	110	61	32	75
	440	260	50	310				
	540	336	62	398				
	640	408	76	484				
	740	480	90	570				
	940	640	110	750				
KK100	980	769	58	827	150	73	41	95
	1080	855	65	920				
	1180	945	70	1015				
	1280	1029	78	1107				
	1380	1115	85	1200				
KK130	980	748	62	810	180	89	53	108
	1180	916	78	994				
	1380	1084	94	1178				
	1680	1346	113	1459				

## 1.12 Switch

### Switch rail

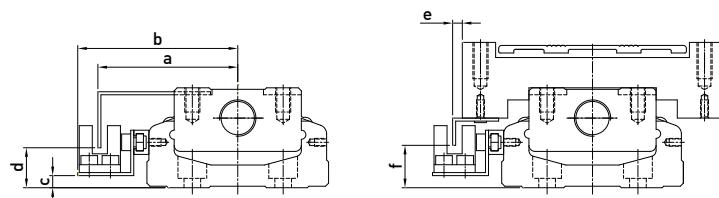


### Switch



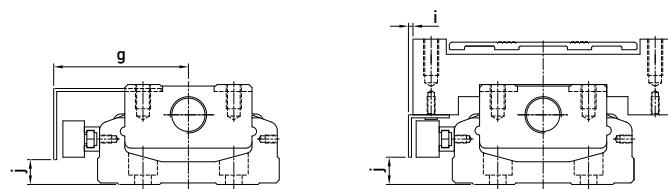
Nominal Width	a	b	c	d	e	f
KK40	41.5	54.1	0.5	10.8	15.3	12
KK50	45.5	59	1	10	15	11
KK60	51	63.8	4	14.5	8	13
KK80	61	74	8	19	9	19
KK86	63.5	76.7	8	18	8	18
KK100	71	84	10	20	9	20
KK130	85.5	98.5	14	24	0.5	23

Switch 1 : OMRON EE-SX-671



Nominal Width	a	b	c	d	e	f
KK40	36.5	44.3	1	9.8	10.5	12
KK50	41.3	48	1	10.5	10.2	11
KK60	46.2	52.8	4	14	3.2	13
KK80	56	63	8	18	4	18
KK86	59	65.7	8	18	3	18
KK100	66	73	10	20	4.2	20
KK130	80.8	87.5	14	23.5	-4.1	23.5

Switch 2 : OMRON EE-SX-674



Nominal Width	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>
KK40	40	5.5	13.5	5.5
KK50	39.5	5.7	7	19.5
KK60	44.5	9	2	9
KK80	54	12	2	13
KK86	57	13	1	13
KK100	64.5	15	2.5	15
KK130	79	19	-6	19

Switch 3 : PANASONIC GX-F12A

Switch 4 : PANASONIC GX-F12A-P



Nominal Width	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>
KK30	28	1.8	5.8	1.8

Switch 5 : YAMATAKE APM-D3B1-03



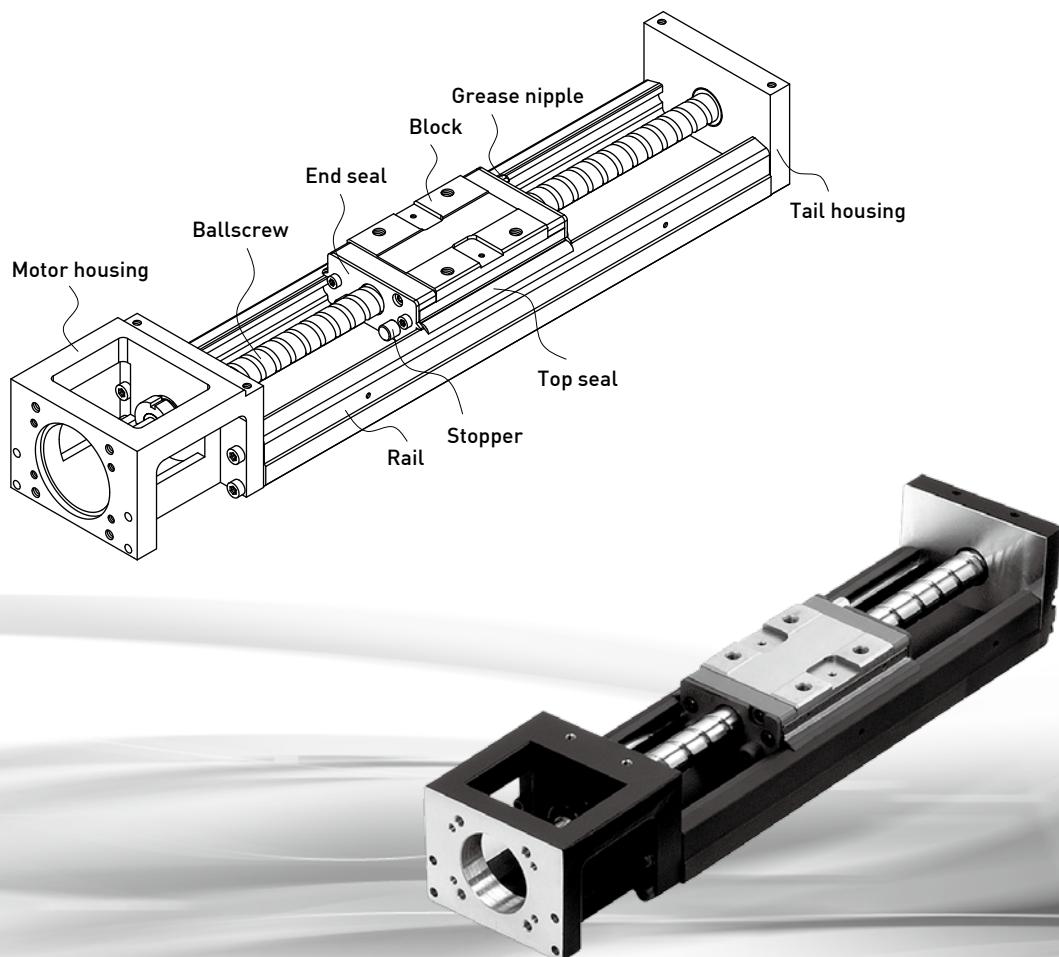
# Single Axis Robot

## SK Series

The HIWIN SK quiet Single Axis Robot with SynchMotion™ Technology offers quieter operation, smooth movement, low particle emission rate, longer service life and superior lubrication. With the SynchMotion™ Technology, SK Single Axis Robots will be more suitable for industries which require higher speeds and quieter performance.

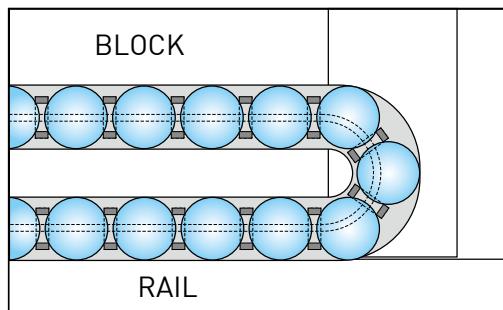
### 2.1 Features

- Low noise
- Low particle emission rate
- Longer service life
- Superior lubrication
- Easy installation and maintenance



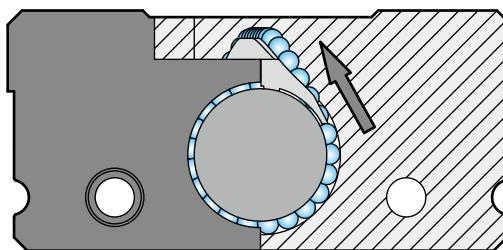
### 2.1.1 SynchMotion™ Technology

With SynchMotion™ Technology, the rolling elements are interposed between the partitions of SynchMotionTM to provide improved circulation. By eliminating the contact between the rolling elements, collision noise and sound levels are greatly reduced.



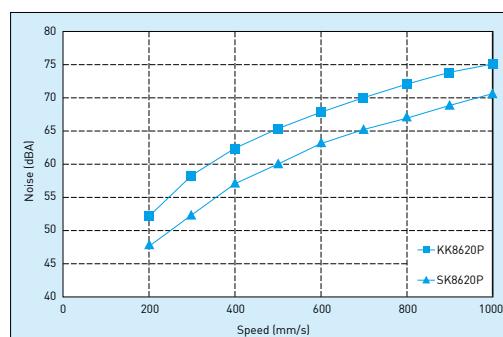
### 2.1.2 Tangent Circulation Technology

The rolling elements enter the circulation system by following the spiral pathway. When compared to the traditional external circulation, the Tangent Circulation Technology diminishes the impact caused by the rolling elements entering the circulation system, improving the speed, acceleration and smoothness while reducing the noise.

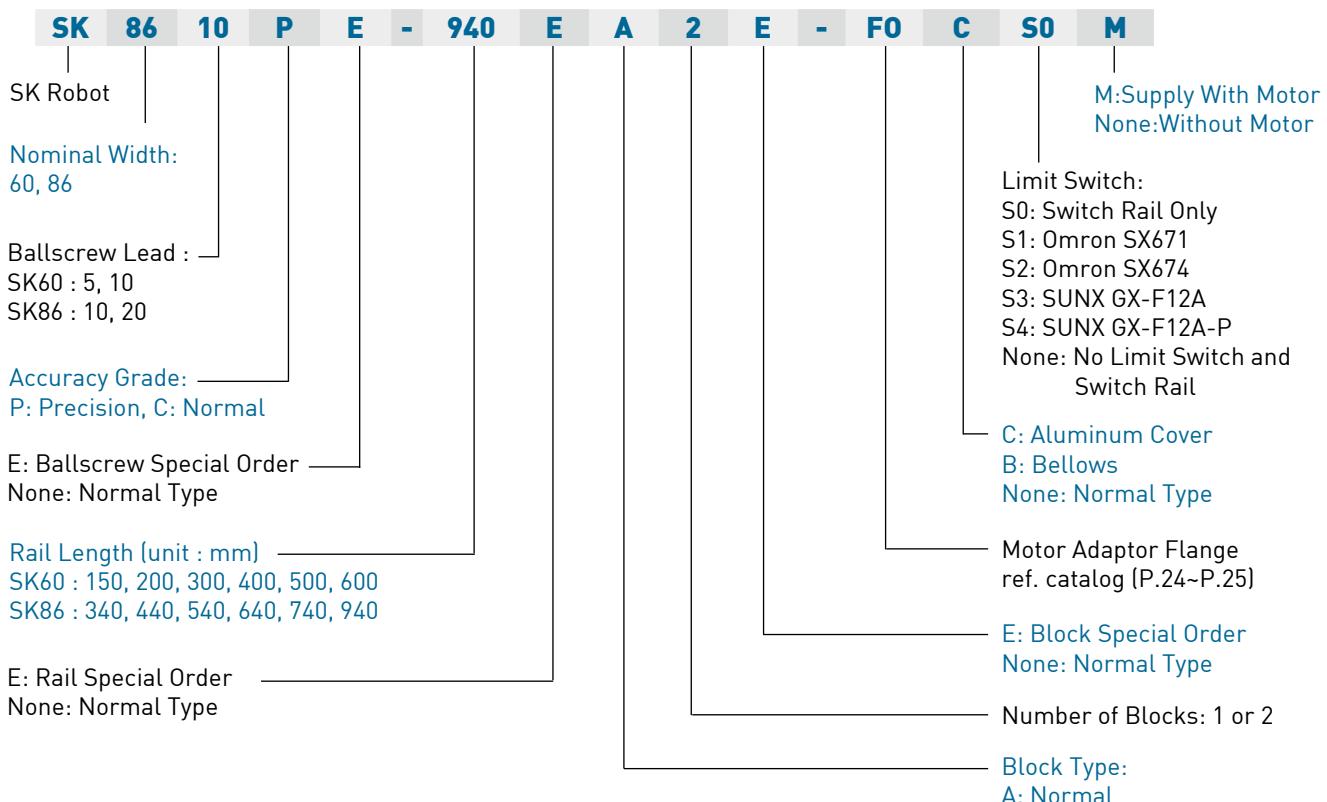


### 2.1.3 Noise Test

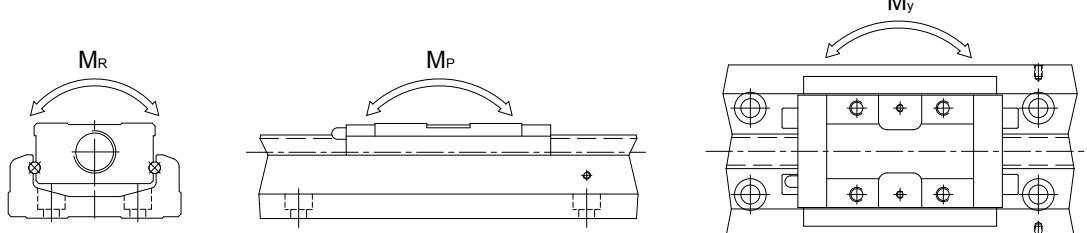
Incorporating both SynchMotion™ Technology and Tangent Circulation Technology, the noise reduction is about 3~5 dB during operation.



## 2.2 Model Number of SK Series



## 2.3 Specifications



Model No.		Ballscrew				Guideway							
		Nominal Diameter (mm)	Lead (mm)	Basic Dynamic Load (N)	Basic Static Load (N)	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)	Static Rated Moment					
								Block A	Block A	Block A1	Block A2	Block A1	Block A2
SK6005	Precision	12	5	3744	6243	15132	19811	168	891	168	891	413	826
	Normal			3377	5626								
SK6010	Precision	12	10	2410	3743	15132	19811	168	891	168	891	413	826
	Normal			2107	3234								
SK8610	Precision	15	10	7144	12642	26011	35793	565	2481	565	2481	1063	2126
	Normal			6429	11387								
SK8620	Precision	15	20	4645	7655	26011	35793	565	2481	565	2481	1063	2126
	Normal			4175	6889								

## 2.4 Accuracy Grade

Unit : mm

Model	Rail Length	Repeatability		Accuracy		Running Parallelism		Starting Torque(N-cm)	
		Precision	Normal	Precision	Normal	Precision	Normal	Precision	Normal
SK60	150	$\pm 0.003$	$\pm 0.01$	0.020	-	0.010	-	15	7
	200								
	300								
	400								
	500	$\pm 0.003$	$\pm 0.01$	0.025	-	0.015	-	15	7
	600								
SK86	340	$\pm 0.003$	$\pm 0.01$	0.025	-	0.015	-	15	10
	440								
	540								
	640								
	740	$\pm 0.003$	$\pm 0.01$	0.030	-	0.020	-	17	10
	940		$\pm 0.01$	0.040	-	0.030	-	25	10

## 2.5 Maximum Speed Limit

Model	Ballscrew Lead (mm)	Rail Length (mm)	Speed (mm/sec)	
			Precision	Normal
SK60	05	150	550	390
		200	550	390
		300	550	390
		400	550	390
		500	550	390
		600	340	340
	10	150	1100	790
		200	1100	790
		300	1100	790
		400	1100	790
		500	1100	790
		600	670	670
SK86	10	340	740	520
		440	740	520
		540	740	520
		640	740	520
		740	740	520
		940	610	430
	20	340	1480	1050
		440	1480	1050
		540	1480	1050
		640	1480	1050
		740	1480	1050
		940	1220	870

## 2.6 Life Calculations

### 2.6.1 Service Life

Under repeated stress between the raceway and the rolling elements, pitting and flaking will occur as it reaches fatigue failure. The service life of the SK Single Axis Robot is defined as the distance traveled before any failure of the raceway or rolling elements appear.

### 2.6.2 Nominal Life (L)

The service life varies greatly even when the SK units are manufactured in the same way or operated under the same conditions. For this reason, nominal life is used as the criteria for predicting the service life of a SK unit.

### 2.6.3 Nominal Life Calculation

The calculating formulas are divided into two parts, guideway and ballscrew. The smaller of the two values would be the recommended nominal life of the SK unit.

Nominal life formulas for both the guideway and ballscrew depend on several parameters as shown below:

#### Guideway

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

$L$  : Life Rating (km)  
 $f_t$  : Contact Coefficient (ref. Table 1)  
 $f_w$  : Loading Coefficient (ref. Table 2)

$C$  : Basic Dynamic Load Rating (N)  
 $P_n$  : Calculated Loading (N)

Table 1

Block type	Contact Coefficient $f_t$
A1	1.0
A2	0.81

Table 2

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

#### Ballscrew and Bearing

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

$L$  : Life Rating (rev.)  
 $f_w$  : Loading Coefficient (ref. Table 2)

$C_a$  : Basic Dynamic Load Rating (N)  
 $P_{a,n}$  : Axial Loading (N)

## 2.7 Lubrication

Insufficient lubrication of the guideway would lead to a reduction of the service life.

The lubricant provides the following functions:

- Reducing rolling friction and avoiding abrasion
- Providing a lubricating film and extending the service life
- Anti-rusting

### 2.7.1 Lubricating grease

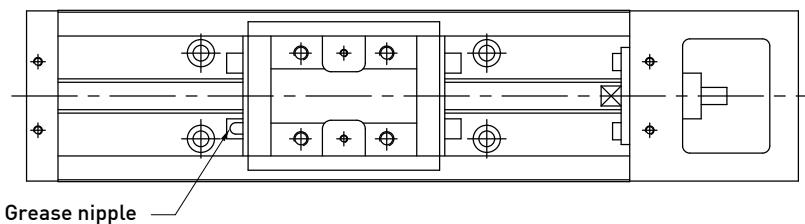
Re-lubricating the SK Single Axis Robot every 100km is recommended. Generally, grease is applied for speeds under 60 m/min. For operating speeds over 60 m/min, a grease with a higher viscosity should be used.

$$T = \frac{100 \times 1000}{V_e \times 60} \quad T : \text{Lubricating frequency (hrs)}$$

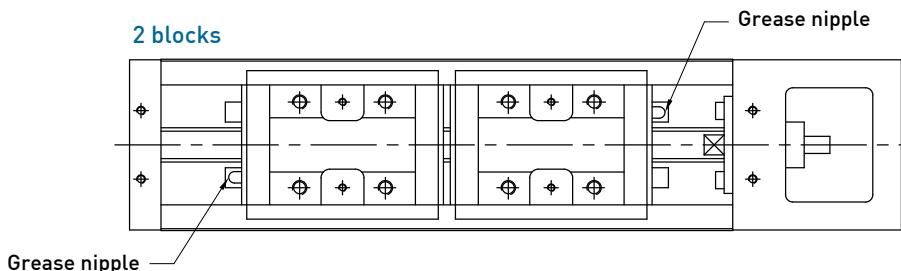
$V_e : \text{Speed (m/min)}$

### 2.7.2 Grease nipple

1 block



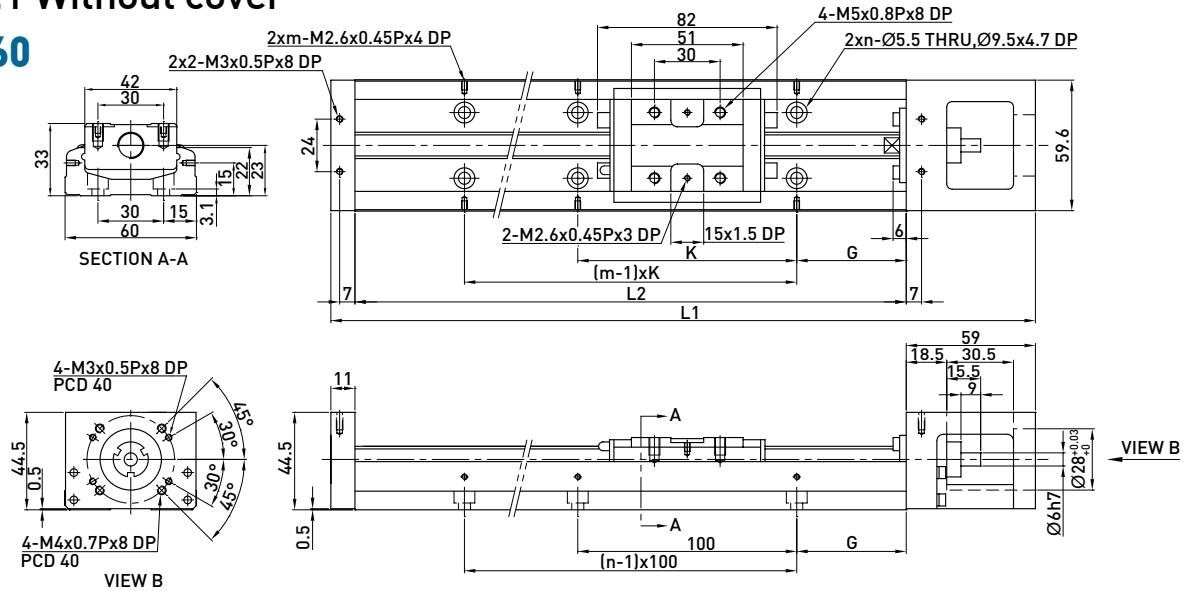
2 blocks



## 2.8 Dimensions

### 2.8.1 Without cover

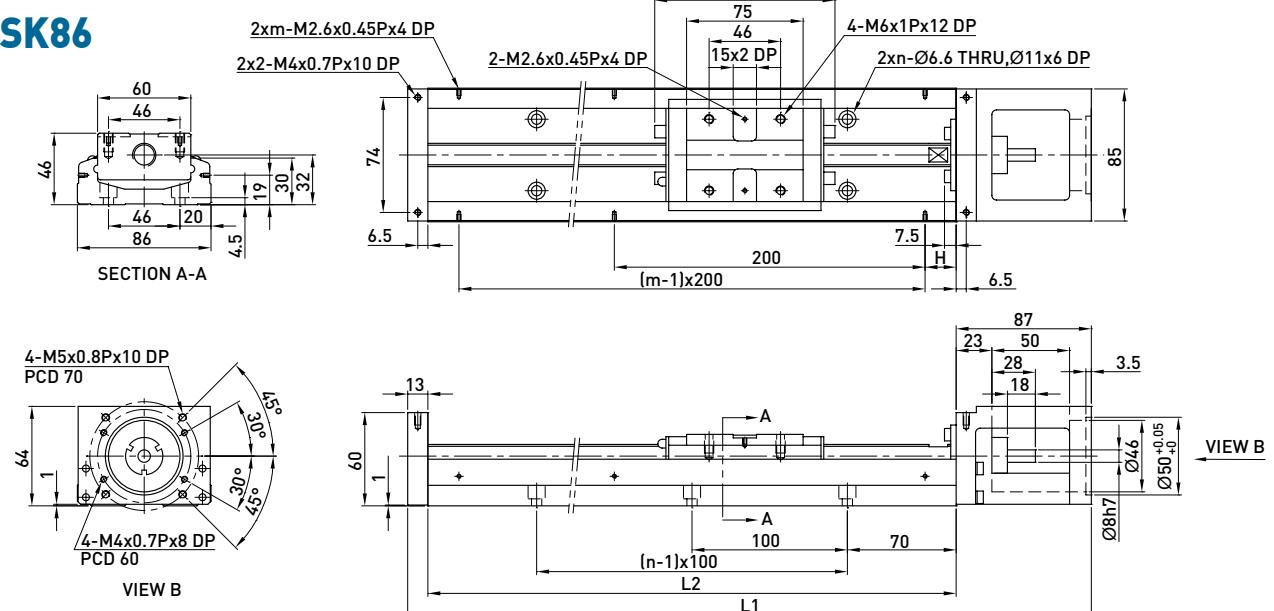
**SK60**



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

Note: Special ballscrew spindle end of 8 mm diameter is available, please contact hiwin if necessary.

**SK86**

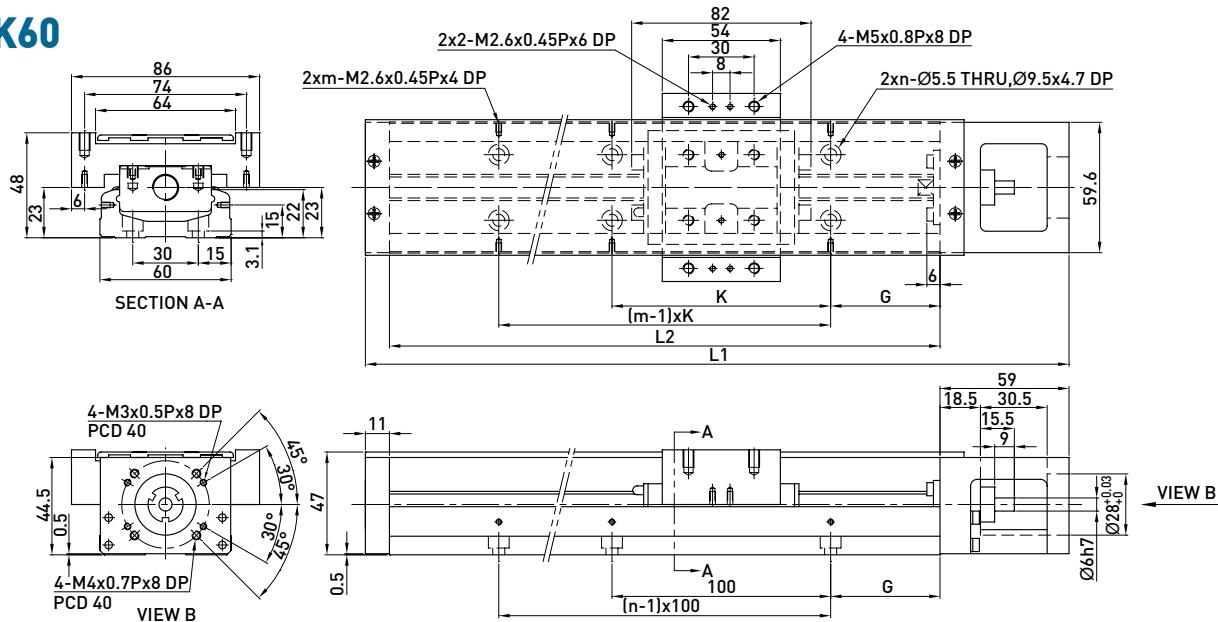


Rail Length L2 (mm)	Total Length L1 (mm)	Maximum Stroke (mm)		H (mm)	n	m	Mass (kg)	
		A1 Block	A2 Block				A1 Block	A2 Block
340	440	210	100	70	3	2	5.7	6.5
440	540	310	200	20	4	3	6.9	7.7
540	640	410	300	70	5	3	8.0	8.8
640	740	510	400	20	6	4	9.2	10.0
740	840	610	500	70	7	4	10.4	11.2
940	1040	810	700	70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

Note: Special ballscrew spindle end of 10 mm diameter is available, please contact hiwin if necessary.

## 2.8.2 With cover

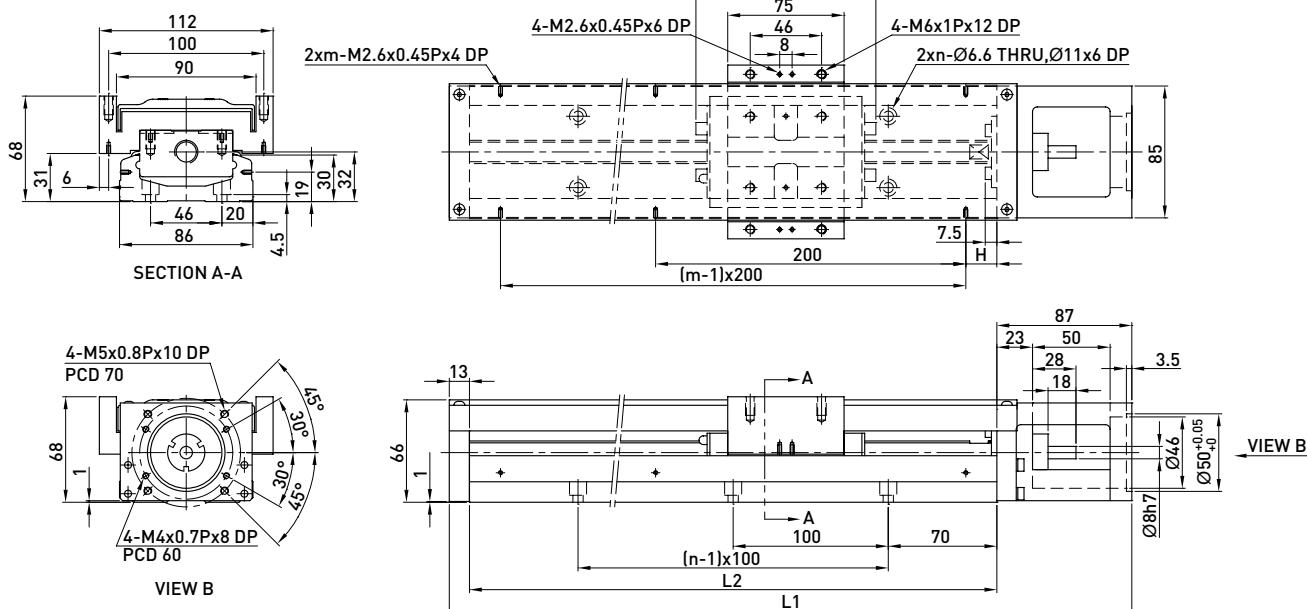
### SK60



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

Note: Special ballscrew spindle end of 8 mm diameter is available, please contact hiwin if necessary.

### SK86



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

Note: Special ballscrew spindle end of 10 mm diameter is available, please contact hiwin if necessary.

## 2.9 Motor Housing and Motor Adaptor Flange

### 2.9.1 Motor Selection

#### HIWIN Mikrosystem Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection		+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			SK60	SK86				
50W	FRLS052□□A4□	0.45	F2	F3	-	D2	1.25	220V
100W	FRLS102□□A4□	0.6	F2	F3	-			220V
200W	FRLS202□□06□	1	-	F0	-			220V
400W	FRLS402□□06□	1.45	-	F0	-			220V
750W	FRMS752□□08□	2.66	-	-	-			220V

#### Mitsubishi Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection		+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			SK60	SK86				
50W	HF-KP053	0.35	F1	F2	0.75	MR-J3S-10A	0.8	220V
100W	HF-KP13	0.56	F1	F2	0.89	MR-J3S-10A	0.8	220V
200W	HF-KP23	0.94	-	F0	1.6	MR-J3S-20A	0.8	220V
400W	HF-KP43	1.5	-	F0	2.1	MR-J3S-40A	1	220V
750W	HF-KP73	2.9	-	-	4	MR-J3S-70A	1.4	220V

#### Panasonic Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection		+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			SK60	SK86				
50W	MSMD5AZP1	0.32	F2	F3	0.53	MADDT1105	0.8	110V
50W	MSMD5AZP1	0.32	F2	F3	0.53	MADDT1205	0.8	220V
100W	MSMD011P1	0.47	F2	F3	0.68	MADDT1107	0.8	110V
100W	MSMD012P1	0.47	F2	F3	0.68	MADDT1205	0.8	220V
200W	MSMD021P1	0.82	-	F1	1.3	MADDT2110	1.1	110V
200W	MSMD022P1	0.82	-	F1	1.3	MADDT1207	0.8	220V
400W	MSMD041P1	1.2	-	F1	1.7	MADDT3120	1.5	110V
400W	MSMD042P1	1.2	-	F1	1.7	MADDT2210	1.1	220V
750W	MSMD082S1	2.3	-	F4	3.1	MADDT3520	1.5	220V

#### Yasukawa Servo Motor

Motor Output	Motor	Weight (kg)	Flange Selection		+Brake Weight (kg)	Drive	Weight (kg)	Remarks
			SK60	SK86				
50W	SGMAV-A5ADA61	0.3	F1	F2		SGDV-R70A01A	0.9	with key
50W	SGMAV-A5ADA2C	0.3	F1	F2		SGDV-R70A01A	0.9	no key
50W	SGMAV-A5ADA21	0.3	F1	F2	0.75	SGDV-R70A01A	0.9	Mid inertia
100W	SGMAV-01ADA64	0.4	F1	F2	0.89	SGDV-R90A01A	0.9	
200W	SGMAV-02ADA65	0.9	-	F0	1.6	SGDV-1R6A01A	0.9	
400W	SGMAV-04ADA66	1.2	-	F0	2.1	SGDV-2R8A01A	1	

## HIWIN Mikosystem Step Motor

Series	Model	Flange Selection		Weight (kg)	Built in Motor	Weight (kg)	Remarks
		SK60	SK86				
ST40	FRST011024	F5	-	0.3			single axis
ST55	FRST021024	F5	-	0.55	STD-24A	0.09	single axis
	FRST022024			0.8			
	FRST023024			1.18			
	FRST121024	F5	-	0.58			axis of symmetry
	FRST122024			0.83			
	FRST123024			0.21			

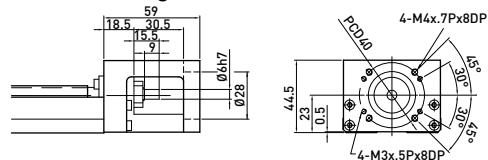
## Oriental Step Motor

Series	Model	Flange Selection		Built in Motor	Weight (kg)	Built in Drive	Weight (kg)
		SK60	SK86				
CSK 2 phase	CSK243-AP	F5	-	PK243-01A	0.21	CSD2109-P	0.12
	CSK244-AP	F5	-	PK244-01A	0.27	CSD2112-P	0.12
	CSK245-AP	F5	-	PK245-01A	0.35	CSD2112-P	0.12
	CSK264-AP	F4	F6	PK264-02A	0.45	CSD2120-P	0.12
	CSK266-AP	F4	F6	PK266-02A	0.7	CSD2120-P	0.12
	CSK268-AP	F4	F6	PK268-02A	1	CSD2120-P	0.12
CFKII 5 phase micro stepping	CFK543AP2	F5	-	PK543NAW	0.21	DFC5107P	0.2
	CFK544AP2	F5	-	PK544NAW	0.27	DFC5107P	0.2
	CFK545AP2	F5	-	PK545NAW	0.35	DFC5107P	0.2
	CFK564AP2	-	F5	PK564NAW	0.6	DFC5114P	0.2
	CFK566AP2	-	F5	PK566NAW	0.8	DFC5114P	0.2
	CFK569AP2	-	F5	PK569NAW	1.3	DFC5114P	0.2
	CFK566HAP2	-	F5	PK566HNAW	0.8	DFC5128P	0.22
UMK 2 phase	CKF569HAP2	-	F5	PK569HNAW	1.3	DFC5128P	0.22
	UMK243A	F5	-	PK243-01	0.21	UDK2109	0.47
	UMK244A	F5	-	PK244-01	0.27	UDK2112	0.47
	UMK245A	F5	-	PK245-01	0.35	UDK2112	0.47
	UMK264A	F4	F6	PK264-02	0.45	UDK2120	0.47
	UMK266A	F4	F6	PK266-02	0.7	UDK2120	0.47
RK 5 phase	UMK268A	F4	F6	PK268-02	1	UDK2120	0.47
	RK543AA	F5	-	PK543W	0.25	RKD507-A	0.4
	RK544AA	F5	-	PK544W	0.3	RKD507-A	0.4
	RK545AA	F5	-	PK545W	0.4	RKD507-A	0.4
	RK566AA	-	F5	PK566W	0.8	RKD514L-A	0.85
	RK569AA	-	F5	PK569W	1.3	RKD514L-A	0.85

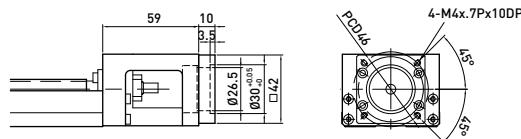
## 2.9.2 Motor Housing and Motor Adaptor Flange

### SK60

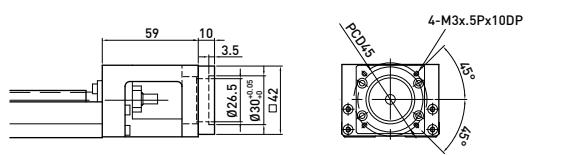
Motor Housing F0



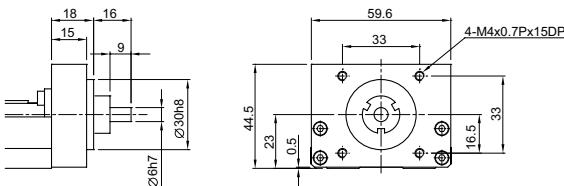
Motor Adaptor Flange F1



Motor Adaptor Flange F2

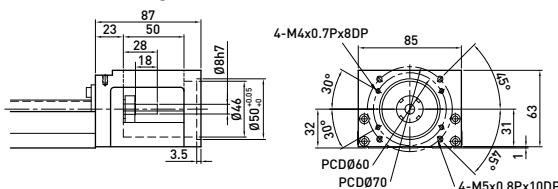


Mount Housing H0

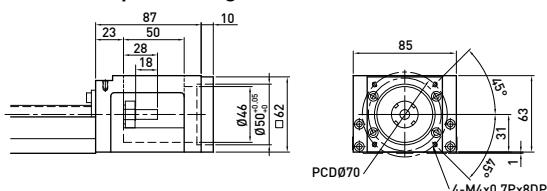


### SK86

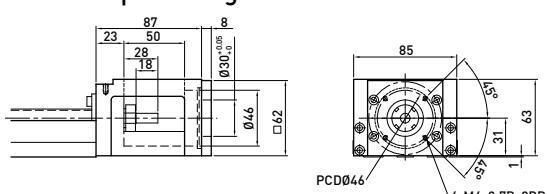
Motor Housing F0



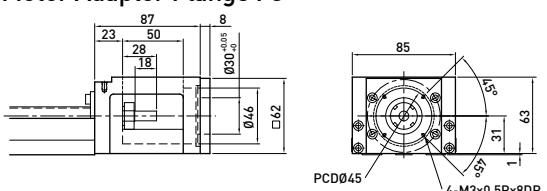
Motor Adaptor Flange F1



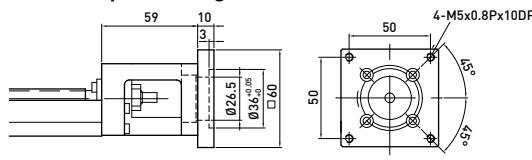
Motor Adaptor Flange F2



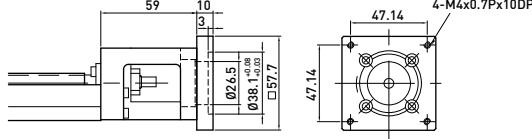
Motor Adaptor Flange F3



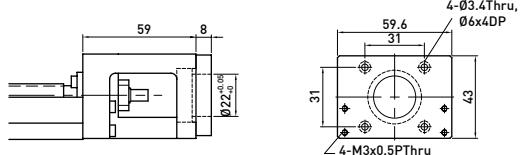
Motor Adaptor Flange F3



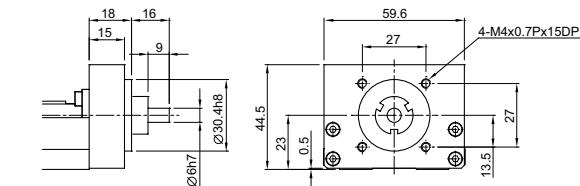
Motor Adaptor Flange F4



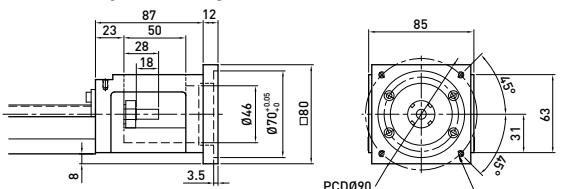
Motor Adaptor Flange F5



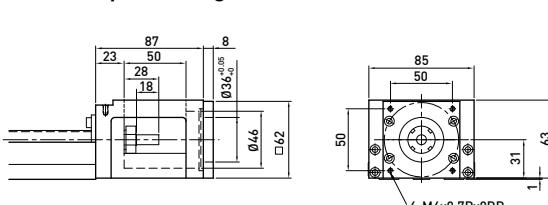
Mount Housing H1



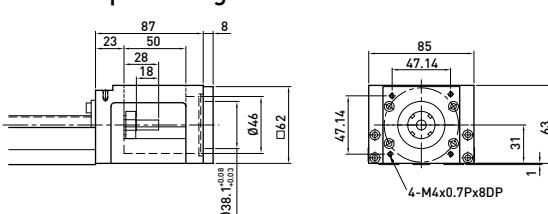
Motor Adaptor Flange F4



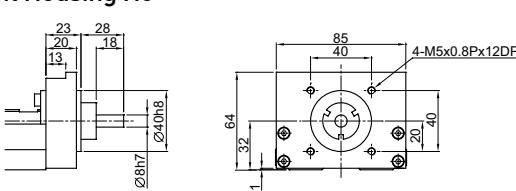
Motor Adaptor Flange F5



Motor Adaptor Flange F6

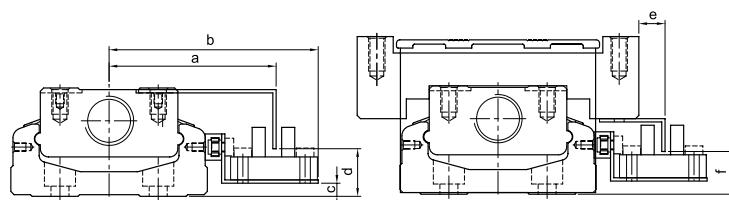
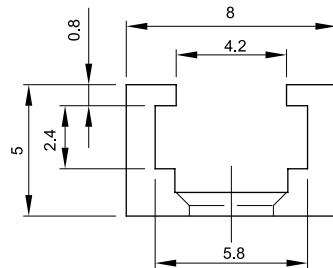


Mount Housing H0



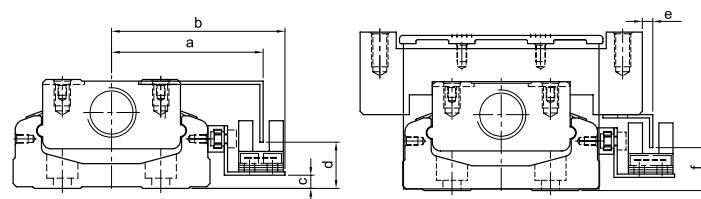
## 2.10 Switch

### Switch rail



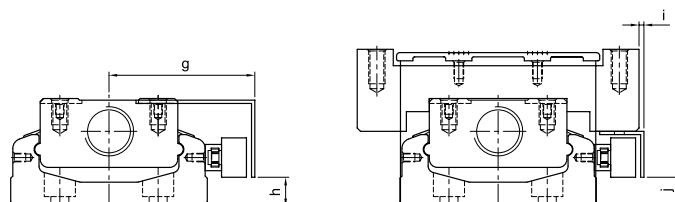
Nominal Width	a	b	c	d	e	f
SK60	51	63.8	4	14.5	8	13
SK86	63.5	76.7	8	18	8	18

Switch 1 : Omron EE-SX671



Nominal Width	a	b	c	d	e	f
SK60	46.2	52.8	4	14	3.2	13
SK86	59	65.7	8	18	3	18

Switch 2 : Omron EE-SX674



Nominal Width	g	h	i	j
SK60	44.5	9	2	9
SK86	57	13	1	13

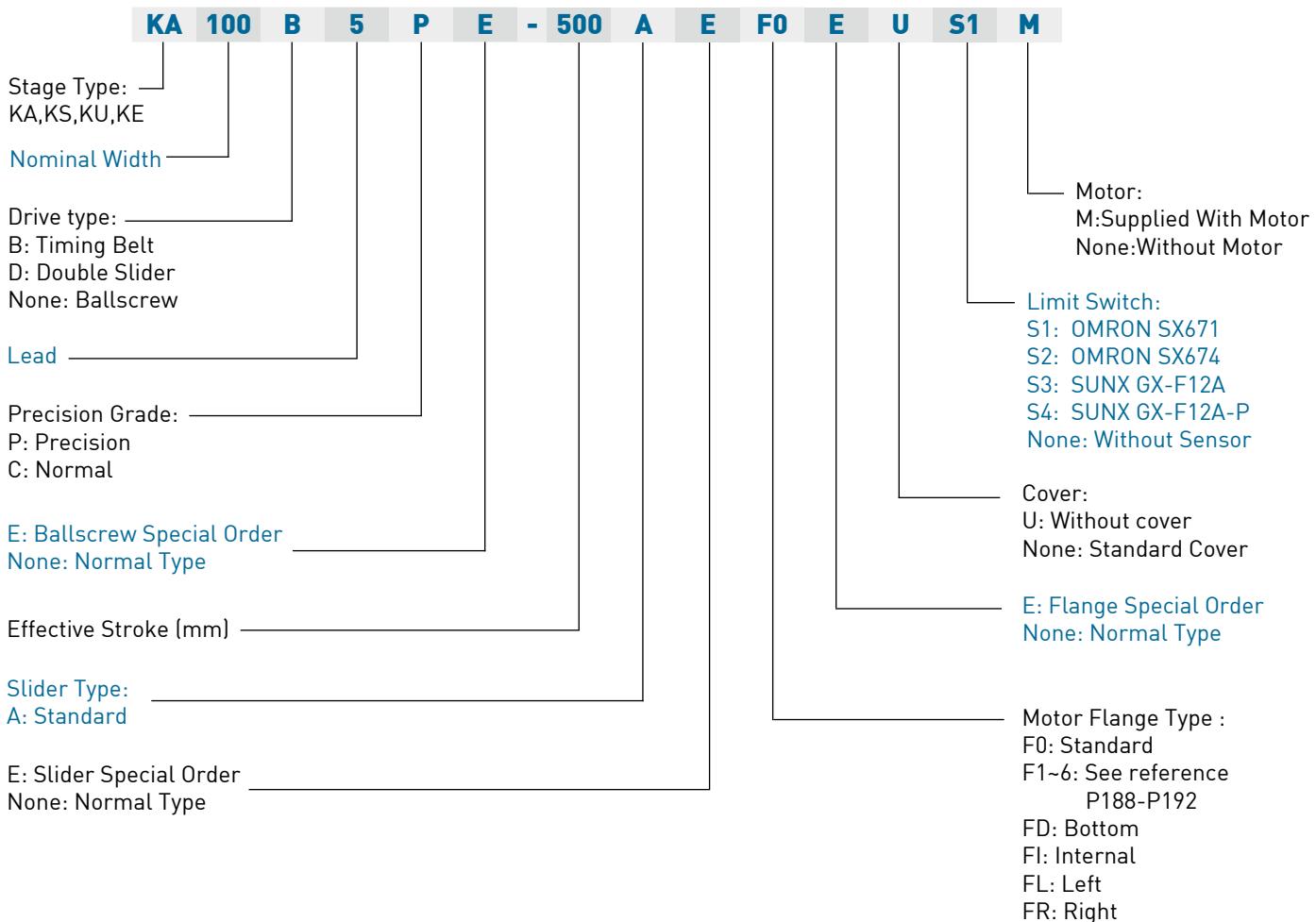
Switch 3, 4 : SUNX GX-F12A, GX-F12A-P

# Single Axis Robot

## KA Series



### 3.1 Model Number of Single Axis Robot Series



### 3.2 Specifications

The KA series designation is represented by the following:

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

#### (1) Model

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

#### (2) Lead

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

KA Model	KA136												KA200												
	KA100						KA170																		
Ballscrew diameter ( $\Phi$ )	15			16			20						25			32			25						
Lead (P)	10	20	40	5	10	32	5	10	20	40	25	50	32	40	10	25									
L (available in left hand thread)		*	L	L	*	L		L	*	*	*	*	*	*	*	*	*	*							

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

### (3) Precision Grade

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

C; Normal grade :  $\pm 0.02\text{mm}$ , P; Precision grade :  $\pm 0.01\text{mm}$ .

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

\* Attention : KA products do not indicate the absolute positional accuracy.

### (4) Effective Stroke

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

\* Attention : Vibration might occur when the effective stroke is longer than what is listed in the catalog. If vibration occurs, reduce the RPM to help improve the situation. Refer to the "Speed" section for information regarding RPM values.

### (5) Slider Type

The KA series is designed to only support the listed loading. Please contact HIWIN for inquiries on greater dynamic load or heavy load models.

### (6) Motor Flange

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

	KA100		KA136		KA170		KA200	
	Screw	PCD	Screw	PCD	Screw	PCD	Screw	PCD
F0	M3	40	M4	60	M5	70	M6	90
	M4	46	M5	70				
F1	M3	45	M4	70	M6	90	M5	70
F2			M4	46	M5	90	M5	90
F3			M3	45	M6	<input type="checkbox"/> 70		
F4			M5	90	M6	<input type="checkbox"/> 69.58		
F5			M4	<input type="checkbox"/> 50				
F6			M4	<input type="checkbox"/> 47.14				

FD : Bottom connected motor (belt pulley drive).

FI : Internal connected motor (coupling drive).

FL : Left connected motor (belt pulley drive).

FR : Right connected motor (belt pulley drive).

Please refer to the Appendix for different flange sizes.

### (7) Aluminum Cover

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

### (8) Limit Switch

HIWIN provides some standard options for limit switches. Please contact a HIWIN sales representative for any other type that is not listed.

### (9) Motor

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

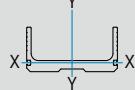
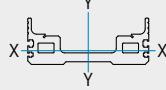
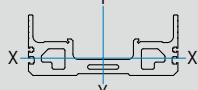
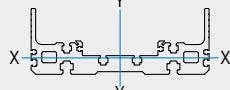
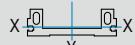
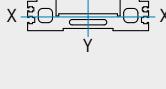
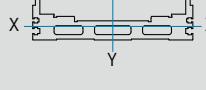
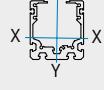
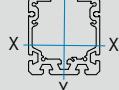
M : motor included. Please refer to the Appendix for motor selection, for other customized motors please contact a HIWIN sales representative.

### 3.3 KA Specifications

Series	Drive Type	Aluminum Base Width	Motor Choice	Maximum Load (Kg)								Motor Connection Type	Model		
				Lead (mm)											
				5	10	20	25	5	10	20	25				
Horizontal				Vertical											
KA	Ballscrew	100	100W (3000 rpm)	47	32	16		16	8.8	3		Direct	KA100		
				47	32	16		16	8.8	3		Bottom	KA100-FD		
				47	32	16		16	8.8	3		Internal	KA100-FI		
				47	32	16		16	8.8	3		Left	KA100-FL		
				47	32	16		16	8.8	3		Right	KA100-FR		
		136	200W (3000 rpm)	95	64	32		32	17.5	6.5		Direct	KA136		
				95	64	32		32	17.5	6.5		Bottom	KA136-FD		
				95	64	32		32	17.5	6.5		Internal	KA136-FI		
				95	64	32		32	17.5	6.5		Left	KA136-FL		
				95	64	32		32	17.5	6.5		Right	KA136-FR		
		170	400W (3000 rpm)		127	64	51		35	13	9	Direct	KA170		
					127	64	51		35	13	9	Bottom	KA170-FD		
					127	64	51		35	13	9	Internal	KA170-FI		
					127	64	51		35	13	9	Left	KA170-FL		
					127	64	51		35	13	9	Right	KA170-FR		
		200	750W (3000 rpm)		239		95		65		17	Direct	KA200		
					239		95		65		17	Bottom	KA200-FD		
					239		95		65		17	Internal	KA200-FI		
					239		95		65		17	Left	KA200-FL		
					239		95		65		17	Right	KA200-FR		
Belt*	100	100W		7.5								Left	KA100B-FL		
				7.5								Right	KA100B-FR		
	136	200W		15								Left	KA136B-FL		
				15								Right	KA136B-FR		
	170	400W		30								Left	KA170B-FL		
				30								Right	KA170B-FR		

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

### 3.4 U-shaped aluminum base features a light weight construction and high rigidity

Series	Moment of Inertia (mm <sup>4</sup> )	I <sub>xx</sub>	I <sub>yy</sub>	
KA	KA100	2.17x10 <sup>5</sup>	1.81x10 <sup>6</sup>	
	KA136	3.37x10 <sup>5</sup>	5.36x10 <sup>6</sup>	
	KA170	8.84x10 <sup>5</sup>	1.24x10 <sup>7</sup>	
	KA200	9.52x10 <sup>5</sup>	1.90x10 <sup>7</sup>	
KS	KS10	8.67x10 <sup>4</sup>	1.45x10 <sup>6</sup>	
	KS14	2.34x10 <sup>5</sup>	4.4x10 <sup>6</sup>	
	KS18	3.7x10 <sup>5</sup>	1.2x10 <sup>7</sup>	
KU	KU60	5.24x10 <sup>5</sup>	5.48x10 <sup>5</sup>	
	KU80	1.56x10 <sup>5</sup>	1.67x10 <sup>6</sup>	

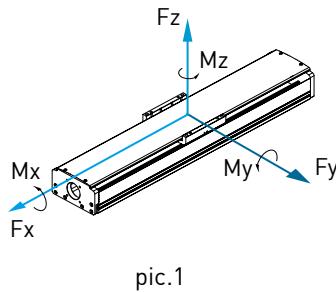
### 3.5 Table for the operating speed and stroke of KA

	KA Model				KA136											
					KA100				KA170				KA200			
	Ballscrew D (mm)				15		16		20		25					
	Ballscrew dr (mm)				12.364	12.399	12.899	12.684	16.624	17.084	21.824	22.094				
Lead(mm)	5	10	20	25	10	20	5	10	10	20	10	25				
RPM: S(rpm)	Maximum Linear Velocity V: (mm/sec)				Maximum Stroke											
100	8	17	33	42	4142	4148	4234	4197	4723	4792	5449	5484				
200	17	33	67	83	2883	2887	2948	2922	3264	3312	3776	3801				
300	25	50	100	125	2325	2329	2378	2357	2617	2657	3035	3056				
400	33	67	133	167	1993	1996	2039	2020	2232	2266	2594	2611				
500	42	83	167	208	1766	1769	1807	1791	1969	1999	2292	2308				
600	50	100	200	250	1598	1601	1636	1621	1774	1802	2070	2084				
700	58	117	233	292	1468	1471	1503	1489	1623	1649	1897	1910				
800	67	133	267	333	1363	1366	1396	1383	1502	1526	1758	1770				
900	75	150	300	375	1277	1279	1307	1295	1401	1424	1642	1654				
1000	83	167	333	417	1203	1205	1232	1220	1316	1337	1545	1556				
1100	92	183	367	458	1140	1142	1167	1156	1242	1263	1461	1471				
1150	96	192	383	479	1111	1113	1138	1128	1209	1230	1423	1433				
1200	100	200	400	500	1085	1086	1111	1101	1179	1198	1387	1397				
1300	108	217	433	542	1036	1038	1061	1051	1122	1141	1323	1332				
1400	117	233	467	583	993	994	1017	1007	1072	1090	1265	1274				
1500	125	250	500	625	954	955	977	968	1027	1044	1213	1222				
1600	133	267	533	667	918	920	941	932	986	1003	1166	1175				
1700	142	283	567	708	886	888	909	900	949	965	1124	1132				
1800	150	300	600	750	857	858	879	870	915	931	1085	1093				
1900	158	317	633	792	830	831	851	843	883	899	1049	1057				
2000	167	333	667	833	805	806	826	817	854	870	1016	1024				
2100	175	350	700	875	782	783	802	794	827	842	985	993				
2200	183	367	733	917	760	762	780	772	802	817	956	964				
2300	192	383	767	958	740	741	759	752	779	793	930	937				
2400	200	400	800	1000	721	722	740	733	757	771	904	912				
2500	208	417	833	1042	704	705	722	715	737	750	881	888				
2600	217	433	867	1083	687	688	705	698	717	731	859	866				
2700	225	450	900	1125	671	672	689	682	699	712	838	845				
2800	233	467	933	1167	656	657	674	667	682	695	818	825				
2900	242	483	967	1208	642	643	659	652	665	678	799	806				
3000	250	500	1000	1250	629	630	645	639	650	662	781	788				

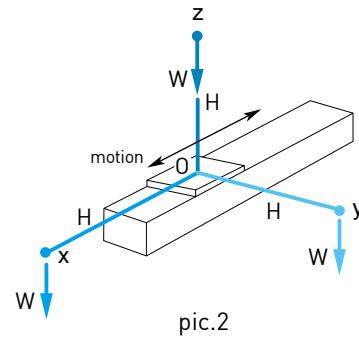
## 3.6 Dynamic Load

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

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



pic.1



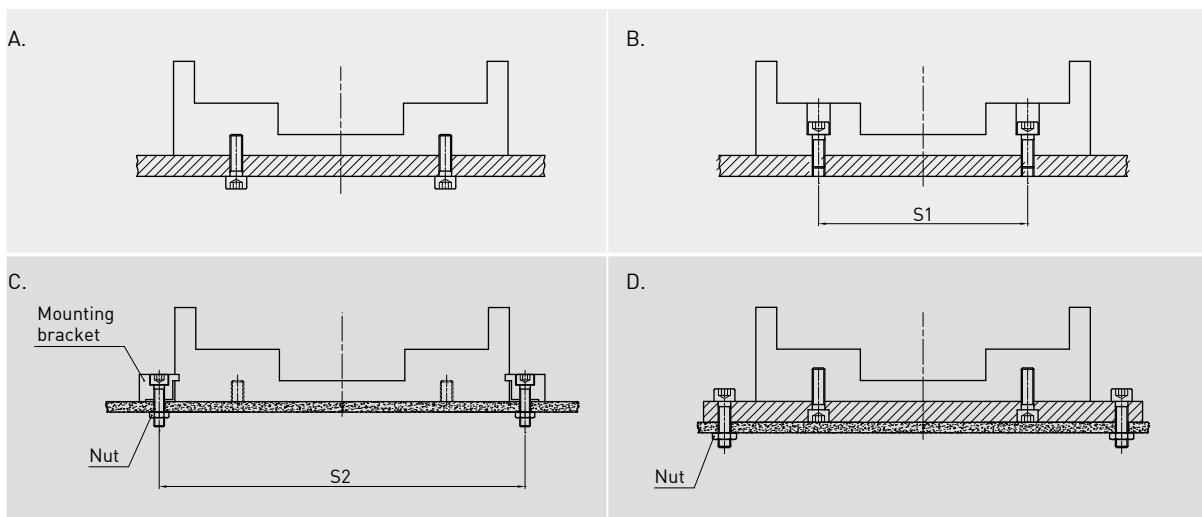
pic.2

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

Off Center Distance	H (mm)		
	x	y	z
KA100	550	550	550
KA136	550	550	550
KA170	780	780	780
KA200	900	900	900

## 3.7 Installation Method

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



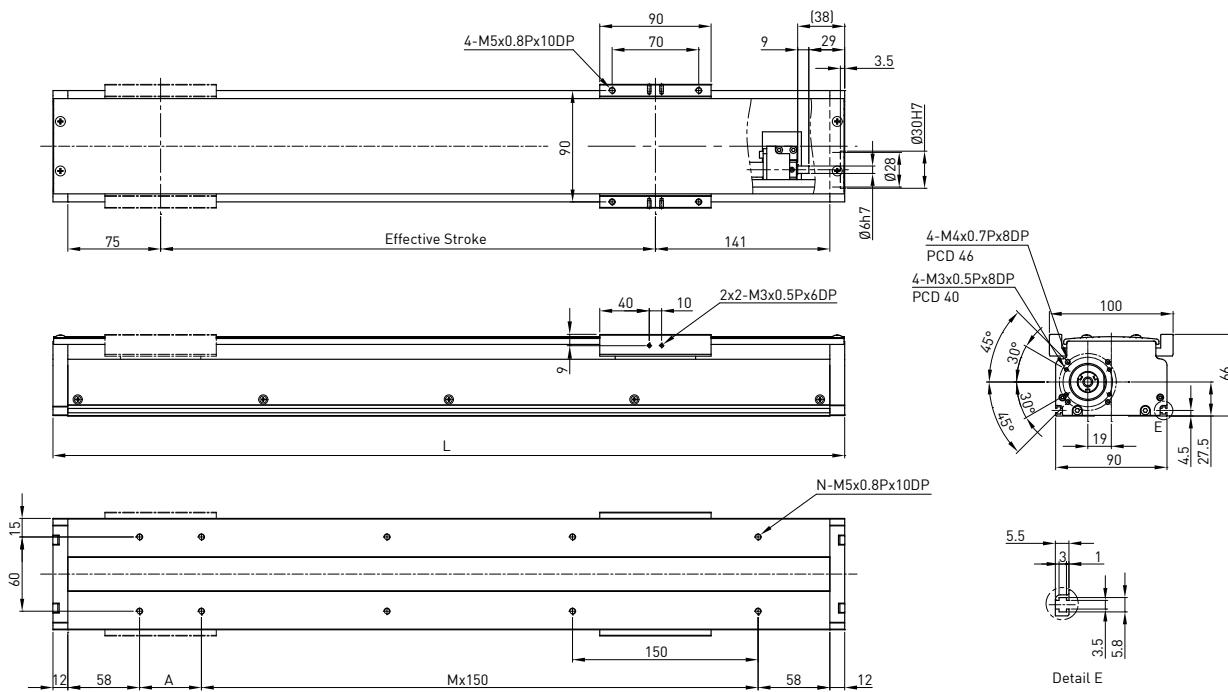
The table below indicates the distance between fixing screws, (S1) on type B and (S2) on type C (fixing from above):

KA Model	S1	S2	Screw
KA100	80	116	M5
KA136	112	150	M6
KA170	136	186	M8
KA200	162	218	M8

## 3.8 KA Series

### Model Number for KA090

KA090	-10	P	-0600	A	F0	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm	C: Normal P: Precision		A: Standard	F0:Direct	U: Without Cover None : Standard Cover	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	
						Drive	Lead	Rated RPM	Max linear speed*		Ball screw C7(normal)	
50	290	150	0	4	3.38				mm/sec	5	10	
100	340	50	1	6	3.78				RPM	3000	3000	
150	390	100	1	6	4.18				mm/sec	250	500	
200	440	150	1	6	4.58				N	280	140	
250	490	50	2	8	4.98				mm	±0.02		
300	540	100	2	8	5.38				mm	150~1250		
350	590	150	2	8	5.78				kg	24	16	
400	640	50	3	10	6.18	Rated dynamic load**			Fyd	N	50	50
450	690	100	3	10	6.58				Fzd	N	240	160
500	740	150	3	10	6.98				Mxd	N-m	4.5	4.2
550	790	50	4	12	7.38				Myd	N-m	2.8	2.7
600	840	100	4	12	7.78				Mzd	N-m	2.2	2
Permitted load condition***						$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$				Fy, Fz, Mx, My, Mz are working loads		

\* Vibration might occur when the effective stroke is longer than 550mm.

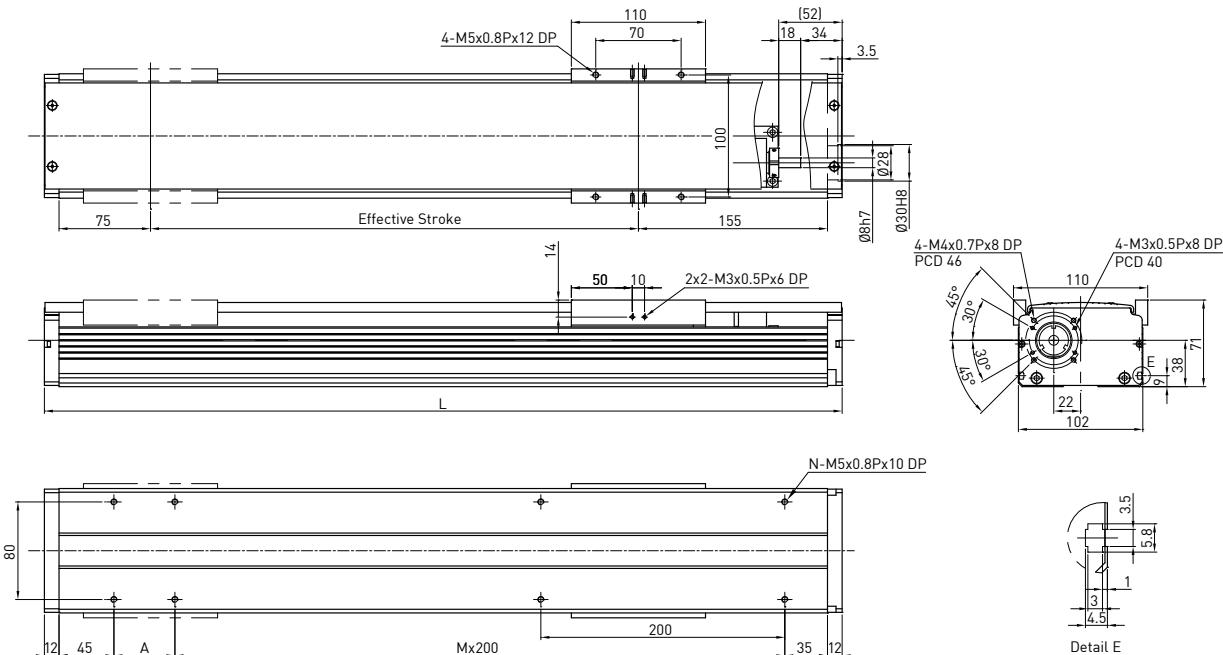
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

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

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

## Model Number for KA100

KA100	-20	P	-1050	A	F0	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	F0:Direct	U: Without Cover None : Standard Cover	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			
						Drive	Lead		mm	5	10	20
100	354	50	1	6	4.86	Rated RPM		RPM	3000	3000	3000	
150	404	100	1	6	5.34	Max linear speed*		mm/sec	250	500	1000	
200	454	150	1	6	5.81	Rated thrust		N	280	140	70	
250	504	200	1	6	6.29	Repeatability		mm	$\pm 0.02$			
300	554	50	2	8	6.77	Effective stroke		mm	100~1050			
350	604	100	2	8	7.25	Max load (H)		kg	47	32	16	
400	654	150	2	8	7.73	Rated dynamic load**	Fyd	N	50	50	50	
450	704	200	2	8	8.2		Fzd	N	470	320	160	
500	754	50	3	10	8.67		Mxd	N-m	16	15	15	
550	804	100	3	10	9.15		Myd	N-m	21	20	20	
600	854	150	3	10	9.63		Mzd	N-m	7	7	6	
650	904	200	3	10	10.11							
700	954	50	4	12	10.59	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$					
750	1004	100	4	12	11.06		Fy, Fz, Mx, My, Mz are working loads					
800	1054	150	4	12	11.54							
850	1104	200	4	12	12.02							
900	1154	50	5	14	12.49							
950	1204	100	5	14	12.97							
1000	1254	150	5	14	13.45							
1050	1304	200	5	14	13.93							

\* Vibration might occur when the effective stroke is longer than 650mm.

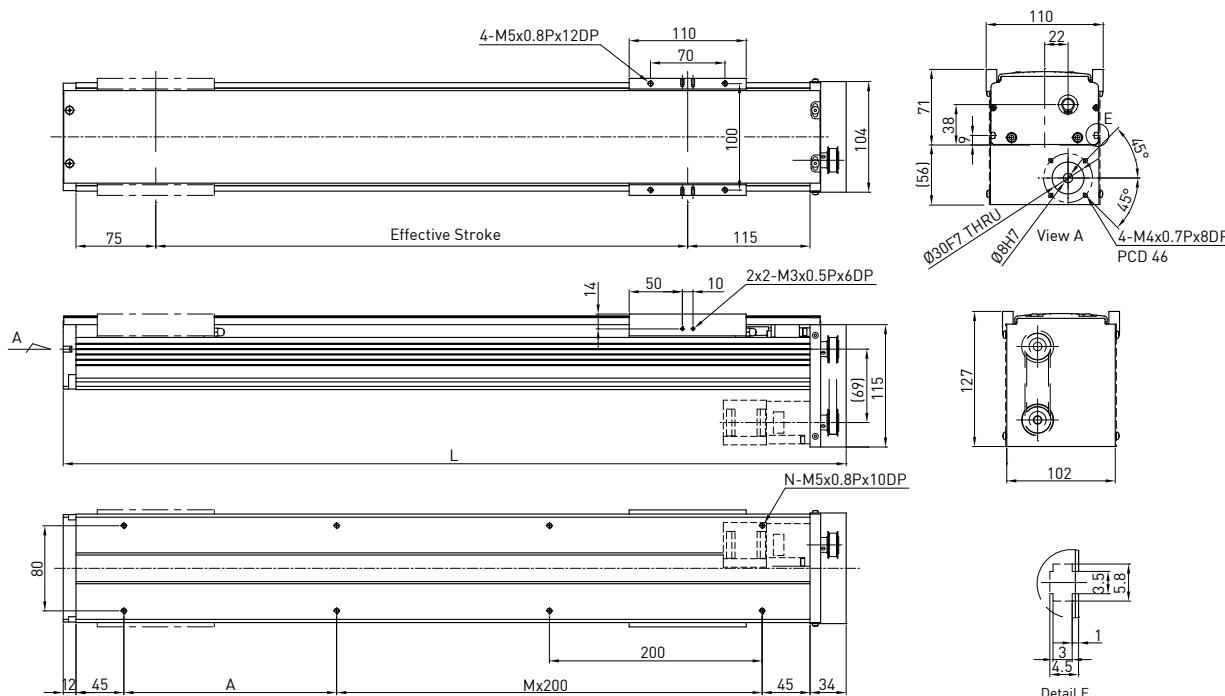
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA100-FD

KA100	-20	P	-1050	A	FD	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
5 mm	C: Normal			A: Standard	FD: Bottom	U: Without Cover	S1: OMRON SX671	M: Supplied With Motor
10 mm						None : Standard Cover	S2: OMRON SX674	None: Without Motor
20 mm	P: Precision						S3: SUNX GX-F12A	
							S4: SUNX GX-F12A-P	
							None: No Limit Switch	



Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output			W	100		
						Drive	Lead	mm		5	10	20
100	336	200	0	4	4.91	Rated RPM		RPM	3000	3000	3000	
150	386	50	1	6	5.41	Max linear speed*		mm/sec	250	500	1000	
200	436	100	1	6	5.88	Rated thrust		N	280	140	70	
250	486	150	1	6	6.36	Repeatability		mm	$\pm 0.02$			
300	536	200	1	6	6.85	Effective stroke		mm	100~1050			
350	586	50	2	8	7.33	Max load (H)		kg	47	32	16	
400	636	100	2	8	7.82	Rated dynamic load**	Fy	N	50	50	50	
450	686	150	2	8	8.29		Fz	N	470	320	160	
500	736	200	2	8	8.76		Mx	N-m	16	15	15	
550	786	50	3	10	9.25		My	N-m	21	20	20	
600	836	100	3	10	9.73		Mz	N-m	7	7	6	
650	886	150	3	10	10.22							
700	936	200	3	10	10.71	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$					
750	986	50	4	12	11.19		Fy, Fz, Mx, My, Mz are working loads					
800	1036	100	4	12	11.67							
850	1086	150	4	12	12.15							
900	1136	200	4	12	12.63							
950	1186	50	5	14	13.12							
1000	1236	100	5	14	13.6							
1050	1286	150	5	14	14.08							

\* Vibration might occur when the effective stroke is longer than 650mm.

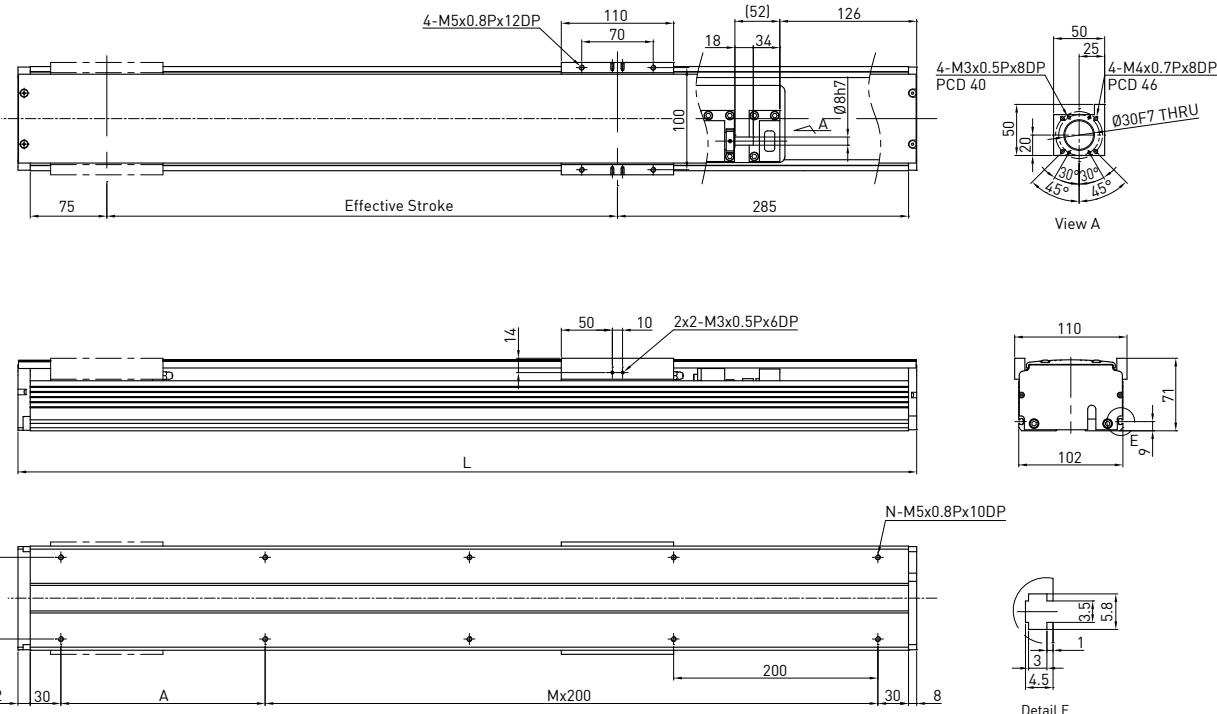
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA100-FI

KA100	-20	P	-1050	A	FI	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	FI : Internal	U: Without Cover None : Standard Cover	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



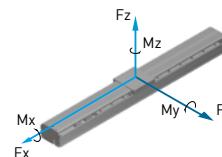
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	100			
						Drive		Ballscrew C7(normal)			
						Lead	mm	5	10	20	
100						Rated RPM	RPM	3000	3000	3000	
150						Max linear speed*	mm/sec	250	500	1000	
200						Rated thrust	N	280	140	70	
250						Repeatability	mm	$\pm 0.02$			
300						Effective stroke	mm	100~1050			
350						Max load (H)	kg	47	32	16	
400						Rated dynamic load**	Fyd	N	50	50	
450							Fzd	N	470	320	
500							Mxd	N-m	16	15	
550							Myd	N-m	21	20	
600							Mzd	N-m	7	7	
650										6	
700						Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$				
750							Fy, Fz, Mx, My, Mz are working loads				
800											
850											
900											
950											
1000											
1050											

\* Vibration might occur when the effective stroke is longer than 650mm.

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

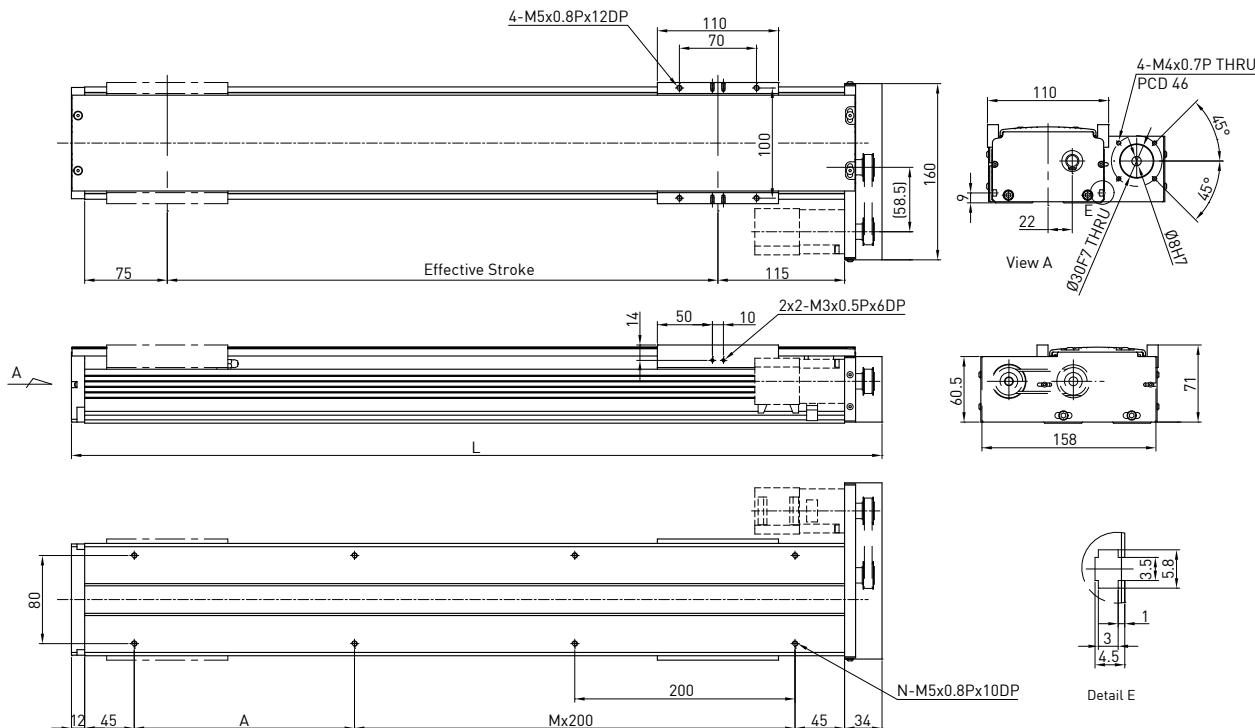
\*\* The load condition is based on 10,000km operation.

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



## Model Number for KA100-FL

KA100	-20	P	-1050	A	FL	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm	C:		A:	FL: Left	U:	S1: OMRON SX671	M:
	10 mm	Normal		Standard		Without Cover	S2: OMRON SX674	Supplied With Motor
	20 mm	P:	Precision			None : Standard Cover	S3: SUNX GX-F12A	None: Without Motor
							S4: SUNX GX-F12A-P	
							None: No Limit Switch	



Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output			W	100			
						Drive	Lead	mm		Ballscrew C7(normal)	5	10	20
100	336	200	0	4	4.91	Rated RPM	mm	5	10	20	3000	3000	3000
150	386	50	1	6	5.41	Max linear speed*	mm/sec	250	500	1000			
200	436	100	1	6	5.88	Rated thrust	N	280	140	70			
250	486	150	1	6	6.36	Repeatability	mm	±0.02					
300	536	200	1	6	6.85	Effective stroke	mm	100~1050					
350	586	50	2	8	7.33	Max load (H)	kg	47	32	16			
400	636	100	2	8	7.82	Rated dynamic load**	Fyd	N	50	50	50		
450	686	150	2	8	8.29		Fzd	N	470	320	160		
500	736	200	2	8	8.76		Mxd	N-m	16	15	15		
550	786	50	3	10	9.25		Myd	N-m	21	20	20		
600	836	100	3	10	9.73		Mzd	N-m	7	7	6		
650	886	150	3	10	10.22	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$						
700	936	200	3	10	10.71		Fy, Fz, Mx, My, Mz are working loads						
750	986	50	4	12	11.19								
800	1036	100	4	12	11.67								
850	1086	150	4	12	12.15								
900	1136	200	4	12	12.63								
950	1186	50	5	14	13.12								
1000	1236	100	5	14	13.6								
1050	1286	150	5	14	14.08								

\* Vibration might occur when the effective stroke is longer than 650mm.

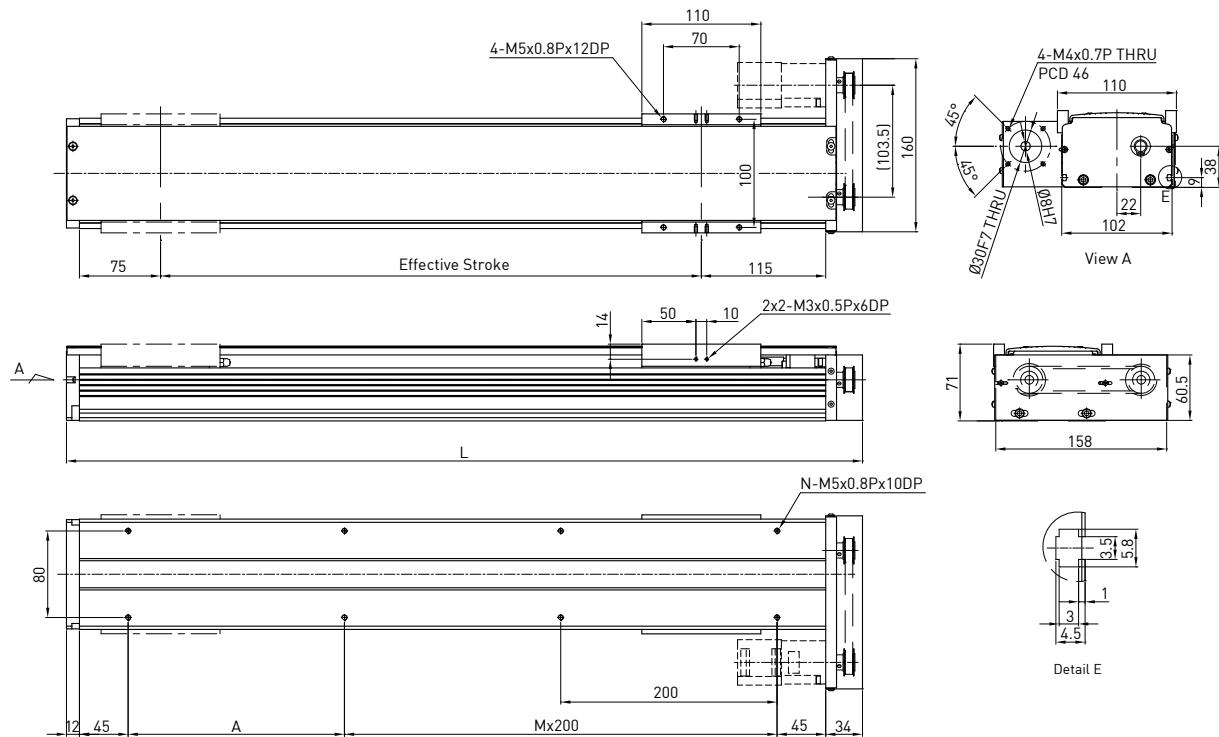
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA100-FR

KA100	-20	P	-1050	A	FR	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	FR: Right	U: Without Cover None : Standard Cover	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	
100	336	200	0	4	4.91	Drive		Ballscrew C7(normal)	
150	386	50	1	6	5.41	Lead	mm	5 10 20	
200	436	100	1	6	5.88	Rated RPM	RPM	3000 3000 3000	
250	486	150	1	6	6.36	Max linear speed*	mm/sec	250 500 1000	
300	536	200	1	6	6.85	Rated thrust	N	280 140 70	
350	586	50	2	8	7.33	Repeatability	mm	±0.02	
400	636	100	2	8	7.82	Effective stroke	mm	100~1050	
450	686	150	2	8	8.29	Max load (H)	kg	47 32 16	
500	736	200	2	8	8.76	Rated dynamic load**	Fyd	N 50 50 50	
550	786	50	3	10	9.25		Fzd	N 470 320 160	
600	836	100	3	10	9.73		Mxd	N-m 16 15 15	
650	886	150	3	10	10.22		Myd	N-m 21 20 20	
700	936	200	3	10	10.71		Mzd	N-m 7 7 6	
750	986	50	4	12	11.19				
800	1036	100	4	12	11.67	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		
850	1086	150	4	12	12.15		Fy, Fz, Mx, My, Mz are working loads		
900	1136	200	4	12	12.63				
950	1186	50	5	14	13.12				
1000	1236	100	5	14	13.6				
1050	1286	150	5	14	14.08				

\* Vibration might occur when the effective stroke is longer than 650mm.

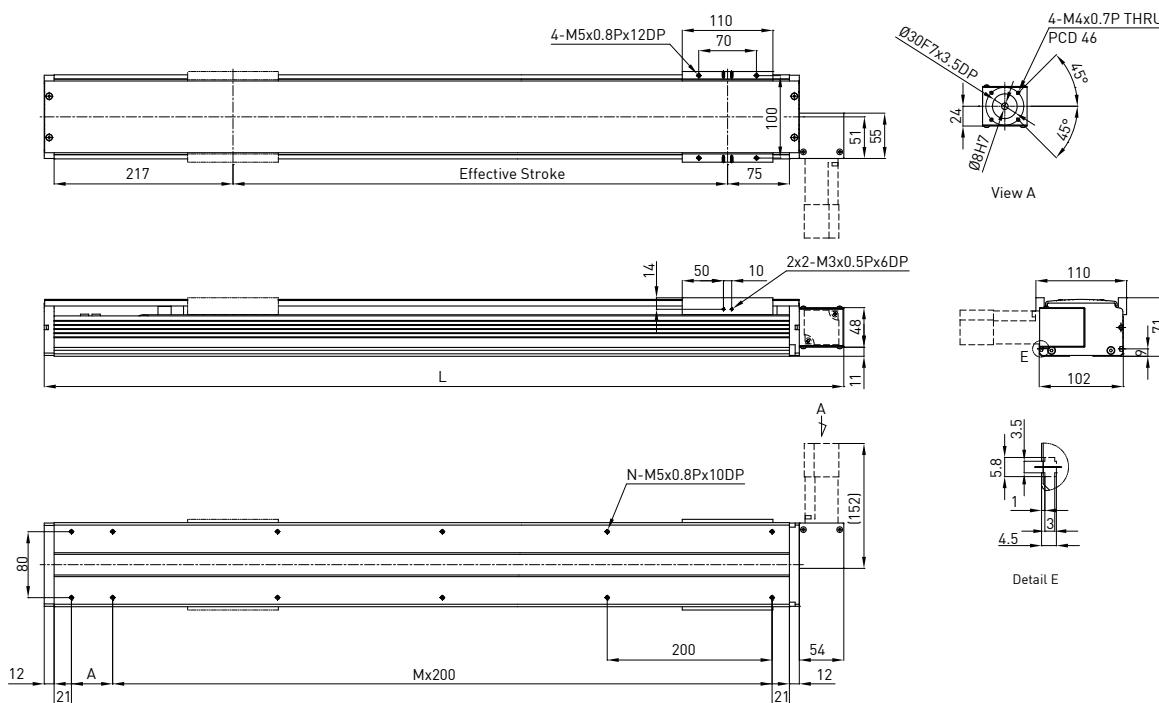
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA100B-FL

KA100	B	-84	C	-3000	A	FL	U	S1	M
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
			C: Normal		A: Standard	FL: Left	U: Without Cover None : Standard Cover	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



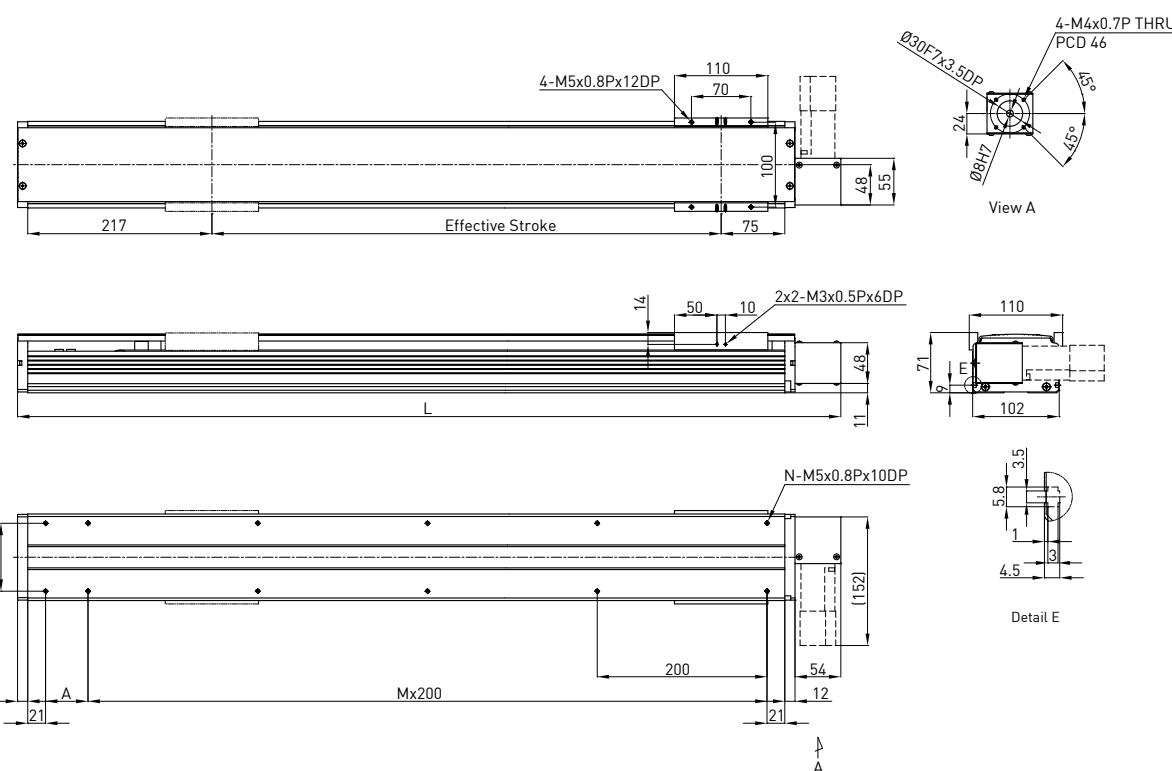
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	100	
200	570	50	2	8	5.41	Drive		Timing Belt	
400	770	50	3	10	7.07	Pulley Perimeter	mm	84	
600	970	50	4	12	8.83	Pulley RPM	RPM	1286	
800	1170	50	5	14	10.49	Max linear speed	mm/sec	1800	
1000	1370	50	6	16	12.15	Rated thrust	N	33	
1200	1570	50	7	18	13.91	Repeatability	mm	±0.1	
1400	1770	50	8	20	15.57	Effective stroke	mm	200~3000	
1600	1970	50	9	22	17.33	Max load (H)	kg	7.5	
1800	2170	50	10	24	18.99	Rated dynamic load*	Fyd	N	50
2000	2370	50	11	26	20.65		Fzd	N	75
2200	2570	50	12	28	22.41		Mxd	N-m	14
2400	2770	50	13	30	24.07		Myd	N-m	20
2600	2970	50	14	32	25.83		Mzd	N-m	6
2800	3170	50	15	34	27.49				
3000	3370	50	16	36	29.15	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.

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

## Model Number for KA100B-FR

KA100	B	-84	C	-3000	A	FR	U	S1	M
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
			C: Normal		A: Standard	FR: Right	U: Without Cover None : Standard Cover	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



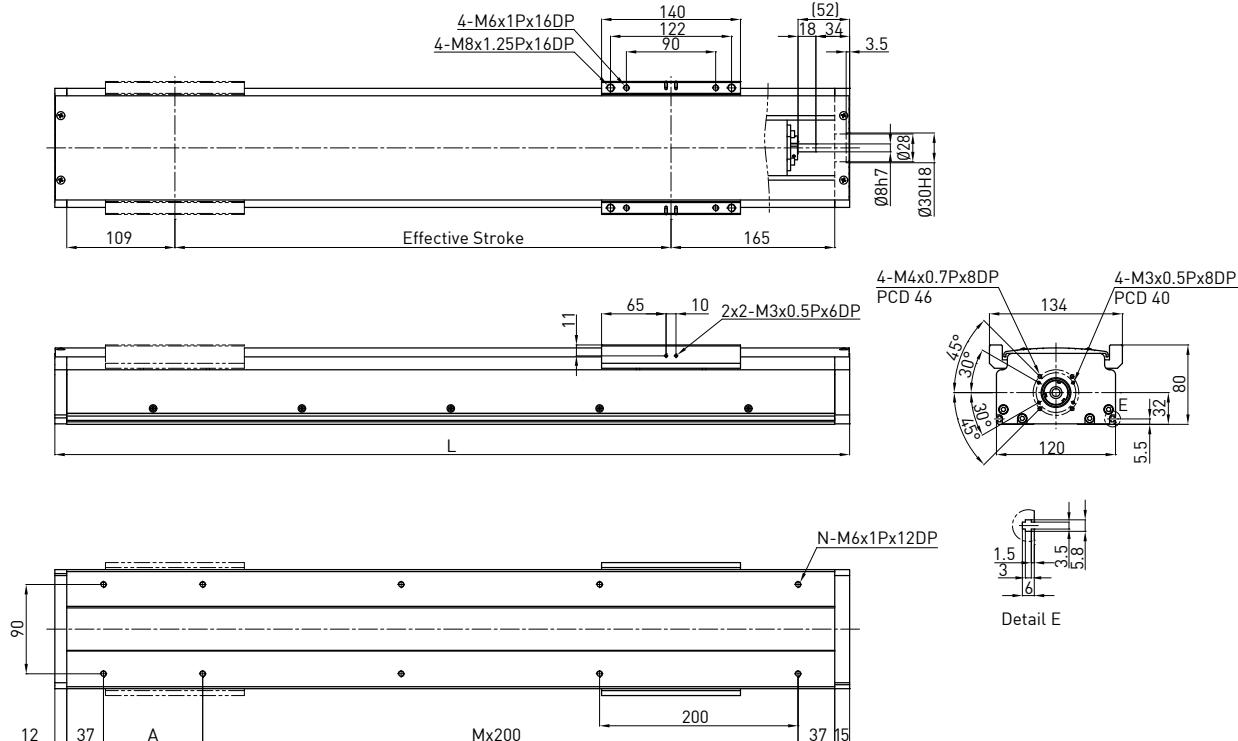
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	100	
200	570	50	2	8	5.41	Drive		Timing Belt	
400	770	50	3	10	7.07	Pulley Perimeter	mm	84	
600	970	50	4	12	8.83	Pulley RPM	RPM	1286	
800	1170	50	5	14	10.49	Max linear speed	mm/sec	1800	
1000	1370	50	6	16	12.15	Rated thrust	N	33	
1200	1570	50	7	18	13.91	Repeatability	mm	±0.1	
1400	1770	50	8	20	15.57	Effective stroke	mm	200~3000	
1600	1970	50	9	22	17.33	Max load (H)	kg	7.5	
1800	2170	50	10	24	18.99	Rated dynamic load*	Fyd	N	50
2000	2370	50	11	26	20.65		Fzd	N	75
2200	2570	50	12	28	22.41		Mxd	N-m	14
2400	2770	50	13	30	24.07		Myd	N-m	20
2600	2970	50	14	32	25.83		Mzd	N-m	6
2800	3170	50	15	34	27.49	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		
3000	3370	50	16	36	29.15		Fy, Fz, Mx, My, Mz are working loads		

\*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 KA120

KA120	-20	P	-1050	A	F0	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	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		
						Drive				Ballscrew C7(normal)		
100	401	100	1	6	7.5	Lead	mm	5	10	20		
150	451	150	1	6	8.13	Rated RPM	RPM	3000	3000	3000		
200	501	200	1	6	8.76	Max linear speed*	mm/sec	250	500	1000		
250	551	50	2	8	9.39	Rated thrust	N	560	280	140		
300	601	100	2	8	10.02	Repeatability	mm	$\pm 0.02$				
350	651	150	2	8	10.65	Effective stroke	mm	100~1050				
400	701	200	2	8	11.28	Max load (H)	kg	47	32	16		
450	751	50	3	10	11.91	Rated dynamic load**	Fyd	N	50	50	50	
500	801	100	3	10	12.54		Fzd	N	470	320	160	
550	851	150	3	10	13.17		Mxd	N-m	31	31	31	
600	901	200	3	10	13.8		Myd	N-m	23	23	23	
650	951	50	4	12	14.43		Mzd	N-m	17	17	17	
700	1001	100	4	12	15.06	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$					
750	1051	150	4	12	15.69		Fy, Fz, Mx, My, Mz are working loads					
800	1101	200	4	12	16.32							
850	1151	50	5	14	16.95							
900	1201	100	5	14	17.58							
950	1251	150	5	14	18.21							
1000	1301	200	5	14	18.84							
1050	1351	50	6	16	19.47							

\* Vibration might occur when the effective stroke is longer than 650mm.

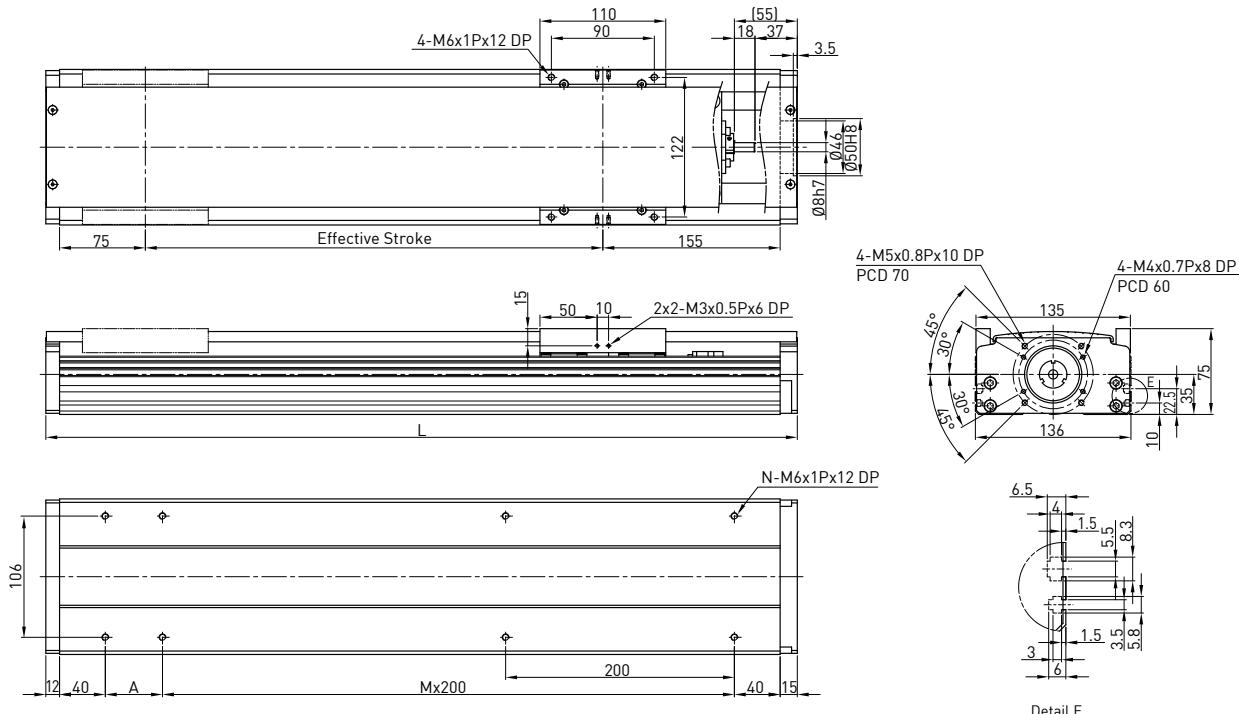
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA136

KA136	-20	P	-1050	A	F0	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	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			
						Drive		Ballscrew C7(normal)			
100	357	50	1	6	6.19	Lead	mm	5	10	20	
150	407	100	1	6	6.74	Rated RPM	RPM	3000	3000	3000	
200	457	150	1	6	7.29	Max linear speed*	mm/sec	250	500	1000	
250	507	200	1	6	7.84	Rated thrust	N	560	280	140	
300	557	50	2	8	8.39	Repeatability	mm	±0.02			
350	607	100	2	8	8.94	Effective stroke	mm	100~1050			
400	657	150	2	8	9.49	Max load (H)	kg	95	64	32	
450	707	200	2	8	10.05	Rated dynamic load**	Fyd	N	50	50	50
500	757	50	3	10	10.6		Fzd	N	950	640	320
550	807	100	3	10	11.15		Mxd	N-m	20	24	28
600	857	150	3	10	11.7		Myd	N-m	26	30	35
650	907	200	3	10	12.25		Mzd	N-m	8	10	13
700	957	50	4	12	12.8		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$				
750	1007	100	4	12	13.35	Fy, Fz, Mx, My, Mz are working loads					
800	1057	150	4	12	13.9						
850	1107	200	4	12	14.45						
900	1157	50	5	14	15						
950	1207	100	5	14	15.55						
1000	1257	150	5	14	16.1						
1050	1307	200	5	14	16.65						

\* Vibration might occur when the effective stroke is longer than 650mm.

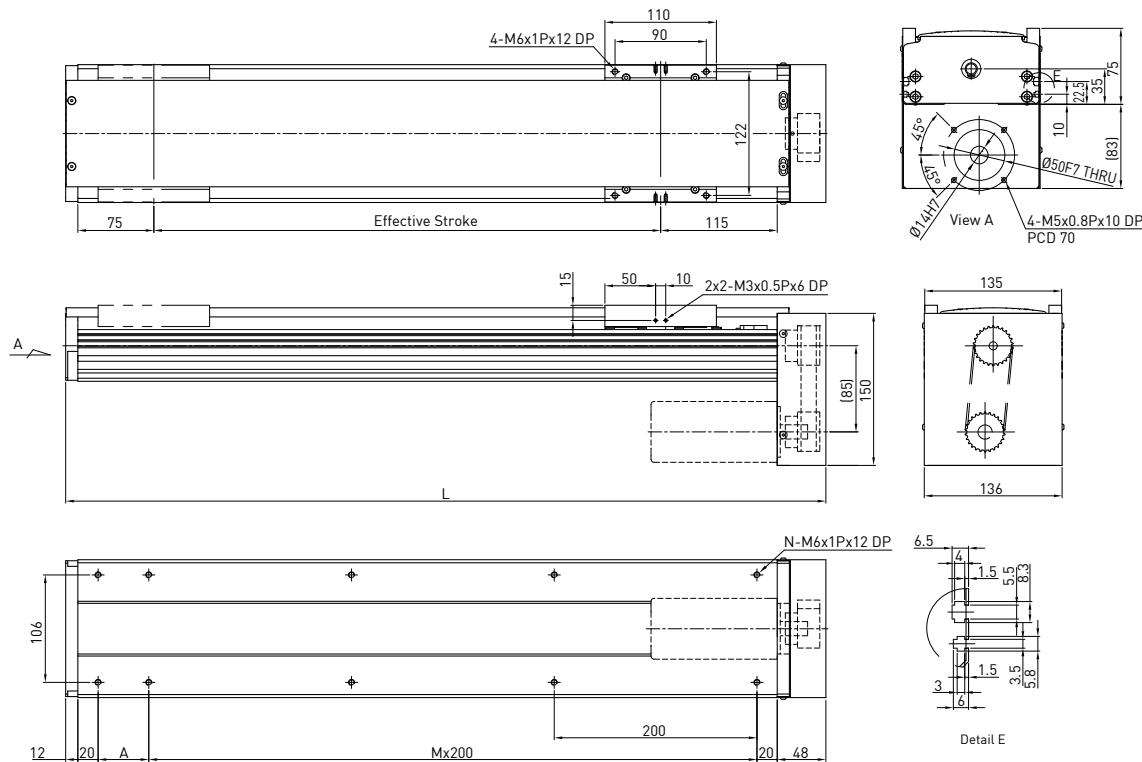
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

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

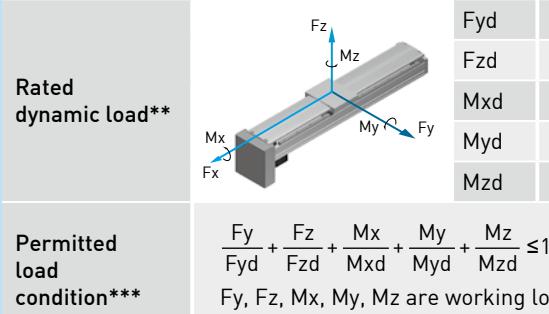
\*\*\* If used on the vertical axis or in a special condition, please contact HIWIN.

## Model Number for KA136-FD

KA136	-20	P	-1050	A	FD	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	FD: Bottom	U: Without Cover None : Standard Cover	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				
						Drive	Lead	Rated RPM	Max linear speed*		mm	5	10	20	
100	350	50	1	6	6.31					Ball screw C7(normal)	RPM	3000	3000	3000	
150	400	100	1	6	6.88						mm/sec	250	500	1000	
200	450	150	1	6	7.44						N	560	280	140	
250	500	200	1	6	8.01						mm	±0.02			
300	550	50	2	8	8.56						mm	100~1050			
350	600	100	2	8	9.12						kg	95	64	32	
400	650	150	2	8	9.68						Fyd	N	50	50	50
450	700	200	2	8	10.25						Fzd	N	950	640	320
500	750	50	3	10	10.81						Mxd	N-m	20	24	28
550	800	100	3	10	11.37						Myd	N-m	26	30	35
600	850	150	3	10	11.94						Mzd	N-m	8	10	13
650	900	200	3	10	12.51										
700	950	50	4	12	13.06										
750	1000	100	4	12	13.62										
800	1050	150	4	12	14.18										
850	1100	200	4	12	14.74										
900	1150	50	5	14	15.3										
950	1200	100	5	14	15.86										
1000	1250	150	5	14	16.42										
1050	1300	200	5	14	16.98										



\* Vibration might occur when the effective stroke is longer than 650mm.

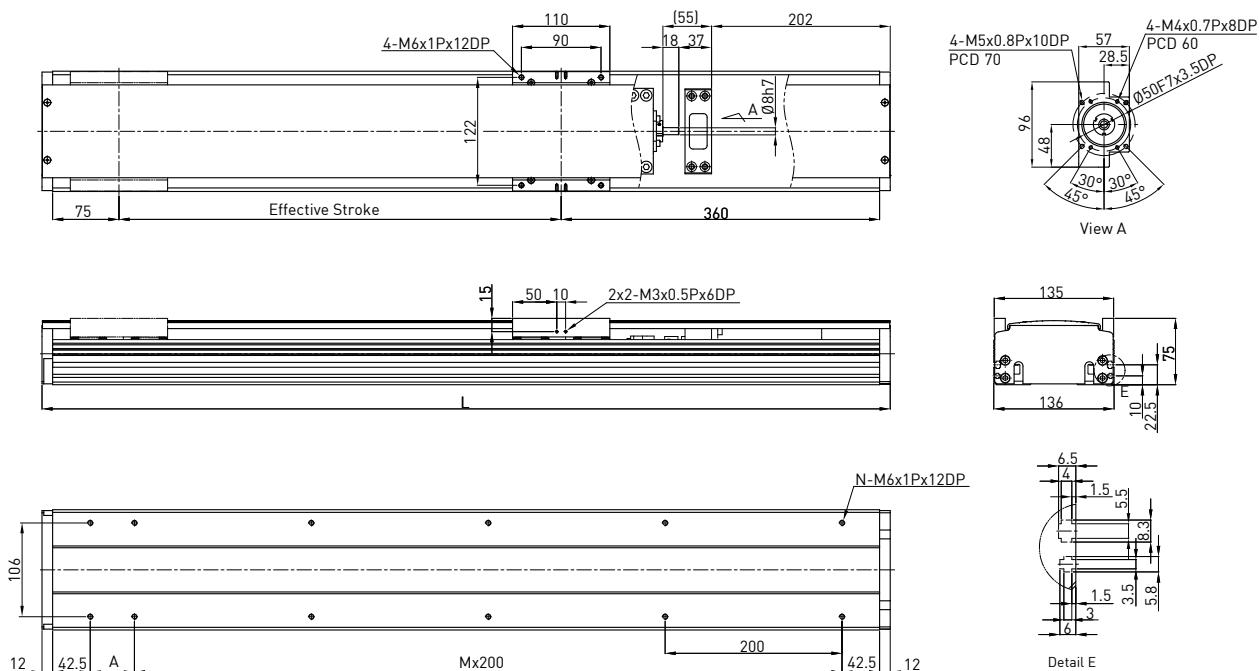
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA136-FI

KA136	-20	P	-1050	A	FI	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	FI : Internal	U: Without Cover None : Standard Cover	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		
						Drive					Ballscrew C7(normal)		
100	559	50	2	8	6.62	Lead				mm	5	10	20
150	609	100	2	8	7.21	Rated RPM				RPM	3000	3000	3000
200	659	150	2	8	7.8	Max linear speed*				mm/sec	250	500	1000
250	709	200	2	8	8.39	Rated thrust				N	560	280	140
300	759	50	3	10	8.98	Repeatability				mm	±0.02		
350	809	100	3	10	9.57	Effective stroke				mm	100-1050		
400	859	150	3	10	10.15	Max load (H)				kg	95	64	32
450	909	200	3	10	10.75	Rated dynamic load**	Fyd			N	50	50	50
500	959	50	4	12	11.34		Fzd			N	950	640	320
550	1009	100	4	12	11.93		Mxd			N-m	20	24	28
600	1059	150	4	12	12.52		Myd			N-m	26	30	35
650	1109	200	4	12	13.11		Mzd			N-m	8	10	13
700	1159	50	5	14	13.71	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$						
750	1209	100	5	14	14.29		Fy, Fz, Mx, My, Mz are working loads						
800	1259	150	5	14	14.87								
850	1309	200	5	14	15.46								
900	1359	50	6	16	16.05								
950	1409	100	6	16	16.64								
1000	1459	150	6	16	17.23								
1050	1509	200	6	16	17.82								

\* Vibration might occur when the effective stroke is longer than 650mm.

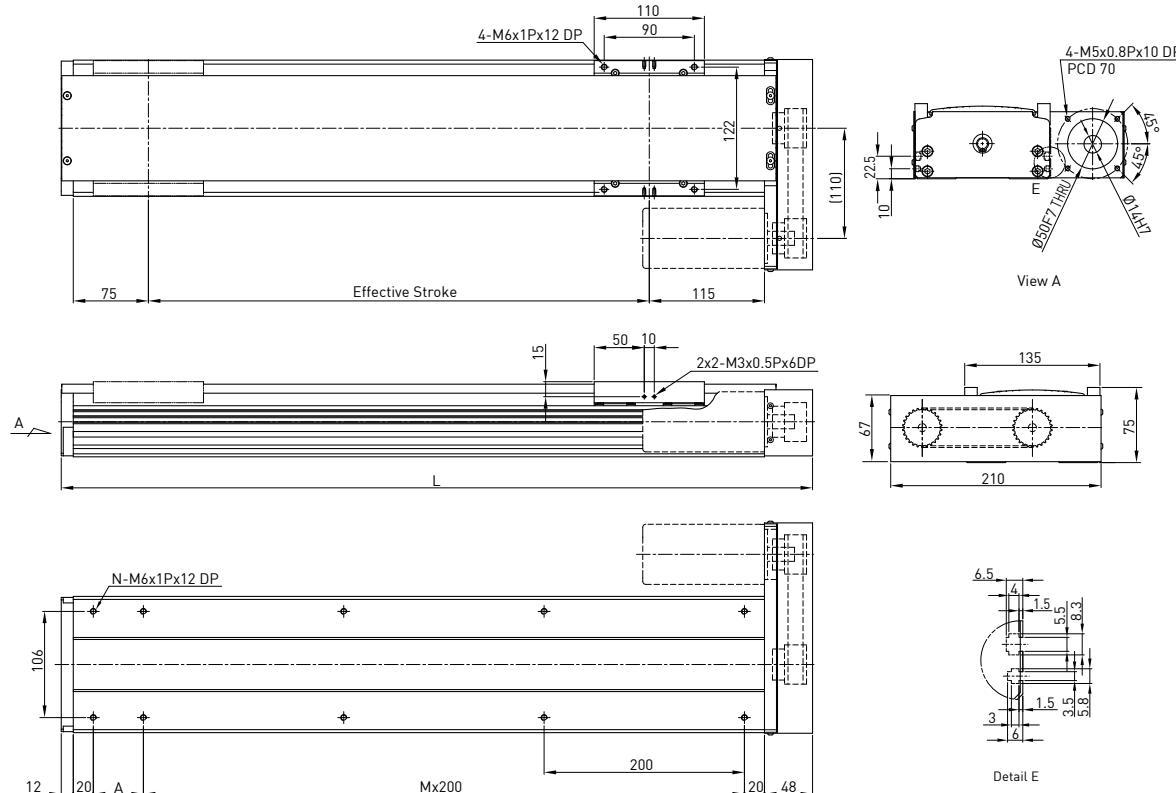
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

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

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

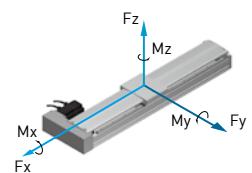
## Model Number for KA136-FL

KA136	-20	P	-1050	A	FL	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm	C:						
	10 mm	Normal						
	20 mm	P:	Precision					
				A: Standard	FL: Left	U: Without Cover	S1: OMRON SX671	M: Supplied With Motor
						None : Standard Cover	S2: OMRON SX674	None: Without Motor
							S3: SUNX GX-F12A	
							S4: SUNX GX-F12A-P	
							None: No Limit Switch	



Effective stroke (mm)	L	A	M	N	Weight (kg)
100	350	50	1	6	6.31
150	400	100	1	6	6.88
200	450	150	1	6	7.44
250	500	200	1	6	8.01
300	550	50	2	8	8.56
350	600	100	2	8	9.12
400	650	150	2	8	9.68
450	700	200	2	8	10.25
500	750	50	3	10	10.81
550	800	100	3	10	11.37
600	850	150	3	10	11.94
650	900	200	3	10	12.51
700	950	50	4	12	13.06
750	1000	100	4	12	13.62
800	1050	150	4	12	14.18
850	1100	200	4	12	14.74
900	1150	50	5	14	15.3
950	1200	100	5	14	15.86
1000	1250	150	5	14	16.42
1050	1300	200	5	14	16.98

AC motor output	W	200		
		Ballscrew C7(normal)		
Drive	mm	5	10	20
Lead	RPM	3000	3000	3000
Rated RPM	mm/sec	250	500	1000
Max linear speed*	N	560	280	140
Rated thrust	mm	$\pm 0.02$		
Repeatability	mm	100~1050		
Effective stroke	kg	95	64	32
Max load (H)	Fyd	N	50	50
Rated dynamic load**	Fzd	N	950	640
	Mxd	N-m	20	24
Permitted load condition***	Myd	N-m	26	30
	Mzd	N-m	8	10



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

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

\* Vibration might occur when the effective stroke is longer than 650mm.

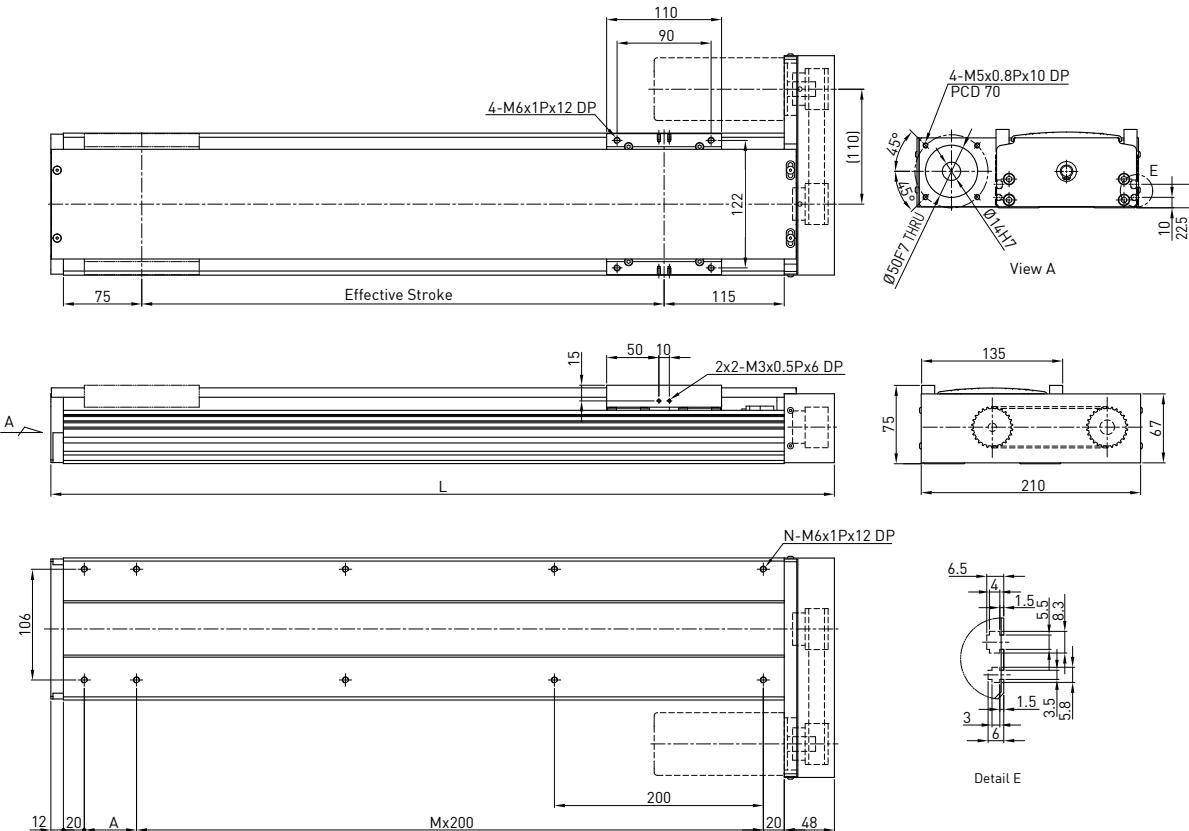
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA136-FR

KA136	-20	P	-1050	A	FR	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	5 mm 10 mm 20 mm	C: Normal P: Precision		A: Standard	FR: Right	U: Without Cover None : Standard Cover	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
100	350	50	1	6	6.31	Drive		Ballscrew C7(normal)
150	400	100	1	6	6.88	Lead	mm	5 10 20
200	450	150	1	6	7.44	Rated RPM	RPM	3000 3000 3000
250	500	200	1	6	8.01	Max linear speed*	mm/sec	250 500 1000
300	550	50	2	8	8.56	Rated thrust	N	560 280 140
350	600	100	2	8	9.12	Repeatability	mm	±0.02
400	650	150	2	8	9.68	Effective stroke	mm	100~1050
450	700	200	2	8	10.25	Max load (H)	kg	95 64 32
500	750	50	3	10	10.81	Rated dynamic load**	Fyd	N 50 50 50
550	800	100	3	10	11.37		Fzd	N 950 640 320
600	850	150	3	10	11.94		Mxd	N-m 20 24 28
650	900	200	3	10	12.51		Myd	N-m 26 30 35
700	950	50	4	12	13.06		Mzd	N-m 8 10 13
750	1000	100	4	12	13.62	Permitted load condition***	Fy	
800	1050	150	4	12	14.18		Fz	
850	1100	200	4	12	14.74		Mz	
900	1150	50	5	14	15.3	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		
950	1200	100	5	14	15.86	Fy, Fz, Mx, My, Mz are working loads		
1000	1250	150	5	14	16.42			
1050	1300	200	5	14	16.98			

\* Vibration might occur when the effective stroke is longer than 650mm.

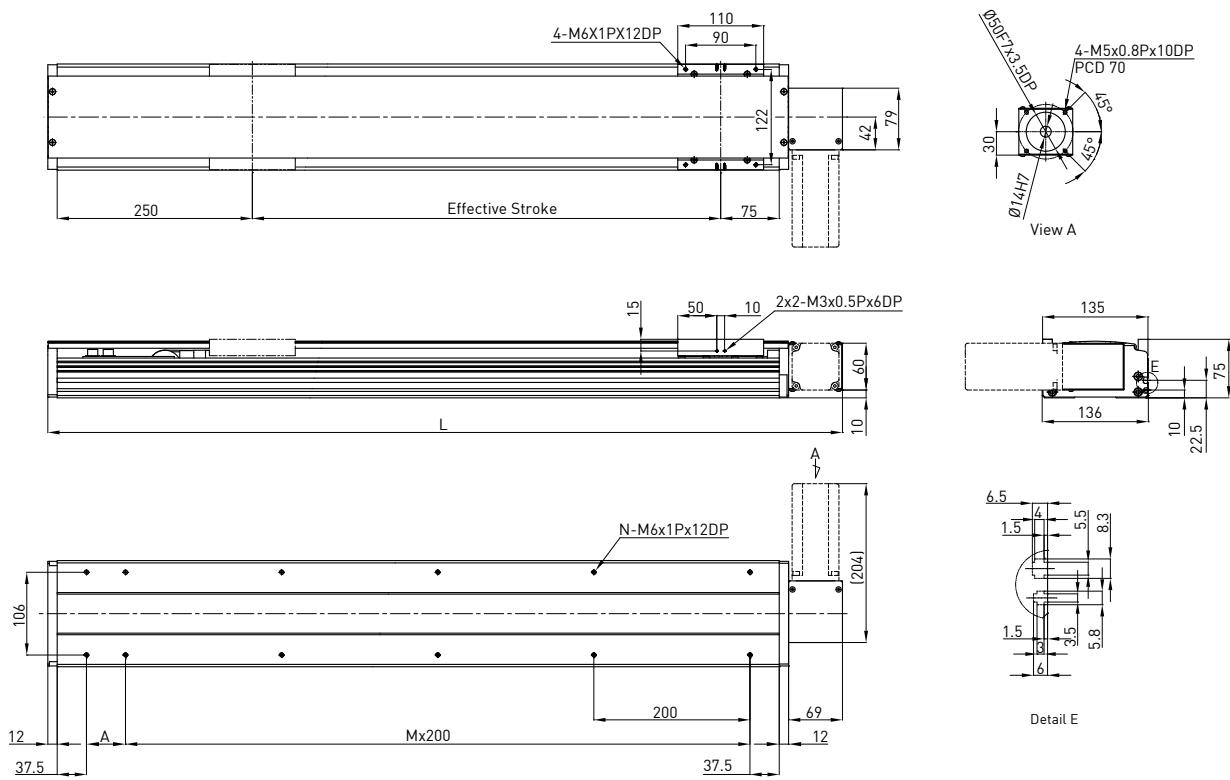
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA136B-FL

KA136	B	-120	C	-3000	A	FL	U	S1	M
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
			C: Normal		A: Standard	FL: Left	U: Without Cover None : Standard Cover	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



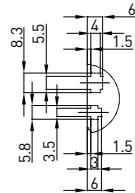
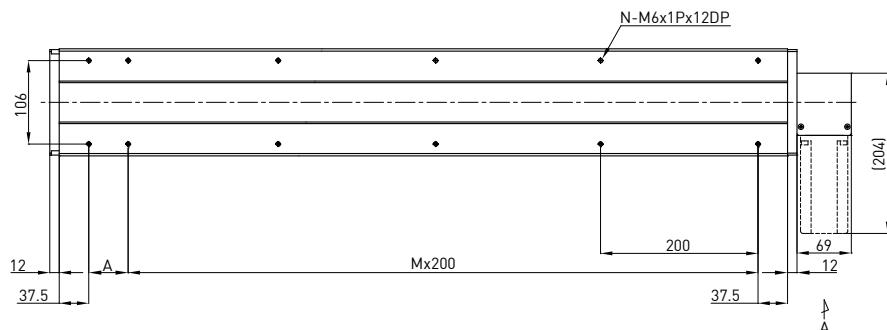
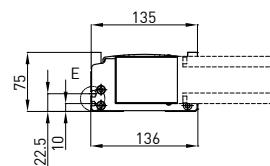
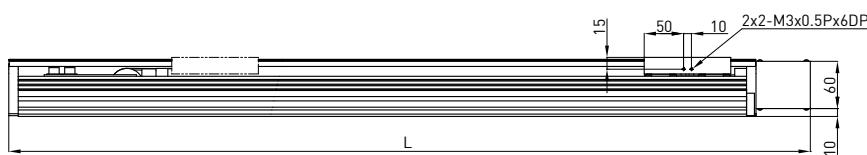
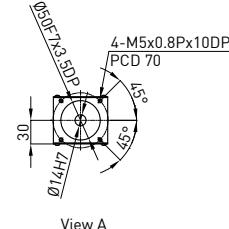
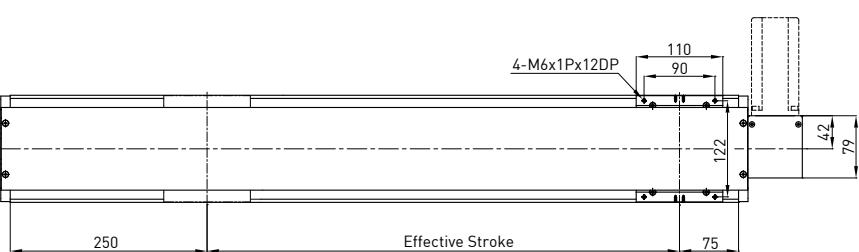
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output		W	200
						Drive	Timing Belt		
200	618	50	2	8	6.97	Pulley Perimeter	mm	120	
400	818	50	3	10	8.93	Pulley RPM	RPM	900	
600	1018	50	4	12	11.01	Max linear speed	mm/sec	1800	
800	1218	50	5	14	12.97	Rated thrust	N	67	
1000	1418	50	6	16	14.93	Repeatability	mm	$\pm 0.1$	
1200	1618	50	7	18	16.99	Effective stroke	mm	200-3000	
1400	1818	50	8	20	18.95	Max load (H)	kg	15	
1600	2018	50	9	22	21.01	Rated dynamic load*	F <sub>yd</sub>	N	50
1800	2218	50	10	24	22.97		F <sub>zd</sub>	N	150
2000	2418	50	11	26	24.93		M <sub>xd</sub>	N·m	42
2200	2618	50	12	28	26.99		M <sub>yd</sub>	N·m	31
2400	2818	50	13	30	28.95		M <sub>zd</sub>	N·m	13
2600	3018	50	14	32	31.01				
2800	3218	50	15	34	32.97	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		
3000	3418	50	16	36	34.93		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.

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

## Model Number for KA136B-FR

KA136	B	-120	C	-3000	A	FR	U	S1	M
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
			C: Normal		A: Standard	FR: Right	U: Without Cover None : Standard Cover	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)
200	618	50	2	8	6.97
400	818	50	3	10	8.93
600	1018	50	4	12	11.01
800	1218	50	5	14	12.97
1000	1418	50	6	16	14.93
1200	1618	50	7	18	16.99
1400	1818	50	8	20	18.95
1600	2018	50	9	22	21.01
1800	2218	50	10	24	22.97
2000	2418	50	11	26	24.93
2200	2618	50	12	28	26.99
2400	2818	50	13	30	28.95
2600	3018	50	14	32	31.01
2800	3218	50	15	34	32.97
3000	3418	50	16	36	34.93

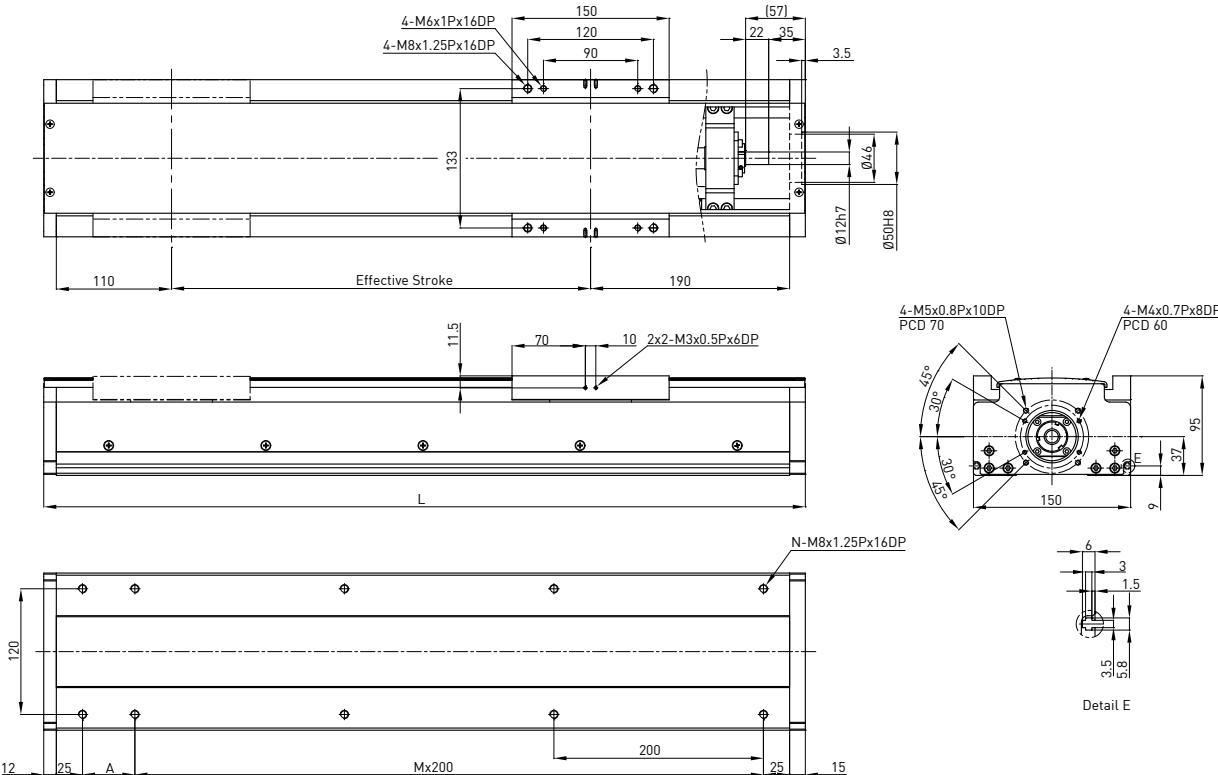
AC motor output	W	200
Drive		Timing Belt
Pulley Perimeter	mm	120
Pulley RPM	RPM	900
Max linear speed	mm/sec	1800
Rated thrust	N	67
Repeatability	mm	±0.1
Effective stroke	mm	200-3000
Max load (H)	kg	15
Rated dynamic load*	Fyd	N 50
	Fzd	N 150
	Mxd	N-m 42
	Myd	N-m 31
	Mzd	N-m 13
Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$	
	Fy, Fz, Mx, My, Mz are working loads	

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

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

## Model Number for KA150

KA150	-10	P	-1250	A	F0	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10 mm 20 mm	C: Normal P: Precision		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	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	
						Drive					Ballscrew C7(normal)	
150	477	200	1	6	12.71	Lead				mm	10	20
200	527	50	2	8	13.59	Rated RPM				RPM	3000	3000
250	577	100	2	8	14.47	Max linear speed*				mm/sec	500	1000
300	627	150	2	8	15.35	Rated thrust				N	280	140
350	677	200	2	8	16.23	Repeatability				mm	±0.02	
400	727	50	3	10	17.11	Effective stroke				mm	100~1050	
450	777	100	3	10	17.99	Max load (H)				kg	64	32
500	827	150	3	10	18.87	Rated dynamic load**		Fyd	N	50	50	
550	877	200	3	10	19.75		Fzd	N	640	320		
600	927	50	4	12	20.63		Mxd	N-m	62	66		
650	977	100	4	12	21.51		Myd	N-m	81	86		
700	1027	150	4	12	22.39		Mzd	N-m	30	33		
750	1077	200	4	12	23.27							
800	1127	50	5	14	24.15	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$					
850	1177	100	5	14	25.03	Fy, Fz, Mx, My, Mz are working loads						
900	1227	150	5	14	25.91							
950	1277	200	5	14	26.79							
1000	1327	50	6	16	27.67							
1050	1377	100	6	16	28.55							
1100	1427	150	6	16	29.43							
1150	1477	200	6	16	30.31							
1200	1527	50	7	18	31.19							
1250	1577	100	7	18	32.07							

\* Vibration might occur when the effective stroke is longer than 650mm.

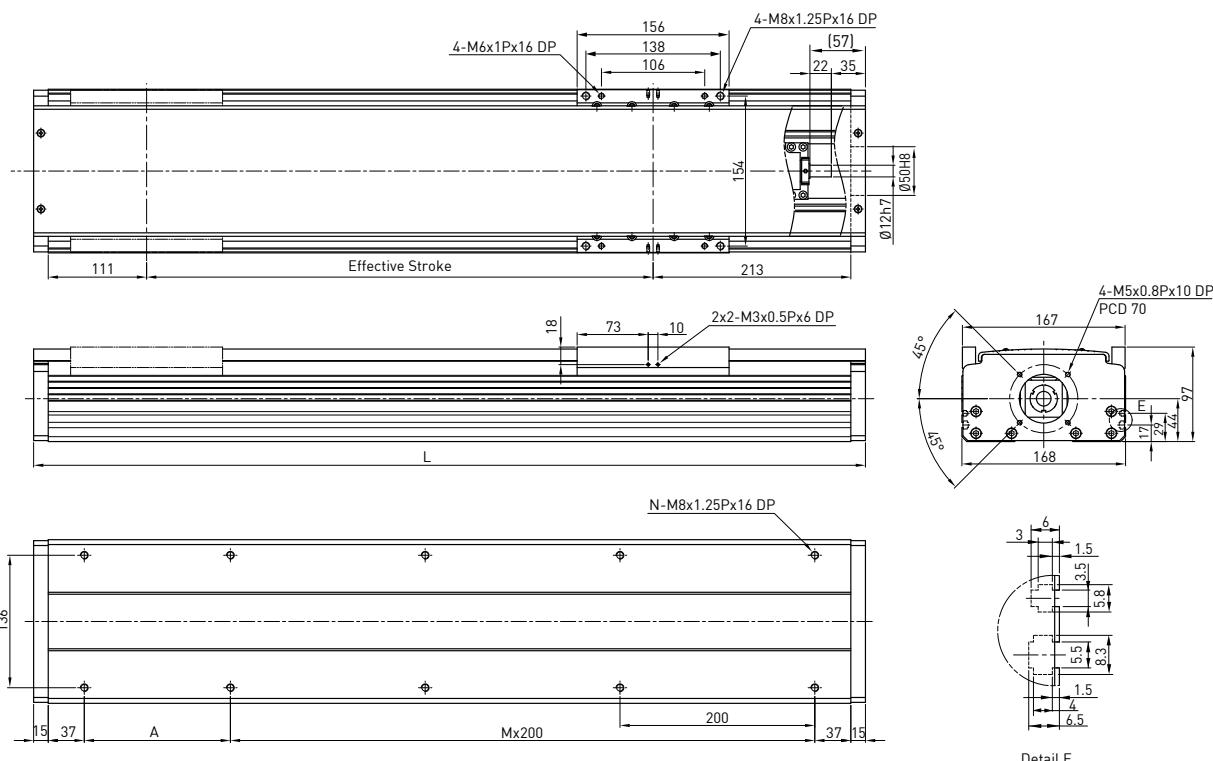
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA170

KA170	-20	P	-1250	A	F0	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10 mm 20 mm	C: Normal P: Precision		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	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



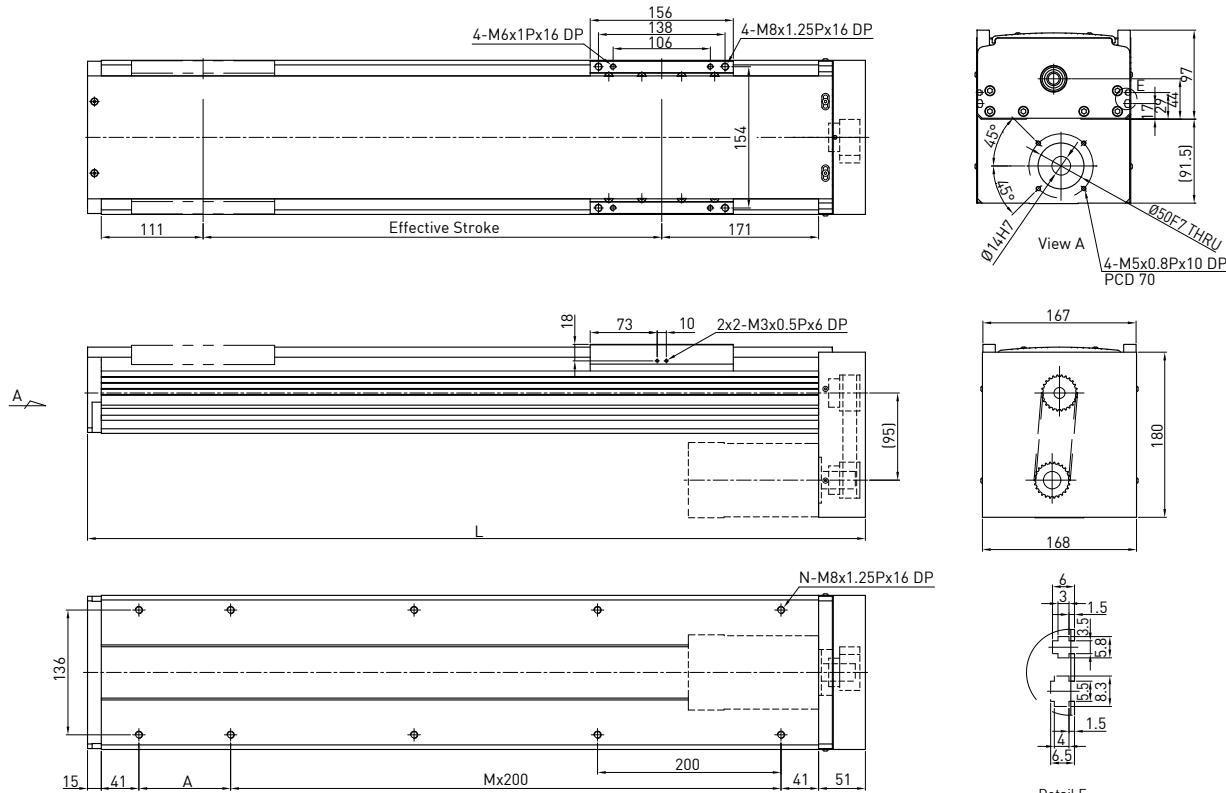
Effective stroke (mm)	L	A	M	N	Weight (kg)
150	504	200	1	6	14.57
200	554	50	2	8	15.45
250	604	100	2	8	16.33
300	654	150	2	8	17.21
350	704	200	2	8	18.09
400	754	50	3	10	18.97
450	804	100	3	10	19.85
500	854	150	3	10	20.73
550	904	200	3	10	21.61
600	954	50	4	12	22.49
650	1004	100	4	12	23.37
700	1054	150	4	12	24.25
750	1104	200	4	12	25.13
800	1154	50	5	14	26.01
850	1204	100	5	14	26.89
900	1254	150	5	14	27.77
950	1304	200	5	14	28.65
1000	1354	50	6	16	29.53
1050	1404	100	6	16	30.41
1100	1454	150	6	16	31.29
1150	1504	200	6	16	32.17
1200	1554	50	7	18	33.05
1250	1604	100	7	18	33.92

AC motor output	W		400	
	Ballscrew C7(normal)			
Drive	mm	10	20	
Lead	RPM	3000	3000	
Rated RPM	mm/sec	500	1000	
Max linear speed*	N	560	280	
Rated thrust	mm	$\pm 0.02$		
Repeatability	mm	150~1250		
Effective stroke	kg	127	64	
Max load (H)	Fyd	N	50	50
Rated dynamic load**	Fzd	N	1270	640
	Mxd	N-m	108	118
	Myd	N-m	155	167
	Mzd	N-m	30	35
	Fx	Mx	Fy	Mz
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 650mm.  
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 KA170-FD

KA170	-20	P	-1250	A	FD	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10 mm 20 mm	C: Normal P: Precision		A: Standard	FD: Bottom	U: Without Cover None : Standard Cover	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	400			
						Drive	Lead	Rated RPM		mm	10	20	
150	498	150	1	6	15.01	Max linear speed*				RPM	3000	3000	
200	548	200	1	6	15.92	Rated thrust				mm/sec	500	1000	
250	598	50	2	8	16.82	Repeatability				N	560	280	
300	648	100	2	8	17.73	Effective stroke				mm	$\pm 0.02$		
350	698	150	2	8	18.63	Max load (H)				mm	150~1250		
400	748	200	2	8	19.54	Rated dynamic load**	Fyd	N	kg	127	64		
450	798	50	3	10	20.45		Fzd	N		50	50		
500	848	100	3	10	21.35		Mxd	N-m		1270	640		
550	898	150	3	10	22.26		Myd	N-m		108	118		
600	948	200	3	10	23.17		Mzd	N-m		155	167		
650	998	50	4	12	24.07					30	35		
700	1048	100	4	12	24.98	Permitted load condition***	$\frac{F_y}{F_{yrd}} + \frac{F_z}{F_{zrd}} + \frac{M_x}{M_{xrd}} + \frac{M_y}{M_{yrd}} + \frac{M_z}{M_{zrd}} \leq 1$						
750	1098	150	4	12	25.89		Fy, Fz, Mx, My, Mz are working loads						
800	1148	200	4	12	26.79								
850	1198	50	5	14	27.71								
900	1248	100	5	14	28.61								
950	1298	150	5	14	29.51								
1000	1348	200	5	14	30.42								
1050	1398	50	6	16	31.33								
1100	1448	100	6	16	32.23								
1150	1498	150	6	16	33.14								
1200	1548	200	6	16	34.04								
1250	1598	50	7	18	34.94								

\* Vibration might occur when the effective stroke is longer than 650mm.

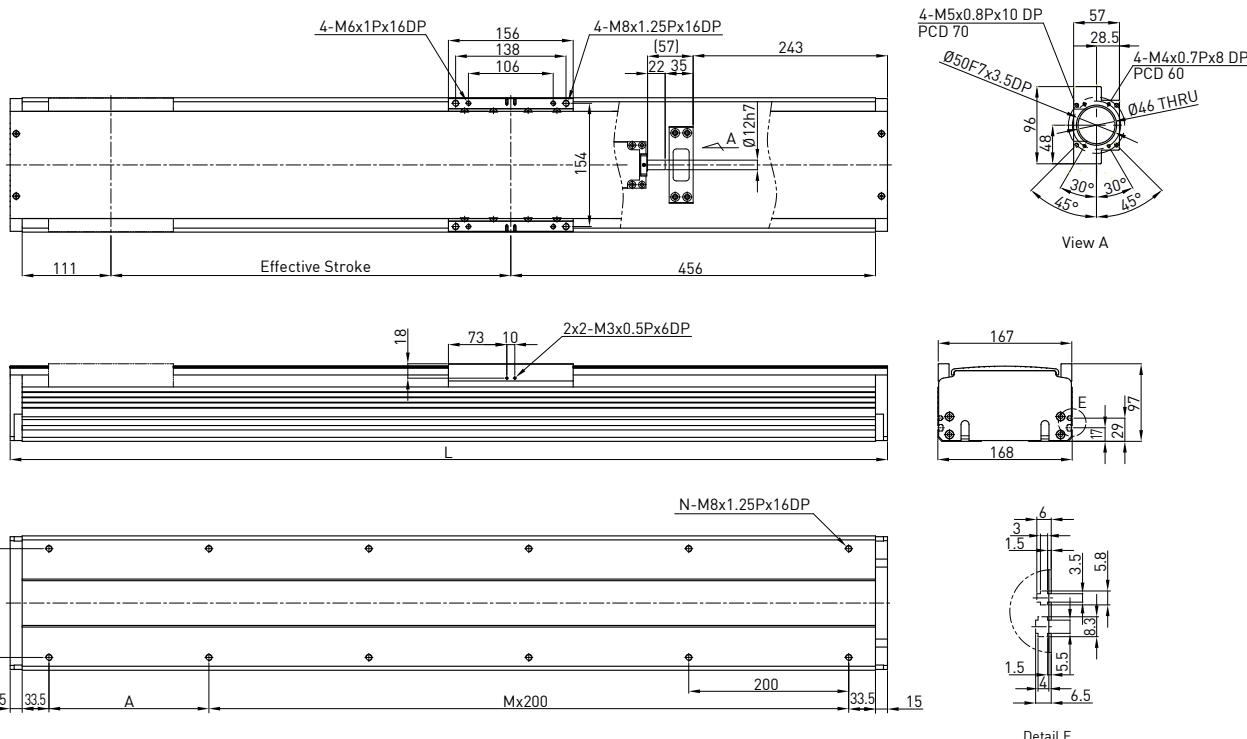
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

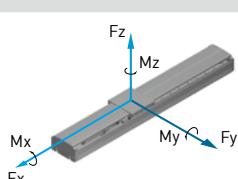
\*\* The load condition is based on 10,000km operation.

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

## Model Number for KA170-FI

KA170	-20	P	-1250	A	FI	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10 mm 20 mm	P: Precision C: Normal		A: Standard	FI : Internal	U: Without Cover None : Standard Cover	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	400	
						Drive				Ballscrew C7(normal)	
150	747	50	3	10	15.59	Lead			mm	10	20
200	797	100	3	10	16.53	Rated RPM			RPM	3000	3000
250	847	150	3	10	17.47	Max linear speed*			mm/sec	500	1000
300	897	200	3	10	18.42	Rated thrust			N	560	280
350	947	50	4	12	19.36	Repeatability			mm	±0.02	
400	997	100	4	12	20.31	Effective stroke			mm	150~1250	
450	1047	150	4	12	23.24	Max load (H)			kg	127	64
500	1097	200	4	12	22.18	Rated dynamic load**		Fyd	N	50	50
550	1147	50	5	14	23.12			Fzd	N	1270	640
600	1197	100	5	14	24.06			Mxd	N-m	108	118
650	1247	150	5	14	25.01			Myd	N-m	155	167
700	1297	200	5	14	25.95			Mzd	N-m	30	35
750	1347	50	6	16	26.89						
800	1397	100	6	16	27.83	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				
850	1447	150	6	16	28.77						
900	1497	200	6	16	29.71						
950	1547	50	7	18	30.66						
1000	1597	100	7	18	31.61						
1050	1647	150	7	18	32.54						
1100	1697	200	7	18	33.48						
1150	1747	50	8	20	34.42						
1200	1797	100	8	20	35.36						
1250	1847	150	8	20	36.31						

\* Vibration might occur when the effective stroke is longer than 650mm.

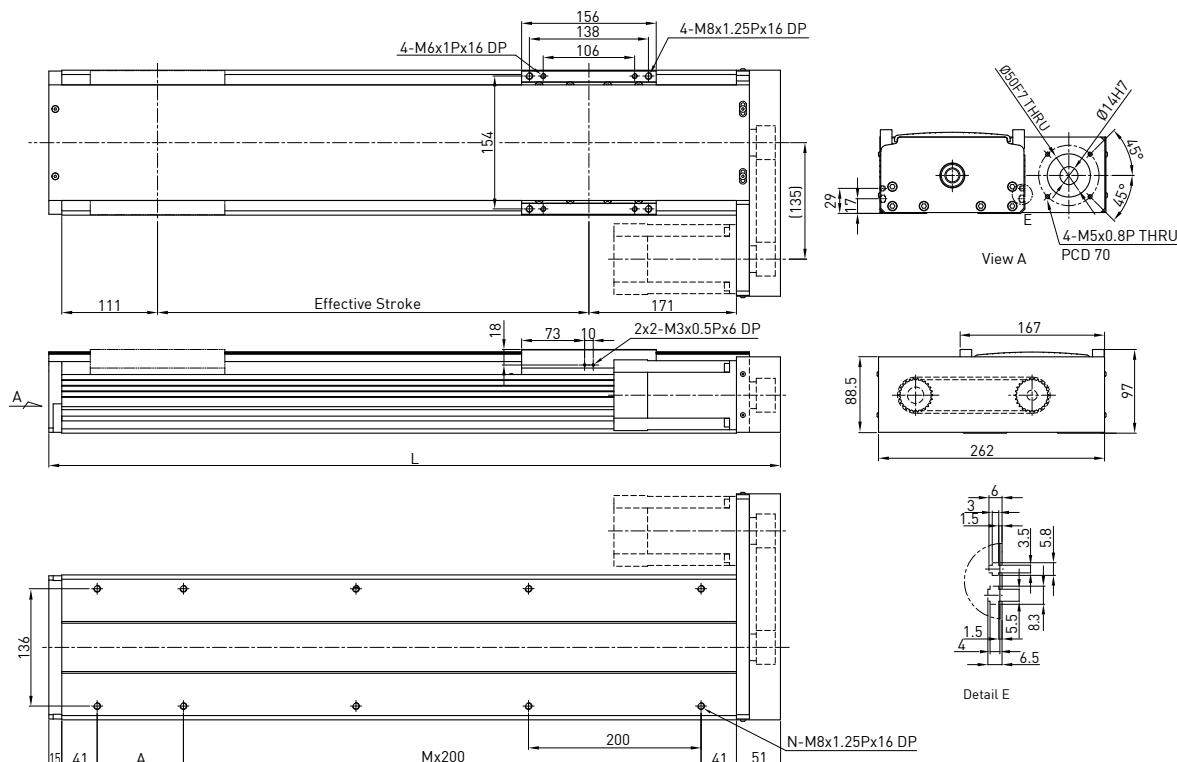
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA170-FL

KA170	-20	P	-1250	A	FL	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10 mm 20 mm	C: Normal P: Precision		A: Standard	FL: Left	U: Without Cover None : Standard Cover	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	400	
						Drive				Ballscrew C7(normal)	
150	498	150	1	6	15.01	Lead	mm	10	20		
200	548	200	1	6	15.92	Rated RPM	RPM	3000	3000		
250	598	50	2	8	16.82	Max linear speed*	mm/sec	500	1000		
300	648	100	2	8	17.73	Rated thrust	N	560	280		
350	698	150	2	8	18.63	Repeatability	mm	±0.02			
400	748	200	2	8	19.54	Effective stroke	mm	150~1250			
450	798	50	3	10	20.45	Max load (H)	kg	127	64		
500	848	100	3	10	21.35	Rated dynamic load**	Fyd	N	50	50	
550	898	150	3	10	22.26		Fzd	N	1270	640	
600	948	200	3	10	23.17		Mxd	N-m	108	118	
650	998	50	4	12	24.07		Myd	N-m	155	167	
700	1048	100	4	12	24.98		Mzd	N-m	30	35	
750	1098	150	4	12	25.89	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	1148	200	4	12	26.79		Fy, Fz, Mx, My, Mz are working loads				
850	1198	50	5	14	27.71						
900	1248	100	5	14	28.61						
950	1298	150	5	14	29.51						
1000	1348	200	5	14	30.42						
1050	1398	50	6	16	31.33						
1100	1448	100	6	16	32.23						
1150	1498	150	6	16	33.14						
1200	1548	200	6	16	34.04						
1250	1598	50	7	18	34.94						

\* Vibration might occur when the effective stroke is longer than 650mm.

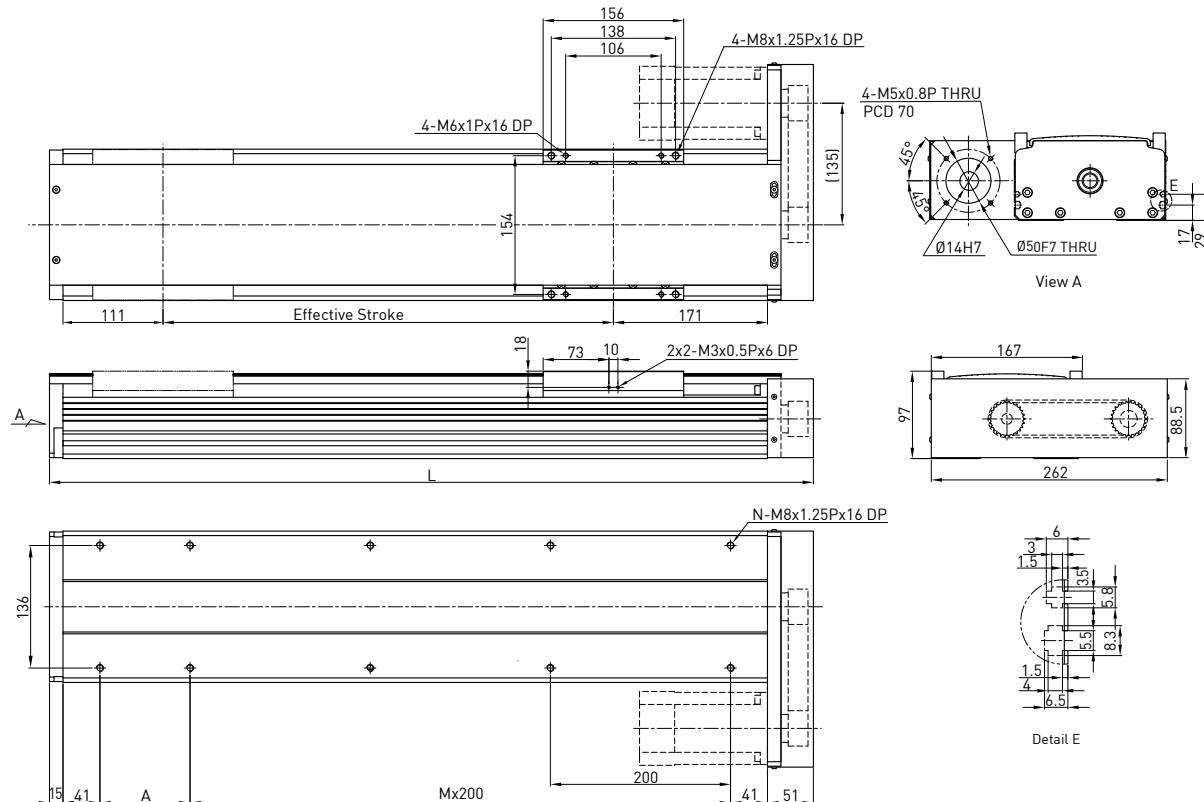
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KA170-FR

KA170	-20	P	-1250	A	FR	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10 mm 20 mm	C: Normal P: Precision		A: Standard	FR: Right	U: Without Cover None : Standard Cover	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	400		
						Drive	Lead	Ballscrew C7(normal)		mm	10	20
150	498	150	1	6	15.01	Rated RPM			RPM	3000	3000	
200	548	200	1	6	15.92	Max linear speed*			mm/sec	500	1000	
250	598	50	2	8	16.82	Rated thrust			N	560	280	
300	648	100	2	8	17.73	Repeatability			mm	$\pm 0.02$		
350	698	150	2	8	18.63	Effective stroke			mm	150~1250		
400	748	200	2	8	19.54	Max load (H)			kg	127	64	
450	798	50	3	10	20.45	Rated dynamic load**	Fyd	N	50	50		
500	848	100	3	10	21.35		Fzd	N	1270	640		
550	898	150	3	10	22.26		Mxd	N-m	108	118		
600	948	200	3	10	23.17		Myd	N-m	155	167		
650	998	50	4	12	24.07		Mzd	N-m	30	35		
700	1048	100	4	12	24.98		Fy					
750	1098	150	4	12	25.89	Fx						
800	1148	200	4	12	26.79	Mx						
850	1198	50	5	14	27.71	Mz						
900	1248	100	5	14	28.61	$\frac{Fy}{Fyd} + \frac{Fz}{Fzd} + \frac{Mx}{Mxd} + \frac{My}{Myd} + \frac{Mz}{Mzd} \leq 1$						
950	1298	150	5	14	29.51	Fy, Fz, Mx, My, Mz are working loads						
1000	1348	200	5	14	30.42							
1050	1398	50	6	16	31.33							
1100	1448	100	6	16	32.23							
1150	1498	150	6	16	33.14							
1200	1548	200	6	16	34.04							
1250	1598	50	7	18	34.94							

\* Vibration might occur when the effective stroke is longer than 650mm.

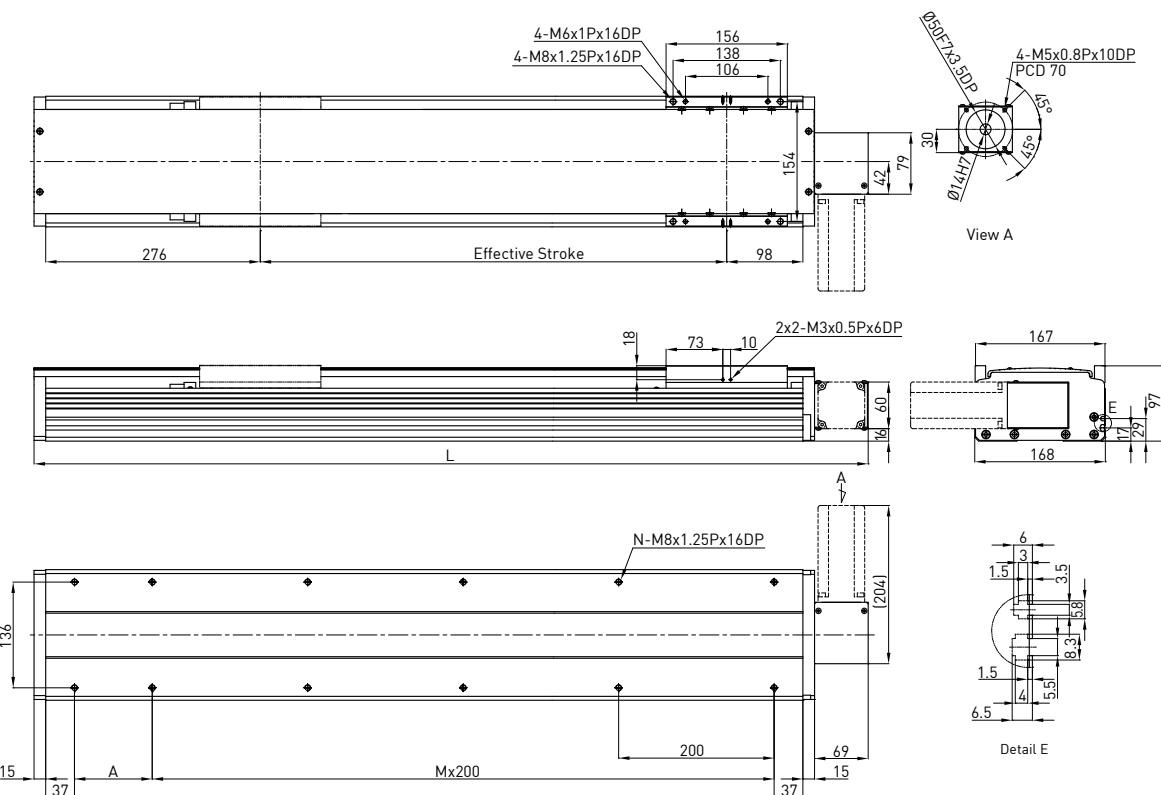
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

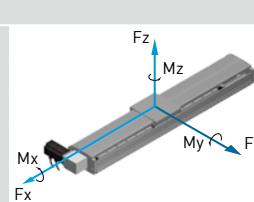
\*\* The load condition is based on 10,000km operation.

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

## Model Number for KA170B-FL

KA170	B	-120	C	-3000	A	FL	U	S1	M
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
			C: Normal		A: Standard	FL: Left	U: Without Cover None : Standard Cover	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



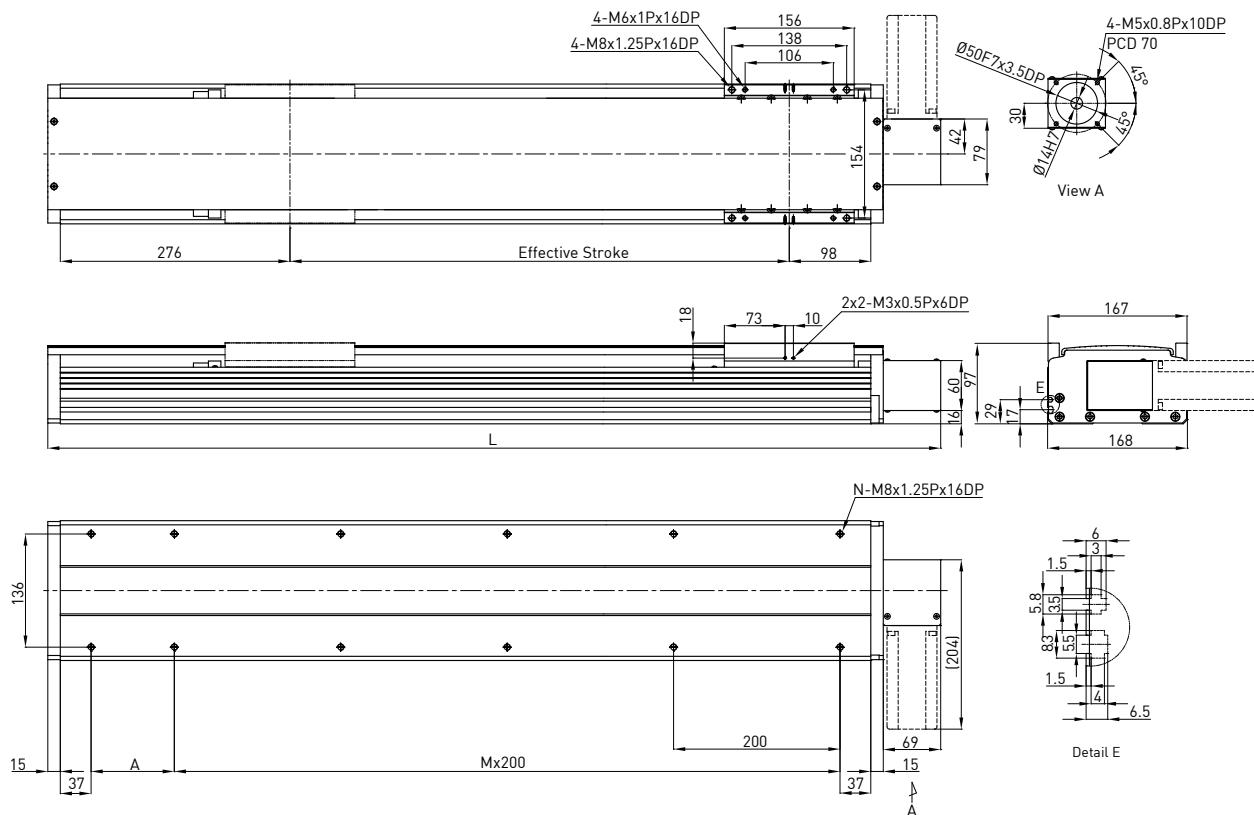
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	400	
200	673	100	2	8	14.74	Drive		Timing Belt	
400	873	100	3	10	17.88	Pulley Perimeter	mm	120	
600	1073	100	4	12	21.13	Pulley RPM	RPM	900	
800	1273	100	5	14	24.37	Max linear speed	mm/sec	1800	
1000	1473	100	6	16	27.52	Rated thrust	N	133	
1200	1673	100	7	18	30.77	Repeatability	mm	±0.1	
1400	1873	100	8	20	34.01	Effective stroke	mm	200~3000	
1600	2073	100	9	22	37.07	Max load (H)	kg	30	
1800	2273	100	10	24	40.3		Fyd	N	50
2000	2473	100	11	26	43.54		Fzd	N	300
2200	2673	100	12	28	46.68		Mxd	N-m	123
2400	2873	100	13	30	49.92		Myd	N-m	174
2600	3073	100	14	32	53.07		Mzd	N-m	38
2800	3273	100	15	34	56.2				
3000	3473	100	16	36	59.44	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		

\*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 KA170B-FR

KA170	B	-120	C	-3000	A	FR	U	S1	M
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
			C: Normal		A: Standard	FR: Right	U: Without Cover None : Standard Cover	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



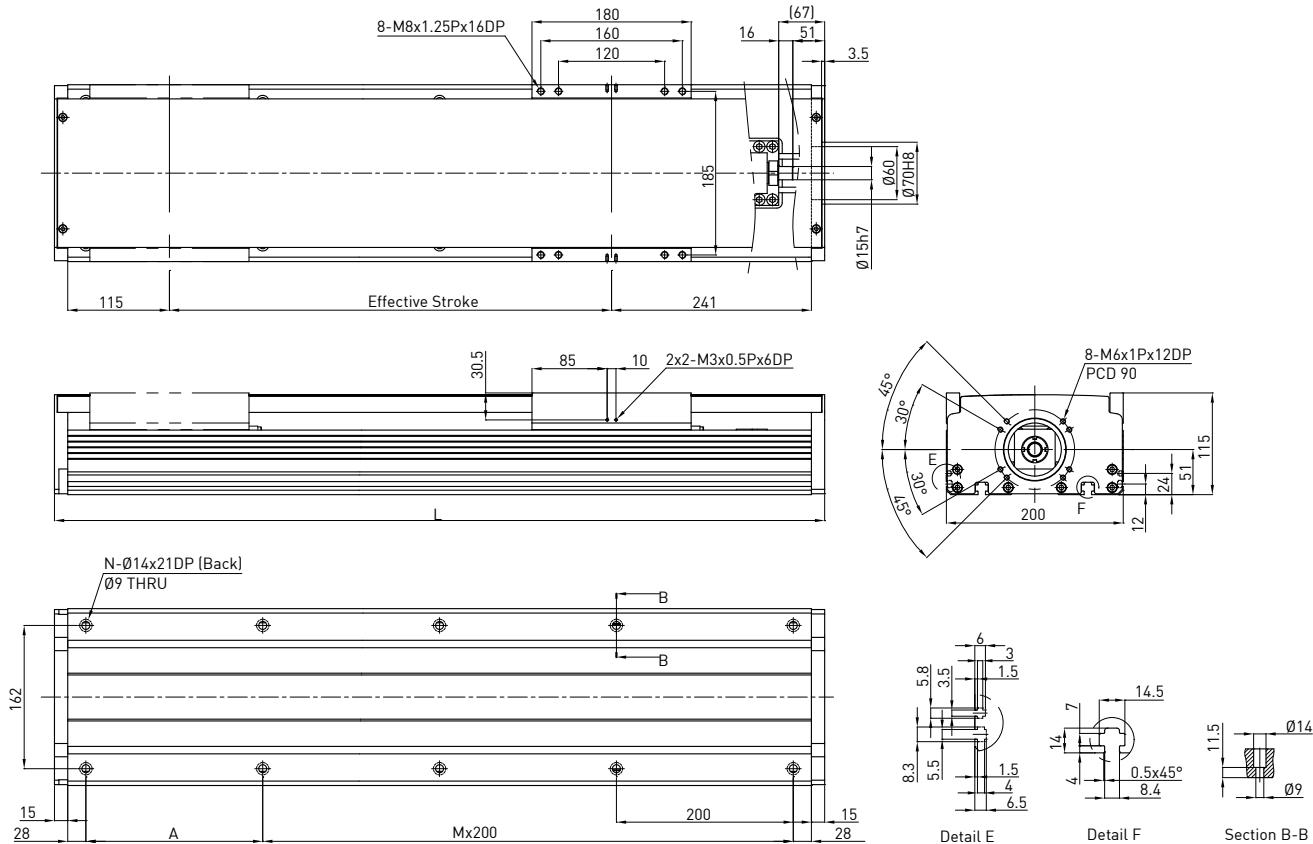
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	400
200	673	100	2	8	14.74	Drive		Timing Belt
400	873	100	3	10	17.88	Pulley Perimeter	mm	120
600	1073	100	4	12	21.13	Pulley RPM	RPM	900
800	1273	100	5	14	24.37	Max linear speed	mm/sec	1800
1000	1473	100	6	16	27.52	Rated thrust	N	133
1200	1673	100	7	18	30.77	Repeatability	mm	±0.1
1400	1873	100	8	20	34.01	Effective stroke	mm	200~3000
1600	2073	100	9	22	37.07	Max load (H)	kg	30
1800	2273	100	10	24	40.3	Rated dynamic load*	Fyd	N
2000	2473	100	11	26	43.54		Fzd	N
2200	2673	100	12	28	46.68		Mxd	N-m
2400	2873	100	13	30	49.92		Myd	N-m
2600	3073	100	14	32	53.07		Mzd	N-m
2800	3273	100	15	34	56.2			38
3000	3473	100	16	36	59.44	Permitted load condition**	$\frac{Fy}{Fyd} + \frac{Fz}{Fzd} + \frac{Mx}{Mxd} + \frac{My}{Myd} + \frac{Mz}{Mzd} \leq 1$	
							Fy, Fz, Mx, My, Mz are working loads	

\*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 KA200

KA200	-25	P	-1250	A	F0	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10mm 25mm	C: Normal P: Precision		A: Standard	F0 : Direct	U: Without Cover None : Standard Cover	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



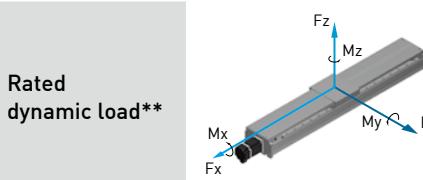
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output			W	750	
						Drive	Lead	Lead		mm	10
150	536	50	2	8	17.66					RPM	3000
200	586	100	2	8	18.99					mm/sec	500
250	636	150	2	8	20.32					N	1050
300	686	200	2	8	21.65					mm	±0.02
350	736	50	3	10	22.98					mm	150~1250
400	786	100	3	10	24.31					kg	239
450	836	150	3	10	25.64						95
500	886	200	3	10	26.97						
550	936	50	4	12	28.3						
600	986	100	4	12	29.63						
650	1036	150	4	12	30.96						
700	1086	200	4	12	32.29						
750	1136	50	5	14	33.62						
800	1186	100	5	14	34.95						
850	1236	150	5	14	36.28						
900	1286	200	5	14	37.61						
950	1336	50	6	16	38.94						
1000	1386	100	6	16	40.27						
1050	1436	150	6	16	41.61						
1100	1486	200	6	16	42.93						
1150	1536	50	7	18	44.26						
1200	1586	100	7	18	45.59						
1250	1636	150	7	18	46.92						

\* 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 in a special condition, please contact HIWIN.

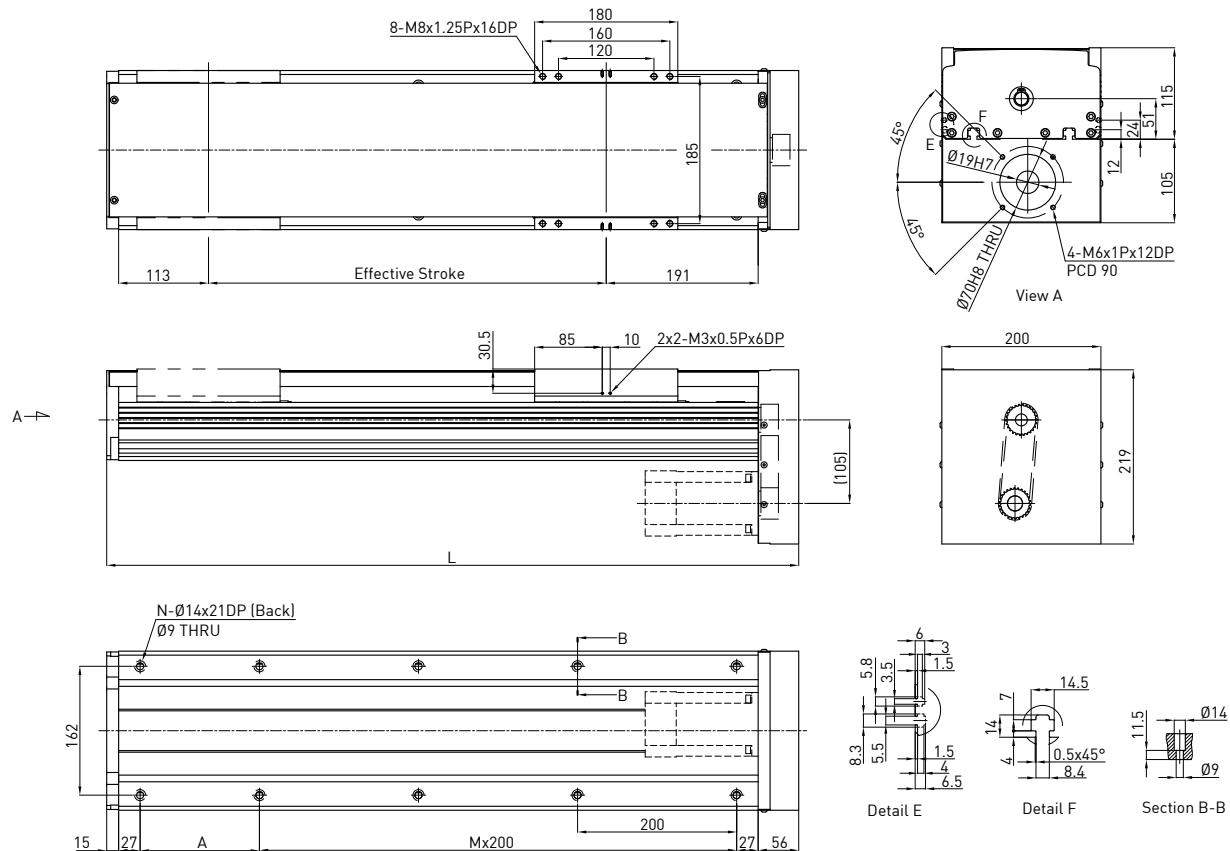


$$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$$

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

## Model Number for KA200-FD

KA200	-25	P	-1250	A	FD	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10mm 25mm	C: Normal P: Precision		A: Standard	FD: Bottom	U: Without Cover None : Standard Cover	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	750	
						Drive		Ballscrew C7(normal)	
150	525	200	1	6	18.46	Lead	mm	10	25
200	575	50	2	8	19.79	Rated RPM	RPM	3000	3000
250	625	100	2	8	21.12	Max linear speed*	mm/sec	500	1250
300	675	150	2	8	22.45	Rated thrust	N	1050	420
350	725	200	2	8	23.78	Repeatability	mm	$\pm 0.02$	
400	775	50	3	10	25.11	Effective stroke	mm	150~1250	
450	825	100	3	10	26.44	Max load (H)	kg	239	95
500	875	150	3	10	27.77	Rated dynamic load**	Fyd	N	50
550	925	200	3	10	29.1		Fzd	N	2390
600	975	50	4	12	30.43		Mxd	N-m	154
650	1025	100	4	12	31.76		Myd	N-m	266
700	1075	150	4	12	33.09		Mzd	N-m	41
750	1125	200	4	12	34.42				52
800	1175	50	5	14	35.75	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		
850	1225	100	5	14	37.08		Fy, Fz, Mx, My, Mz are working loads		
900	1275	150	5	14	38.41				
950	1325	200	5	14	39.74				
1000	1375	50	6	16	41.07				
1050	1425	100	6	16	42.41				
1100	1475	150	6	16	43.73				
1150	1525	200	6	16	45.06				
1200	1575	50	7	18	46.39				
1250	1625	100	7	18	47.72				

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

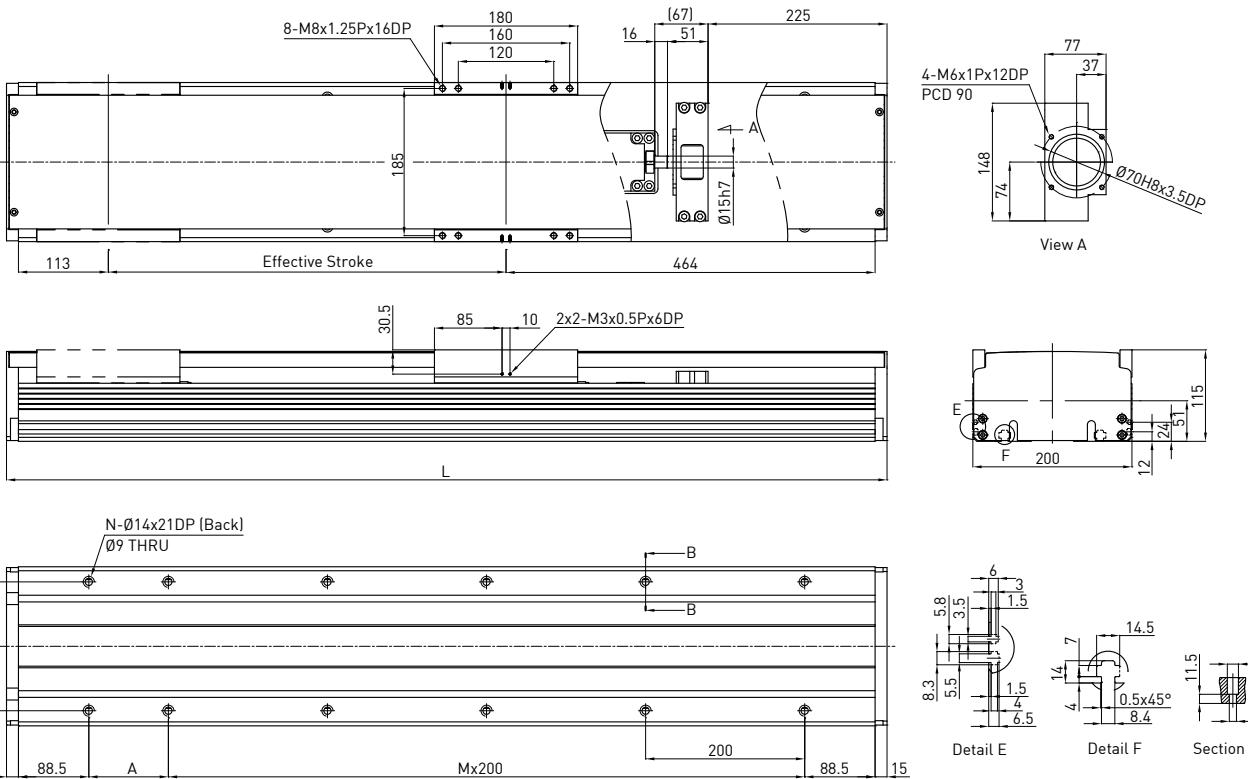
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

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

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

## Model Number for KA200-FI

KA200	-25	P	-1250	A	FI	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10mm 25mm	C: Normal P: Precision		A: Standard	FI: Internal	U: Without Cover None : Standard Cover	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)
150	757	150	2	8	19.83
200	807	200	2	8	21.32
250	857	50	3	10	22.82
300	907	100	3	10	24.31
350	957	150	3	10	25.81
400	1007	200	3	10	27.3
450	1057	50	4	12	28.79
500	1107	100	4	12	30.29
550	1157	150	4	12	31.78
600	1207	200	4	12	33.27
650	1257	50	5	14	34.77
700	1307	100	5	14	36.26
750	1357	150	5	14	37.76
800	1407	200	5	14	39.25
850	1457	50	6	16	40.74
900	1507	100	6	16	42.24
950	1557	150	6	16	43.73
1000	1607	200	6	16	45.22
1050	1657	50	7	18	46.73
1100	1707	100	7	18	48.21
1150	1757	150	7	18	49.7
1200	1807	200	7	18	51.2
1250	1857	50	8	19	52.69

AC motor output	W	
	750	
Drive	Ballscrew C7(normal)	
Lead	mm	10 25
Rated RPM	RPM	3000 3000
Max linear speed*	mm/sec	500 1250
Rated thrust	N	1050 420
Repeatability	mm	±0.02
Effective stroke	mm	150~1250
Max load (H)	kg	239 95
Rated dynamic load**	Fyd	N 50 50
	Fzd	N 2390 950
	Mxd	N-m 154 178
	Myd	N-m 266 302
	Mzd	N-m 41 52
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.

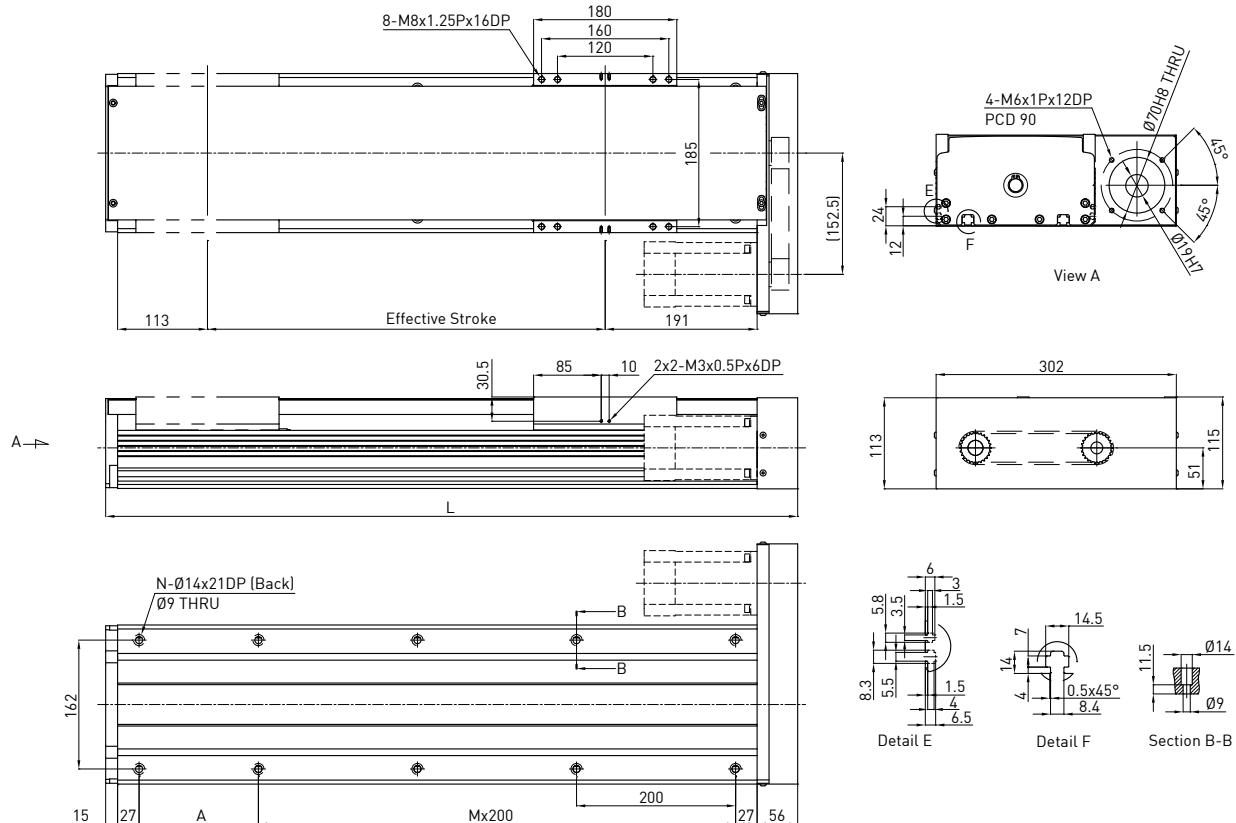
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

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

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

## Model Number for KA200-FL

KA200	-25	P	-1250	A	FL	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10mm 25mm	C: Normal P: Precision		A: Standard	FL: Left	U: Without Cover None : Standard Cover	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

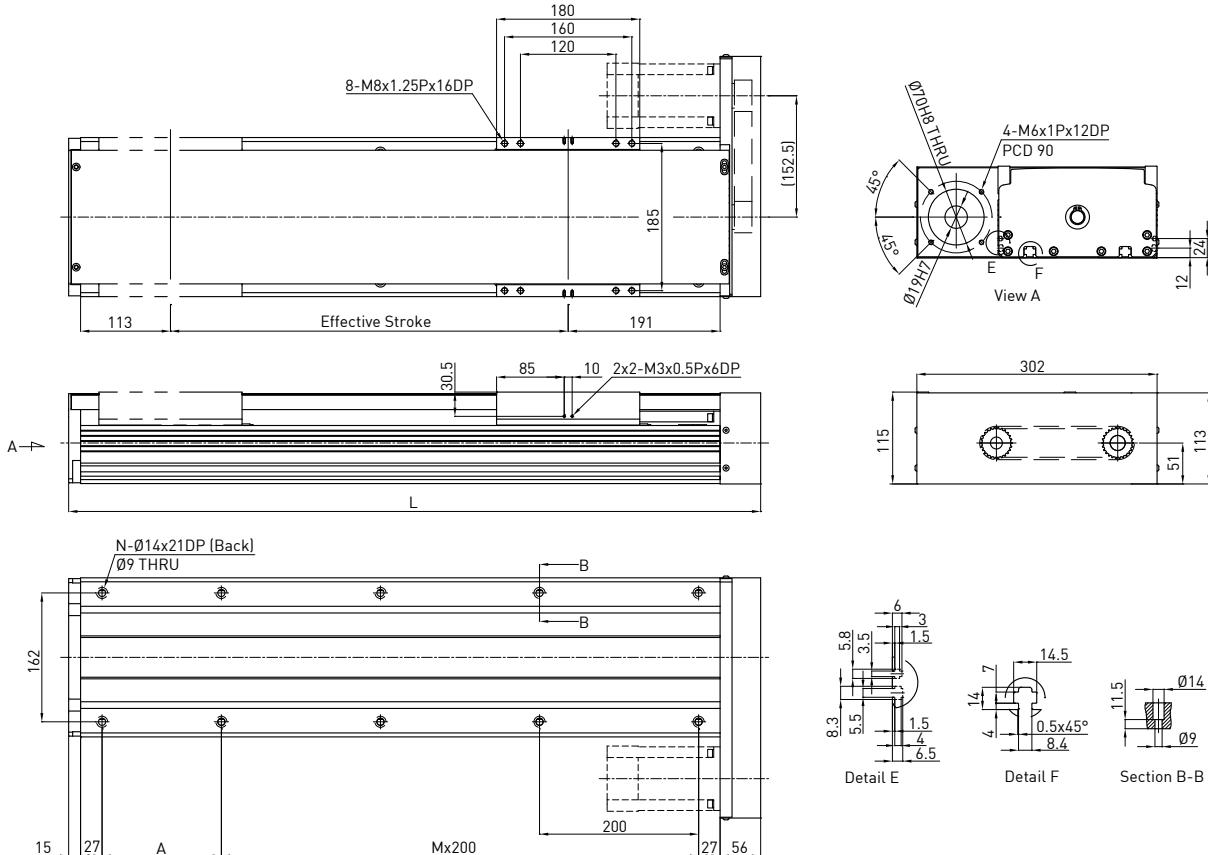


Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output			W	750				
						Drive	Lead	mm		10	25			
150	525	200	1	6	18.46	Rated RPM		RPM	3000	3000				
200	575	50	2	8	19.79	Max linear speed*		mm/sec	500	1250				
250	625	100	2	8	21.12	Rated thrust		N	1050	420				
300	675	150	2	8	22.45	Repeatability		mm	$\pm 0.02$					
350	725	200	2	8	23.78	Effective stroke		mm	150-1250					
400	775	50	3	10	25.11	Max load (H)		kg	239	95				
450	825	100	3	10	26.44	Rated dynamic load**	Fy	N	50	50				
500	875	150	3	10	27.77		Fzd	N	2390	950				
550	925	200	3	10	29.1		Mxd	N-m	154	178				
600	975	50	4	12	30.43		Myd	N-m	266	302				
650	1025	100	4	12	31.76		Mzd	N-m	41	52				
700	1075	150	4	12	33.09		$\frac{F_y}{Fyd} + \frac{F_z}{Fzd} + \frac{M_x}{Mxd} + \frac{M_y}{Myd} + \frac{M_z}{Mzd} \leq 1$							
750	1125	200	4	12	34.42	Fy, Fz, Mx, My, Mz are working loads								
800	1175	50	5	14	35.75									
850	1225	100	5	14	37.08									
900	1275	150	5	14	38.41									
950	1325	200	5	14	39.74									
1000	1375	50	6	16	41.07									
1050	1425	100	6	16	42.41									
1100	1475	150	6	16	43.73									
1150	1525	200	6	16	45.06									
1200	1575	50	7	18	46.39									
1250	1625	100	7	18	47.72									

\* 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 in a special condition, please contact HIWIN.

## Model Number for KA200-FR

KA200	-25	P	-1250	A	FR	U	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Cover	Limit Switch	Motor
	10mm 25mm	C: Normal P: Precision		A: Standard	FR: Right	U: Without Cover None : Standard Cover	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	750	
						Drive				Ballscrew C7(normal)	
150	525	200	1	6	18.46	Lead	mm	10	25		
200	575	50	2	8	19.79	Rated RPM	RPM	3000	3000		
250	625	100	2	8	21.12	Max linear speed*	mm/sec	500	1250		
300	675	150	2	8	22.45	Rated thrust	N	1050	420		
350	725	200	2	8	23.78	Repeatability	mm	±0.02			
400	775	50	3	10	25.11	Effective stroke	mm	150~1250			
450	825	100	3	10	26.44	Max load (H)	kg	239	95		
500	875	150	3	10	27.77	Rated dynamic load**	Fyd	N	50	50	
550	925	200	3	10	29.1		Fzd	N	2390	950	
600	975	50	4	12	30.43		Mxd	N-m	154	178	
650	1025	100	4	12	31.76		Myd	N-m	266	302	
700	1075	150	4	12	33.09		Mzd	N-m	41	52	
750	1125	200	4	12	34.42						
800	1175	50	5	14	35.75						
850	1225	100	5	14	37.08						
900	1275	150	5	14	38.41						
950	1325	200	5	14	39.74						
1000	1375	50	6	16	41.07	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$				
1050	1425	100	6	16	42.41		Fy, Fz, Mx, My, Mz are working loads				
1100	1475	150	6	16	43.73						
1150	1525	200	6	16	45.06						
1200	1575	50	7	18	46.39						
1250	1625	100	7	18	47.72						

\* 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 in a special condition, please contact HIWIN.

# Single Axis Robot KS Series

## 4.1 Features

- For use in clean room
- Stainless steel cover
- Already installed AC servo motor (optional)
- High repeatability  $\pm 0.02\text{mm}$
- Dustproof
- Different strokes available

## 4.2 Applications

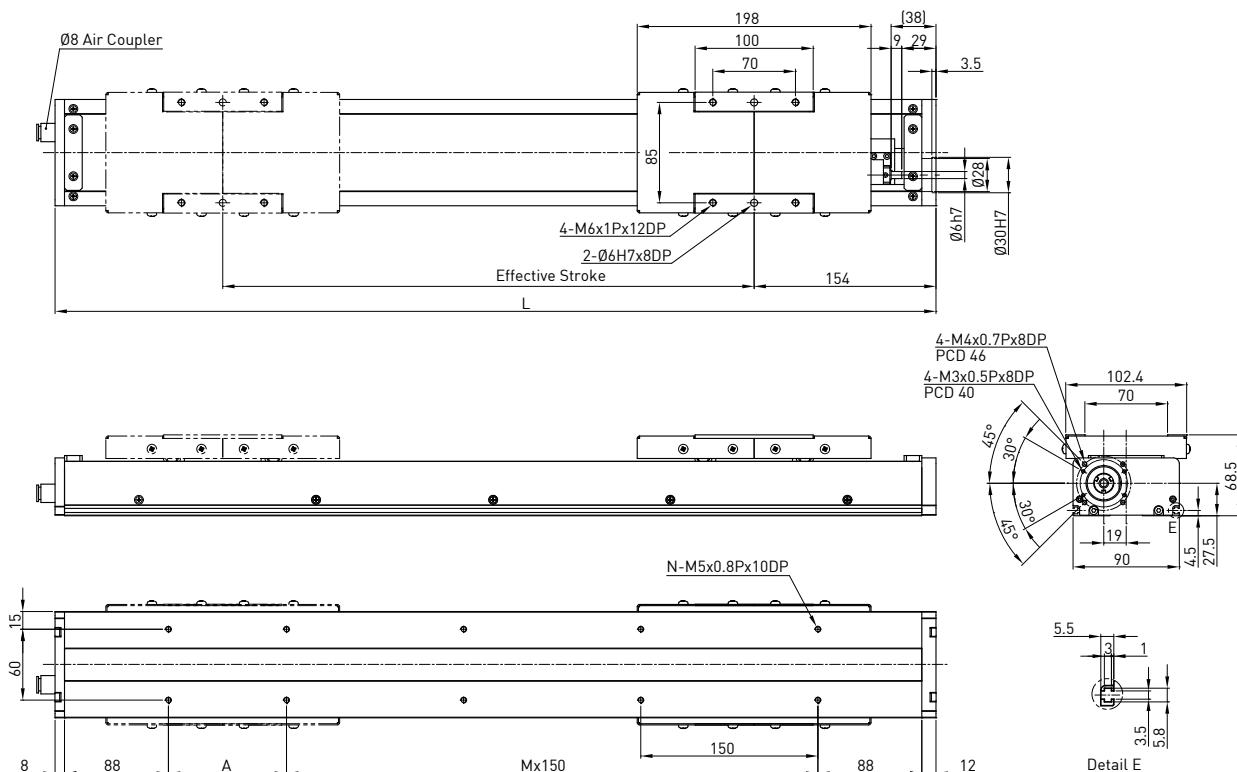
- FPD industry
- Semiconductor
- Medical applications
- FPD glass transfer
- Inspection & testing equipment



## 4.3 KS Series

### Model Number for KS090

KS090	-10	P	-0600	A	F0	S1	M
Model	Lead	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
5mm 10mm	P: Precision C: Normal			A: Standard	F0: Direct	S1:OMRON SX671 S2:OMRON SX674 S3:SUNX GX-F12A S4:SUNX GL-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	
						Drive	Lead		Ballscrew C7(normal)	
50	346	150	0	4	3.38	Rated RPM	mm	5	10	
100	396	50	1	6	3.78	Max linear speed*	RPM	3000	3000	
150	446	100	1	6	4.18	mm/sec	250	500		
200	496	150	1	6	4.58	Rated thrust	N	280	140	
250	546	50	2	8	4.98	Repeatability	mm	±0.02		
300	596	100	2	8	5.38	Effective stroke	mm	50~600		
350	646	150	2	8	5.78	Max load (H)	kg	24	16	
400	696	50	3	10	6.18	Rated dynamic load**	Fyd	N	20	20
450	746	100	3	10	6.58		Fzd	N	240	160
500	796	150	3	10	7.19		Mxd	N-m	5	4.8
550	846	50	4	12	7.38		Myd	N-m	3	3
600	896	100	4	12	7.78		Mzd	N-m	2.2	2.2
Permitted load condition***						$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ Fy, Fz, Mx, My, Mz are working loads				

\* Vibration might occur when the effective stroke is longer than 650mm.

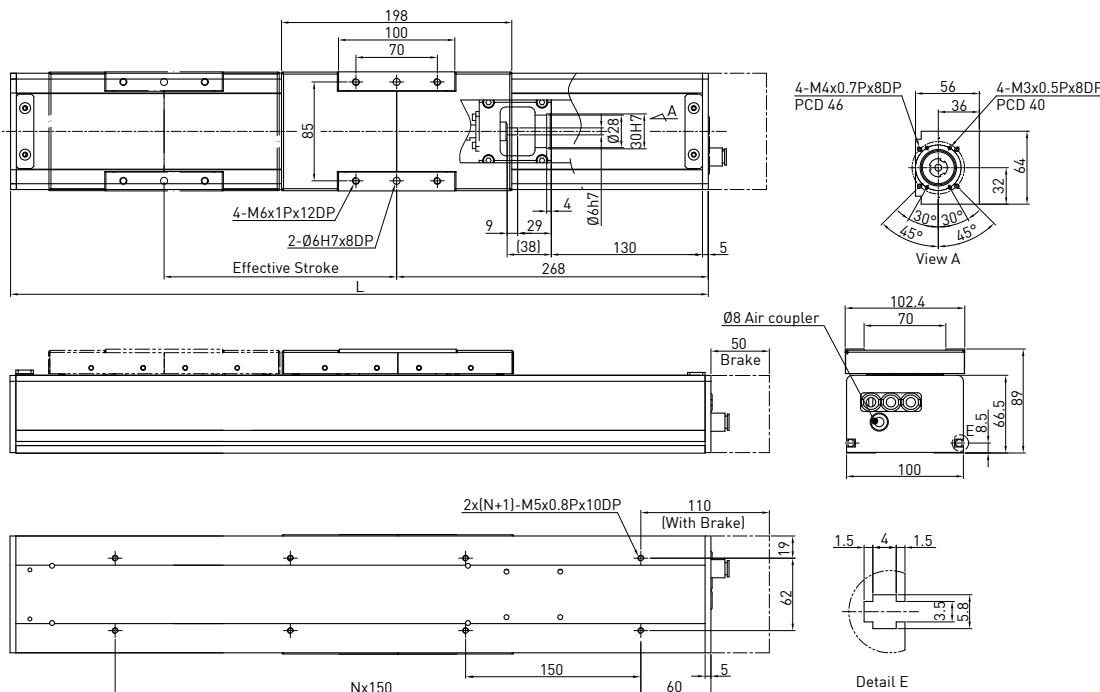
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KS100-FI

<b>KS100</b>	<b>-20</b>	<b>P</b>	<b>-800</b>	<b>A</b>	<b>FI</b>	<b>S2</b>	<b>M</b>
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				W	100				
				Drive	Lead	mm	5	10	20	RPM	3000	3000	3000
200	600	3	9.1	Rated RPM		mm	5	10	20				
300	700	4	9.8	Max linear speed*		mm/sec	250	500	1000				
400	800	4	10.5	Rated thrust		N	280	140	70				
500	900	5	11.2	Repeatability		mm	±0.02						
600	1000	6	11.9	Effective stroke		mm	100~1050						
700	1100	6	12.6	Max load (H)		kg	9.6	6.2	3.1				
800	1200	7	13.3	Rated dynamic load**	Fyd	N	20	20	20				
					Fzd	N	96	62	31				
				Mxd	N-m	1	1.1	1.2					
				Myd	N-m	1	1	1.1					
				Mzd	N-m	0.9	0.9	1					
				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$									
				Fy, Fz, Mx, My, Mz are working loads									

\* Vibration might occur when the effective stroke is longer than 650mm.

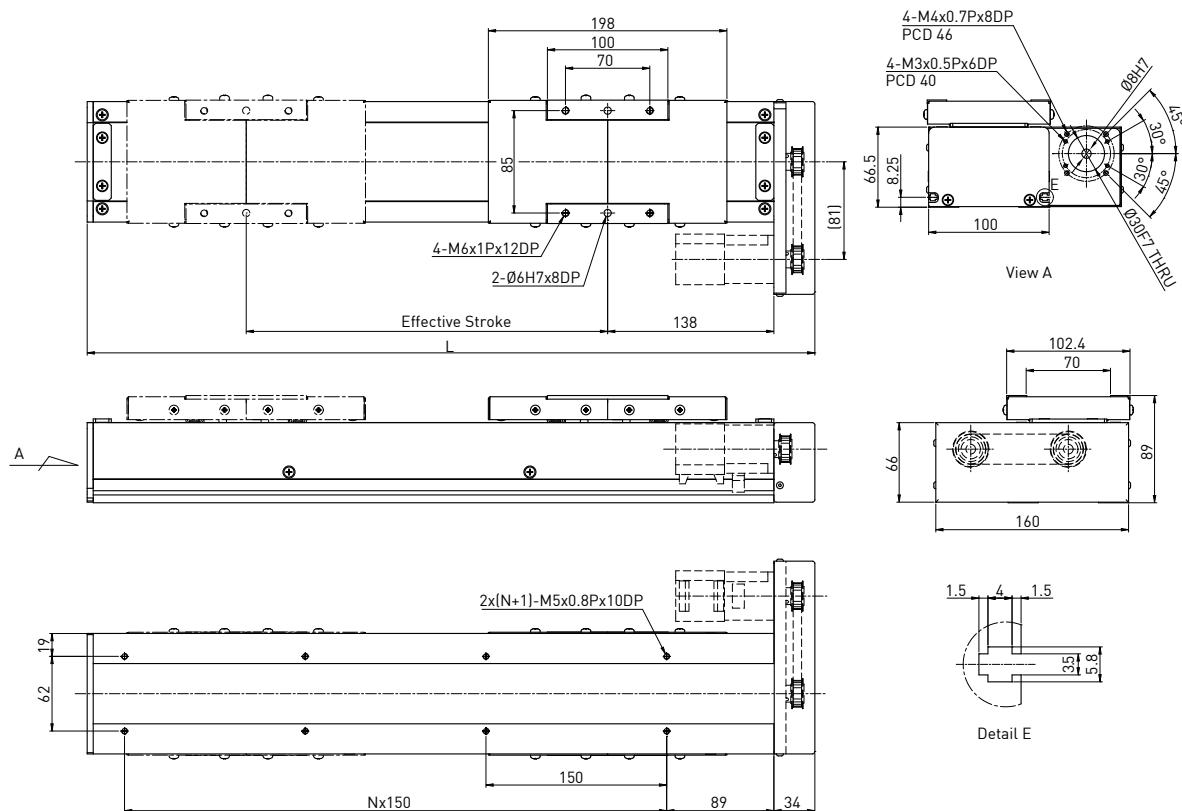
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KS100-FL

KS100	-20	P	-800	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	100		
				Drive	Lead	Ball screw C7(normal)		mm	5	10
200	504	2	6.0	Rated RPM			RPM	3000	3000	3000
300	604	3	6.9	Max linear speed*			mm/sec	250	500	1000
400	704	3	7.8	Rated thrust			N	280	140	70
500	804	4	8.7	Repeatability			mm	$\pm 0.02$		
600	904	5	9.6	Effective stroke			mm	100~1050		
700	1004	5	10.5	Max load (H)			kg	9.6	6.2	3.1
800	1104	6	11.4	Rated dynamic load**	F <sub>y</sub> d	N	20	20	20	
					F <sub>z</sub> d	N	96	62	31	
					M <sub>x</sub> d	N·m	1	1.1	1.2	
					M <sub>y</sub> d	N·m	1	1	1.1	
					M <sub>z</sub> d	N·m	0.9	0.9	1	
				$\frac{F_y}{F_{y_d}} + \frac{F_z}{F_{z_d}} + \frac{M_x}{M_{x_d}} + \frac{M_y}{M_{y_d}} + \frac{M_z}{M_{z_d}} \leq 1$						
				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 650mm.

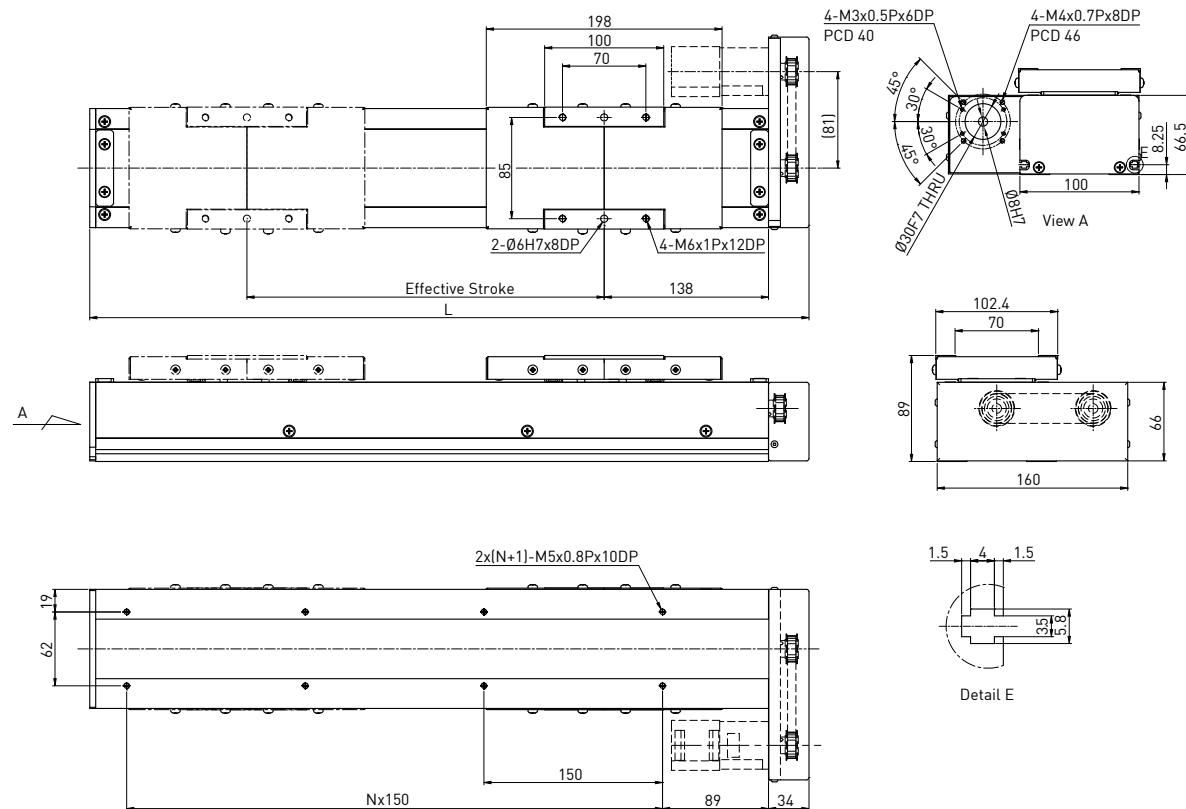
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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 KS100-FR

KS100	-20	P	-800	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

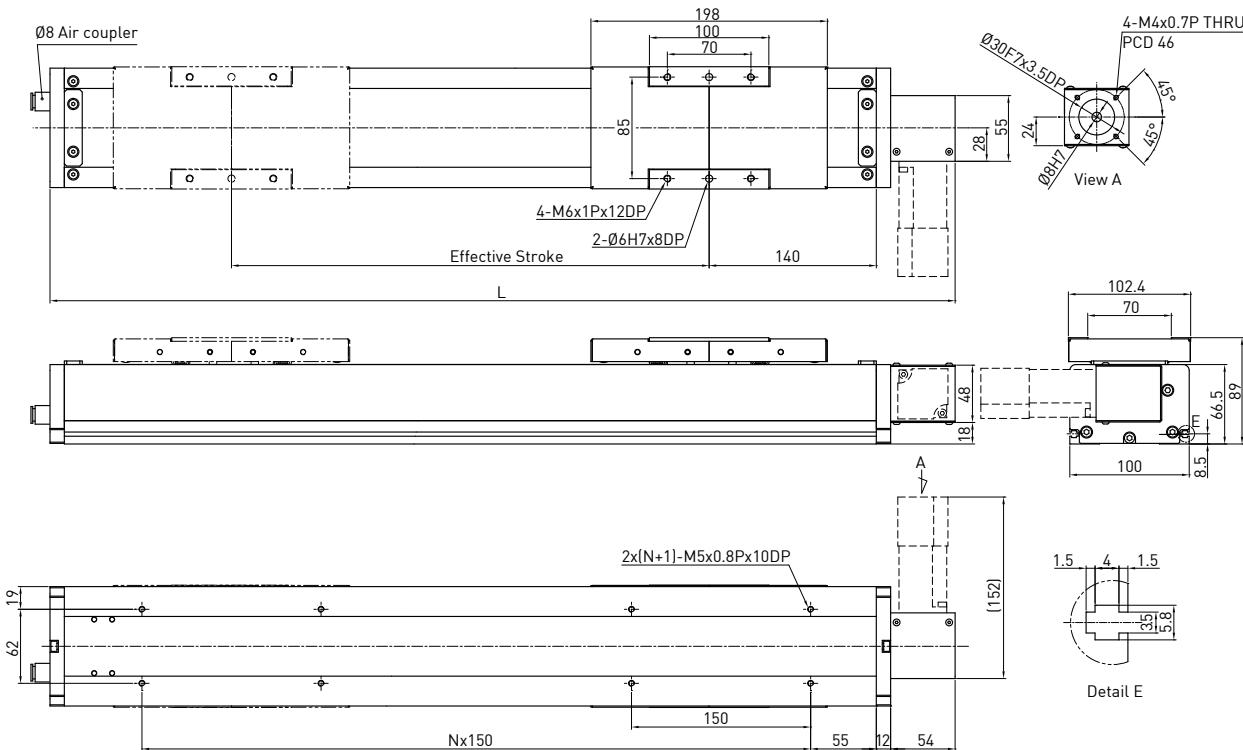


Effective stroke (mm)	L	N	Weight (kg)	AC motor output				W	100			
				Drive	Lead	Rated RPM	Max linear speed*		mm	5	10	20
200	504	2	6.0						RPM	3000	3000	3000
300	604	3	6.9						mm/sec	250	500	1000
400	704	3	7.8						N	280	140	70
500	804	4	8.7						mm	$\pm 0.02$		
600	904	5	9.6						mm	100~1050		
700	1004	5	10.5						kg	9.6	6.2	3.1
800	1104	6	11.4									
				Rated dynamic load**				Fyd	N	20	20	20
				Permitted load condition***				Fzd	N	96	62	31
				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$				Mxd	N-m	1	1.1	1.2
				Fy, Fz, Mx, My, Mz are working loads				Myd	N-m	1	1	1.1
								Mzd	N-m	0.9	0.9	1

\* Vibration might occur when the effective stroke is longer than 650mm.  
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 KS100B-FL

KS100	B	-84	C	-3000	A	FL	S2	M
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



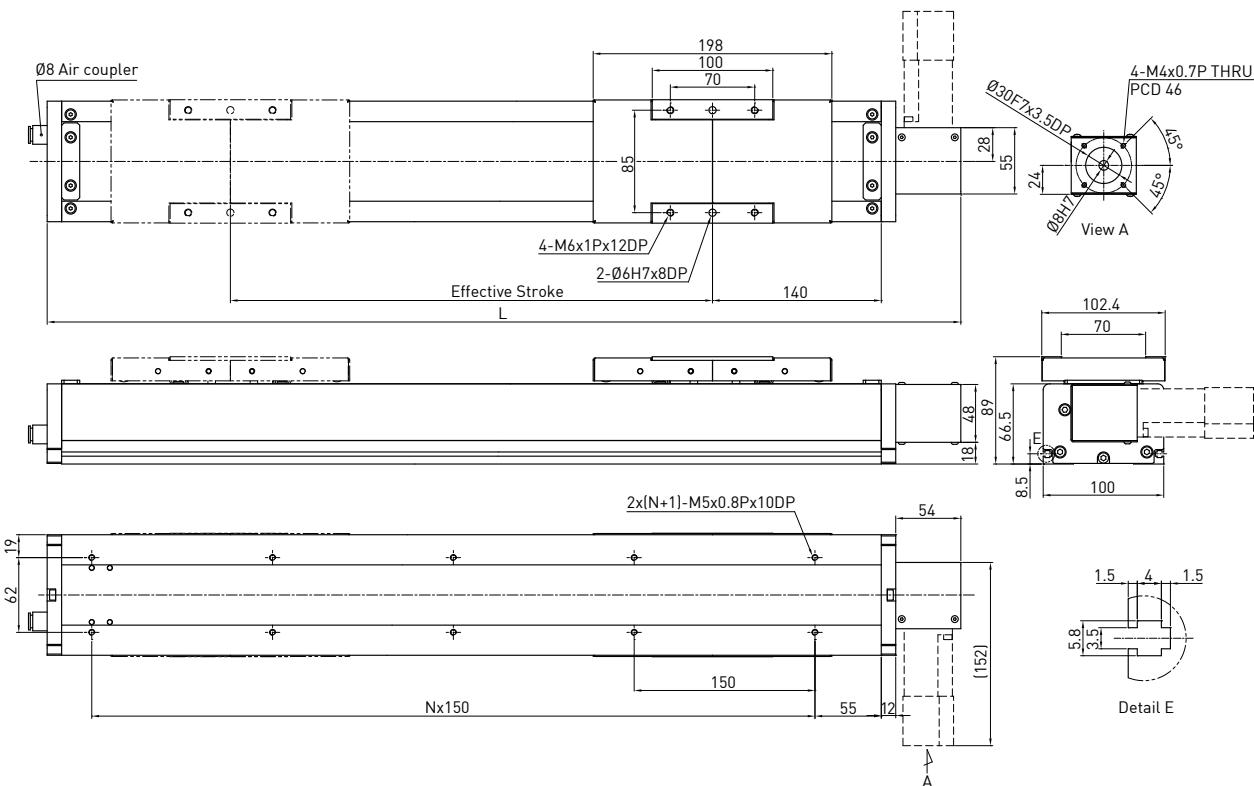
Effective stroke (mm)	L	N	Weight (kg)	AC motor output			W	100
				Drive	Pulley Perimeter	Pulley RPM		
200	558	2	6.1					Timing Belt
400	758	4	7.6					84
600	958	5	9.1					1286
800	1158	6	10.6					1800
1000	1358	8	12.1					33
1200	1558	9	13.6					±0.1
1400	1758	10	15.1					200~3000
1600	1958	12	16.6					7.5
1800	2158	13	18.1					20
2000	2358	14	19.6	Rated dynamic load*	Fzd	N		75
2200	2558	16	21.1		Mxd	N-m		1
2400	2758	17	22.6		Myd	N-m		0.9
2600	2958	18	24.1		Mzd	N-m		0.5
2800	3158	20	25.6		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$			
3000	3358	21	27.1	Fy, Fz, Mx, My, Mz are working loads				

\*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 KS100B-FR

KS100	B	-84	C	-3000	A	FR	S2	M
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



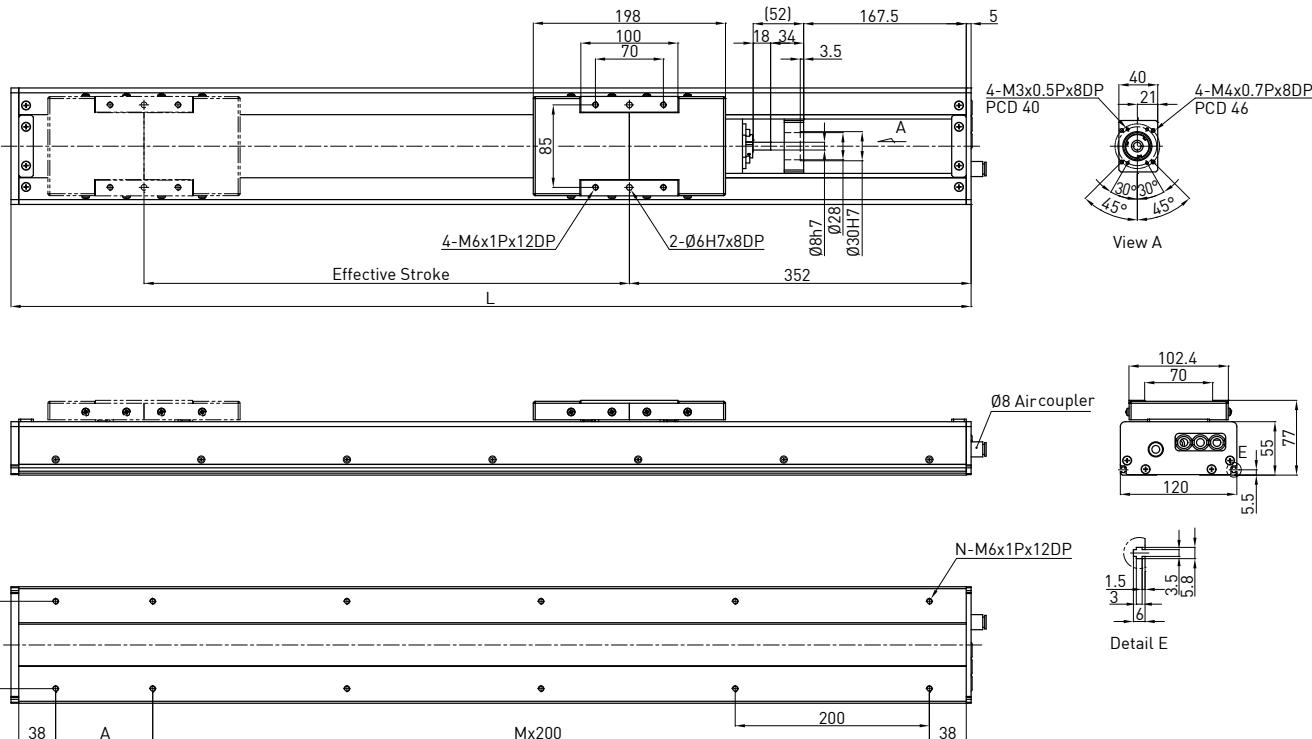
Effective stroke (mm)	L	N	Weight (kg)	AC motor output		W	100
				Drive	Pulley Perimeter		
200	558	2	6.1			mm	84
400	758	4	7.6			RPM	1286
600	958	5	9.1			mm/sec	1800
800	1158	6	10.6			N	33
1000	1358	8	12.1			mm	±0.1
1200	1558	9	13.6			mm	200~3000
1400	1758	10	15.1			kg	7.5
1600	1958	12	16.6	Rated dynamic load*	Fy	N	20
1800	2158	13	18.1		Fz	N	75
2000	2358	14	19.6		Mx	N-m	1
2200	2558	16	21.1		My	N-m	0.9
2400	2758	17	22.6		Mz	N-m	0.5
2600	2958	18	24.1				
2800	3158	20	25.6	Permitted load condition**		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$	
3000	3358	21	27.1	Fy, Fz, Mx, My, Mz are working loads			

\*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 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			W	100		
						Drive				Ballscrew C7(normal)		
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	47	32	16
450	939	50	4	12	10.72	Rated dynamic load**	Fy	d	N	50	50	50
500	989	100	4	12	11.35		Fz	d	N	470	320	160
550	1039	150	4	12	11.98		Mx	d	N-m	31	33	35
600	1089	200	4	12	12.61		My	d	N-m	23	25	27
650	1139	50	5	14	13.24		Mz	d	N-m	17	18	19
700	1189	100	5	14	13.87	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$					
750	1239	150	5	14	14.5		Fy, Fz, Mx, My, Mz 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.

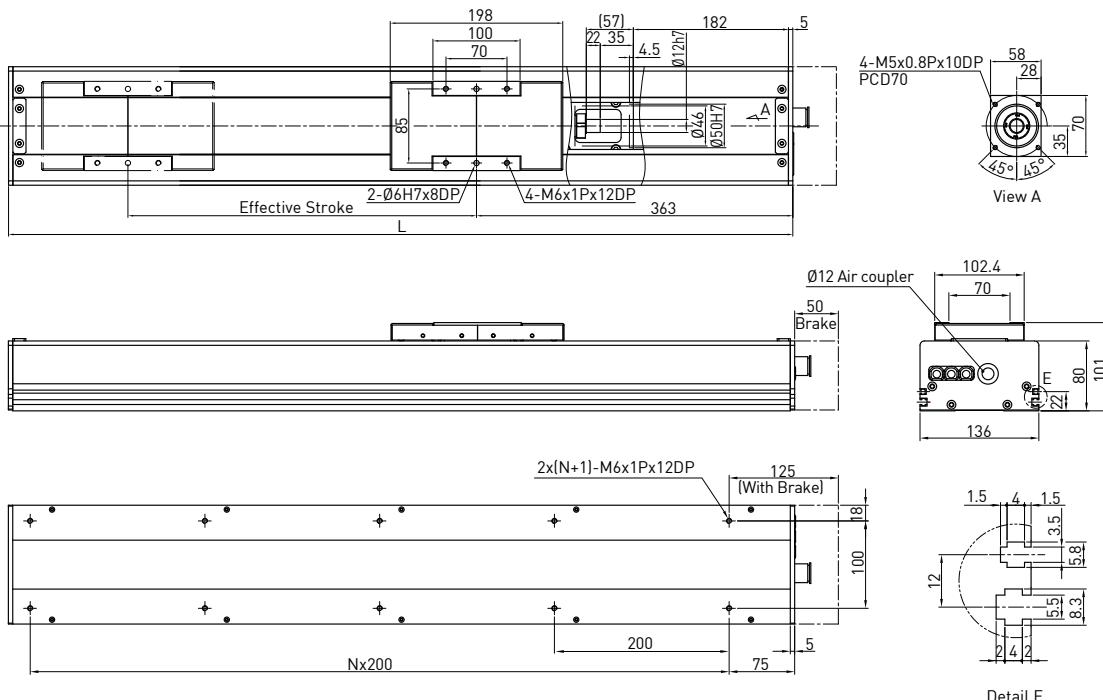
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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

<b>KS140</b>	<b>-20</b>	<b>P</b>	<b>-1100</b>	<b>A</b>	<b>FI</b>	<b>S2</b>	<b>M</b>
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		W	200	
				Drive	Lead		mm	10
200	700	3	13.5	Rated RPM		RPM	3000	3000
300	800	3	14.7	Max linear speed*		mm/sec	500	1000
400	900	4	15.9	Rated thrust		N	280	140
500	1000	4	17.1	Repeatability		mm	$\pm 0.02$	
600	1100	5	18.3	Effective stroke		mm	100~1050	
700	1200	5	19.5	Max load (H)		kg	82	40
800	1300	6	20.7	Rated dynamic load**	Fyd	N	50	50
900	1400	6	21.9		Fzd	N	820	400
1000	1500	7	23.2		Mxd	N-m	60	66
1100	1600	7	24.4		Myd	N-m	80	86
					Mzd	N-m	20	26
Permitted load condition***				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ <p>Fy, Fz, Mx, My, Mz are working loads</p>				

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

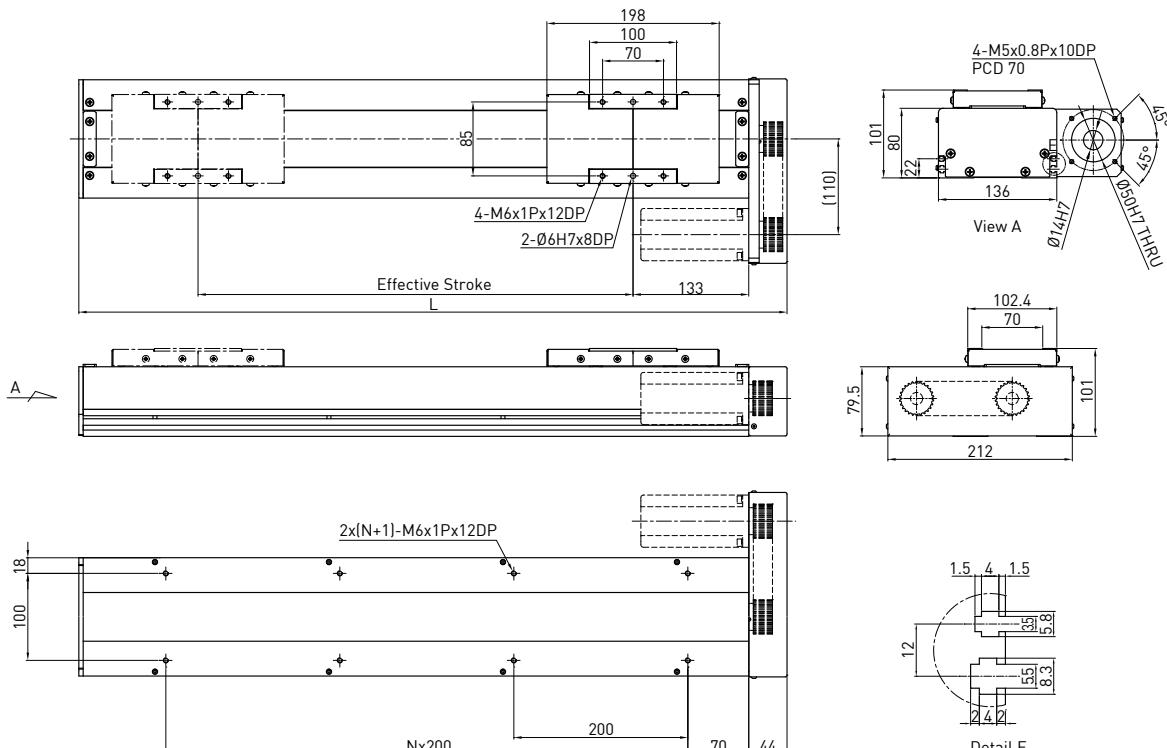
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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)		mm	10	20
200	514	1	11.5	Lead			RPM	3000	3000
300	614	2	13.0	Rated RPM			mm/sec	500	1000
400	714	2	14.5	Max linear speed*			N	280	140
500	814	3	16.0	Rated thrust			mm	±0.02	
600	914	3	17.5	Repeatability			mm	100~1050	
700	1014	4	19.0	Effective stroke			kg	82	40
800	1114	4	20.5	Max load (H)			Fyd	N	50
900	1214	5	22.0	Rated dynamic load**			Fzd	N	820
1000	1314	5	23.5				Mxd	N-m	60
1100	1414	6	25.0				Myd	N-m	86
							Mzd	N-m	26
				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.

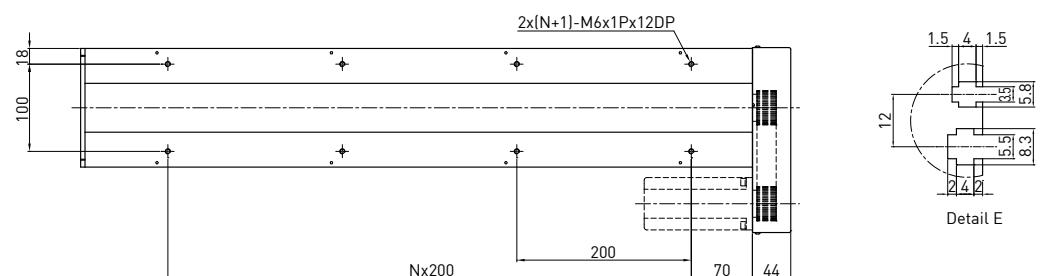
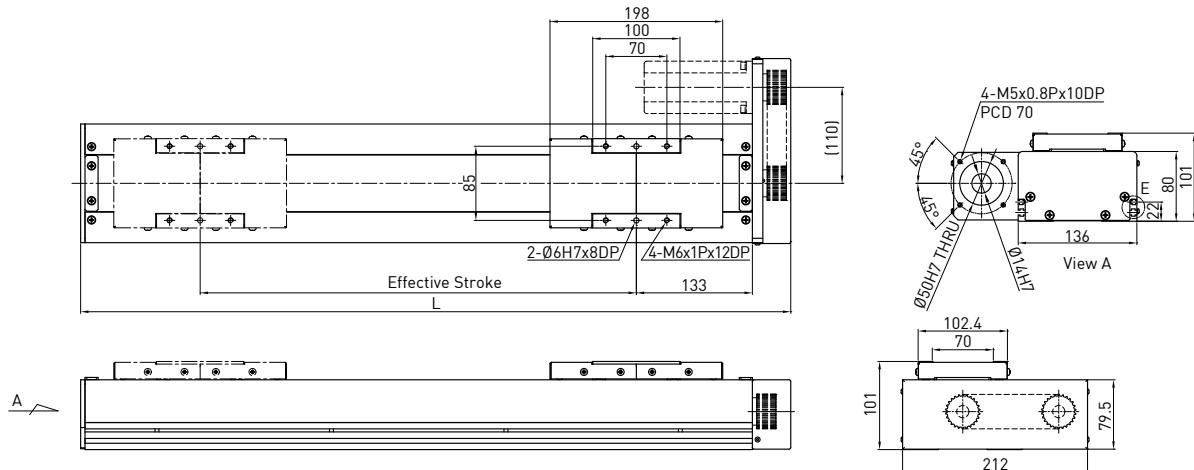
\*\* The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\*\* 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

<b>KS140</b>	<b>-20</b>	<b>P</b>	<b>-1100</b>	<b>A</b>	<b>FR</b>	<b>S2</b>	<b>M</b>
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	200	
				Drive	Lead		mm	10
200	514	1	11.5	Rated RPM		RPM	3000	3000
300	614	2	13.0	Max linear speed*		mm/sec	500	1000
400	714	2	14.5	Rated thrust		N	280	140
500	814	3	16.0	Repeatability		mm	±0.02	
600	914	3	17.5	Effective stroke		mm	100~1050	
700	1014	4	19.0	Max load (H)		kg	82	40
800	1114	4	20.5	Rated dynamic load**	Fy <sub>d</sub>	N	50	50
900	1214	5	22.0		Fz <sub>d</sub>	N	820	400
1000	1314	5	23.5		M <sub>x</sub> <sub>d</sub>	N-m	60	66
1100	1414	6	25.0		M <sub>y</sub> <sub>d</sub>	N-m	80	86
					M <sub>z</sub> <sub>d</sub>	N-m	20	26
				Permitted load condition***	$\frac{F_y}{F_{y_d}} + \frac{F_z}{F_{z_d}} + \frac{M_x}{M_{x_d}} + \frac{M_y}{M_{y_d}} + \frac{M_z}{M_{z_d}} \leq 1$			
					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.

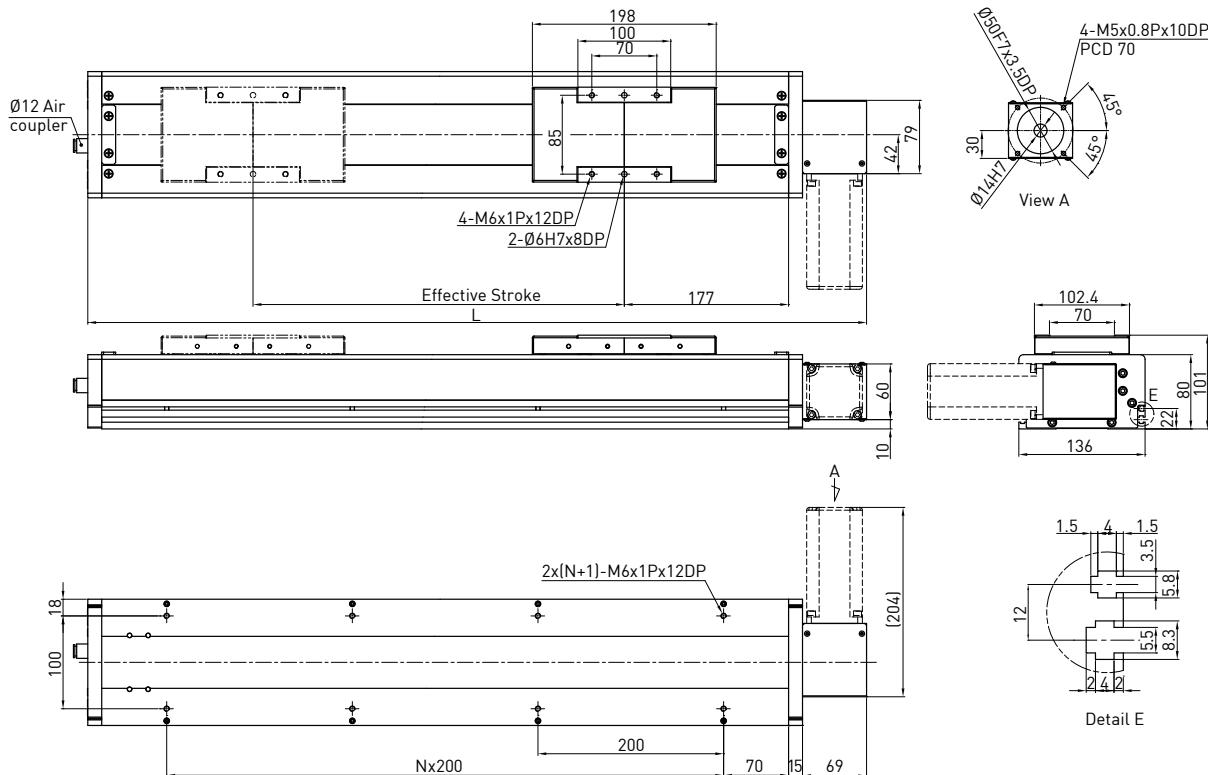
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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

KS140	B	-120	C	-3000	A	FL	S2	M
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



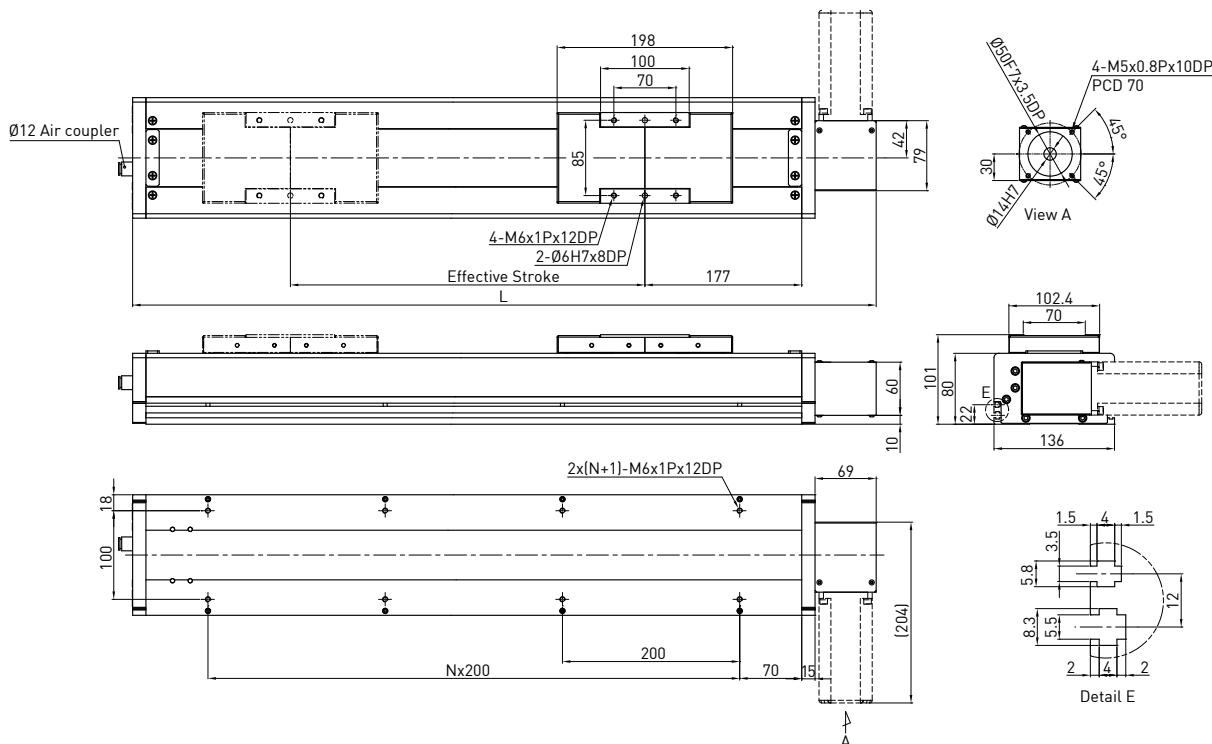
Effective stroke (mm)	L	N	Weight (kg)	AC motor output			W	200
				Drive	Pulley Perimeter	Pulley RPM		
200	639	2	10.4	Max linear speed			mm	120
400	839	3	12.6	Rated thrust			RPM	900
600	1039	4	14.8	Repeatability			mm/sec	1800
800	1239	5	17.0	Effective stroke			N	67
1000	1439	6	19.2	Max load (H)			mm	$\pm 0.1$
1200	1639	7	21.4	Rated dynamic load*	Fy	Fyd	kg	200~3000
1400	1839	8	23.6		Fz	Fzd		15
1600	2039	9	25.8		Mx	Mxd		50
1800	2239	10	28.0		My	Myd		150
2000	2439	11	30.2		Fx	Mzd		70
2200	2639	12	32.4					86
2400	2839	13	34.6	Permitted load condition**				26
2600	3039	14	36.8					
2800	3239	15	39.0		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$			
3000	3439	16	41.2		Fy, Fz, Mx, My, Mz are working loads			

\*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

KS140	B	-120	C	-3000	A	FR	S2	M
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



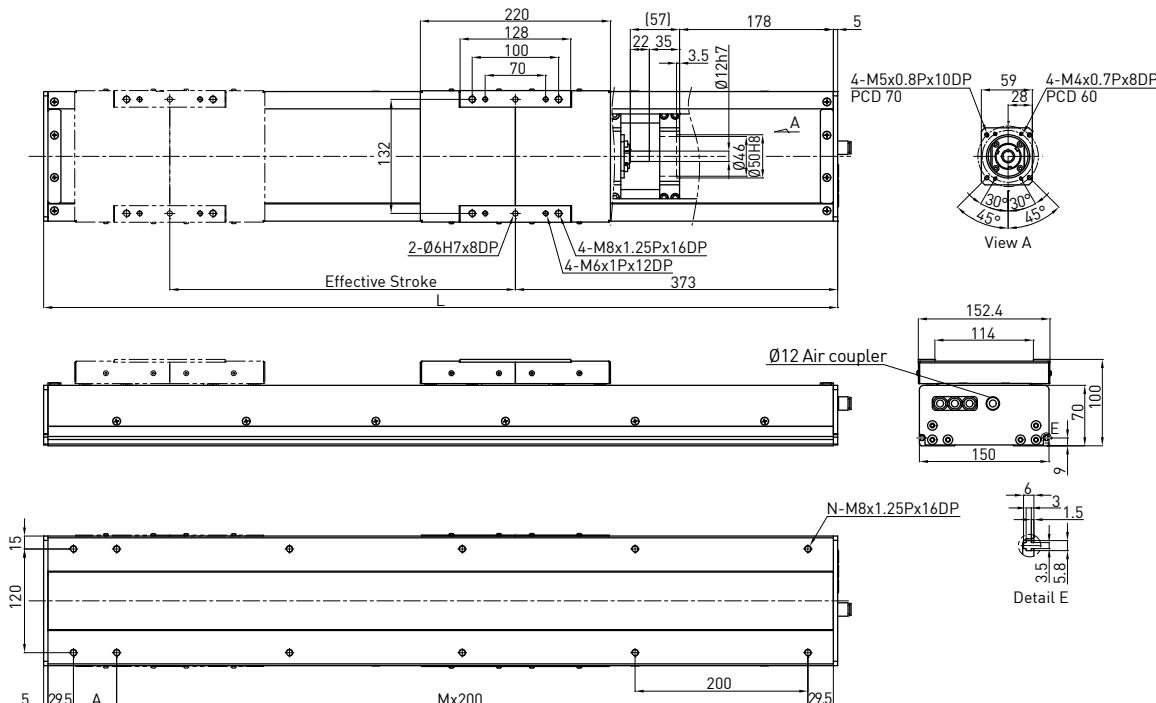
Effective stroke (mm)	L	N	Weight (kg)	AC motor output			W	200
				Drive	Pulley Perimeter	Pulley RPM		
200	639	2	10.4	Max linear speed	mm	120		Timing Belt
400	839	3	12.6	Rated thrust	RPM	900		
600	1039	4	14.8	Repeatability	mm/sec	1800		
800	1239	5	17.0	Effective stroke	N	67		
1000	1439	6	19.2	Max load (H)	mm	±0.1		
1200	1639	7	21.4	Rated dynamic load*	mm	200~3000		
1400	1839	8	23.6		kg	15		
1600	2039	9	25.8		Fyd	N	50	
1800	2239	10	28.0		Fzd	N	150	
2000	2439	11	30.2		Mxd	N-m	70	
2200	2639	12	32.4		Myd	N-m	86	
2400	2839	13	34.6		Mzd	N-m	26	
2600	3039	14	36.8	Permitted load condition**	$\frac{Fy}{Fyd} + \frac{Fz}{Fzd} + \frac{Mx}{Mxd} + \frac{My}{Myd} + \frac{Mz}{Mzd} \leq 1$			
2800	3239	15	39.0		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



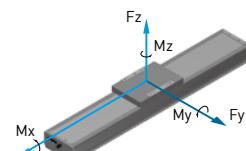
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output		W	200	
						Drive			Ball screw C7(normal)	
150	669	200	2	8	13.96	Lead	mm	10	20	
200	719	50	3	10	14.84	Rated RPM	RPM	3000	3000	
250	769	100	3	10	15.72	Max linear speed*	mm/sec	500	1000	
300	819	150	3	10	16.6	Rated thrust	N	280	140	
350	869	200	3	10	17.48	Repeatability	mm	$\pm 0.02$		
400	919	50	4	12	18.36	Effective stroke	mm	150~1250		
450	969	100	4	12	19.24	Max load (H)	kg	87	45	
500	1019	150	4	12	20.12	Rated dynamic load**	Fyd	N	50	50
550	1069	200	4	12	21		Fzd	N	870	450
600	1119	50	5	14	21.88		Mxd	N-m	60	66
650	1169	100	5	14	22.76		Myd	N-m	80	86
700	1219	150	5	14	23.64		Mzd	N-m	20	26
750	1269	200	5	14	24.52					
800	1319	50	6	16	25.4	Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$			
850	1369	100	6	16	26.28		Fy, Fz, Mx, My, Mz are working loads			
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					

\* 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.

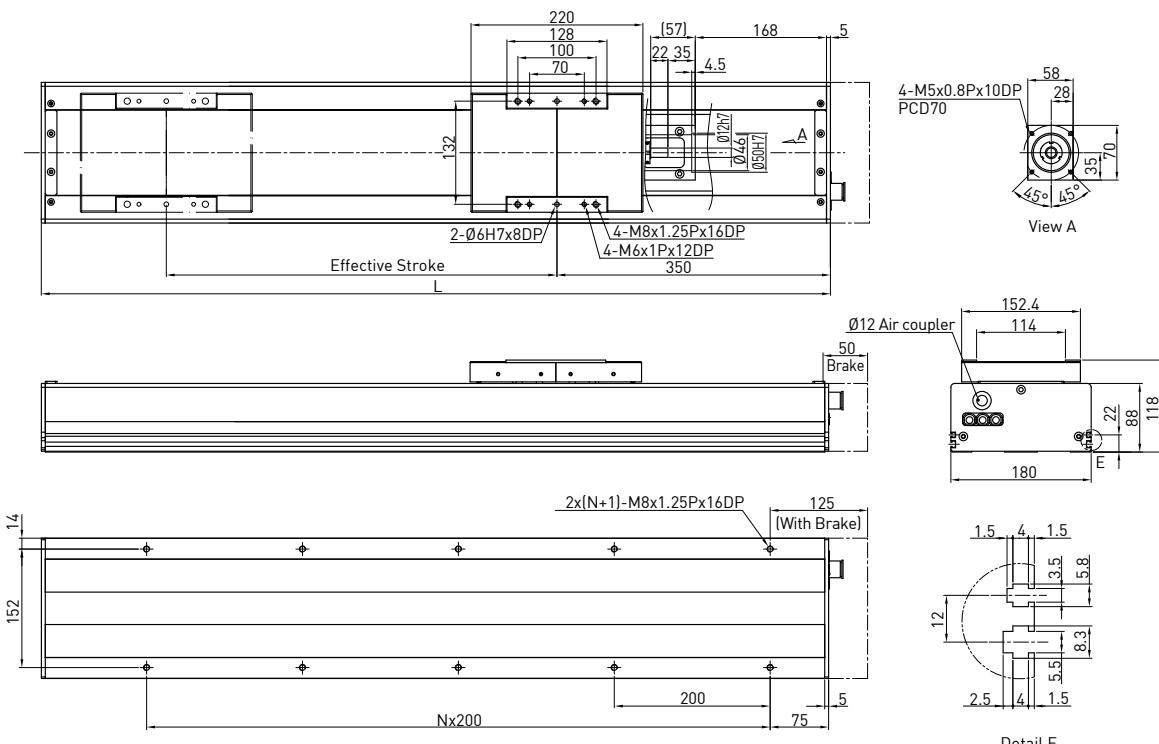
\*\* The load condition is based on 10,000km operation.

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



## Model Number for KS180-FI

<b>KS180</b>	<b>-20</b>	<b>P</b>	<b>-1200</b>	<b>A</b>	<b>FI</b>	<b>S2</b>	<b>M</b>
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			W	400	
				Drive	Lead	mm		Ballscrew C7(normal)	
200	710	3	16.5	Rated RPM	mm	10	20		
300	810	3	18.1	Max linear speed*	RPM	3000	3000		
400	910	4	19.7	Rated thrust	mm/sec	500	1000		
500	1010	4	21.3	Repeatability	N	560	280		
600	1110	5	22.9	Effective stroke	mm	±0.02			
700	1210	5	24.4	Max load (H)	kg	95	46		
800	1310	6	26	Rated dynamic load**	Fyd	N	50	50	
900	1410	6	27.6		Fzd	N	950	460	
1000	1510	7	29.2		Mxd	N-m	70	80	
1100	1610	7	30.8		Myd	N-m	80	90	
1200	1710	8	32.3		Mzd	N-m	22	23	
					Fy, Fz, Mx, My, Mz	are working loads			
Permitted load condition***				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$					

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

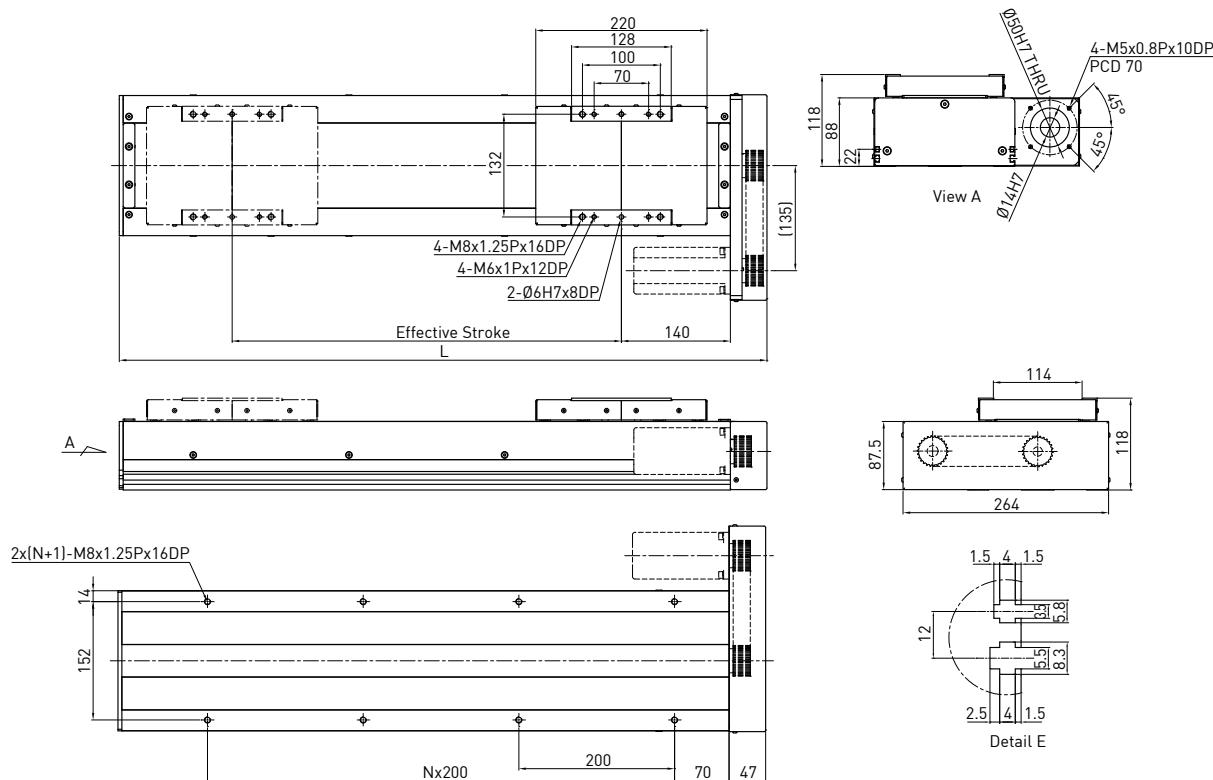
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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			W	400			
				Drive	Lead	Rated RPM		mm	10	20	
200	532	1	11.3					RPM	3000	3000	
300	632	2	12.3					mm/sec	500	1000	
400	732	2	13.3					N	560	280	
500	832	3	14.3					mm	$\pm 0.02$		
600	932	3	15.3					mm	150~1250		
700	1032	4	16.3					kg	95	46	
800	1132	4	17.3					Fyd	N	50	50
900	1232	5	18.3					Fzd	N	950	460
1000	1332	5	19.3	Rated dynamic load**				Mxd	N-m	70	80
1100	1432	6	20.3					Myd	N-m	80	90
1200	1532	6	21.3					Mzd	N-m	22	23
				Permitted load condition***			$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ <p>Fy, Fz, Mx, My, Mz are working loads</p>				

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

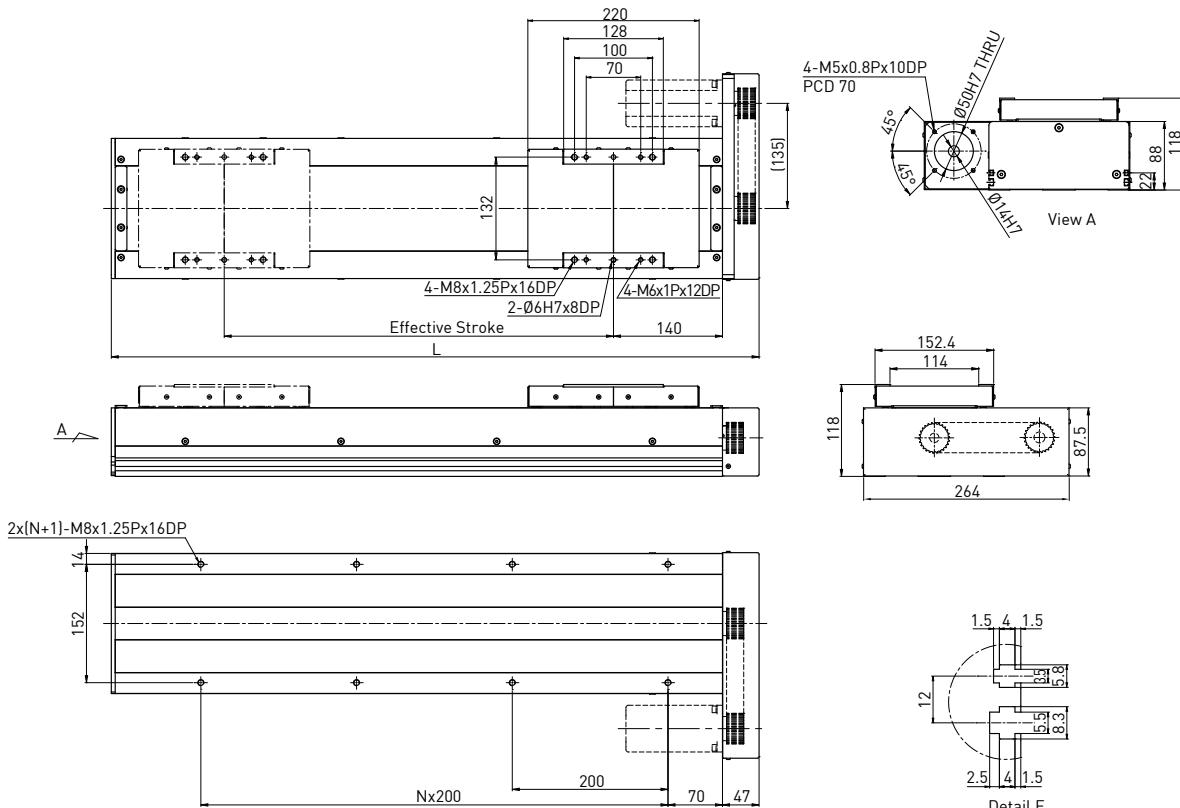
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

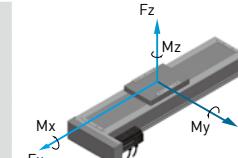
\*\* The load condition is based on 10,000km operation.

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

## Model Number for KS180-FR

<b>KS180</b>	<b>-20</b>	<b>P</b>	<b>-1200</b>	<b>A</b>	<b>FR</b>	<b>S2</b>	<b>M</b>
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	400		
				Drive	Ball screw C7(normal)		mm	10	20
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	150~1250		
800	1132	4	17.3	Max load (H)		kg	95	46	
900	1232	5	18.3	Rated dynamic load**		Fyd	N	50	50
1000	1332	5	19.3			Fzd	N	950	460
1100	1432	6	20.3			Mxd	N-m	70	80
1200	1532	6	21.3			Myd	N-m	80	90
						Mzd	N-m	22	23
				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.

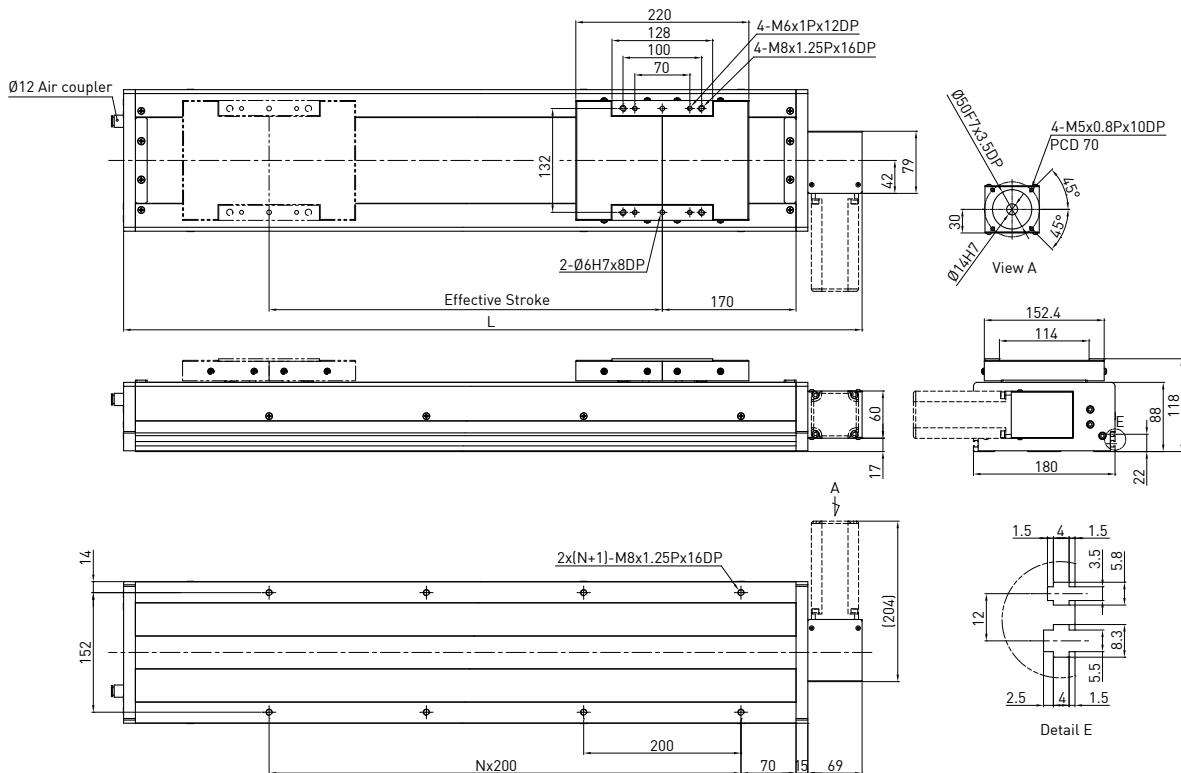
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\* 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-FL

KS180	B	-120	C	-3000	A	FL	S2	M
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



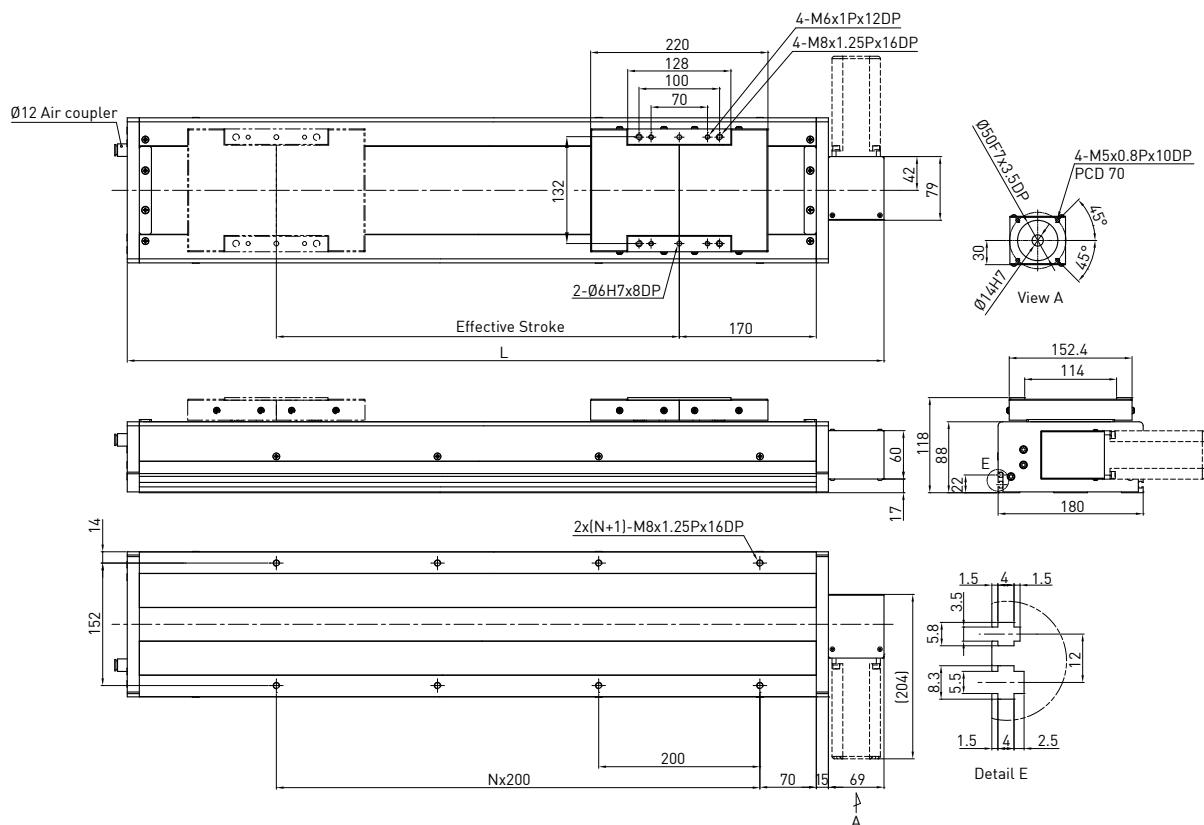
Effective stroke (mm)	L	N	Weight (kg)	AC motor output			W	400
				Drive	Pulley Perimeter	Pulley RPM		
200	639	2	14.2				mm	120
400	839	3	17.0				RPM	900
600	1039	4	19.8				mm/sec	1800
800	1239	5	22.6				N	133
1000	1439	6	25.4				mm	$\pm 0.1$
1200	1639	7	28.2					200~3000
1400	1839	8	31.0				kg	30
1600	2039	9	33.8	Rated dynamic load*	F <sub>y</sub> d	N		50
1800	2239	10	36.6		F <sub>z</sub> d	N		300
2000	2439	11	39.4		M <sub>x</sub> d	N-m		82
2200	2639	12	42.2		M <sub>y</sub> d	N-m		92
2400	2839	13	45.0		M <sub>z</sub> d	N-m		23
2600	3039	14	47.8	Permitted load condition**	$\frac{F_y}{F_{y'd}} + \frac{F_z}{F_{z'd}} + \frac{M_x}{M_{x'd}} + \frac{M_y}{M_{y'd}} + \frac{M_z}{M_{z'd}} \leq 1$			
2800	3239	15	50.6		F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads			
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.

## Model Number for KS180B-FR

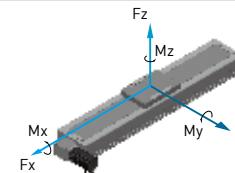
KS180	B	-120	C	-3000	A	FR	S2	M
Model	Timing Belt	Pulley Perimeter	Precision Grade	Effective Stroke	Slider Type	Motor Flange	Limit Switch	Motor
			C: Normal		A: Standard	FR: Right	S2: OMRON SX674 None: No Limit Switch	M: Supplied With Motor None: Without Motor



Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	400
200	639	2	14.2	Drive		Timing Belt
400	839	3	17.0	Pulley Perimeter	mm	120
600	1039	4	19.8	Pulley RPM	RPM	900
800	1239	5	22.6	Max linear speed	mm/sec	1800
1000	1439	6	25.4	Rated thrust	N	133
1200	1639	7	28.2	Repeatability	mm	±0.1
1400	1839	8	31.0	Effective stroke	mm	200~3000
1600	2039	9	33.8	Max load (H)	kg	30
1800	2239	10	36.6	Rated dynamic load*	Fyd	N
2000	2439	11	39.4		Fzd	N
2200	2639	12	42.2		Mxd	N-m
2400	2839	13	45.0		Myd	N-m
2600	3039	14	47.8		Mzd	N-m
2800	3239	15	50.6	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$	
3000	3439	16	53.4		Fy, Fz, Mx, My, Mz are working loads	

\*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

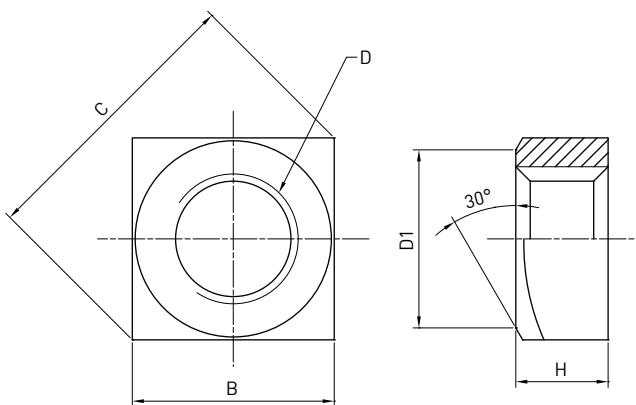
### 5.2 Applications

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

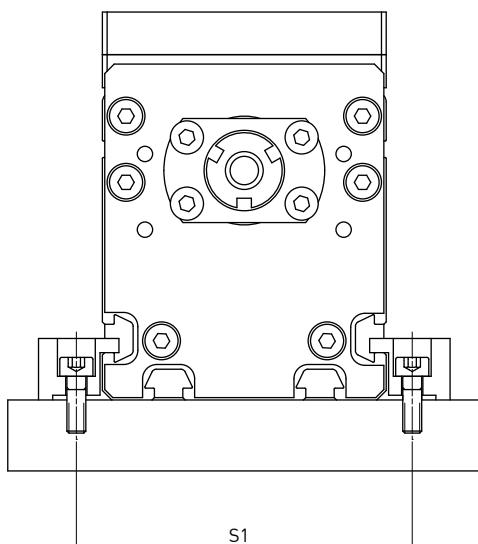


## 5.3 KU Mounting

### Square nut



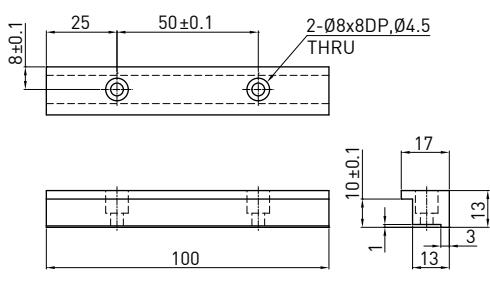
	B	C	D	D1	H
KU60	7	9.9	M4x0.7	6.8	3.2
KU80	8	11.3	M5x0.8	7.8	4



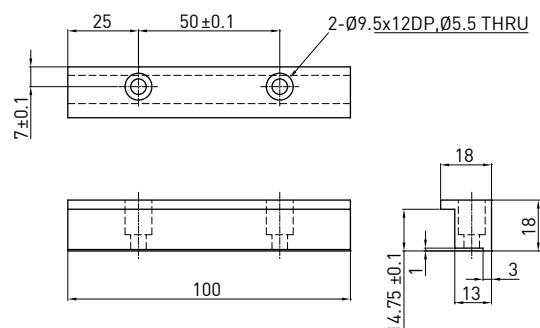
KU Model	S1	Screw
KU80	93	M5
KU60	71	M4

### 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

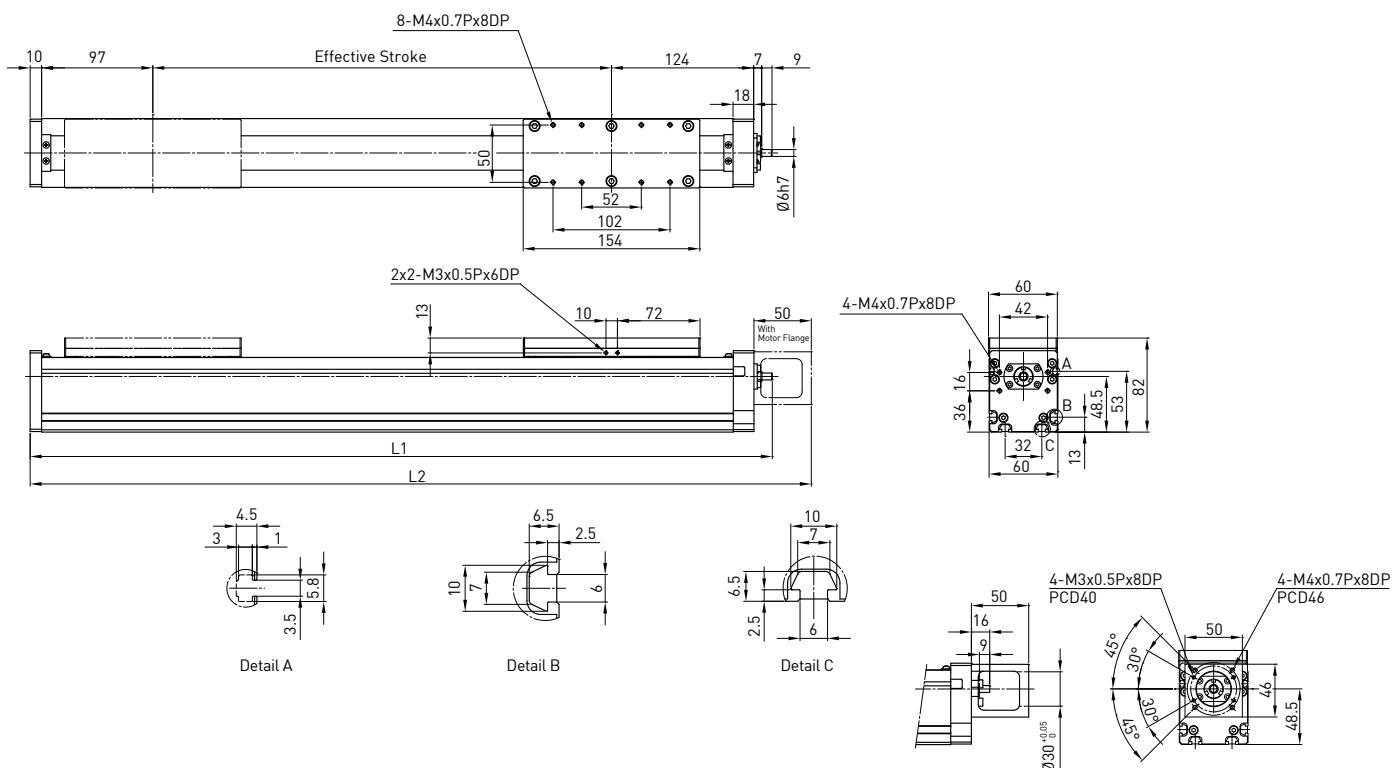
C: Normal  
P: Precision

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		
50	297	331	1	Drive			Ballscrew C7(normal)		
100	347	381	1.5	Lead		mm	5	10	
150	397	431	2	Rated RPM		RPM	3000	3000	
200	447	481	2.5	Max linear speed*		mm/sec	250	500	
250	497	531	3	Rated thrust		N	280	140	
300	547	581	3.5	Repeatability		mm	$\pm 0.02$		
350	597	631	4	Effective stroke		mm	50~600		
400	647	681	4.5	Max load (H)		kg	47	32	
450	697	731	5	Rated dynamic load**	Fyd	N	50	50	
500	747	781	5.5		Fzd	N	470	320	
550	797	831	6		Mxd	N-m	7	7	
600	847	881	6.5		Myd	N-m	27	33	
					Mzd	N-m	2	2	
Permitted load condition***		$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$							
Fy, Fz, Mx, My, Mz are working loads									

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

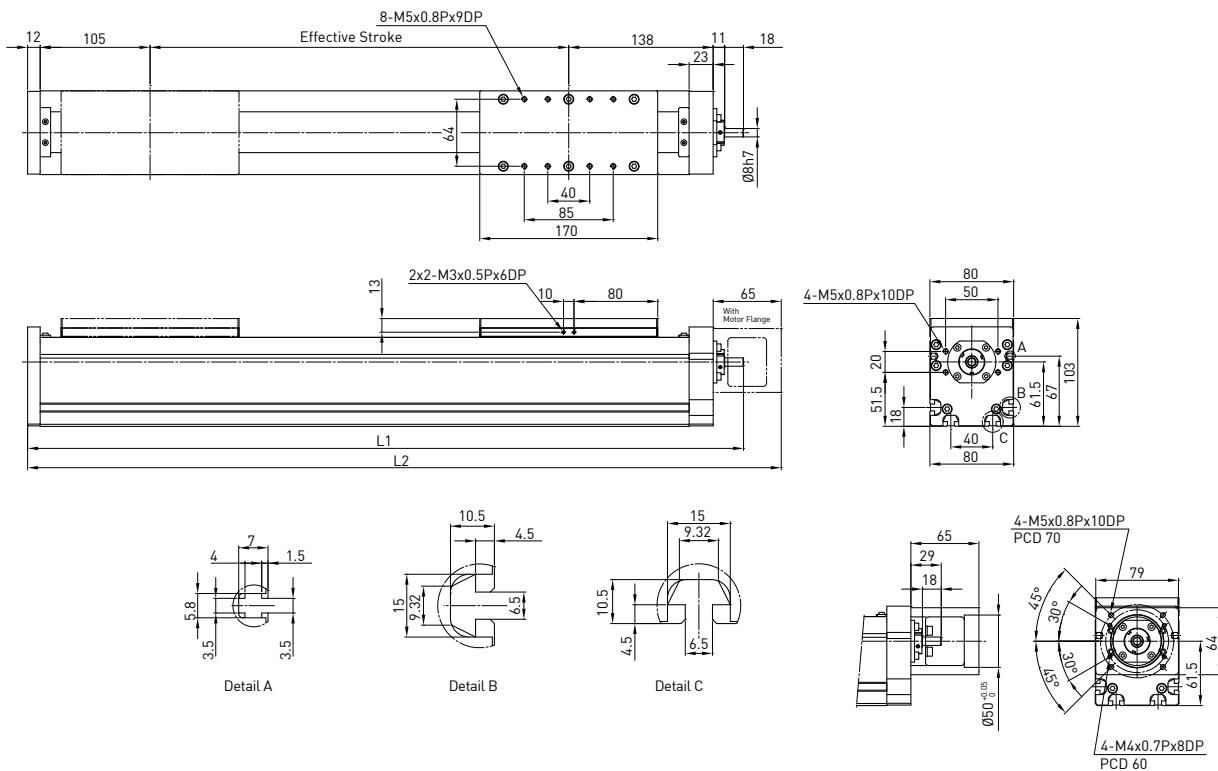
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\*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	200		
100	384	420	7.04	Drive				Ballscrew 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	$\pm 0.02$		
400	684	720	9.68	Effective stroke			mm	100-1100		
450	734	770	10.12	Max load (H)			kg	95	64	32
500	784	820	10.56	Rated dynamic load**	Fyd		N	50	50	50
550	834	870	11.0		Fzd		N	950	640	320
600	884	920	11.44		Mxd		N·m	6	7	8
650	934	970	11.88		Myd		N·m	20	30	41
700	984	1020	12.32		Mzd		N·m	0.5	1	1
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		Fy, Fz, Mx, My, Mz 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

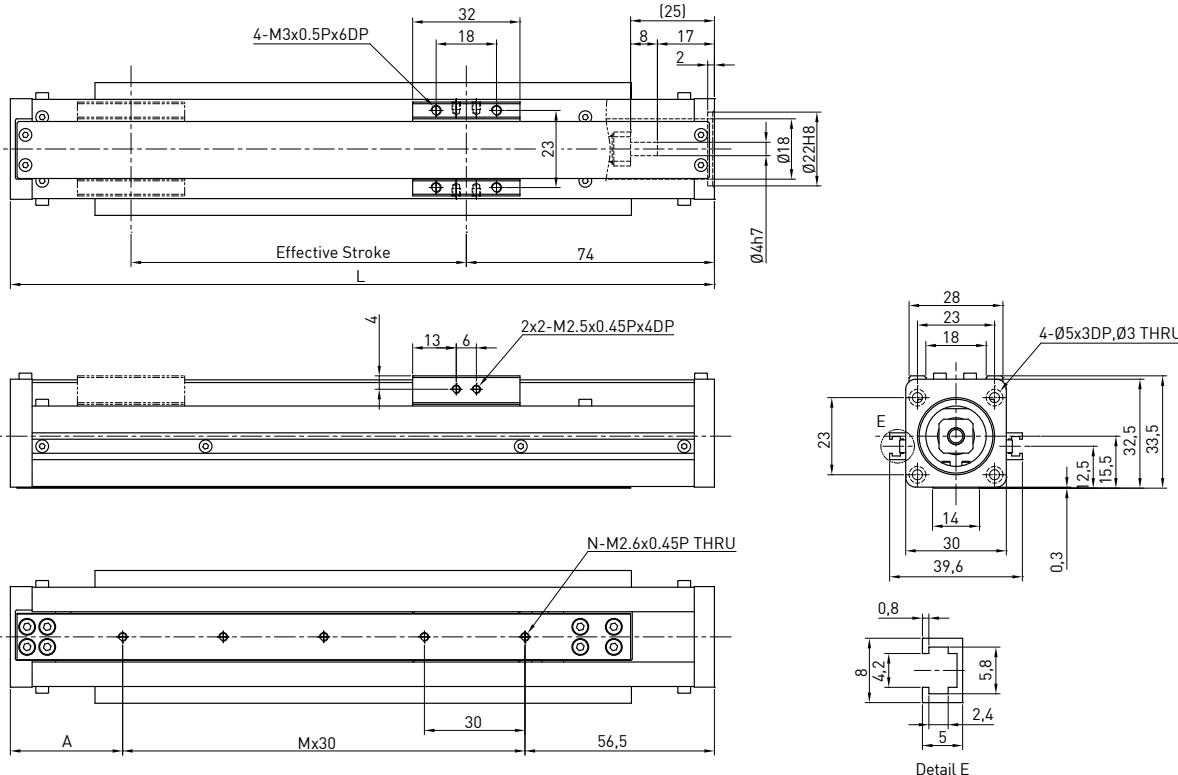
- Precision Industry & Semiconductor
- Inspection, Testing & Assembly equipment
- Optical & Medical equipment



## 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
	160	43.5	2	3	0.2	Rated RPM	RPM	-
	210	33.5	4	5	0.5	Lead	mm	1.25
	260	23.5	6	7	0.8	Max linear speed	mm/sec	62.5
	310	43.5	7	8	1.1	Rated thrust	N	175
	360	33.5	9	10	1.4	Repeatability	mm	±0.02
	410	53.5	10	11	1.9	Effective stroke	mm	50-300
						Max load (H)	kg	4
						Rated dynamic load*	Fy	N
							Fyd	4

$$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$$
 Fy, Fz, Mx, My, Mz are working loads

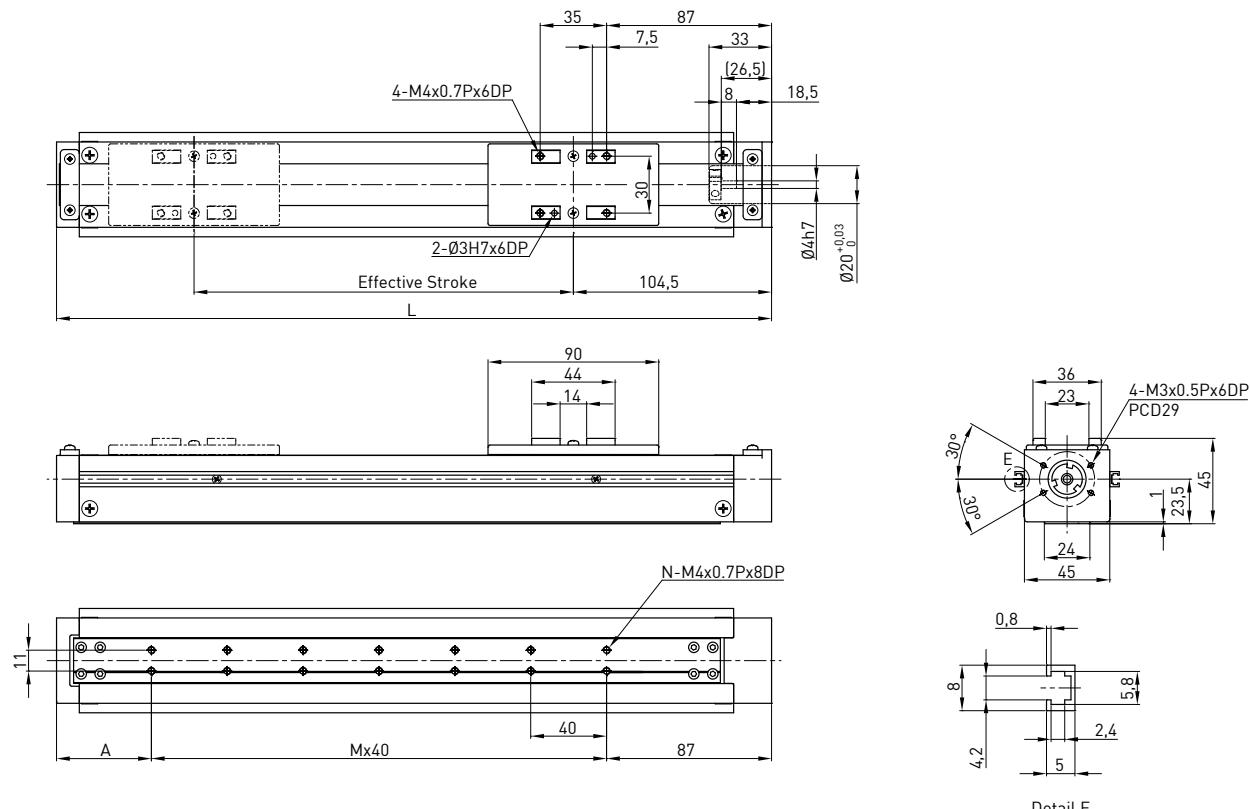
Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$	
	Fy, Fz, Mx, My, Mz are working loads	

\* 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 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



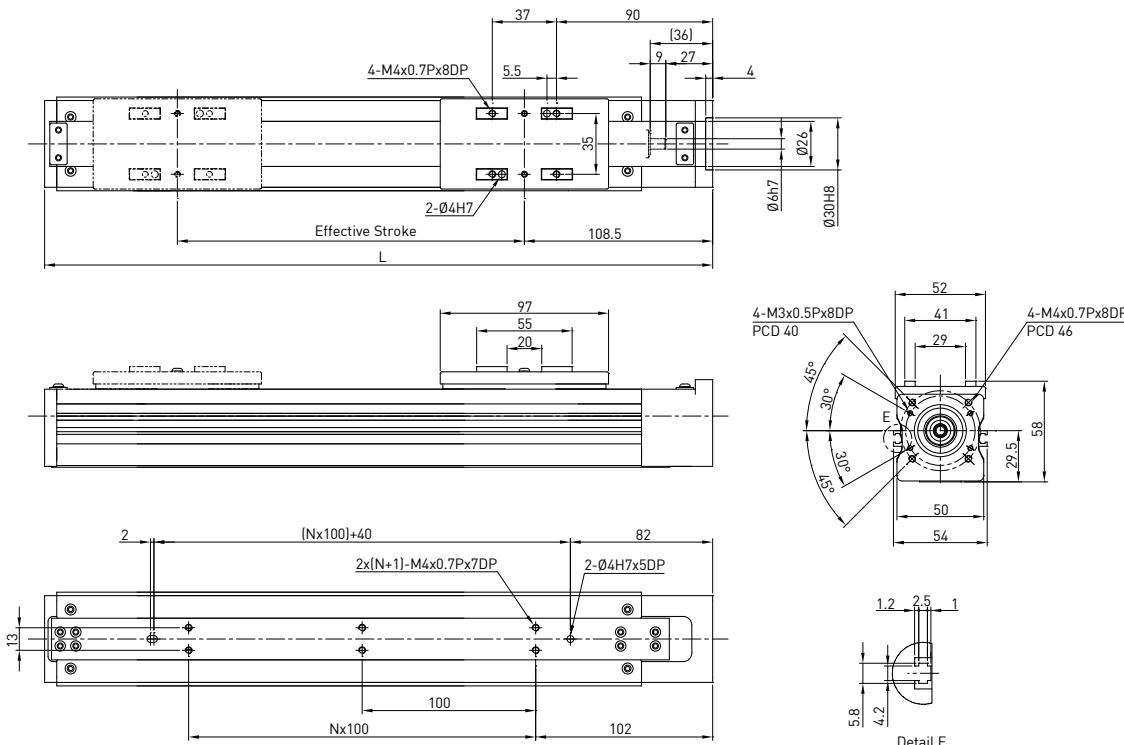
Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output			W	50	
						Rated RPM	Lead	Max linear speed		RPM	3000
50	227	60	2	6	1				mm	2	5
100	277	70	3	8	1.3				mm/sec	100	250
150	327	40	5	12	1.6				N	280	140
200	377	50	6	14	1.9				mm	±0.02	
250	427	60	7	16	2.2				mm	50~300	
300	477	70	8	18	2.5				kg	8	6
Rated dynamic load*						Fy	Fzd	Mxd	Fyd	N	6
						Fz	Mzd	Myd	Fzd	N	80
						Mx	My	Fy	Mzd	N-m	1.1
						Fx			My	N-m	0.5
									Mzd	N-m	0.5
Permitted load condition**						$\frac{Fy}{Fyd} + \frac{Fz}{Fzd} + \frac{Mx}{Mxd} + \frac{My}{Myd} + \frac{Mz}{Mzd} \leq 1$					
						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 (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



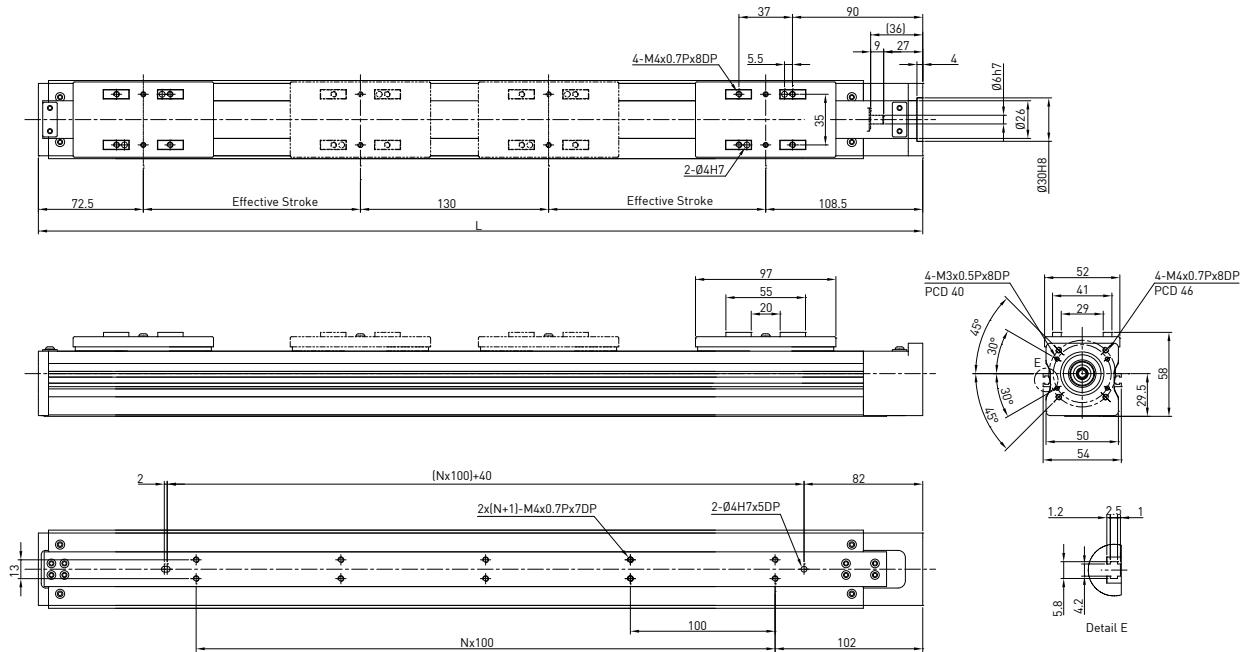
Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	50
100	285	1	1.4	Rated RPM	RPM	3000
200	385	2	1.7	Lead	mm	4
300	485	3	2	Max linear speed	mm/sec	200
400	585	4	2.3	Rated thrust	N	175
				Repeatability	mm	±0.02
				Effective stroke	mm	100~400
				Max load (H)	kg	10
Rated dynamic load*				F <sub>y</sub> d	N	6
				F <sub>z</sub> d	N	100
				M <sub>x</sub> d	N·m	1.7
				M <sub>y</sub> d	N·m	0.8
				M <sub>z</sub> d	N·m	0.8
Permitted load condition**				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$		
				F <sub>y</sub> , F <sub>z</sub> , M <sub>x</sub> , M <sub>y</sub> , M <sub>z</sub> are working loads		

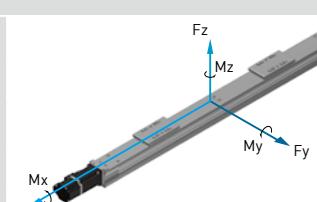
\* The load condition is based on 10,000km operation.

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

## Model Number for KE050 (Double Slider)

KE050	D	-04	C	-250	A	F0	S2	M
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



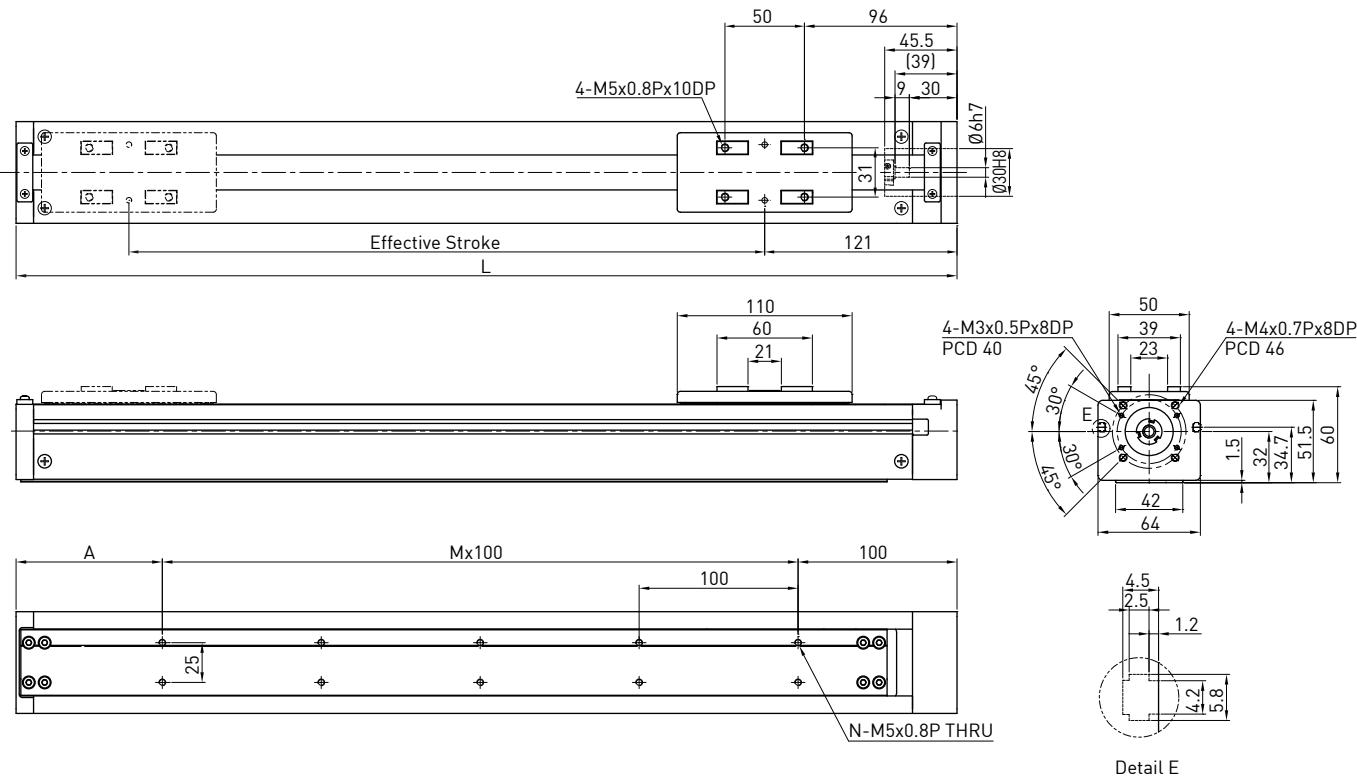
Effective stroke (mm)	L	N	Weight (kg)	AC motor output	W	50	
100	511	3	2.3	Rated RPM	RPM	3000	
150	611	4	2.5	Lead	mm	4	
200	711	5	2.8	Max linear speed	mm/sec	200	
250	811	6	3.0	Rated thrust	N	175	
				Repeatability	mm	±0.02	
				Effective stroke	mm	100~400	
				Max load (H)	kg	10	
Rated dynamic load*					Fyd	N	6
Permitted load condition**				$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ $F_y, F_z, M_x, M_y, M_z \text{ are working loads}$	Fzd	N	100
					Mxd	N-m	1.7
					Myd	N-m	0.8
					Mzd	N-m	0.8

\* 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



Detail E

Effective stroke (mm)	L	A	M	N	Weight (kg)	AC motor output	W	100	
Rated RPM	RPM	3000		3000					
Lead	mm	5		10					
Max linear speed*	mm/sec	250		500					
Rated thrust	N	280		140					
Repeatability	mm	±0.02							
Effective stroke	mm	50~600							
Max load (H)	kg	15		13					
Rated dynamic load**	Fy	6		Fzd	N		6		
	Fz	150		Mxd	N-m		130		
	Mx	4.4		Myd	N-m		4.5		
	Mz	2.3		Mzd	N-m		2.4		
	Fy	2.3		2.4					
Permitted load condition***	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$ <p>Fy, Fz, Mx, My, Mz are working loads</p>								

\* Vibration might occur when the effective stroke is longer than 550mm.

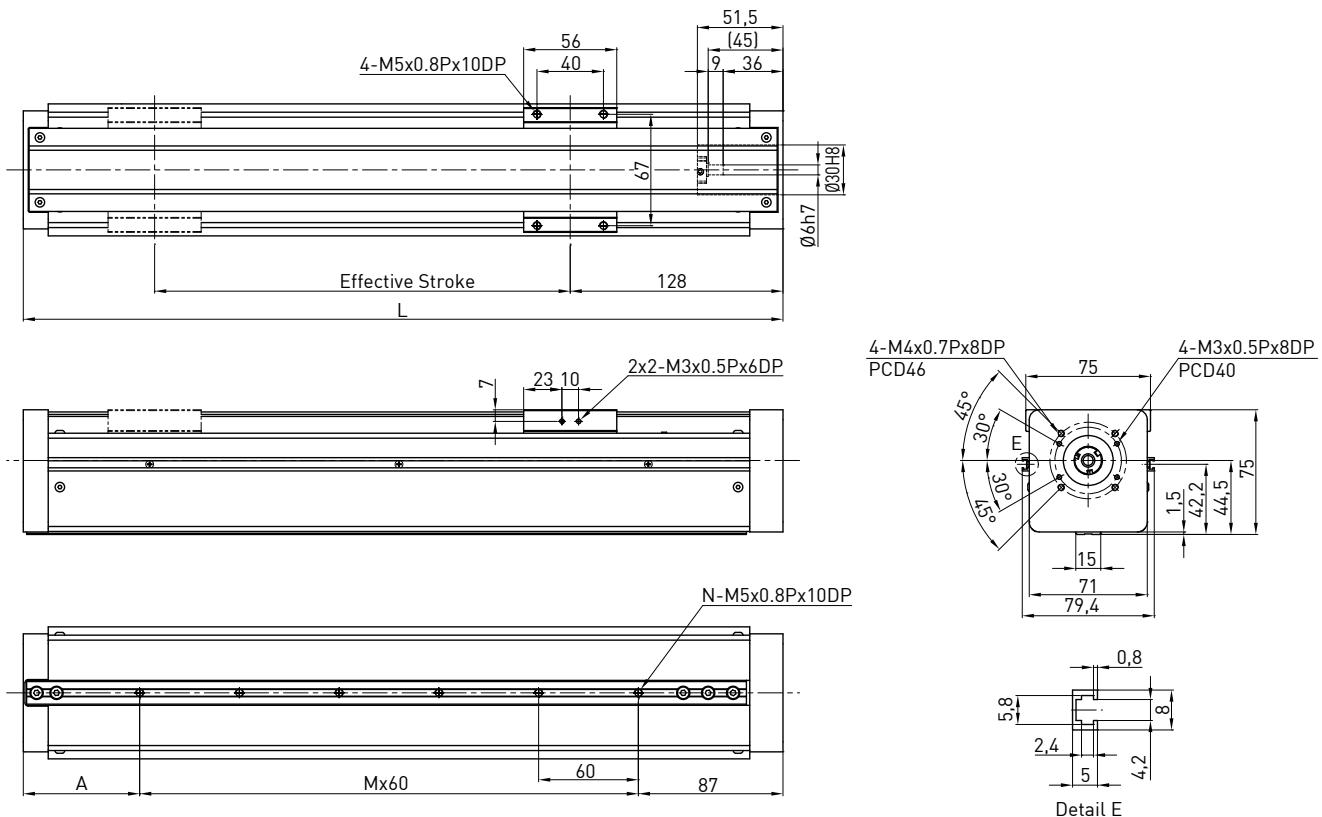
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\*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	
						Rated RPM	Lead	Max linear speed*		RPM	3000
50	257	50	2	3	2.8				mm	5	10
100	307	40	3	4	3.1				mm/sec	250	500
150	357	90	3	4	3.4				N	280	140
200	407	80	4	5	3.7				mm	±0.02	
250	457	70	5	6	4				mm	50~600	
300	507	60	6	7	4.3				kg	20	18
350	557	50	7	8	4.6						
400	607	40	8	9	4.9	Rated dynamic load**	Fyd	N	6	6	
450	657	90	8	9	5.2		Fzd	N	200	180	
500	707	80	9	10	5.5		Mxd	N-m	4.5	4.5	
550	757	70	10	11	5.8		Myd	N-m	1.8	1.8	
600	807	60	11	12	6.1	Permitted load condition***	Mzd	N-m	1.6	1.6	
							$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$				
							Fy, Fz, Mx, My, Mz Mz are working loads				

\* Vibration might occur when the effective stroke is longer than 550mm.

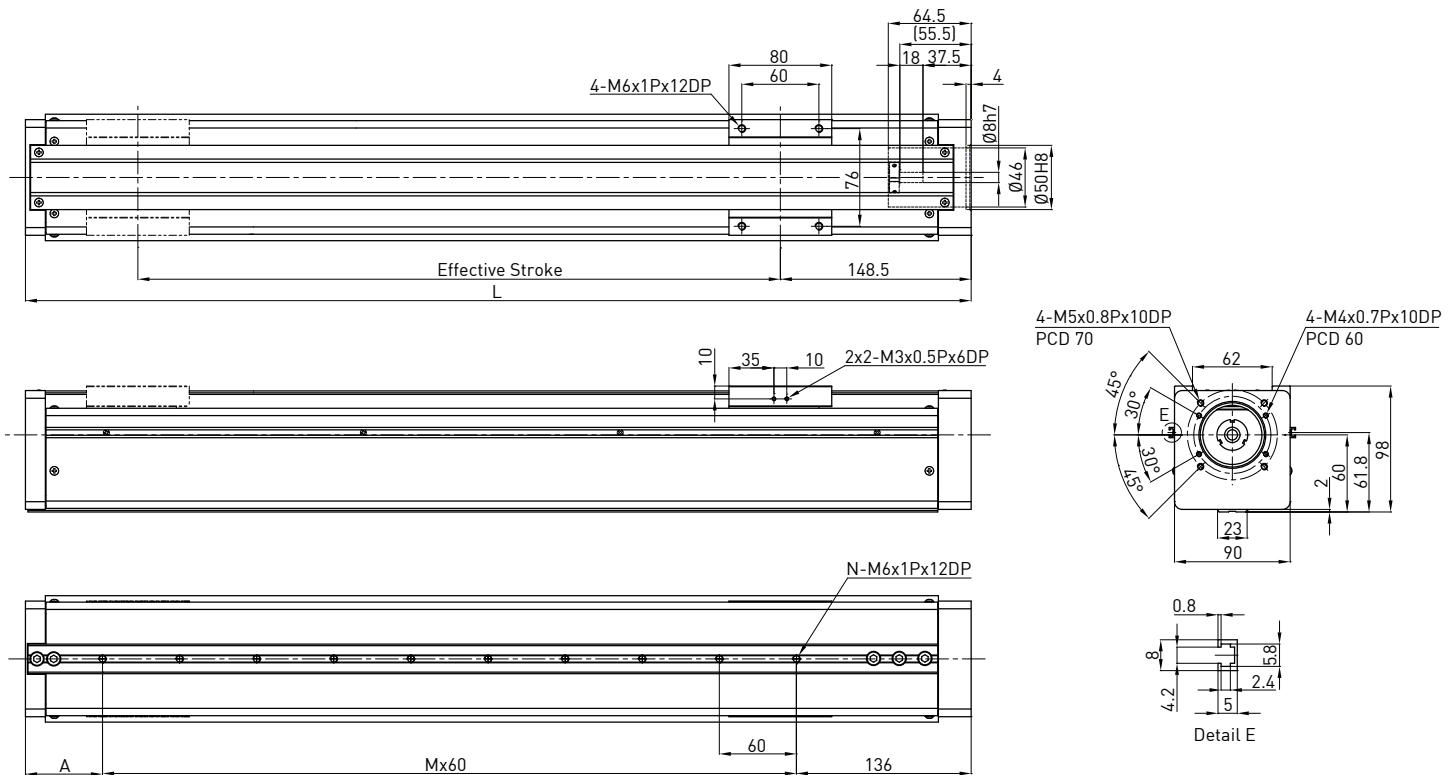
The maximum speed should be decreased by 15% for every 100mm of increased stroke.

\*\*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		
						Rated RPM	RPM	3000	3000			
50	286	90	1	2	6.7	Lead	mm	5	10			
100	336	80	2	3	7	Max linear speed	mm/sec	250	500			
150	386	70	3	4	7.3	Rated thrust	N	280	140			
200	436	60	4	5	7.6	Repeatability	mm	±0.02				
250	486	50	5	6	7.9	Effective stroke	mm	50~600				
300	536	40	6	7	8.2	Max load [H]	kg	25	23			
350	586	90	6	7	8.5	Rated dynamic load*	Fyd	N	6	6		
400	636	80	7	8	8.8		Fzd	N	250	230		
450	686	70	8	9	9.1		Mxd	N-m	13	12		
500	736	60	9	10	9.4		Myd	N-m	7.1	7		
550	786	50	10	11	9.7		Mzd	N-m	7.1	6.9		
600	836	40	11	12	10	Permitted load condition**	$\frac{F_y}{F_{yd}} + \frac{F_z}{F_{zd}} + \frac{M_x}{M_{xd}} + \frac{M_y}{M_{yd}} + \frac{M_z}{M_{zd}} \leq 1$					

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

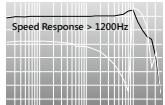
\*\*If used on vertical axis or special condition, please contact HIWIN.

# Single Axis Robot Motor & Drive



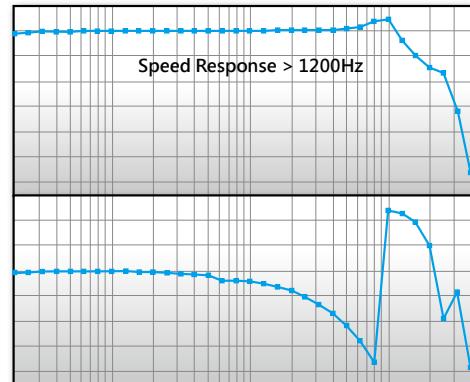
## 7.1 Features

### Excellent Performance



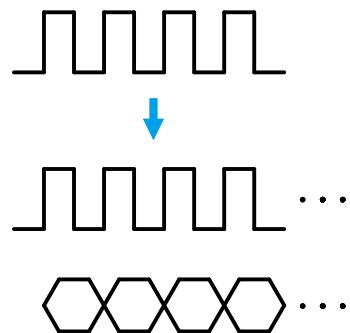
#### Excellent high speed response

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.



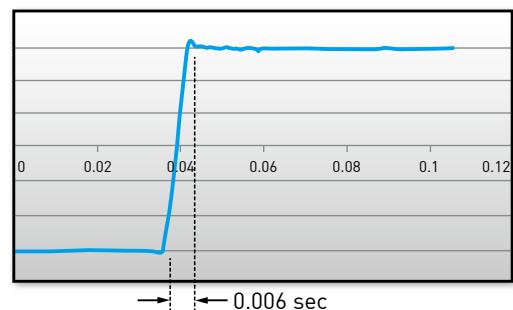
#### 17bit High resolution encoder

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

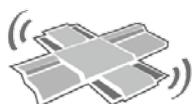
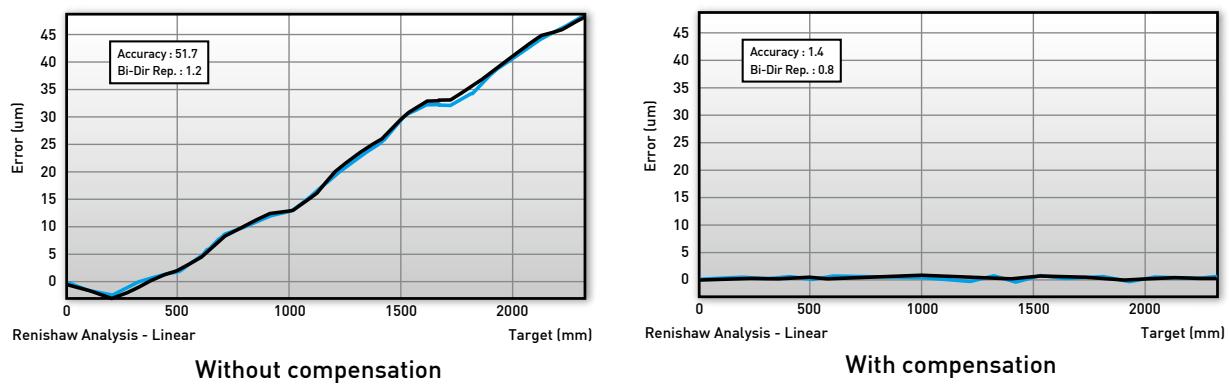
Using advanced WizAlg controller design tools, plus space vector current control technology, servo performance has been achieved to the highest level. To change motor speed from -3000 to +3000 rpm, it takes as low as 0.006 second.





## Built-in accuracy improvement features

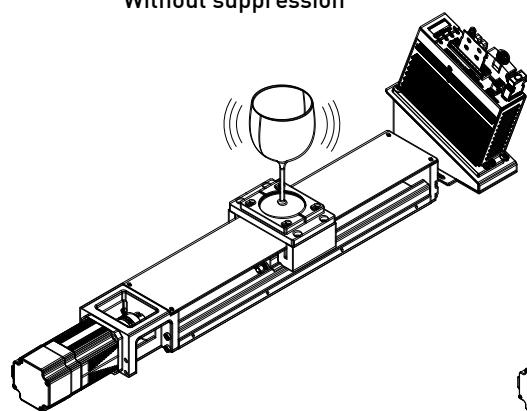
The D2 drive includes features to improve total positioning accuracy of the mechanical system. The table size can be up to 16000 points. It is implemented in all control modes to optimize system behavior.



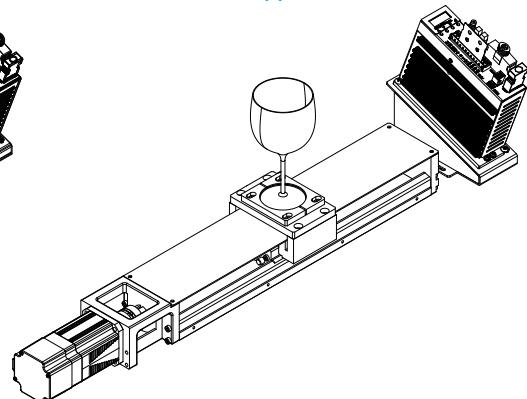
## Vibration Suppression Feature

The D2 drive 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

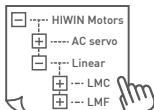
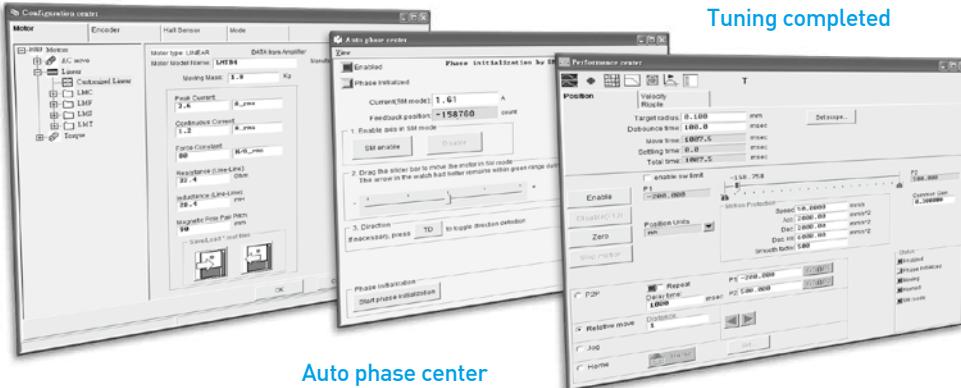


# Simple Operation



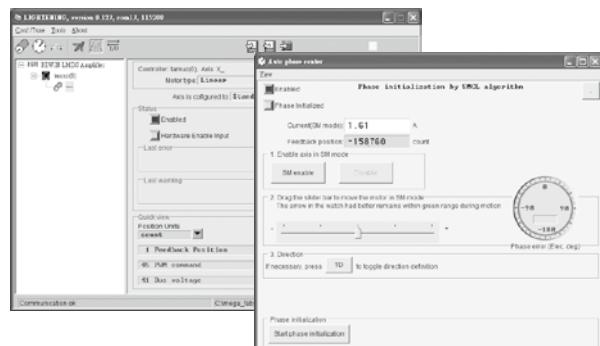
Three Steps

## Simple setup



## 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.

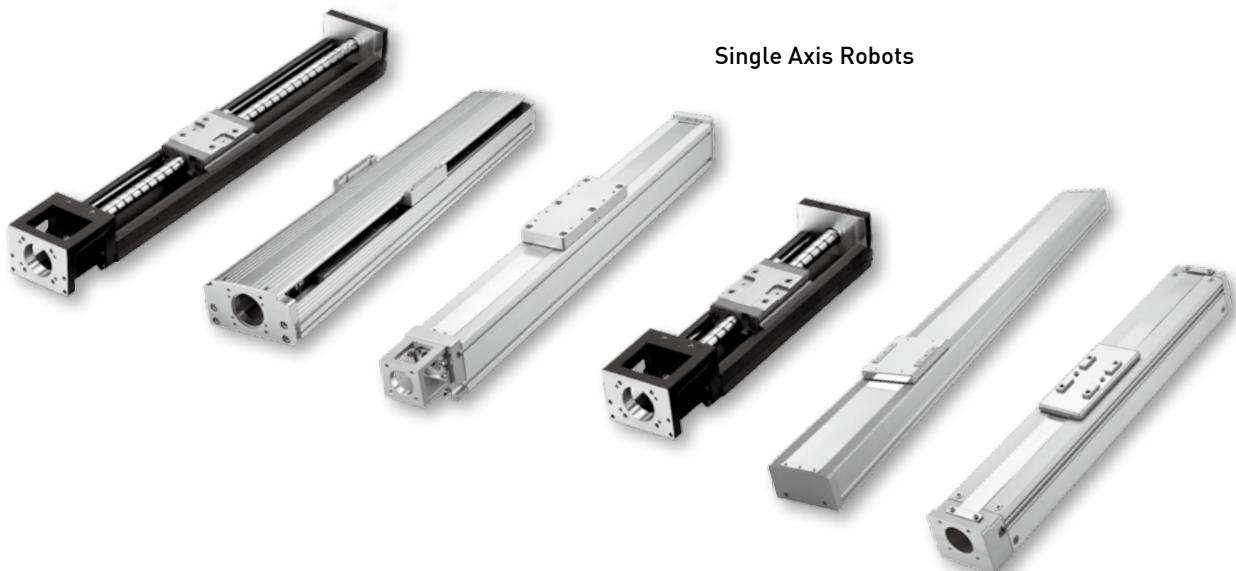


## Easy Integration



### The total solution

HIWIN provides positioning modules, motors, and the best servo drive 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 Drive



AC servo Motor



Line Filter



Ferrite core



STD0 terminal



Regenerative resistors



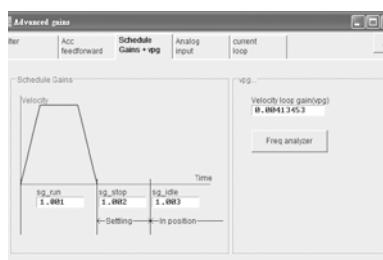
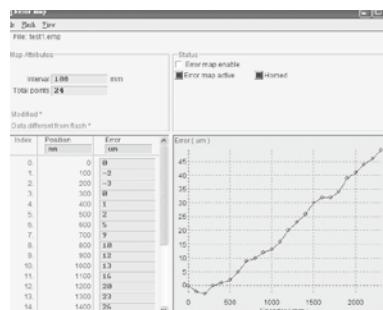
## Complete Tool Sets

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 drive 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.



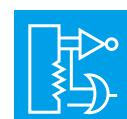
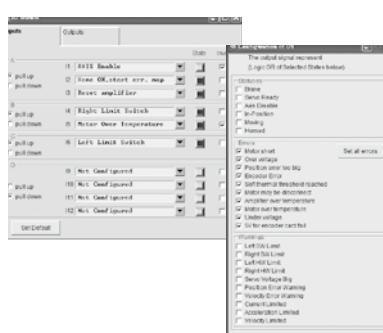
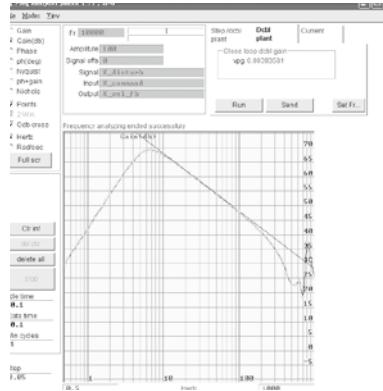
### Advanced gain scheduling feature

After setting gains through optimization tools, there is only one value to adjust: the common gain. During motion, the D2 drive 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 drive 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.



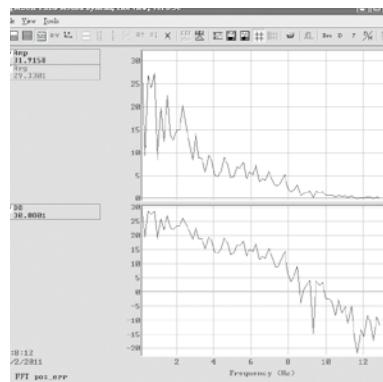
### Variety of I/O functions

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 drive 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

CE

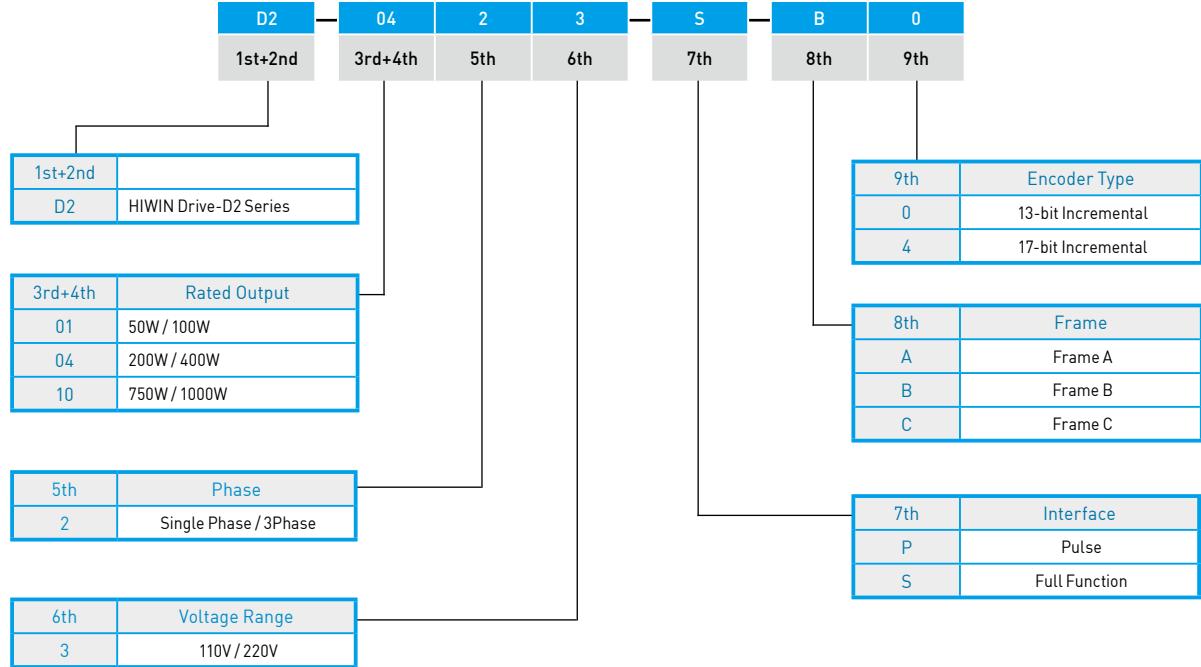
		Drive	Motor
CE Directives	EMC Directives	EN55011 EN61000-6-2 EN61000-6-4 EN61000-3-2 EN61000-3-3	EN55011 EN61000-6-2 EN61000-6-4
	Low-Voltage Directives	EN61800-5-1	EN60034-1 EN60034-5

### 7.3 Motor line-up / Application

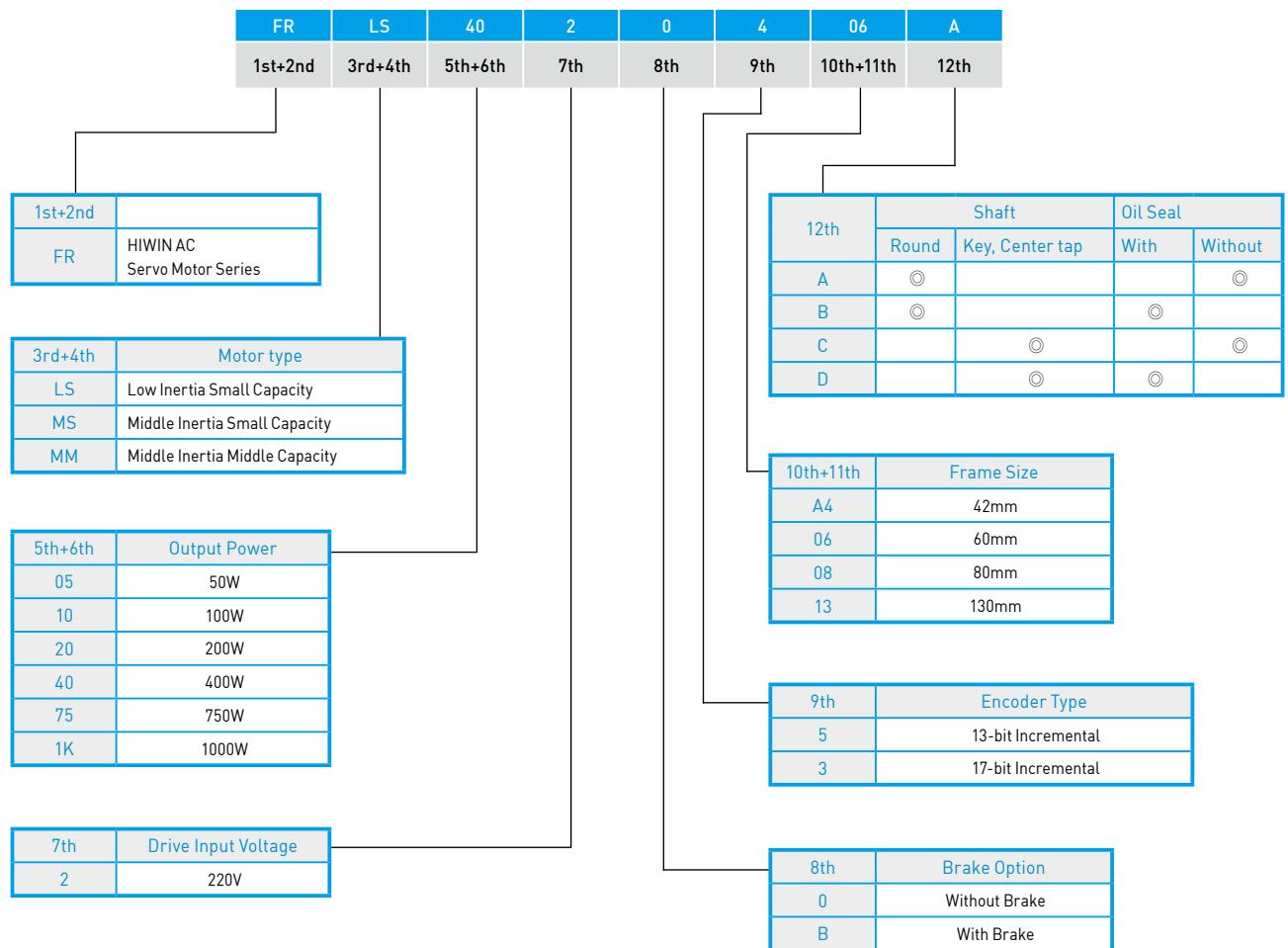
Motor		Voltage	Rated Output (W)	Rated Rotational Speed(Max Speed)(rpm)	Rotary Encoder		Enclosure Rating	Application	
					13-bit	17-bit			
Low Inertia	FRLS		220V	50W	3000 4500	◎	◎	IP54/IP65	<ul style="list-style-type: none"> <li>◆ Semiconductor equipment</li> <li>◆ Packing machines</li> <li>◆ SMT machines</li> <li>◆ Food machines</li> <li>◆ LCD equipment</li> </ul>
			220V	100W	3000 4500	◎	◎		
			220V	200W	3000 4500	◎	◎		
			220V	400W	3000 4500	◎	◎		
Middle Inertia	FRMS		220V	750W	3000 4500	◎	◎	IP54/IP65	<ul style="list-style-type: none"> <li>◆ Semiconductor equipment</li> <li>◆ Packing machines</li> <li>◆ SMT machines</li> <li>◆ Food machines</li> <li>◆ LCD equipment</li> </ul>
	FRMM		220V	1000W	2000 3000	◎	◎	IP54/IP65	<ul style="list-style-type: none"> <li>◆ Machine tools</li> <li>◆ Conveyors</li> <li>◆ Textile machines</li> <li>◆ Robots</li> </ul>

## 7.4 Model designation

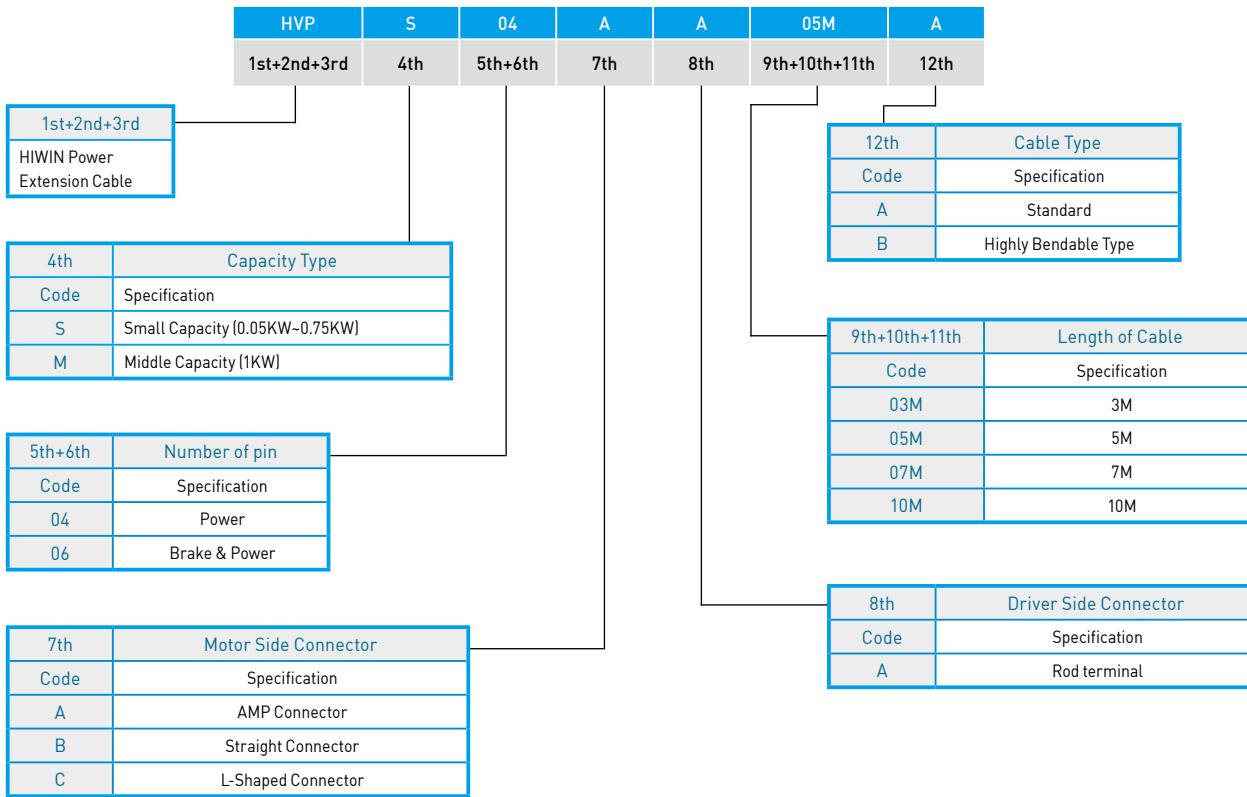
### Drive-D2 Series



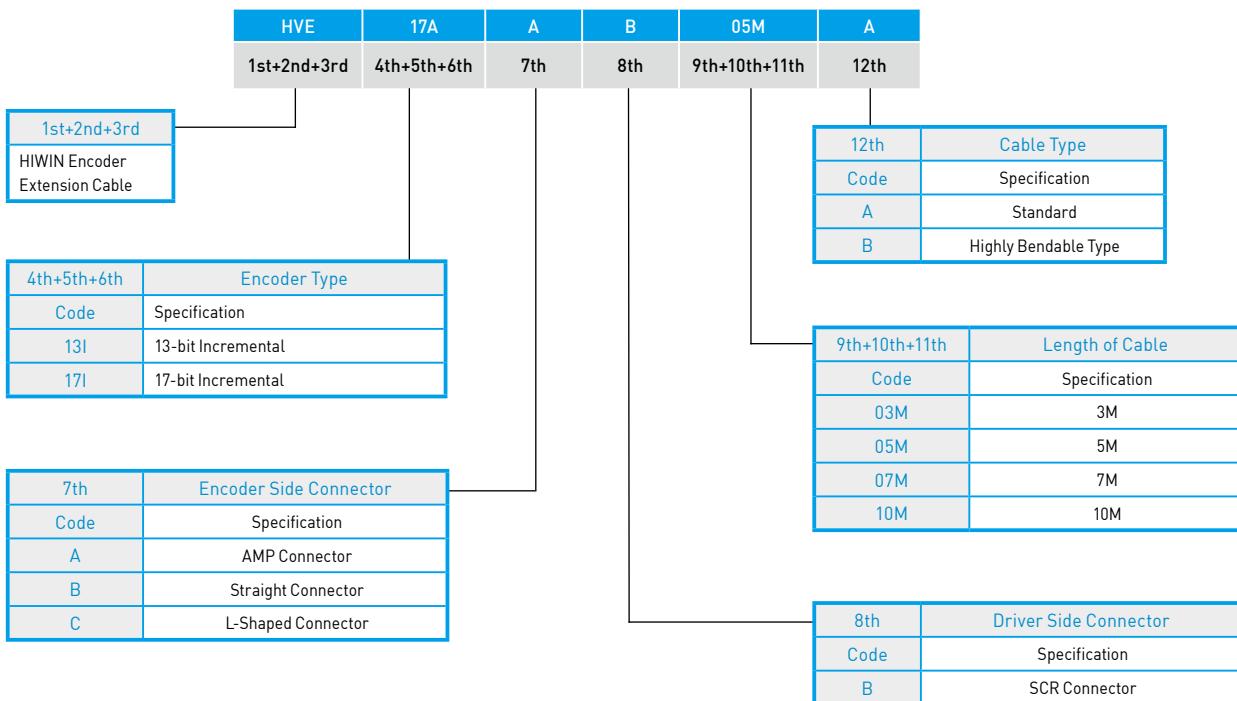
### Servo motor



## Motor cable & Brake cable

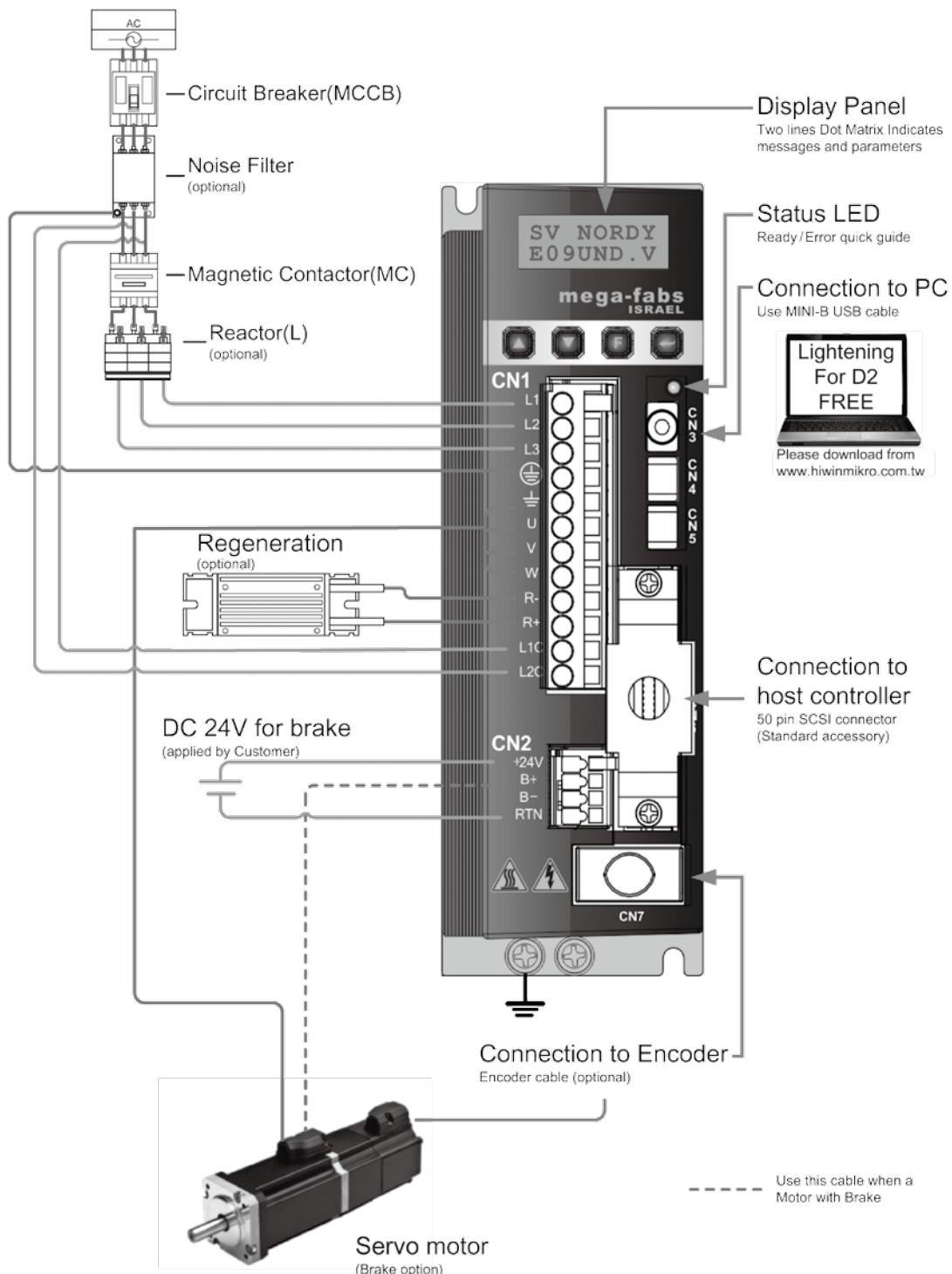


## Encoder cable



## 7.5 Wiring layout

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



## 7.6 Part Numbers and Options

### AC50W~AC750W-13bit Incremental

Motor				Drive			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	
<b>Low Inertia</b>	FRLS	single phase/ 3phase 220V	50	FRLS05205A4△	D2-0123-S-A0	Frame A	Approx. 0.4kVA
				FRLS052B5A4△			
			100	FRLS10205A4△			
				FRLS102B5A4△			
			200	FRLS2020506△	D2-0423-S-B0	Frame B	Approx. 0.9kVA
				FRLS202B506△			
			400	FRLS4020506△			
				FRLS402B506△			
			750	FRMS7520508△	D2-1023-S-C0	Frame C	Approx. 1.8kVA
				FRMS752B508△			

(Note 1) △ : 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 drive 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-EMC3	D2-EMC2	050100700001

#### ◆ 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				Drive			Power capacity (Rated load)	
Motor Series		Power supply	Output (W)	Part No. (Note 1)	Part No. (Full function type)	Part No. (Pulse type Only)		
Middle Inertia	FRMM	single phase/ 3phase 220V	1000	FRMM1K20513△	D2-1023-S-C0	D2-1023-P-C0	Frame C	Approx. 1.8kVA
				FRMM1K2B513△				

(Note 1) △ : 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

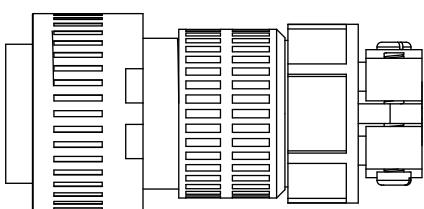
12th	Cable Type
Code	Specification
A	Standard
B	Highly Bendable Type

Cable Length

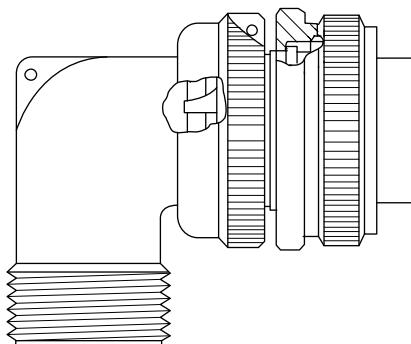
9th+10th+11th	Length of Cable
Code	Specification
03M	3M
05M	5M
07M	7M
10M	10M

### ◆ Motor Side Connector

- Straight Type

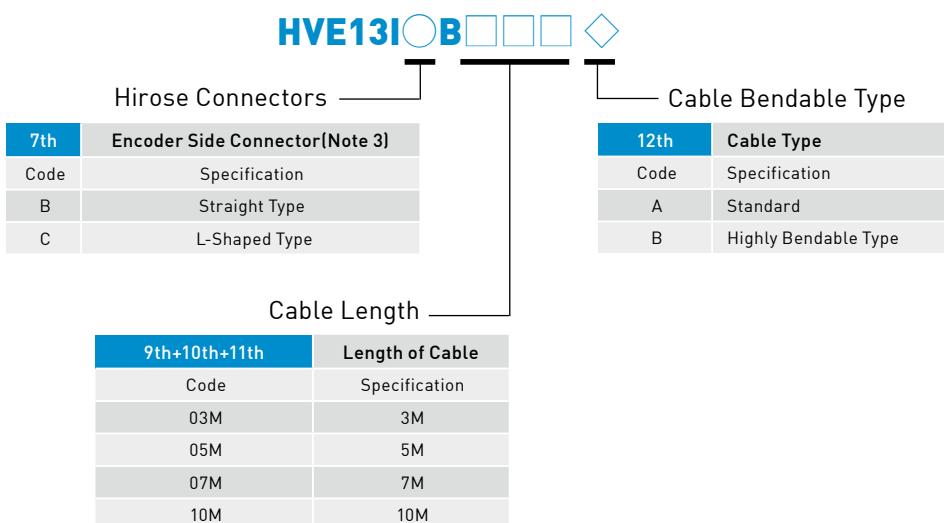


- L-Shaped Type



Optional parts						
Motor cable(Note 2)		Encoder cable	D2 drive 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

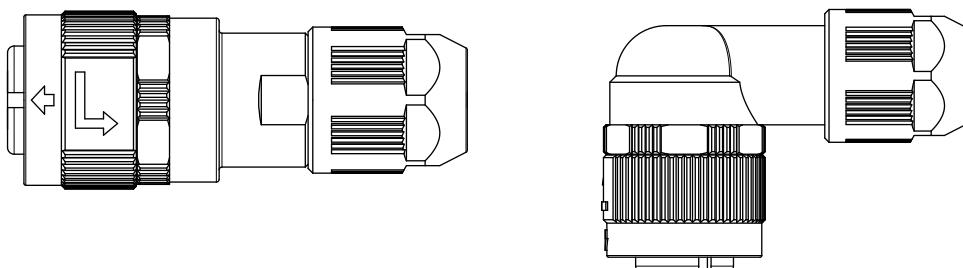
### ◆ Encoder Cable(13bit-Incremental)



### ◆ Encoder Side Connector

● Straight Type

● L-Shaped Type



# AC50W~AC750W-17bit Incremental

Motor				Drive			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		
<b>Low Inertia</b>	FRLS	single phase/ 3phase 220V	50	FRLS05203A4△ FRLS052B3A4△	D2-0123-S-A4	D2-0123-P-A4	Frame A	Approx. 0.4kVA
			100	FRLS10203A4△ FRLS102B3A4△				
			200	FRLS2020306△ FRLS202B306△				
			400	FRLS4020306△ FRLS402B306△				
			750	FRMS7520308△ FRMS752B308△	D2-1023-S-C4	D2-1023-P-C4	Frame C	Approx. 1.8kVA
<b>Middle Inertia</b>	FRMS							

(Note 1) △ : 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 drive 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

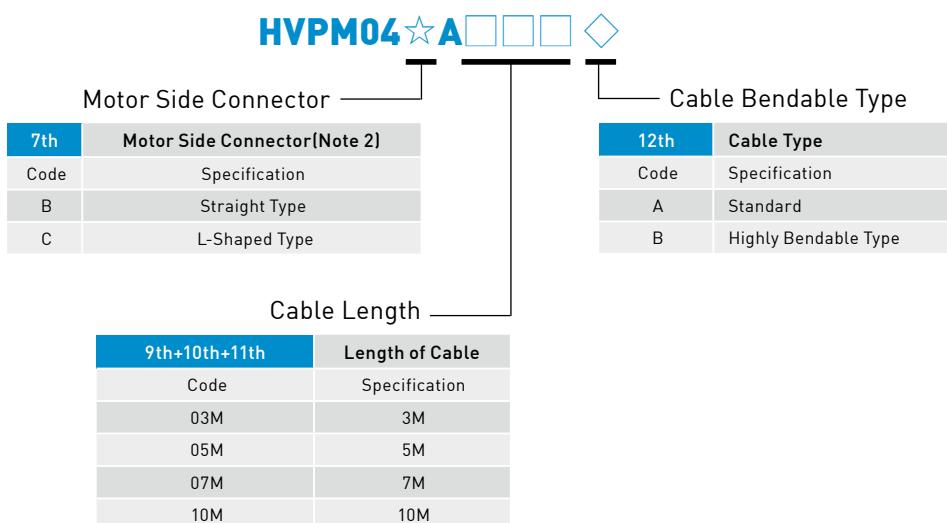
## AC1KW-17bit Incremental

Motor				Drive			Power capacity (Rated load)	
Motor Series		Power supply	Output (W)	Part No. (Note 1)	Part No. (Full function type)	Part No. (Pulse type Only)		
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]

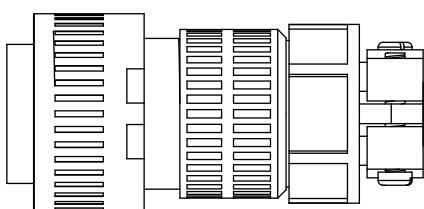
(Note 3) : EMC pack model [please refer to p.150]

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

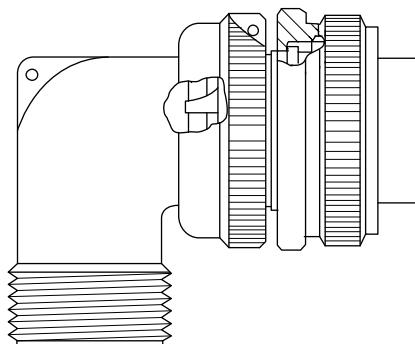


#### ◆ Motor Side Connector

- Straight Type

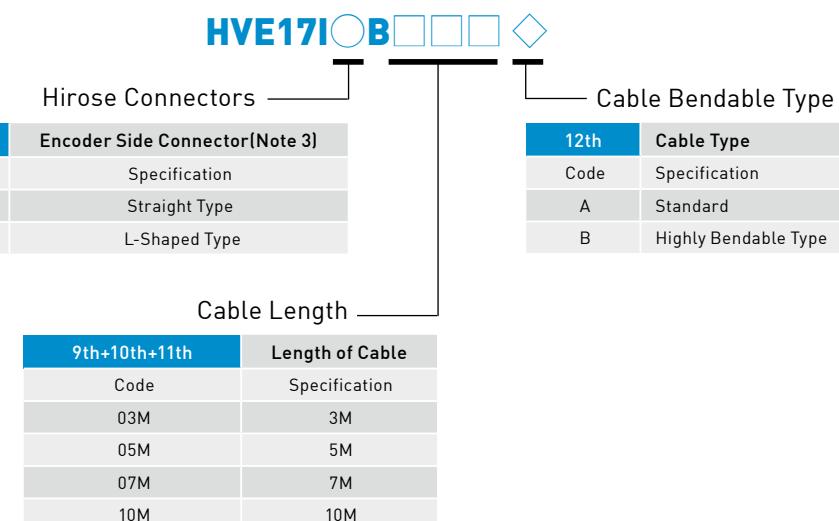


- L-Shaped Type



Optional parts							
Motor cable(Note 2)		Encoder cable	D2 drive 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	

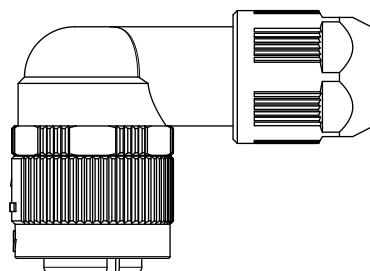
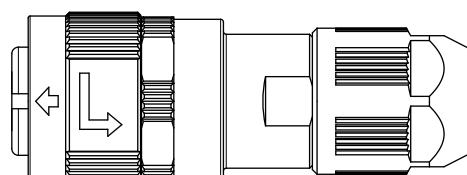
### ◆ Encoder Cable(17bit-Incremental)



### ◆ Encoder Side Connector

● Straight Type

● L-Shaped Type



## 7.7 Servo Drive

### 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						
Encoder feedback		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	<b>Control input</b>		(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.
	<b>Control output</b>		(1)Servo Ready, (2)Errors, (3)In-Position, (4)Zero Speed Detected etc.
	<b>Pulse input</b>	<b>Max. command pulse frequency</b>	Dedicated interface for Photo-coupler(single end input): 500kpps Dedicated interface for line driver(differential input): 4Mpps(16M cnt/s with AqB)
		<b>Input pulse signal format</b>	(1) Pulse and Direction, (2) Pulse Up/Pulse Down(3) Quadrature(AqB)
		<b>Electronic gear (Division/ Multiplication of command pulse)</b>	Gear ratio: pulses/counts pulses: 1~2147483647, counts: 1~2147483647
		<b>Smoothing filter</b>	Smooth factor : 1~500 [0: no smoothing filter]
	<b>Vibration suppression filter(VSF)</b>		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	<b>Control input</b>		(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.
	<b>Control output</b>		(1)Servo Ready, (2)Errors, (3)In-Velocity, (4)Zero Speed Detected etc.
	<b>PWM input</b>	<b>Velocity command input</b>	Speed command input can be provided by means of duty cycle of PWM input. Parameter are used for scale setting and command polarity.
	<b>Analog Input</b>	<b>Velocity command input</b>	Speed command input can be provided by means of analog voltage. Parameter are used for scale setting and command polarity.
	<b>Zero speed clamp</b>		Zero speed clamp input is possible.
Torque control	<b>Control input</b>		(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.
	<b>Control output</b>		(1)Servo Ready, (2)Errors, (3)In-Velocity, (4)Zero Speed Detected etc.
	<b>PWM input</b>	<b>Torque command input</b>	Torque command input can be provided by means of duty cycle of PWM input. Parameter are used for scale setting and command polarity.
	<b>Analog Input</b>	<b>Torque command input</b>	Torque command input can be provided by means of analog voltage. Parameter are used for scale setting and command polarity.
	<b>Speed limit function</b>		Speed limit value with parameter is possible
Common	<b>Auto tune</b>		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.
	<b>Emulated encoder feedback output</b>		Set up of any value is possible (frequency up to 18M cnt/s)
	<b>Protective function</b>		(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
	<b>Error log</b>		Errors and warnings are saved in non-volatile memory
	<b>Error Mapping</b>		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
	<b>Others</b>		Friction compensation, Backlash compensation

## 7.7.2 Basic specifications for pulse type

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

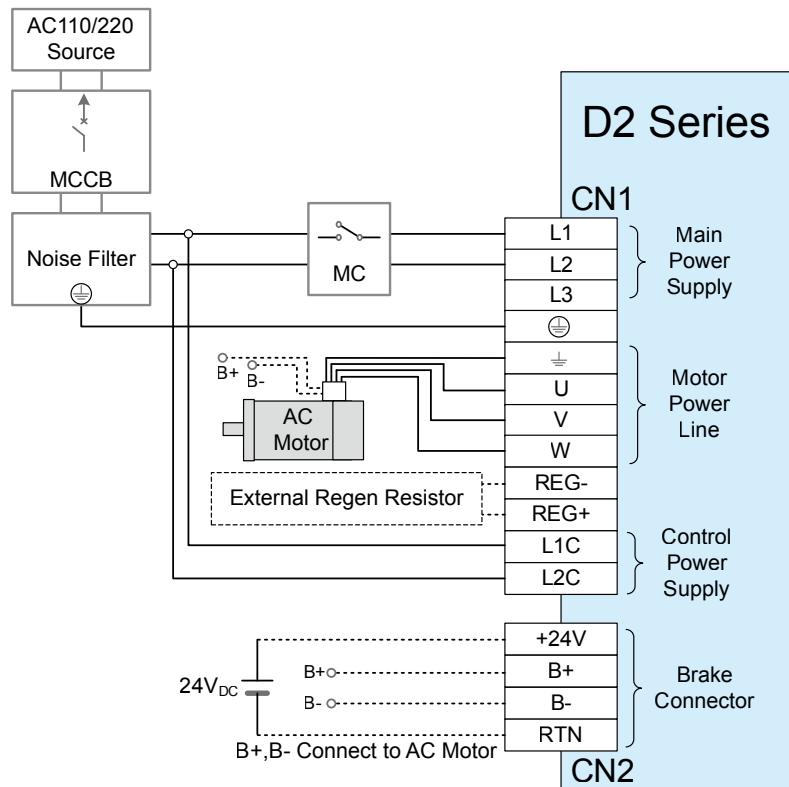
## Functions

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.
	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
Common	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

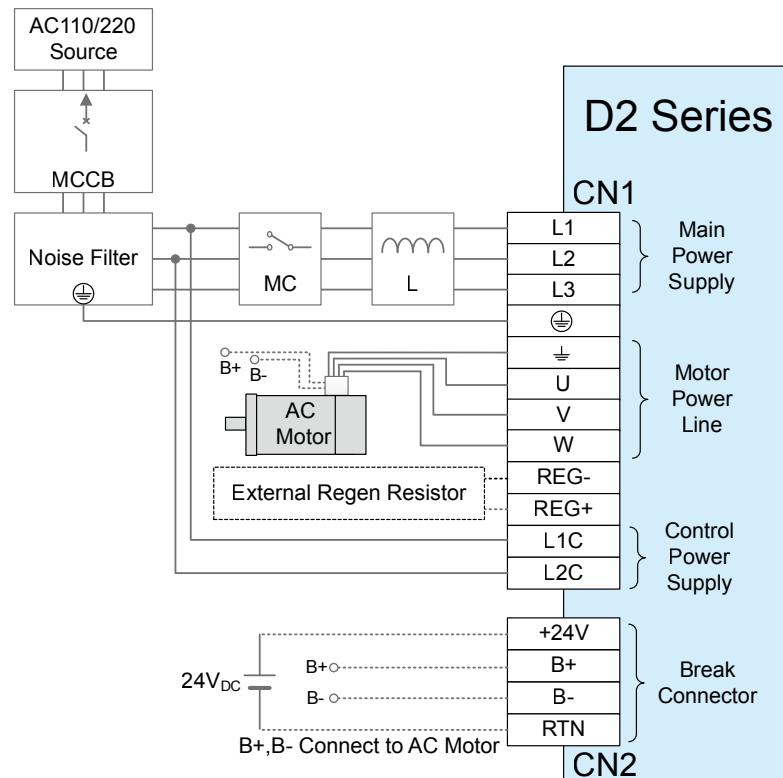
Wiring to Connector CN1 and CN2

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



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

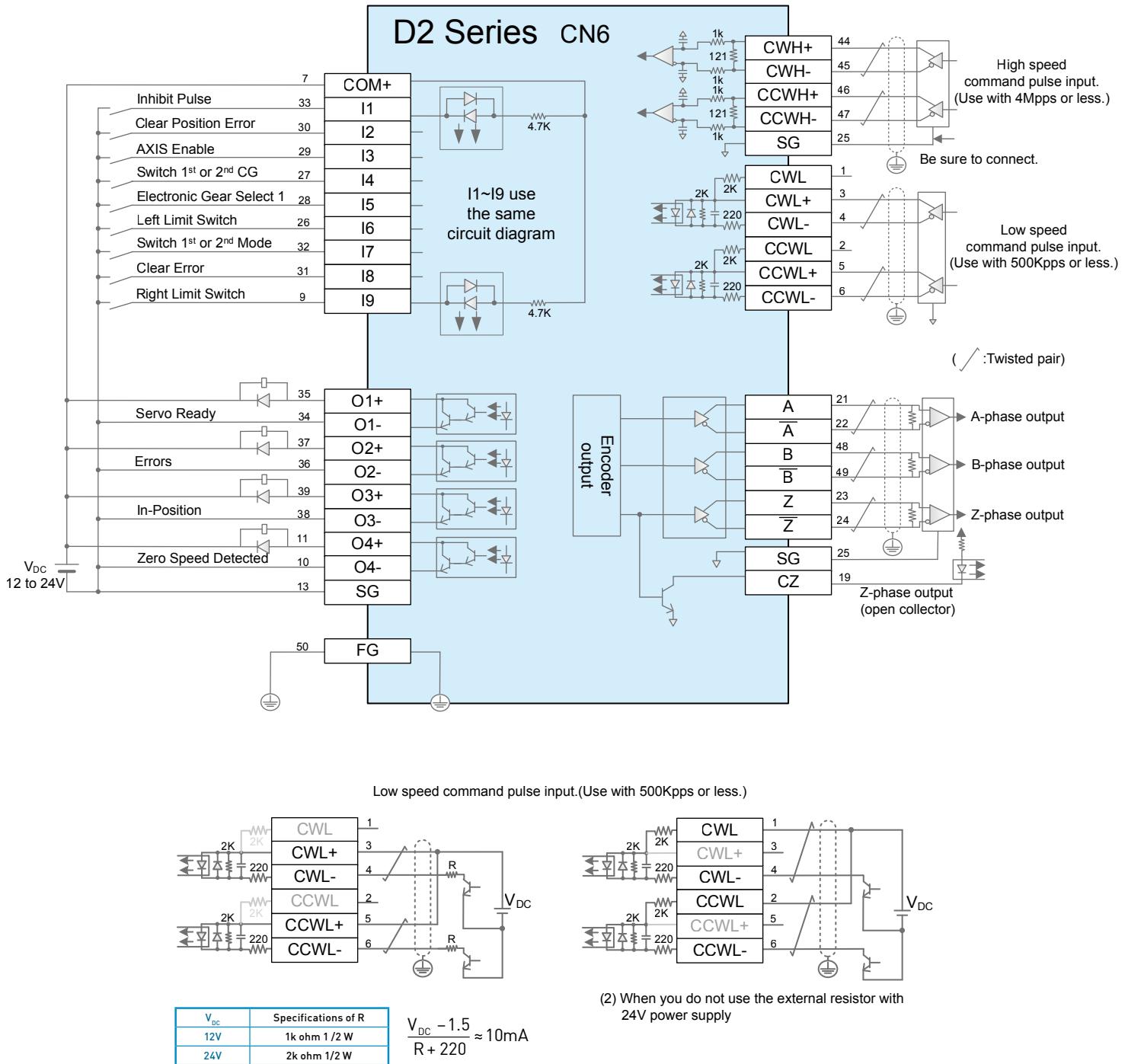
B. Three-phase(Brake without relay, using HIWIN motor)



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

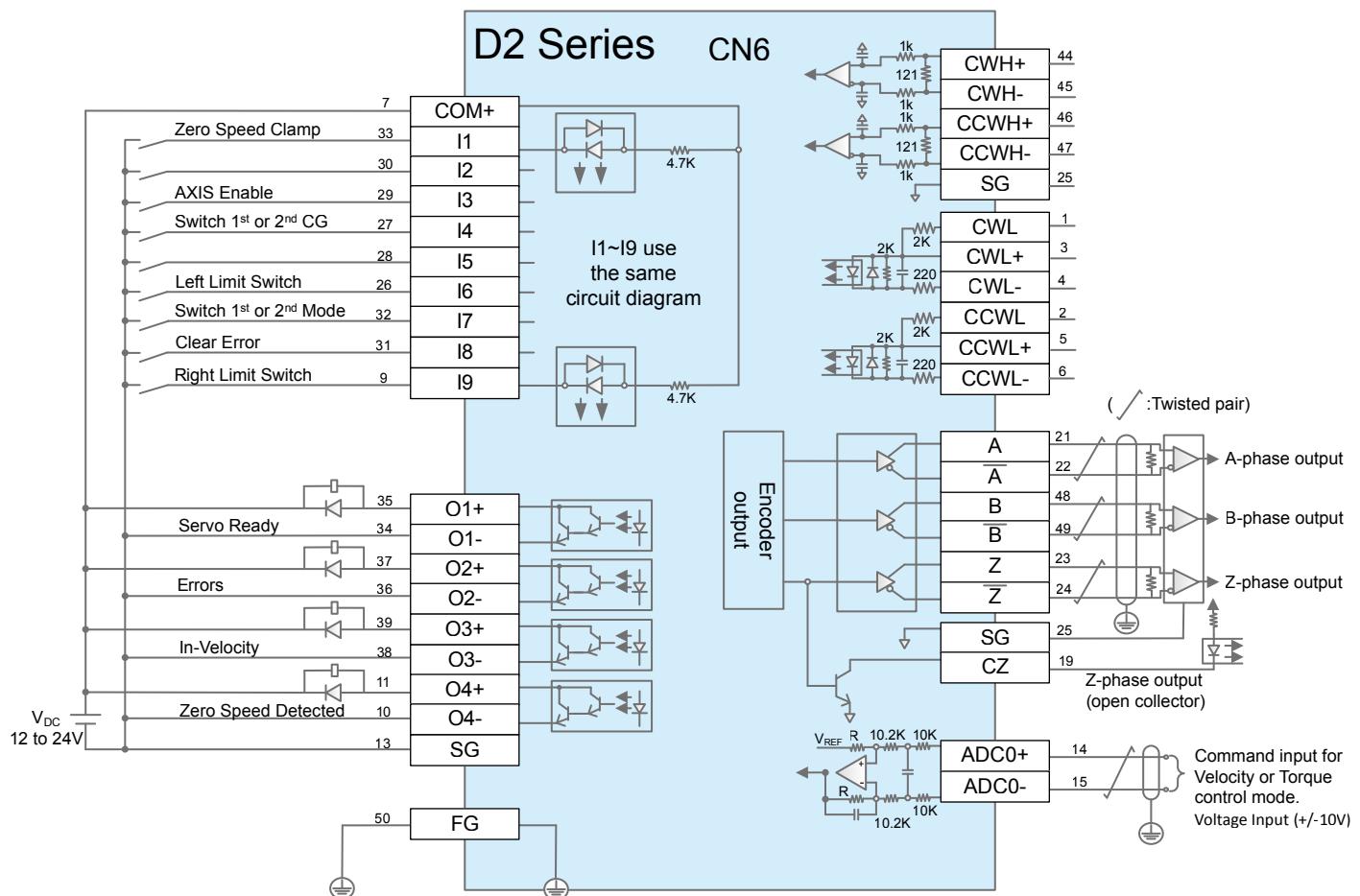
## 7.7.3 Control circuit

### A. Wiring Example of Position Control Mode



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

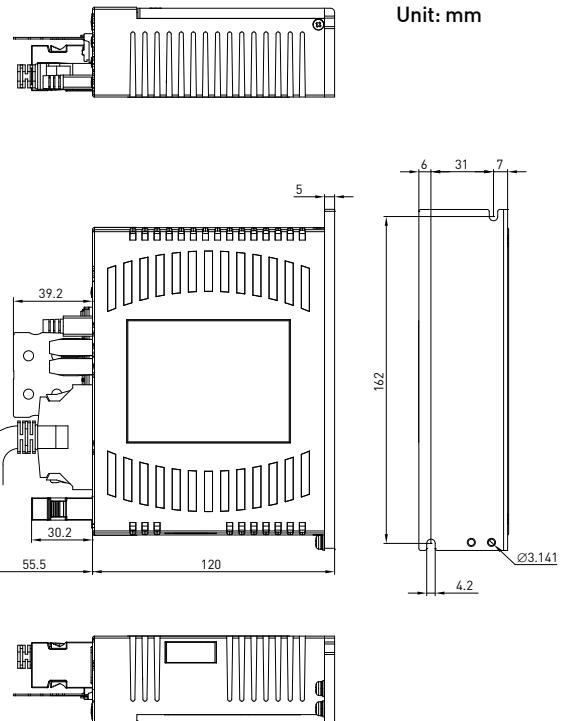
B. Wiring Example of Velocity/Torque Control Mode



## 7.7.4 Dimensions of drive

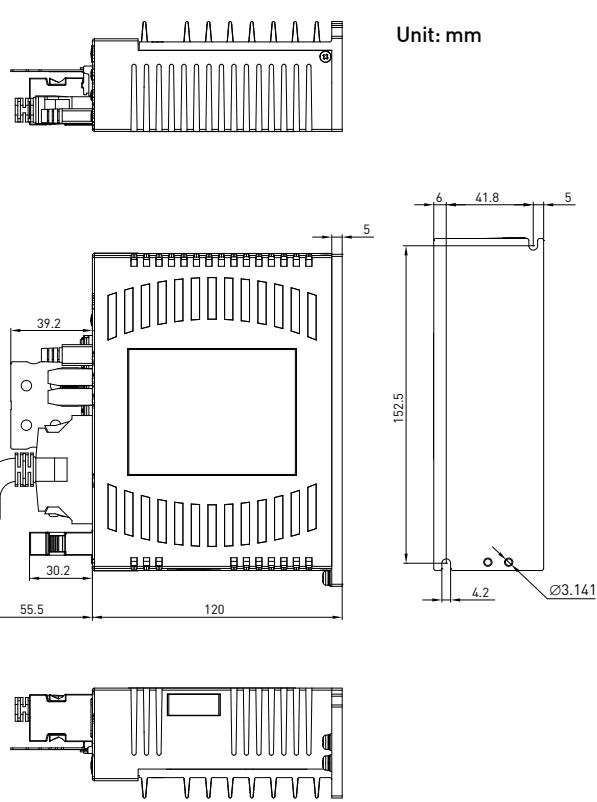
### ● Frame A

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

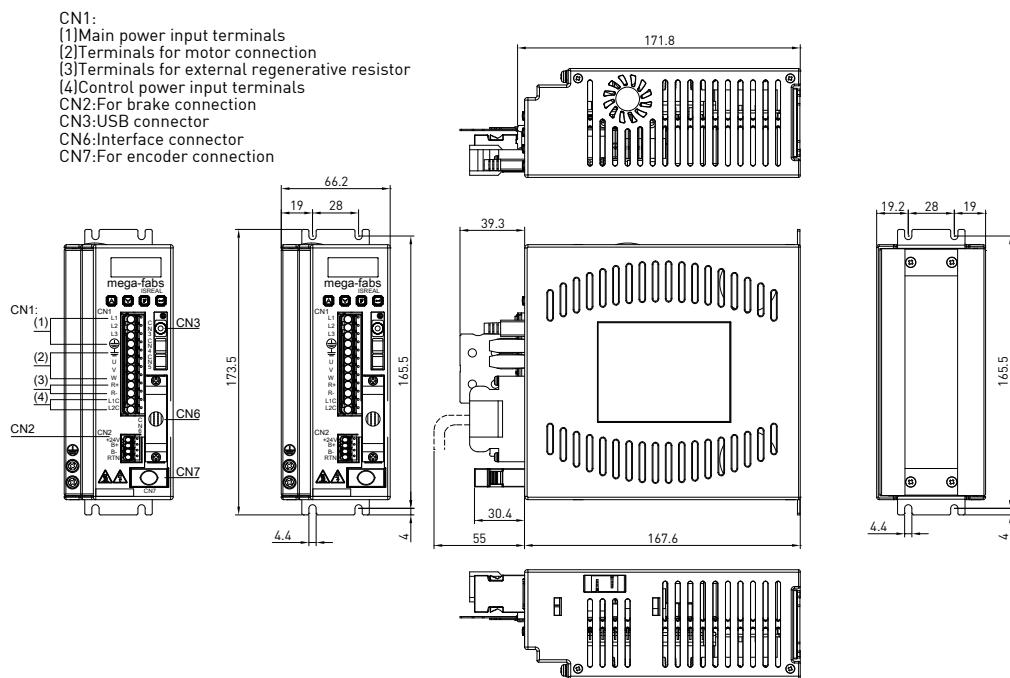


### ● Frame B

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



## 7.7.5 Accessory composition

### Connector Kit

Part Name	Model	Description	Quantity
D2 drive 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
Low Inertia	FRLS					13-bit	17-bit		
		220V	50W	3000 4500	◎	◎	IP54/IP65	Ambient Temperature: 0°C~40°C	
		220V	100W	3000 4500	◎	◎		Storage Temperature: -15°C~70°C	
		220V	200W	3000 4500	◎	◎		Ambient Humidity: 80% RH down	
		220V	400W	3000 4500	◎	◎		Storage Humidity: 80% RH down	
Middle Inertia	FRMS		220V	750W	3000 4500	◎	◎	IP54/IP65	Storage Environment: Indoor & keep off Causticity gas, Inflammable gas, oil and dust
	FRMM		220V	1000W	2000 3000	◎	◎		Elevation: 1000m down
									Vibration Resistance: 49m/s <sup>2</sup> down

## 7.8 Servo Motor

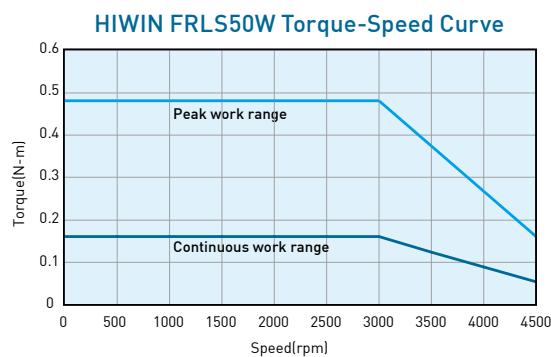
### 7.8.1 Model of AC Servo motor

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

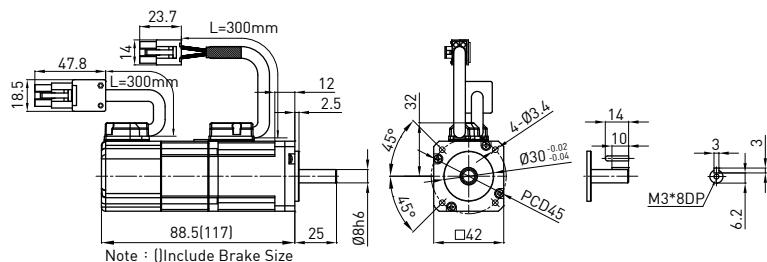
- Specifications

Parameter	Symbol	Unit	FRLS052□□A4□
Drive Input Voltage	V	V	AC220
Rated Power	W	W	50
Rated Torque	T <sub>c</sub>	N.m	0.16
Rated Current	I <sub>c</sub>	A(rms)	0.9
Peak Max. Torque	T <sub>p</sub>	N.m	0.48
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	0.178
Back EMF Constant	K <sub>e</sub>	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·m <sup>2</sup> ( $\times 10^{-4}$ )	0.02(0.022)
Weight(with brake)	M	kg	0.45(0.58)
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

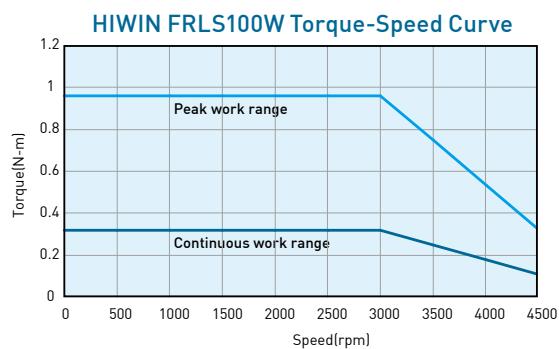


## AC 100W (Low inertia, Small capacity)

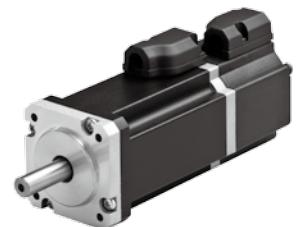
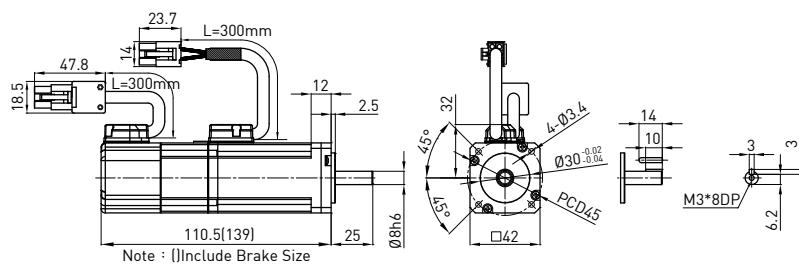
### ● Specifications

Parameter	Symbol	Unit	FRLS102□□A4□
Drive 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>	Vrms / 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> ( $\times 10^{-4}$ )	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

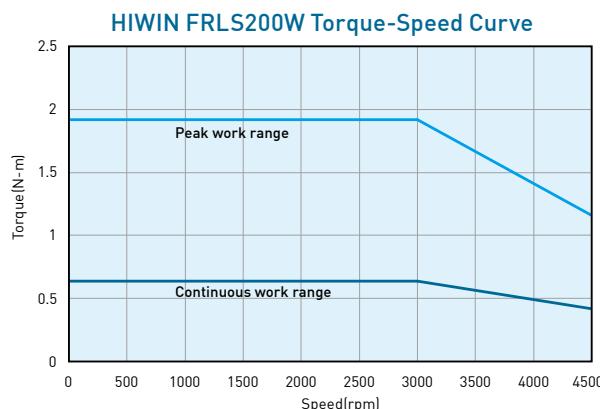


## AC 200W (Low inertia, Small capacity)

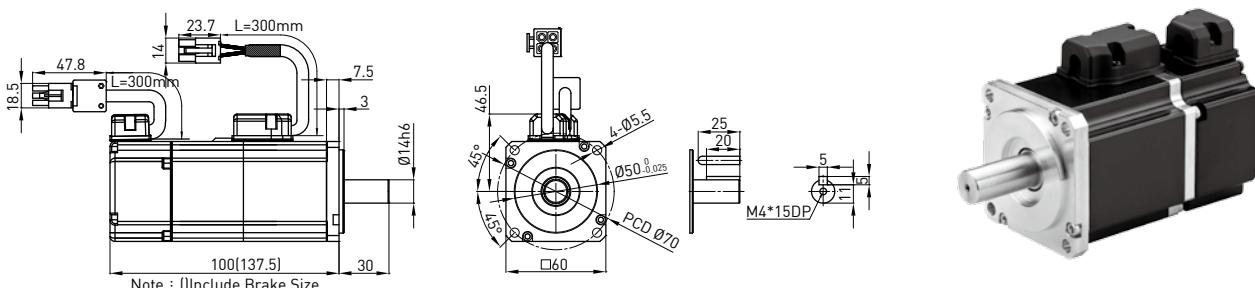
### ● Specifications

Parameter	Symbol	Unit	FRLS202□□06□
Drive Input Voltage	V	V	AC220
Rated Power	W	W	200
Rated Torque	T <sub>c</sub>	N.m	0.64
Rated Current	I <sub>c</sub>	A(rms)	1.7
Peak Max. Torque	T <sub>p</sub>	N.m	1.92
Peak Max. Current	I <sub>p</sub>	A(rms)	5.1
Rated Speed	$\omega_c$	rpm	3000
No Load Max. Speed	$\omega_p$	rpm	4500
Torque Constant	K <sub>t</sub>	N.m / Arms	0.43
Back EMF Constant	K <sub>e</sub>	Vrms / k rpm	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	T <sub>b</sub>	N.m	1.3
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

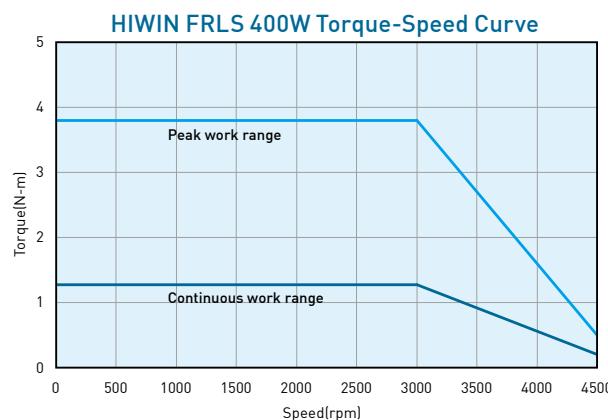


## AC 400W (Low inertia, Small capacity)

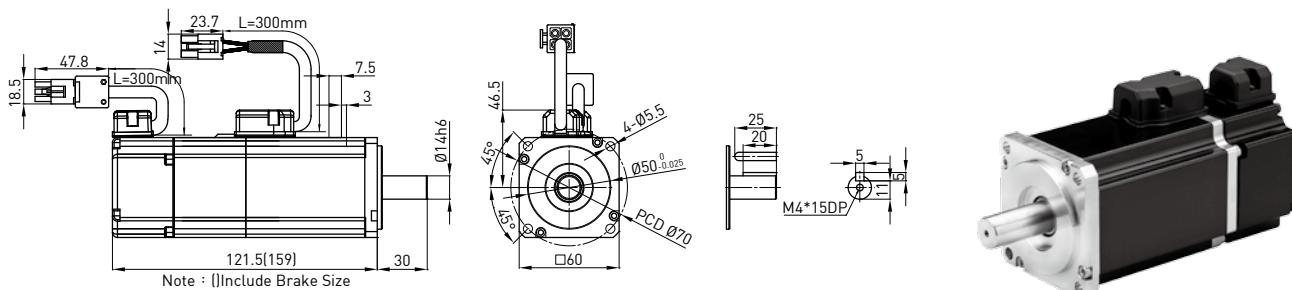
### ● Specifications

Parameter	Symbol	Unit	FRLS402□□06□
Drive Input Voltage	V	V	AC220
Rated Power	W	W	400
Rated Torque	T <sub>c</sub>	N.m	1.27
Rated Current	I <sub>c</sub>	A(rms)	2.5
Peak Max. Torque	T <sub>p</sub>	N.m	3.81
Peak Max. Current	I <sub>p</sub>	A(rms)	7.5
Rated Speed	ω <sub>c</sub>	rpm	3000
No Load Max. Speed	ω <sub>p</sub>	rpm	4500
Torque Constant	K <sub>t</sub>	N.m / Arms	0.53
Back EMF Constant	K <sub>e</sub>	Vrms / k rpm	31.9
Resistance (line to line)	R	Ω	3.5
Inductance (line to line)	L	mH	13
Inertia of Rotating Parts (with brake)	J	kg·m <sup>2</sup> [×10 <sup>-4</sup> ]	0.27[0.31]
Weight (with brake)	M	kg	1.31[1.86]
Brake Keep Torque	T <sub>b</sub>	N.m	1.3
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

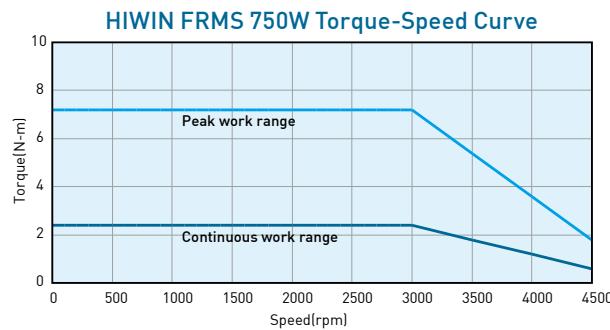


## AC 750W (Middle inertia, Small capacity)

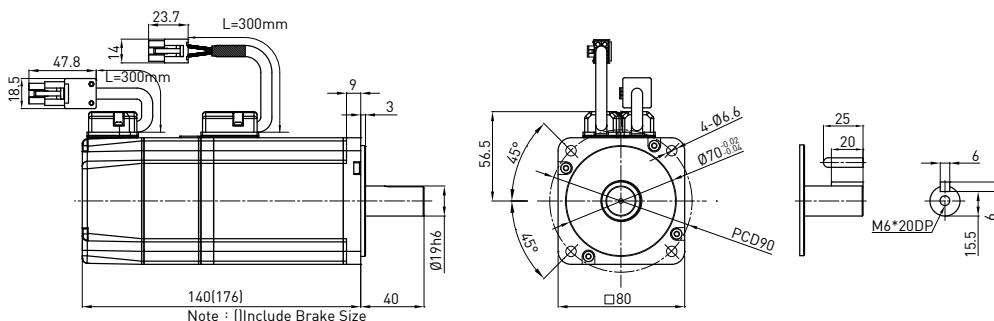
### ● Specifications

	Symbol	Unit	FRMS752□□08□
Drive Input Voltage	V	V	AC220
Rated Power	W	W	750
Rated Torque	T <sub>c</sub>	N.m	2.4
Rated Current	I <sub>c</sub>	A(rms)	5.1
Peak Max. Torque	T <sub>p</sub>	N.m	7.2
Peak Max. Current	I <sub>p</sub>	A(rms)	15.3
Rated Speed	$\omega_c$	rpm	3000
No Load Max. Speed	$\omega_p$	rpm	4500
Torque Constant	K <sub>t</sub>	N.m / Arms	0.47
Back EMF Constant	K <sub>e</sub>	Vrms / k rpm	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> ( $\times 10^{-4}$ )	1.41(1.46)
Weight (with brake)	M	kg	2.66(3.32)
Brake Keep Torque	T <sub>b</sub>	N.m	2.4
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

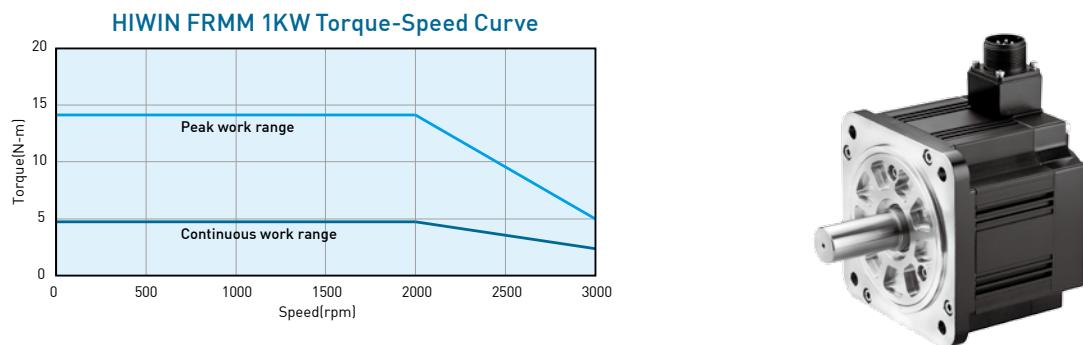


## AC 1KW (Middle inertia, Middle capacity)

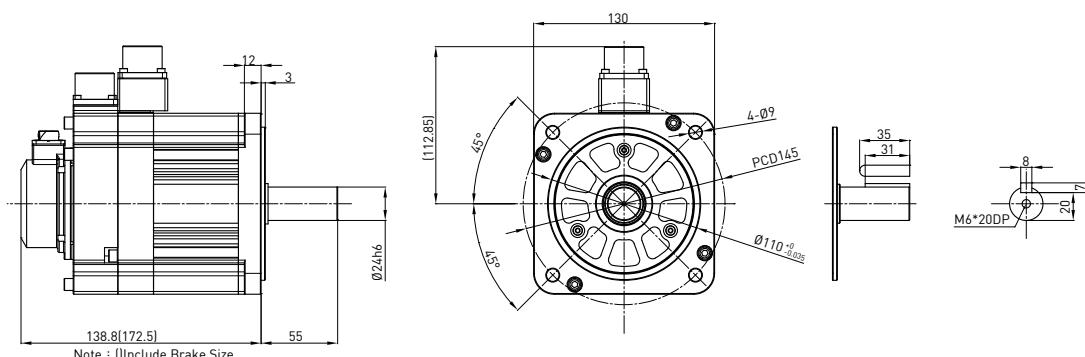
### ● Specifications

	Symbol	Unit	FRMM1K2□□13□
Drive Input Voltage	V	V	AC220
Rated Power	W	W	1000
Rated Torque	T <sub>c</sub>	N.m	4.77
Rated Current	I <sub>c</sub>	A(rms)	5.1
Peak Max. Torque	T <sub>p</sub>	N.m	14.3
Peak Max. Current	I <sub>p</sub>	A(rms)	15.3
Rated Speed	ω <sub>c</sub>	rpm	2000
No Load Max. Speed	ω <sub>p</sub>	rpm	3000
Torque Constant	K <sub>t</sub>	N.m / Arms	0.94
Back EMF Constant	K <sub>e</sub>	V <sub>rms</sub> / k rpm	54.7
Resistance (line to line)	R	Ω	0.81
Inductance (line to line)	L	mH	8
Inertia of Rotating Parts (with brake)	J	kg·m <sup>2</sup> [×10 <sup>-4</sup> ]	7.6(8.7)
Weight (with brake)	M	kg	5.4(6.2)
Brake Keep Torque	T <sub>b</sub>	N.m	10
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



## 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

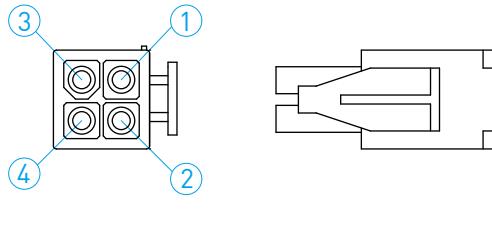
### 7.8.3.1 Motor Power Connector

#### ● Small Capacity Series(AC50W~AC750W)

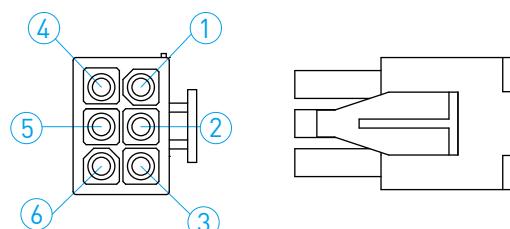
Signal	Color	AMP-172167-1 (without brake)	AMP-172168-1 (with brake)
U	Red	3	3
V	White	2	2
W	Black	1	1
GND	Green	4	4
B+	Black	--	5
B-	White	--	6

Connector Pin Position Definition{without brake & with brake}

AMP-172167-1(without brake)



AMP-172168-1(with brake)

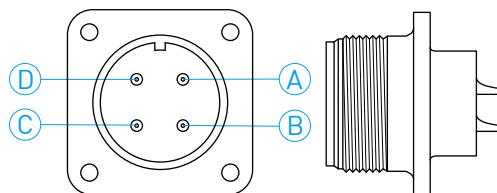


#### ● Middle Capacity Series(AC1KW)

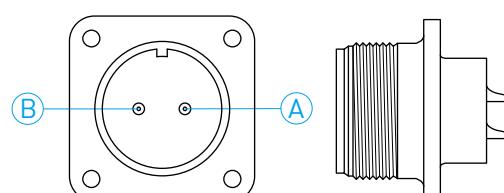
Signal	Color	MS3102A18-10P	MS3102A14-9P
U	Red	A	--
V	White	B	--
W	Black	C	--
GND	Green	D	--
B+	Black	--	A
B-	Black	--	B

Connector Pin Position Definition{without brake & with brake}

MS3102A18-10P



MS3102A14-9P

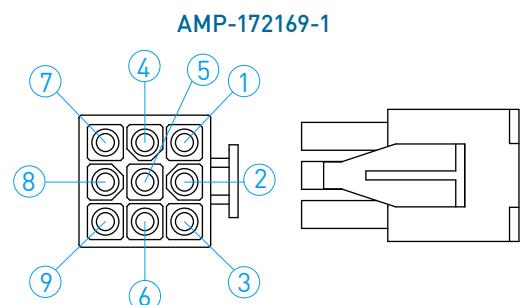


Note: When using the brake, two connectors must be used simultaneously.

### 7.8.3.2 Encoder Connector

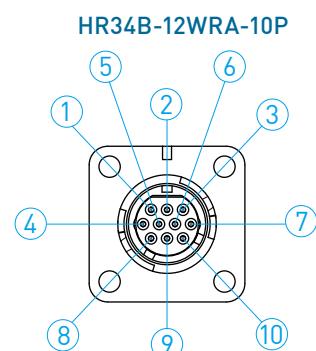
13-bit Incremental : AC50W~AC750W

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



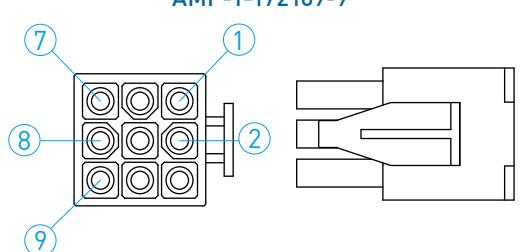
13-bit Incremental : AC1KW

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



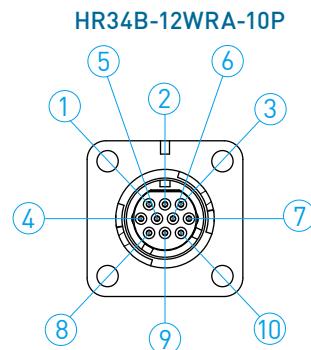
17-bit Incremental : AC50W~AC750W

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



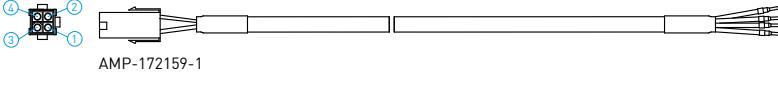
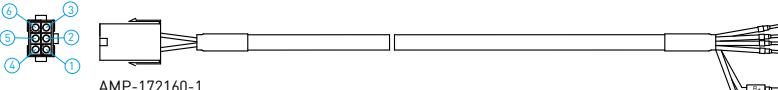
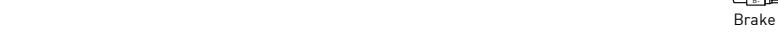
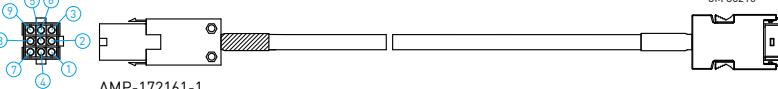
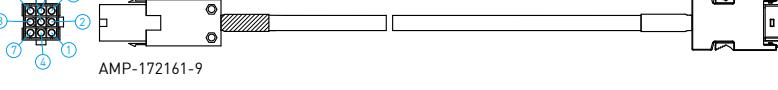
17-bit Incremental : AC50W~AC750W

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

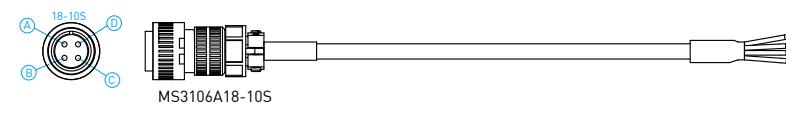
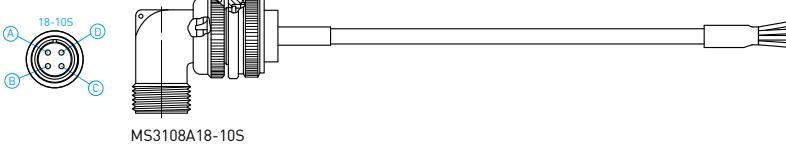
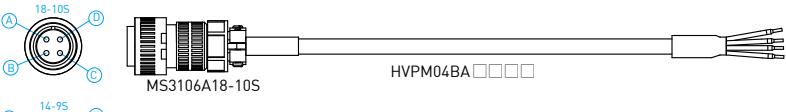
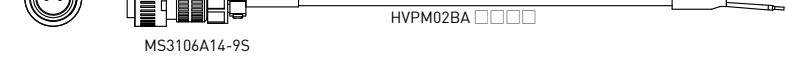
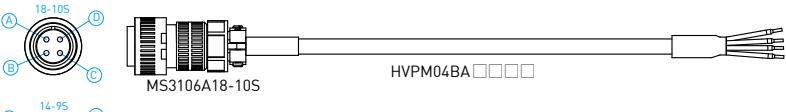
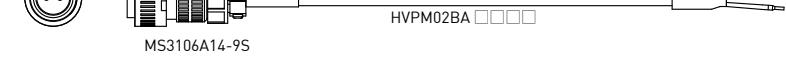
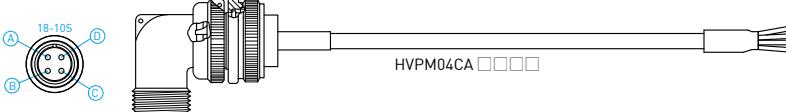
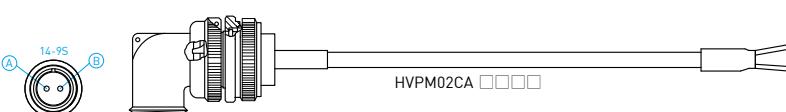
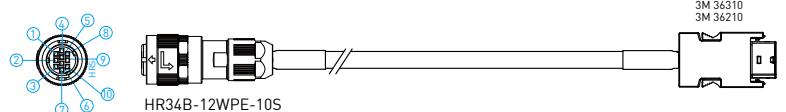
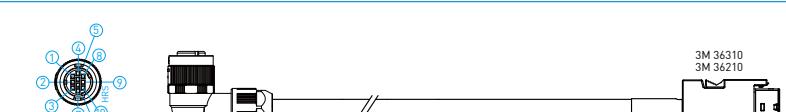
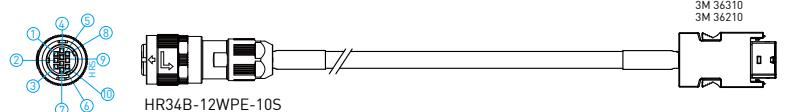
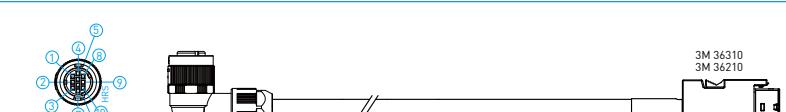


## 7.8.4 AC Servo Motor Accessories

### Small Capacity

Name	Type	Connect	Description
AC Servo Motor	HVPS04AA□□□A	CN1	
Power Cable	HVPS04AA□□□B (highly bendable)		
AC Servo Motor	HVPS06AA□□□A	CN1	
Power Cable (Brake)	HVPS06AA□□□B (highly bendable)		
AC Servo Motor	HVE13IAA□□□A	CN7	
Encoder Cable (13bit-Incremental)	HVE13IAA□□□B (highly bendable)		
AC Servo Motor	HVE17IAA□□□A	CN7	
Encoder Cable (17bit-Incremental)	HVE17IAA□□□B (highly bendable)		

## Middle Capacity

Name	Type	Connect	Description
AC Servo Motor	HVPM04BA□□□A	CN1	
	HVPM04BA□□□B (Highly Bendable)		
Power Cable	HVPM04CA□□□A	CN1	
	HVPM04CA□□□B (Highly Bendable)		
AC Servo Motor	HVPM06BA□□□A	CN1	
	HVPM06BA□□□B (Highly Bendable)		
Power Cable (with brake)	HVPM06CA□□□A	CN1	
	HVPM06CA□□□B (Highly Bendable)		
AC Servo Motor	HVE13IBA□□□A	CN7	
	HVE13IBA□□□B (Highly Bendable)		
Encoder Cable (13bit-Incremental)	HVE13ICA□□□A	CN7	
	HVE13ICA□□□B (Highly Bendable)		
AC Servo Motor	HVE17IBA□□□A	CN7	
	HVE17IBA□□□B (Highly Bendable)		
Encoder Cable (17bit-Incremental)	HVE17ICA□□□A	CN7	
	HVE17ICA□□□B (Highly Bendable)		

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

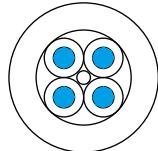
## Drive Cable

Name	Type	Connect	Description
Mini USB Cable	051700800366	CN3	
Interface Cable	HE00815AC200	CN6	

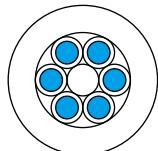
## 7.8.5 Power & Encoder External Cables

### 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)**

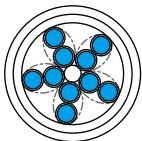
Items	HVPS04BA□□□A	HVPS04BA□□□B
Specification	UL2586(Rated Tem. :105°C) AWG14×4C	UL2586(Rated Tem. :105°C) AWG14×4C
Finished Dimensions	10.5 dia. mm	
Internal Configuration		
Standard Length	Cable Length:3m, 5m, 7m, 10m	

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

Items	HVPM04□A□□□A HVPM04□A□□□B	HVPS02□A□□□A HVPS02□A□□□B
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	

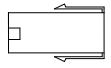
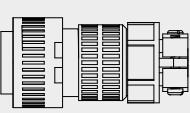
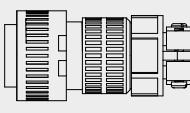
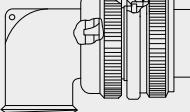
### 7.8.5.3 Highly Bendable Test

<b>Testing Conditions</b>	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
<b>Bending Life</b>	Number of bends(with weight)	3,000,000 cycles
	Number of bends(with no weight)	5,000,000 cycles
<b>Highly Bendable Test</b>		

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

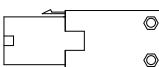
## 7.8.5.4 Selecting extension cables

### ● 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
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
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.

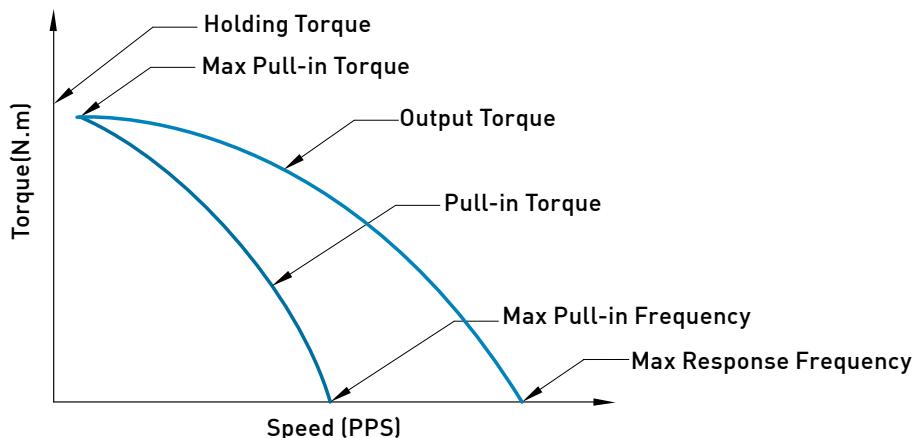
## 7.9 Step Motor

### Two Phase Step Motor

#### Step Motor Ordering Information

Product	Model	Phase/Shaf	Type	Step Angle	Voltage	Serial number
Brushless Motor	ST: Step Motor	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

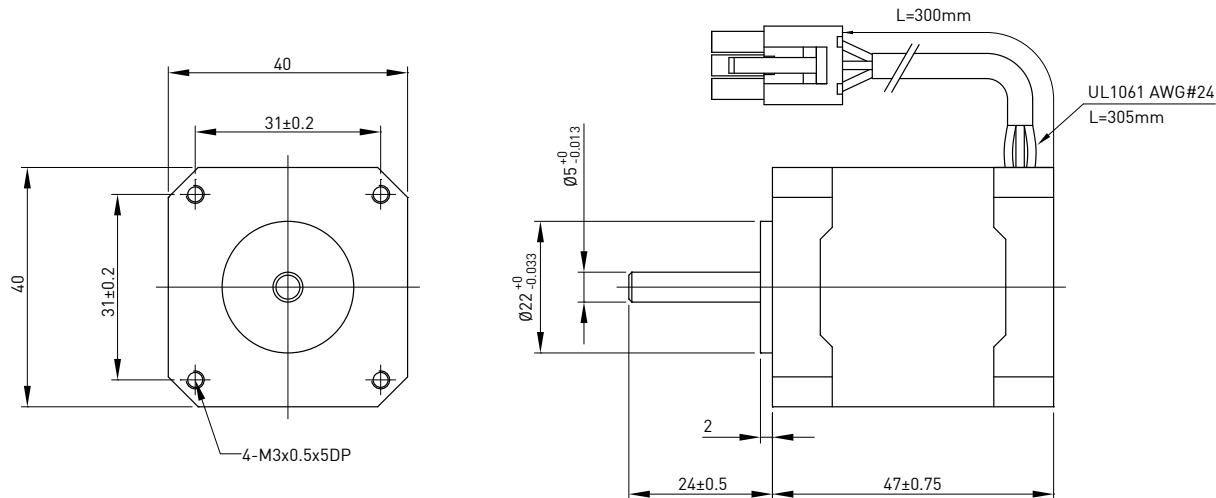
The frequency of motor that no output torque and motor can not start and stop immediately.

#### ● Holding Torque

Amount of torque that the motor produces when it has rated current flowing through the windings but the motor is at rest.

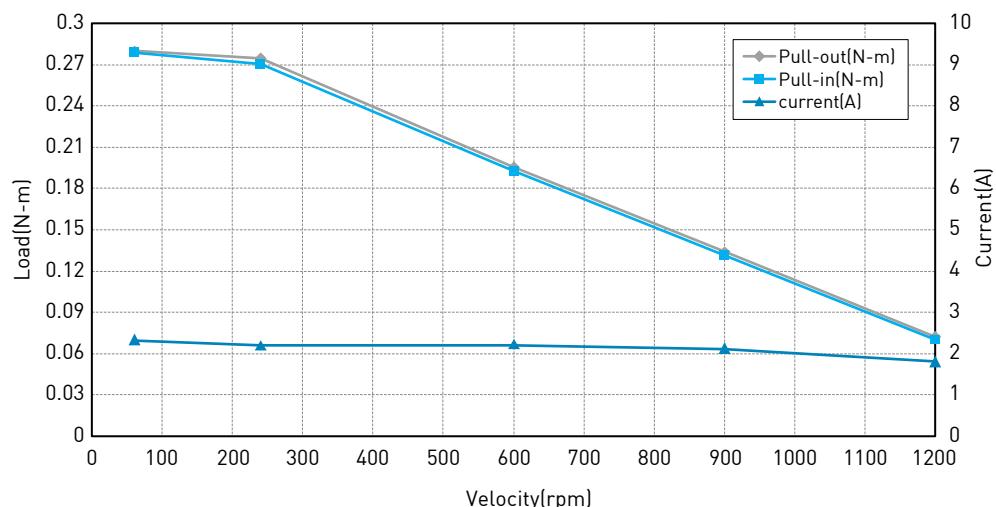
## 7.9.1 Model of Step Motor

**40mm Step Angle 1.8° ST40 Series**

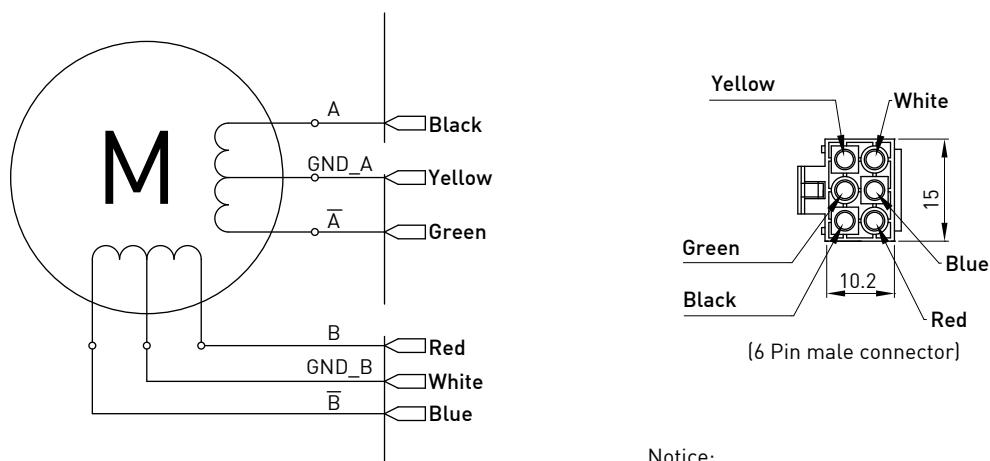


Model	Winding Type	Holding Torque	Current	Resistance	Inductance	Rotor Inertia	Leads	Motor Length	Input Voltage
Single axis		N.m	A/phase	Ω/phase	mH/phase	g-cm <sup>2</sup>	(L)mm	Vdc	
FRST01102401	Single Pole	0.27	0.95	3.3	3.5	19	6	47	4

### ● Torque- Speed Curve



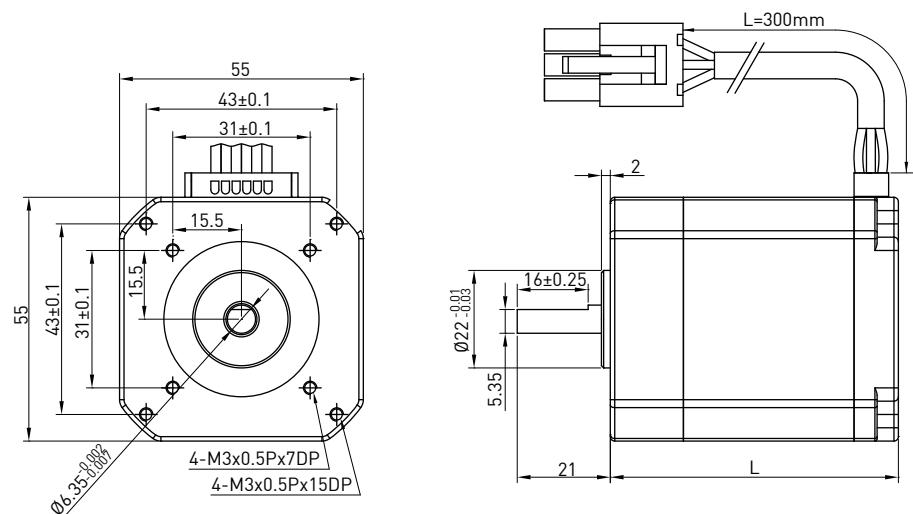
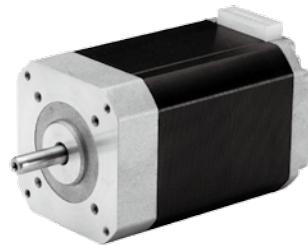
### ● Wiring Diagram



#### Notice:

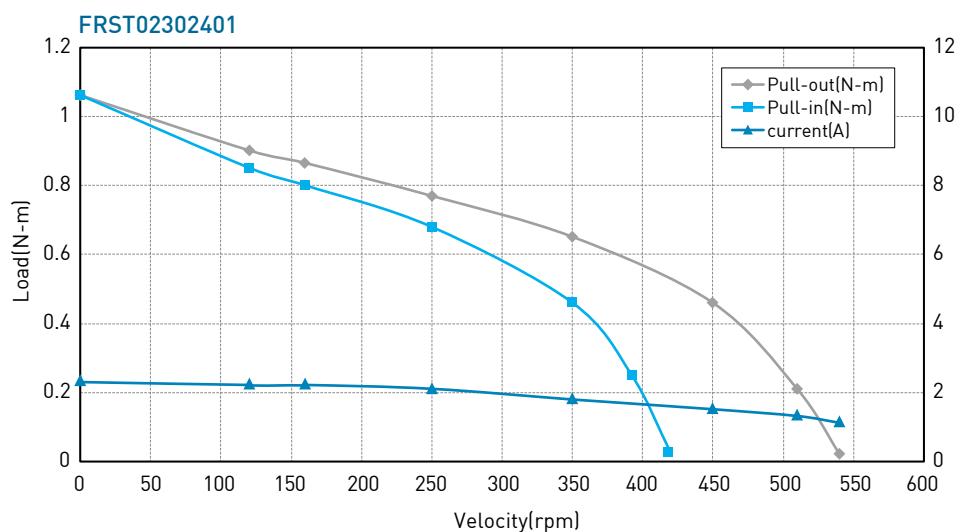
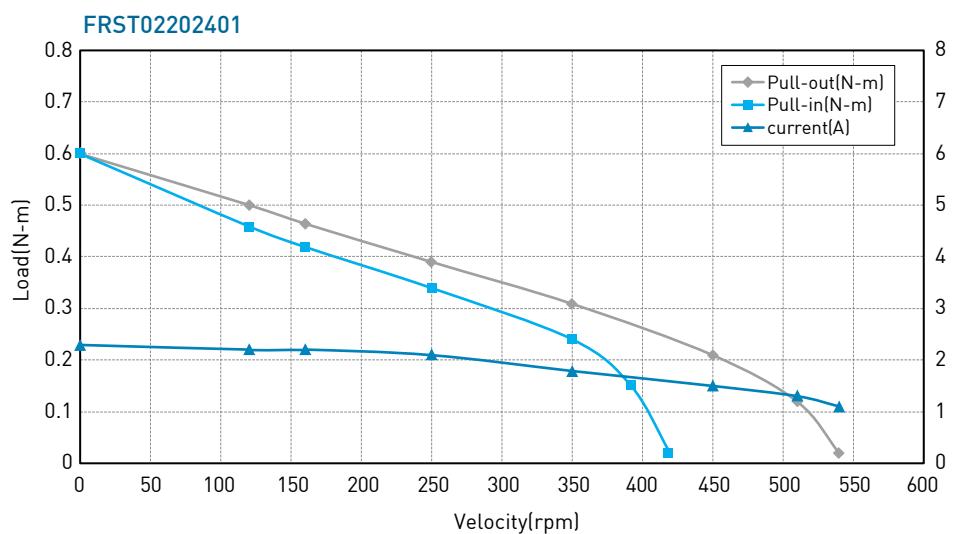
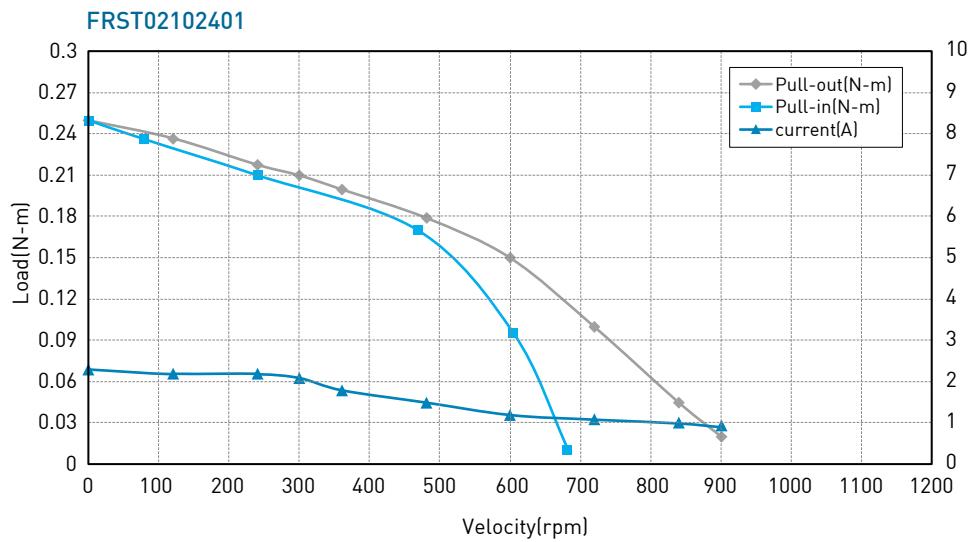
- ★ Please use the wire which is larger than  $0.5\text{mm}^2$  and as short as possible for power and motor connection.
- ★ Support 2 phase stepping motor (6 lead wire).

## 55mm Step Angle 1.8° ST55 Series

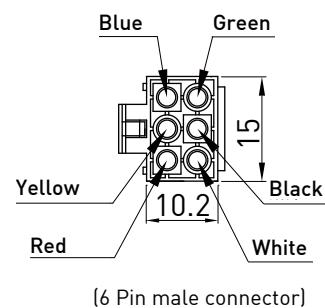
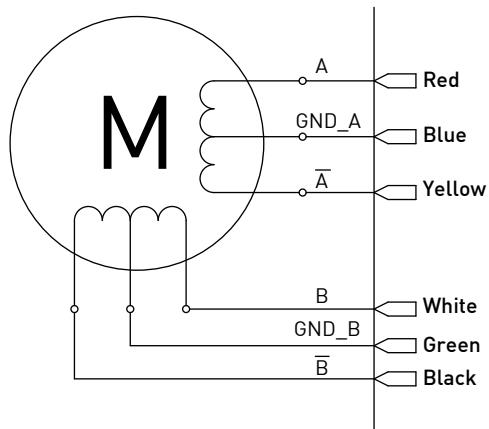


Model		Winding Type	Holding torque	Current	Resistance	Inductance	Rotor Inertia	Leads	Motor Length	Input Voltage	
Single axis	Double axis										
			N.m	A/phase	Ω/phase	mH/phase	g-m <sup>2</sup>				
FRST02102401	FRST12102401	Single Pole		0.25	1.3	2.8	3.3	90	6	50.5	3
FRST02202401	FRST12202401	Single 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 Drive (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

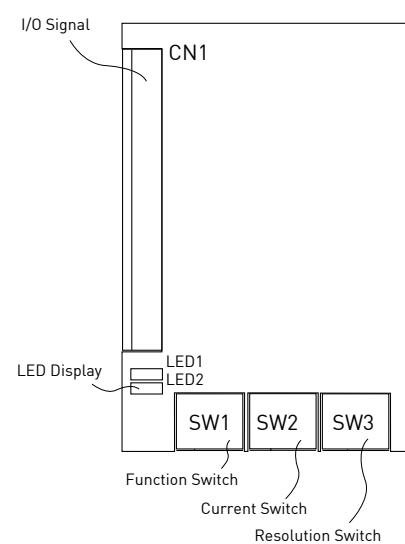
#### 1. LED State

- LED display

Display	Color	function
LED1	Red	Power light
LED2	Green	State light

- State light Information

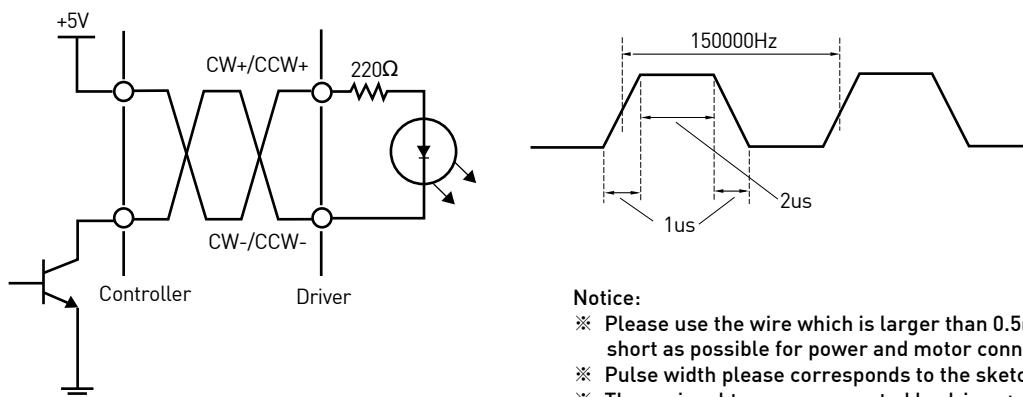
Drive State	LED State
Forward	low speed flash (0.5s/per)
Reverse	high speed flash (0.2s/per)
Limit Input	low speed flash (1s/per)
Exciting release	dark
Stand by	light



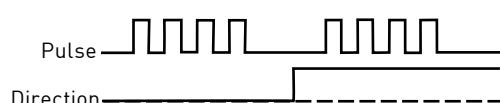
## 2. Input / Output

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

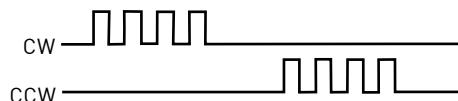
### ● Input Pulse Single Wiring Diagram



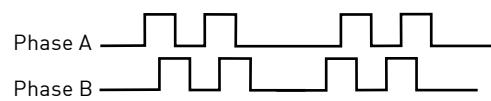
A. Pulse/Direction (1P)

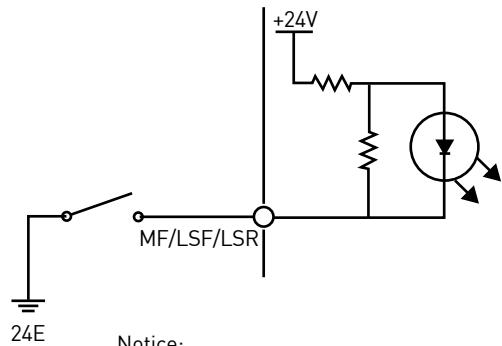


B. CW/CCW (2P)



C. Quadrature (A/B)

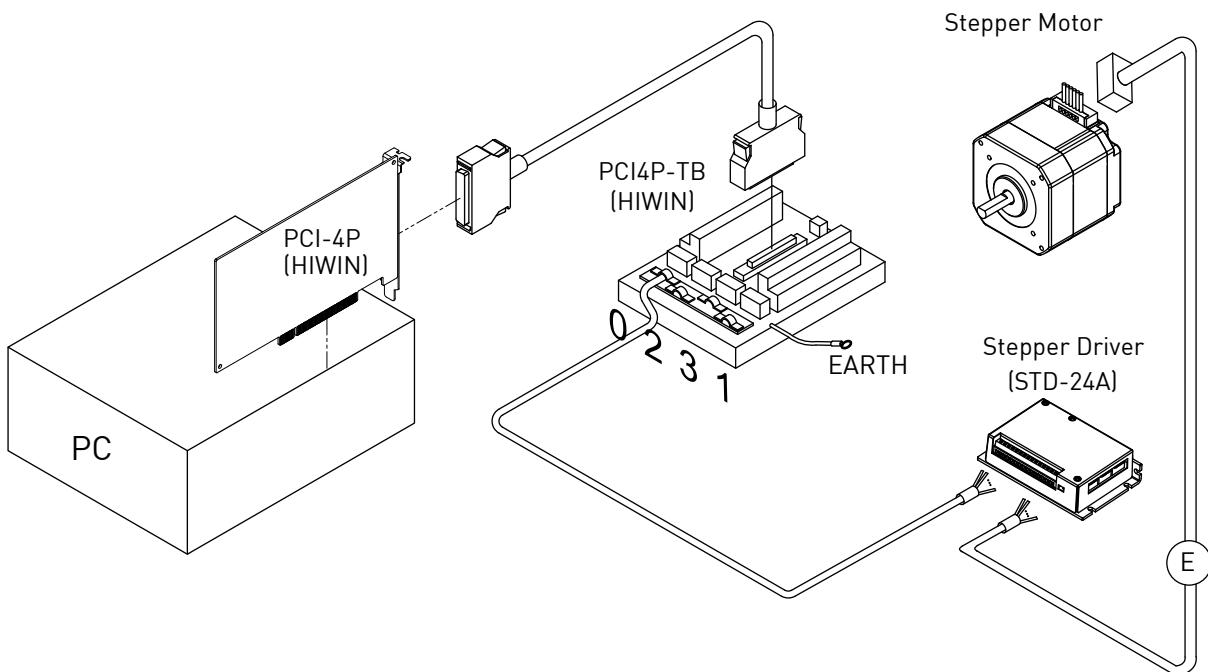


● Limit Input、Motor Disable Wiring Diagram


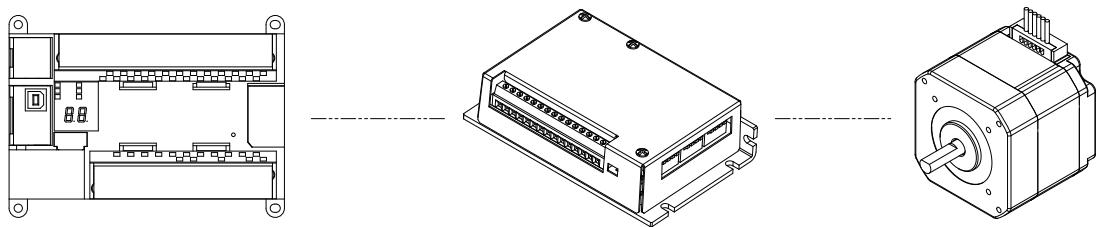
## Notice:

- ※ 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

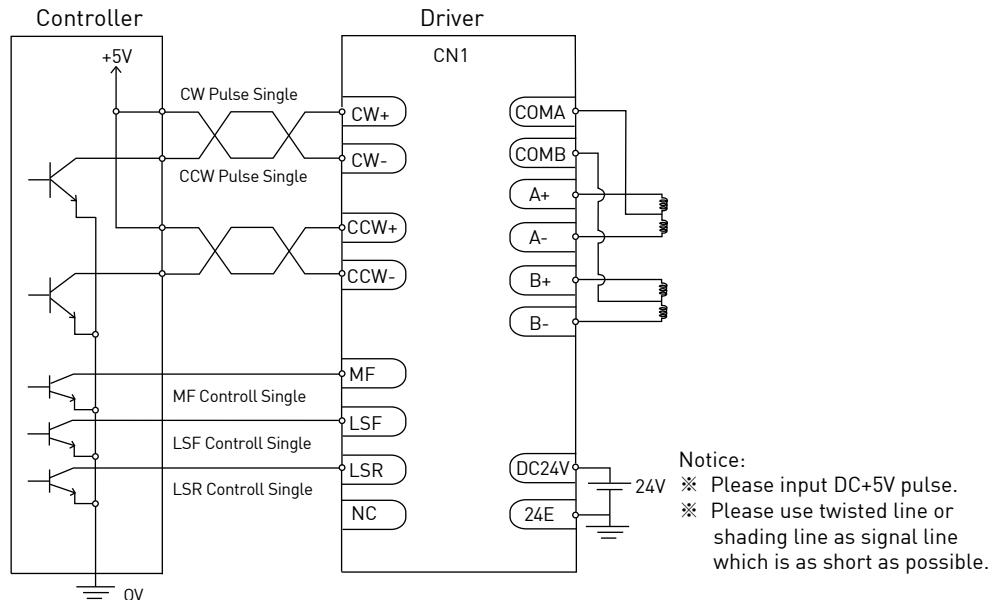


PLC Motion Controller

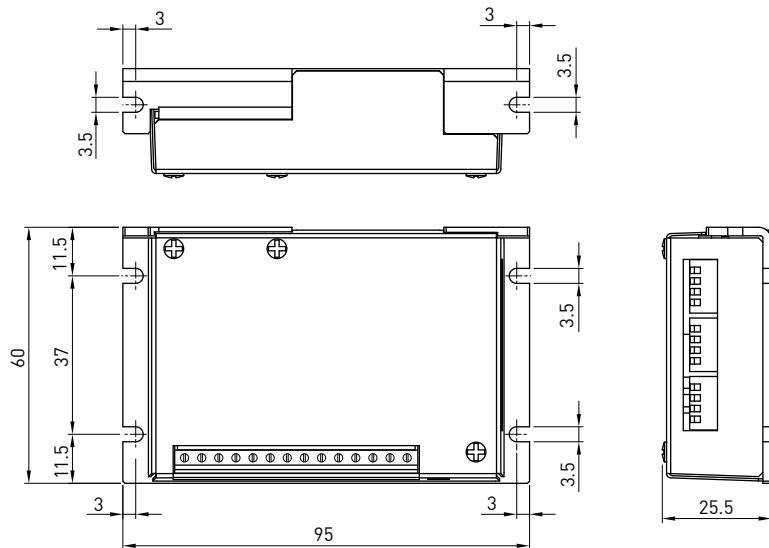
Stepper Motor Driver (STD-24A)

Stepper Motor

## Connect Diagram



## 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	 7007-6RH	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+

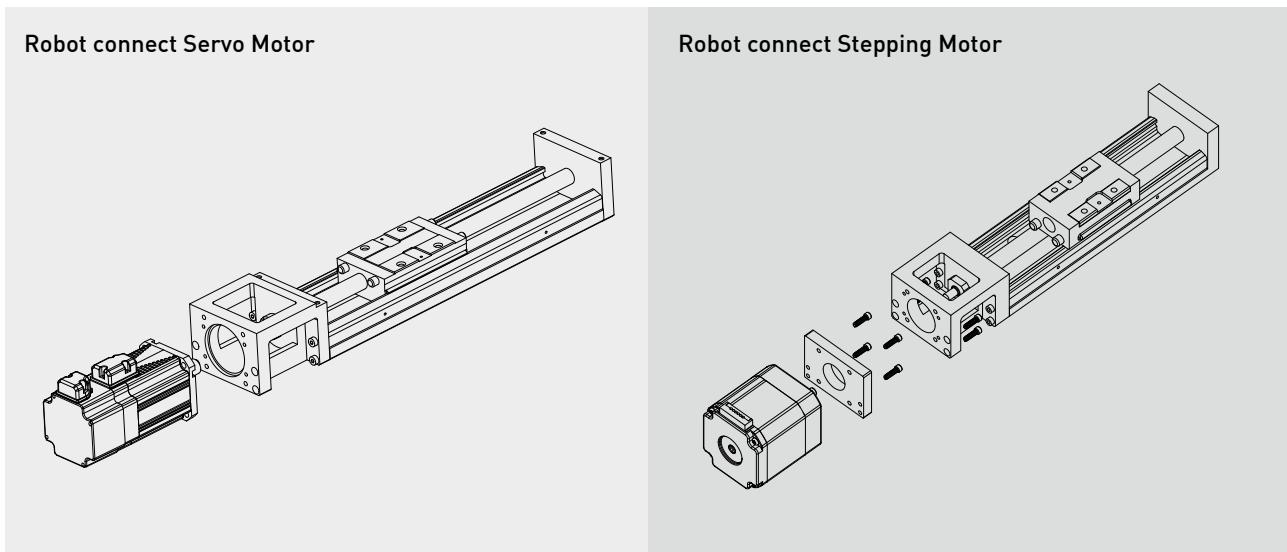
List A

□□	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	
KK40	F2	F2	-	-	-	F3	F3	F3	F3	
KK50	F2	F2	-	-	-	F3	F3	F3	F3	
KK60	F2	F2	-	-	-	F5	F5	F5	F5	
KK86	-	-	F0	F0	-	-	-	-	-	
KK100	-	-	F0	F0	F1	-	-	-	-	
KK130	-	-	F1	F1	F2	-	-	-	-	
SK60	F2	F2	F0	F0	-	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	-	-	-	KK60-F5	KK60-F5	KK60-F5	KK60-F5	
KU80	KK86-F3	KK86-F3	F0	F0	-	-	-	-	-	
KE50	KA100-F1	KA100-F1	-	-	-	KK60-F5	KK60-F5	KK60-F5	KK60-F5	
KE65	KA100-F1	KA100-F1	-	-	-	KK60-F5	KK60-F5	KK60-F5	KK60-F5	



## 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

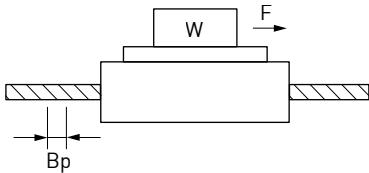
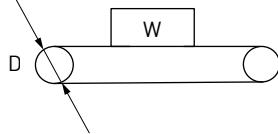
#### (1) Peak torque

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.

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

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 its 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 [ $\text{kg}\cdot\text{m}^2$ ]

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  $M[\text{kg}] = \text{Density } \rho [\text{kg}/\text{m}^3] \cdot \text{Volume } V[\text{m}^3]$

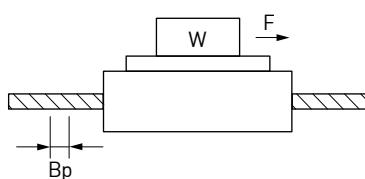
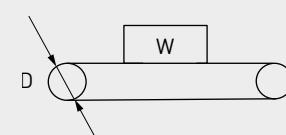
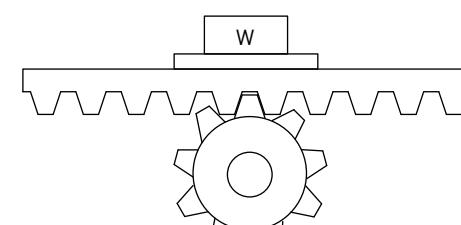
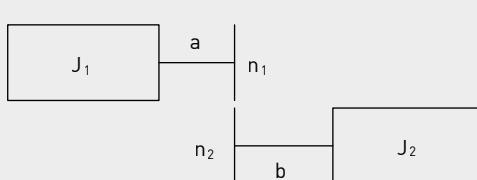
Density of each material

Iron  $\rho = 7.9 \times 10^3 [\text{kg}/\text{m}^3]$

Brass  $\rho = 8.5 \times 10^3 [\text{kg}/\text{m}^3]$

Aluminum  $\rho = 2.8 \times 10^3 [\text{kg}/\text{m}^3]$

### 7.11.3 Equivalent inertia calculations for different mechanisms

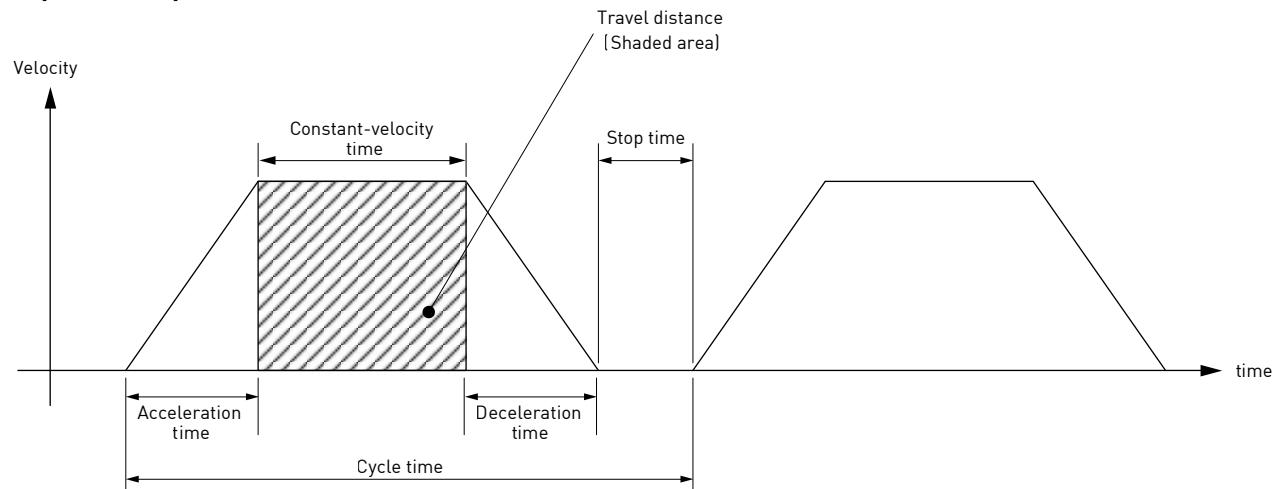
Mechanism	J calculation formula
Ballscrew	 $J = J_B + \frac{MB_P^2}{4\pi^2}$
Belt(Conveyor)	 $J = \frac{1}{4}W_b D^2$ <p>*Excluding drum J</p>
Rack and pinion	 $J = J_p + (M_r + W_r) \frac{D^2}{4}$
Reduction gear	 $J = J_1 + \left(\frac{n_2}{n_1}\right)^2 J_2$ <p>Inertia on shaft "a"</p>

**List of variables:**

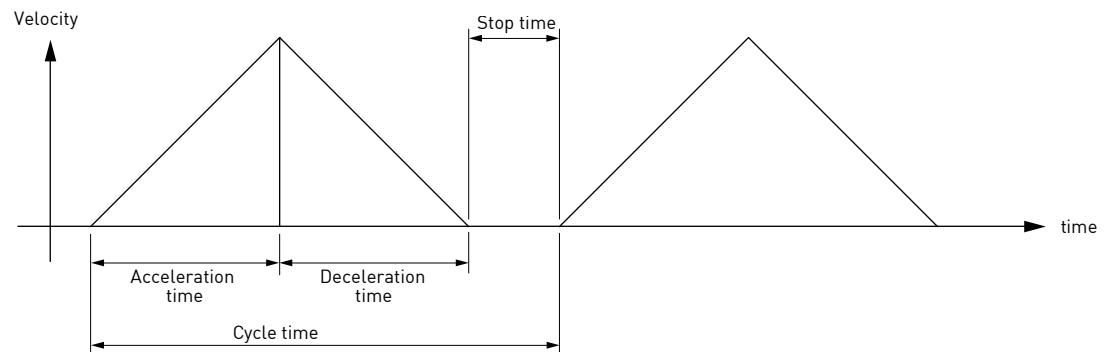
- J : Inertia [kg·m<sup>2</sup>]
- J<sub>B</sub> : J of ballscrew
- J<sub>P</sub> : J of pinion
- M : Mass [kg]
- M<sub>r</sub> : Mass of rack [kg]
- W<sub>b</sub> : Workpiece weight on belt [kg]
- W<sub>r</sub> : Workpiece weight on rack [kg]
- P : Lead
- D : Drum diameter [m]
- n<sub>1</sub> : Rotational 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



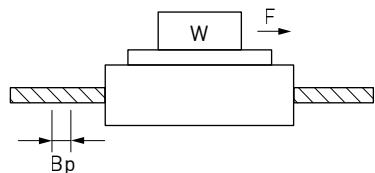
**List of variables:**

- 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  $W = 10 \text{ [kg]}$

Ballscrew length  $B_L = 0.5 \text{ [m]}$

Ballscrew diameter  $B_D = 0.02 \text{ [m]}$

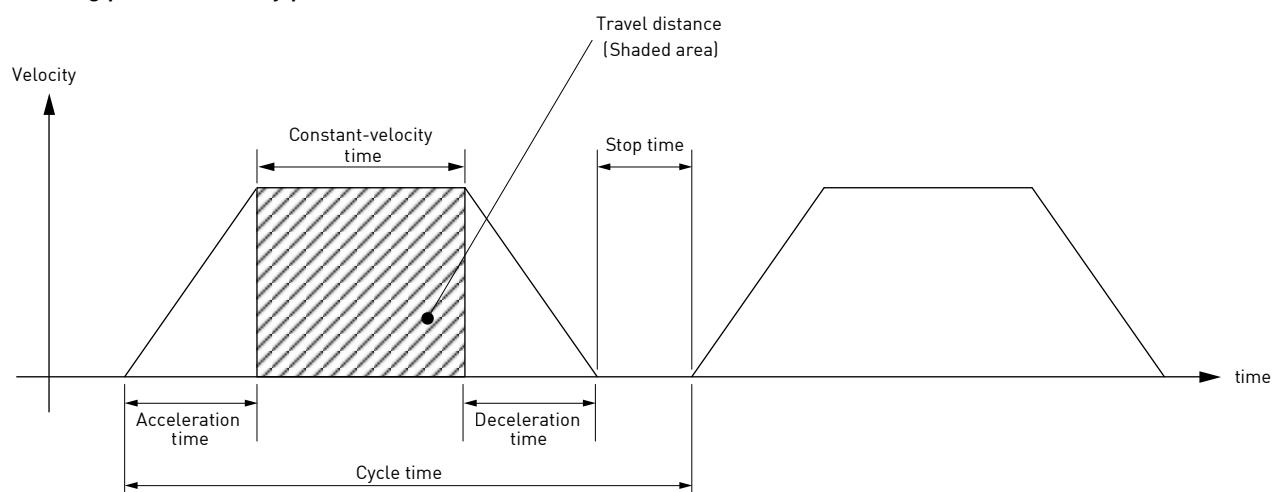
Ballscrew lead  $B_P = 0.02 \text{ [m]}$

Ballscrew efficiency  $B_{\text{eff}} = 0.9$

Travel distance  $0.3 \text{ [m]}$

Coupling inertia  $J_C = 10 \times 10^{-6} \text{ [kg-m}^2]$

### 2. Running pattern(velocity profile)



Acceleration time  $t_a = 0.1 \text{ [s]}$

Constant-velocity time  $t_b = 0.8 \text{ [s]}$

Deceleration time  $t_d = 0.1 \text{ [s]}$

Cycle time  $t_c = 2 \text{ [s]}$

Travel distance  $0.3 \text{ [m]}$

### 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 ( $V_{max}$ )

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

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

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

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

Ballscrew lead BP = 0.02 [m]

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

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

### 9. Calculation of torque

Traveling torque

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

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

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

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

### 12. Evaluation

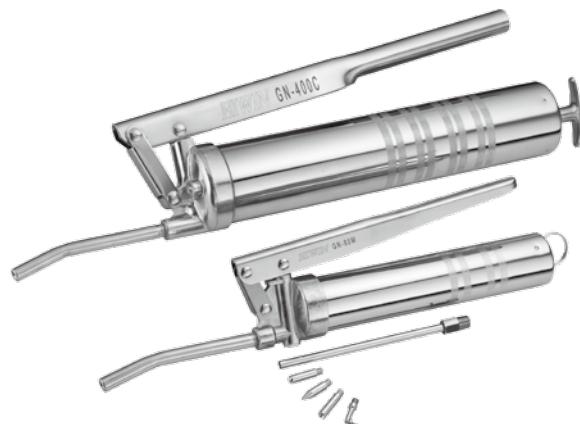
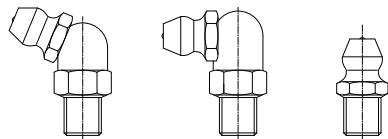
Judging from the inertia ratio calculated above, a 200W motor is acceptable, although the torque margin is significantly large.

# 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.

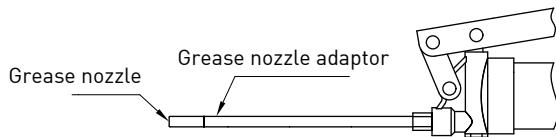
Grease Nipple: M6, PT1/8



Model no.	GN-80M	GN-400C
Dimensions		
Spec.	1. Working pressure: 15 MPa 2. Output: 0.5~0.6 c.c./Stroke 3. Weight: 520 g (grease excluded) 4. Grease reload: 70 g flexible tube or 120 ml bulk loading	1. Working pressure: 15 MPa 2. Output: 0.8~0.9 c.c./Stroke 3. Weight: 1150 g (grease excluded) 4. Grease reload: 14 o.z. cartridge pipe or 400 ml bulk loading

## 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	<p>GT-PT1/8-M5</p> <p>140</p> <p>120</p> <p>11</p> <p>PT 1/8</p>

### 8.2.2 Grease Nozzle

Model no.	Dimensions	Lubricating Type
GNZ-L-M5	<p>Ø2</p> <p>Ø24</p> <p>13</p> <p>5</p> <p>M5x0.5P</p> <p>20</p>	Minimized grease hole
GNZ-P-M5	<p>Ø26</p> <p>(Ø1.8)</p> <p>25</p> <p>5</p> <p>M5x0.5P</p>	Minimized grease hole
GNZ-R-M5	<p>Ø26</p> <p>25</p> <p>5</p> <p>M5x0.5P</p>	Dent Nipple (DIN3405)
GNZ-C-M5	<p>Ø26</p> <p>25</p> <p>5</p> <p>M5x0.5P</p>	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:**

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

- 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:**

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

- HIWIN G05 Grease for General Purpose

**Features:**

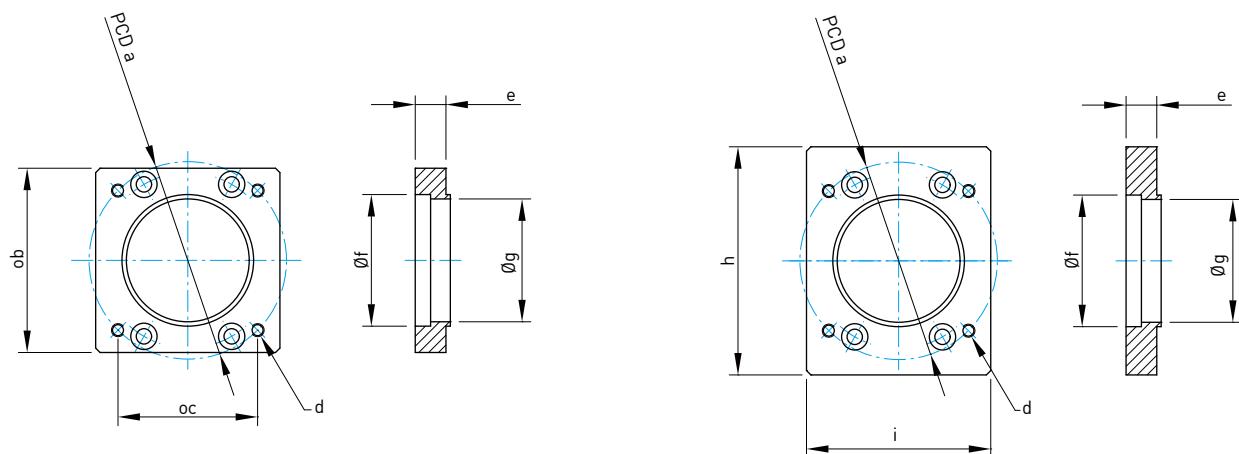
1. Wear resistant
2. Low friction
3. Long-life
4. Low oxidation tendency
5. Water resistant
6. Corrosion resistant

**Basic Properties:**

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

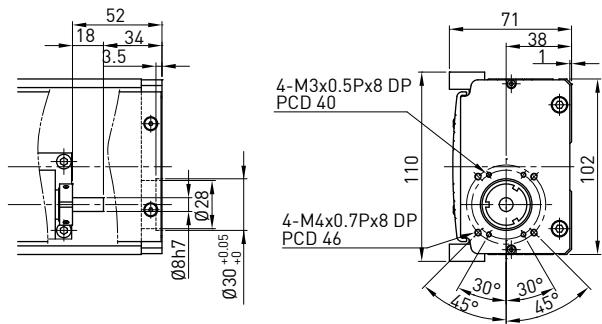
## Appendix 1: Motor Adaptor Flange List

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

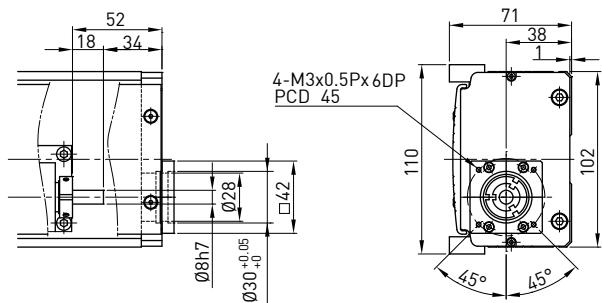


## KA100

Motor Adaptor Flange F0

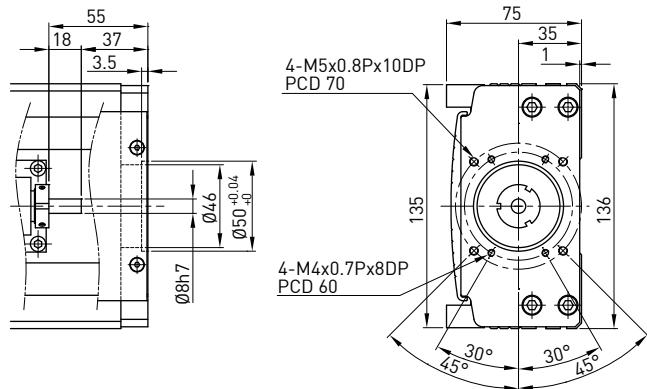


Motor Adaptor Flange F1

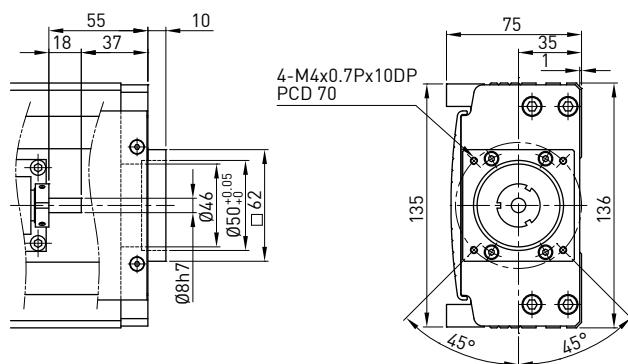


## KA136

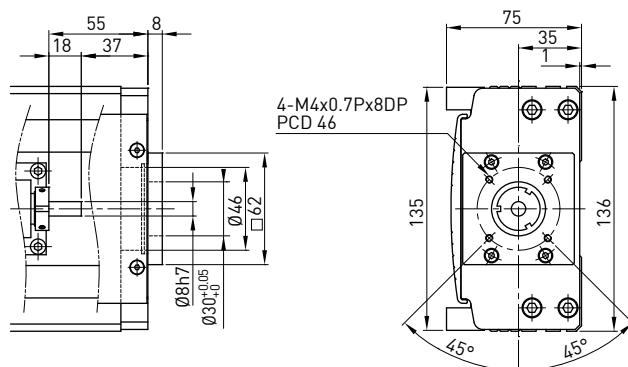
Motor Adaptor Flange F0



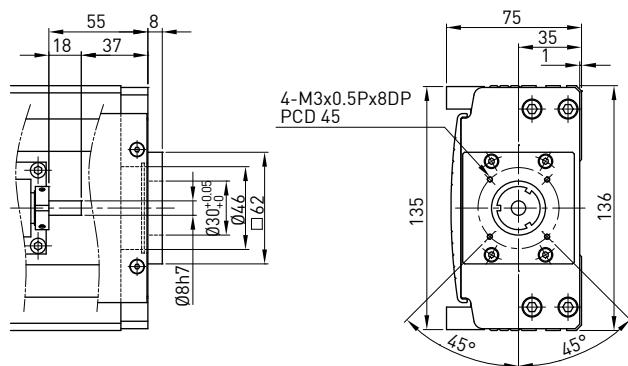
Motor Adaptor Flange F1



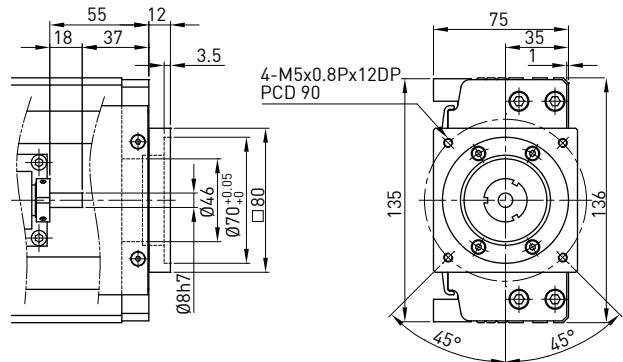
Motor Adaptor Flange F2



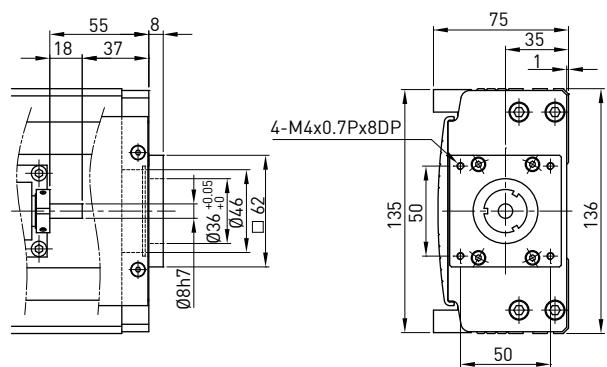
Motor Adaptor Flange F3



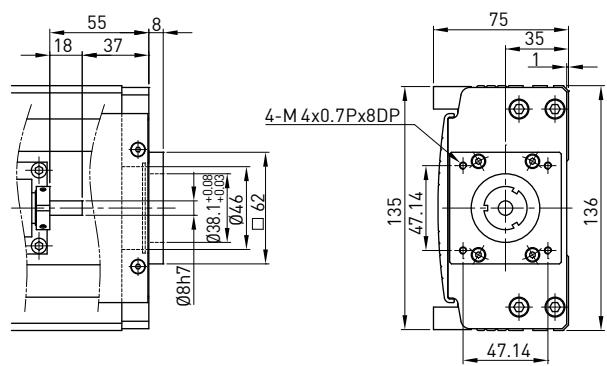
Motor Adaptor Flange F4



Motor Adaptor Flange F5

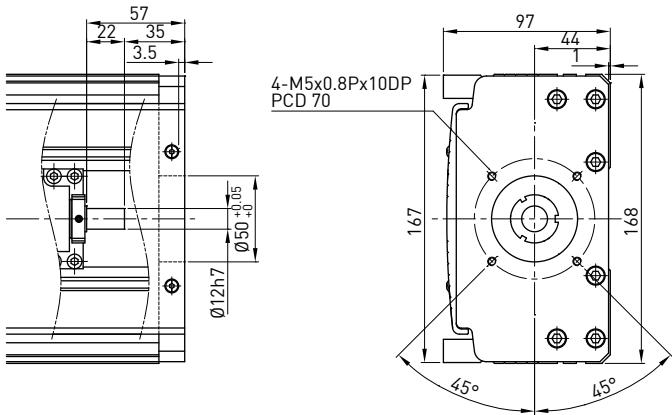


Motor Adaptor Flange F6

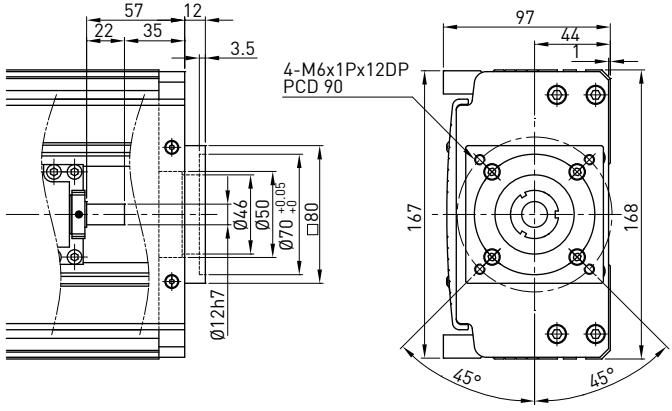


## KA170

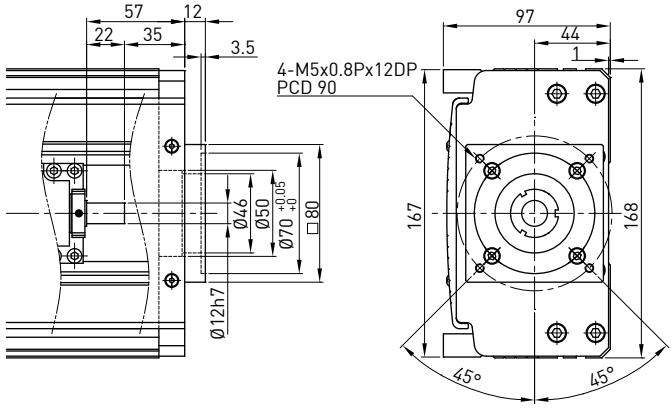
**Motor Adaptor Flange F0**



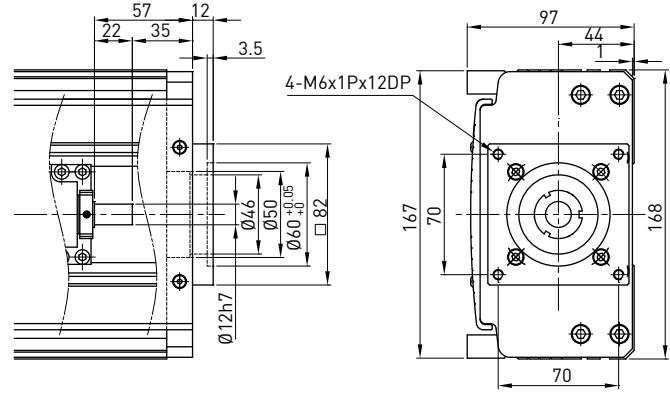
**Motor Adaptor Flange F1**



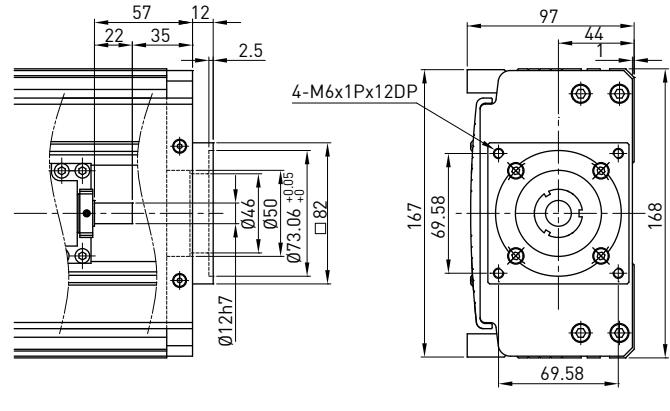
**Motor Adaptor Flange F2**



**Motor Adaptor Flange F3**

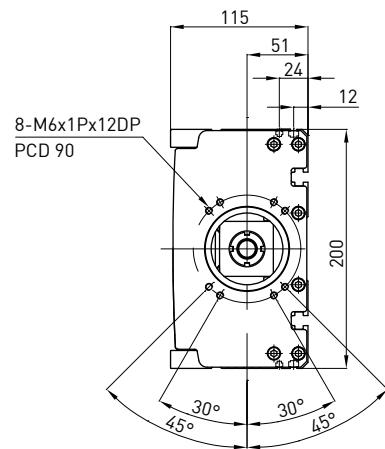
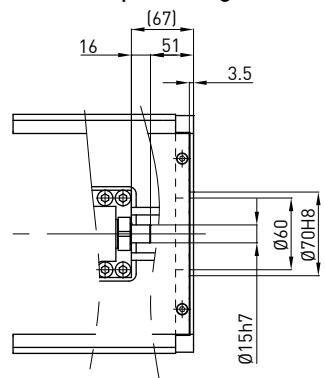


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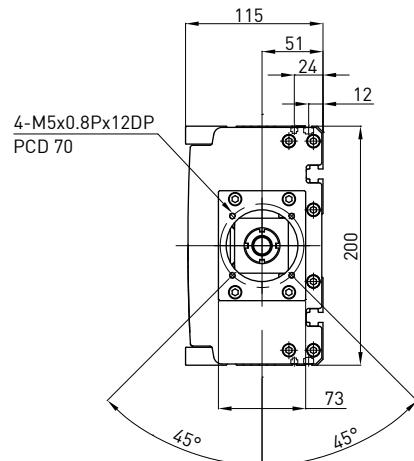
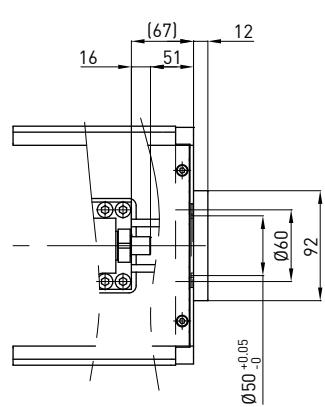


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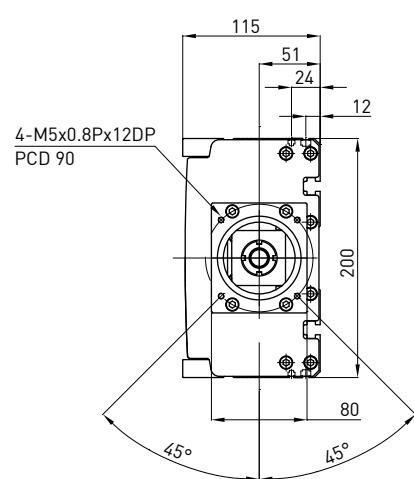
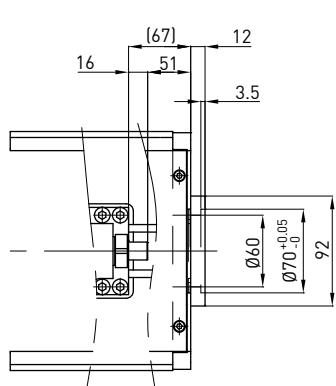
**Motor Adaptor Flange F0**



**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					
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	D2-1023-S-C0	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					
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					
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					
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	

## HIWIN Mikosystem Step Motor

Series	Model	Flange Selection										Weight (kg)	Built in Motor	Weight (kg)	Remarks
		KA100	KA136	KA170	KA200	KS100	KS140	KS180	KU060	KU080	KE050				
ST40	FRST011024	-	-	-	-	-	-	-	-	-	-	0.3	STD-24A	0.09	single axis
ST55	FRST021024	-	-	-	-	-	-	-	-	-	-	0.55			
	FRST022024	-	-	-	-	-	-	-	-	-	-	0.8	STD-24A	0.09	single axis
	FRST023024	-	-	-	-	-	-	-	-	-	-	1.18			
	FRST121024	-	-	-	-	-	-	-	-	-	-	0.58			
	FRST122024	-	-	-	-	-	-	-	-	-	-	0.83	STD-24A	0.09	axis of symmetry
	FRST123024	-	-	-	-	-	-	-	-	-	-	0.21			

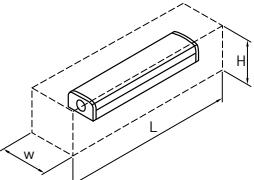
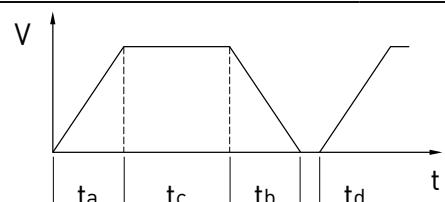
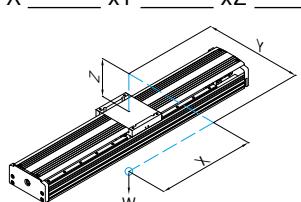
## Oriental Step Motor

Series	Model	Flange Selection										Built in Motor	Weight (kg)	Built in Motor	Weight (kg)
		KA100	KA136	KA170	KA200	KS100	KS140	KS180	KU060	KU080	KE050				
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	-	-	PK566HNW	0.8	DFC5128P	0.22
	CKF569HAP2	-	F5	-	-	-	KK86-F5	-	KK86-F5	-	-	PK569HNW	1.3	DFC5128P	0.22
	CFK596HAP2	-	-	F3	-	-	-	-	-	-	-	PK596HNW	1.7	DFC5128P	0.22
	CFK599HAP2	-	-	F3	-	-	-	-	-	-	-	PK599HNW	2.8	DFC5128P	0.22
	CFK5913HAP2	-	-	F3	-	-	-	-	-	-	-	PK5913HNW	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 (K Series)

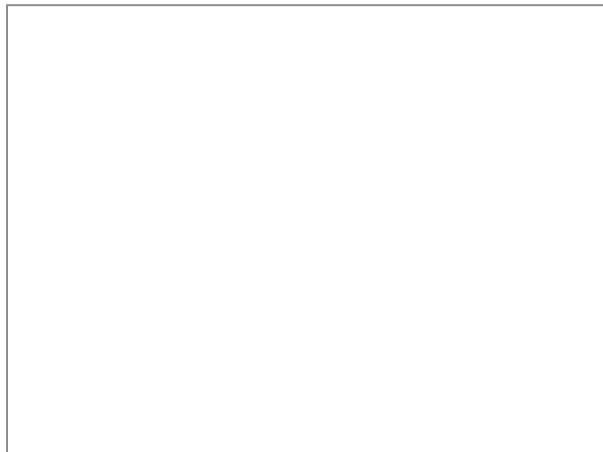
Date: / /

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 _____ x W _____ x H _____ . 		
8. Screw lead(mm)	_____ mm		
9. Max speed / acceleration			
10. Motor operation			Max speed V= _____ mm/s ta= _____ sec tb= _____ sec tc= _____ sec td= _____ sec
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 _____ x Y _____ x Z _____ . X= _____ mm Y= _____ mm Z= _____ mm 		
13. Expected service life			
14. Accessories	<input type="checkbox"/> motor <input type="checkbox"/> drive <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 _____		



Motion Control and System Technology



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