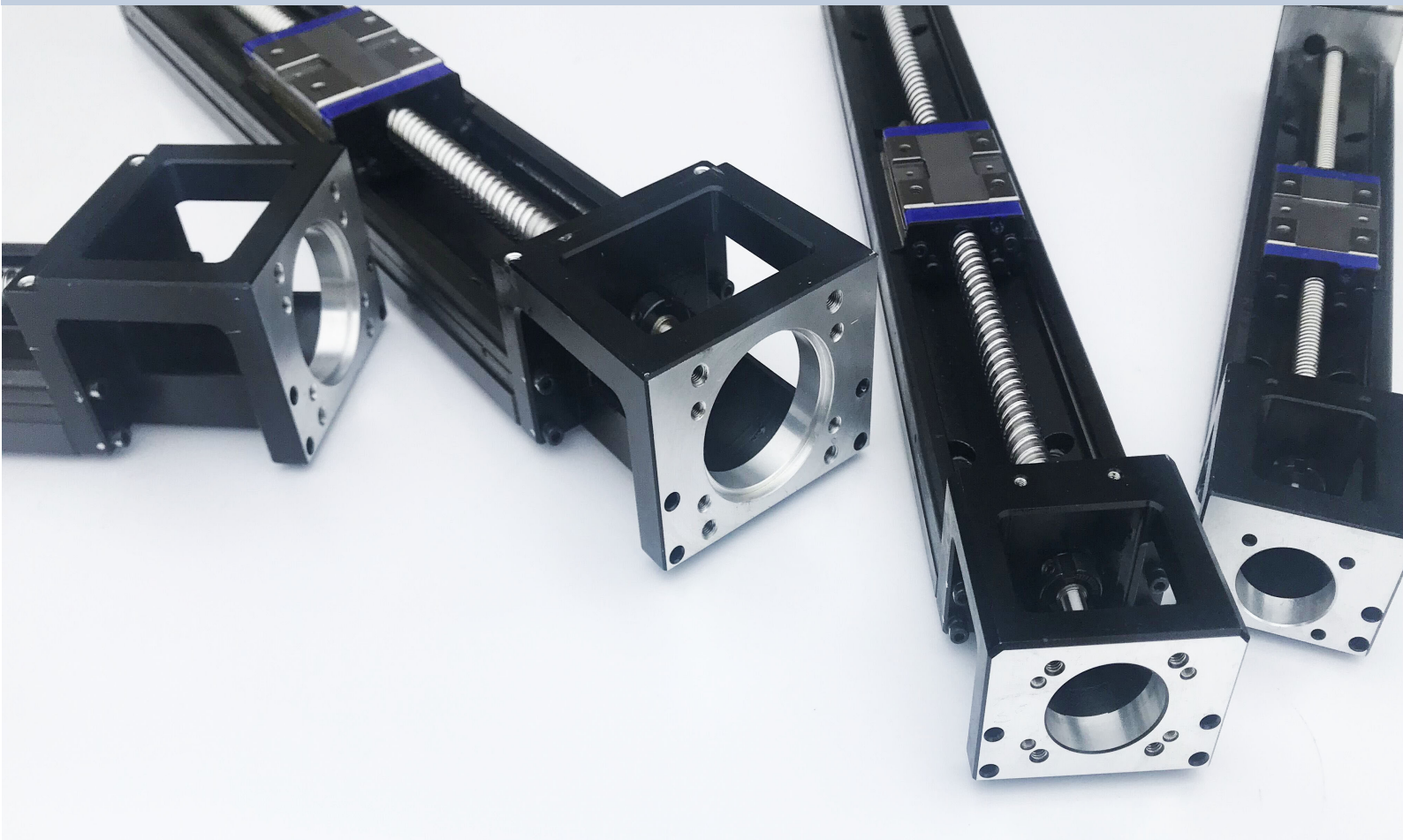




# Single Axis Robot

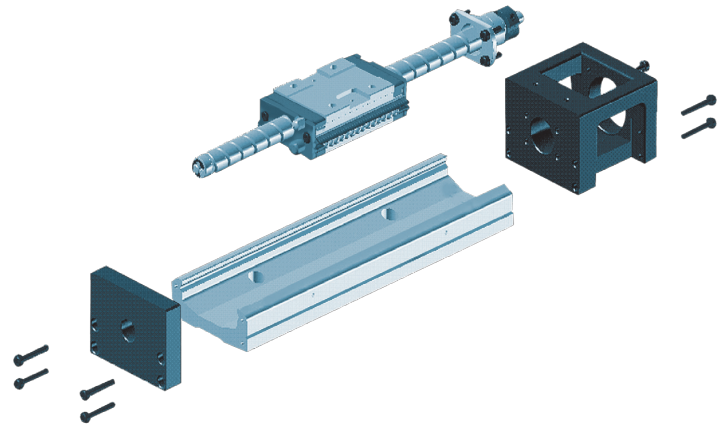
## KK Type Technical Information

# Single Axis Robot

## KK Type

### 1.1 Features

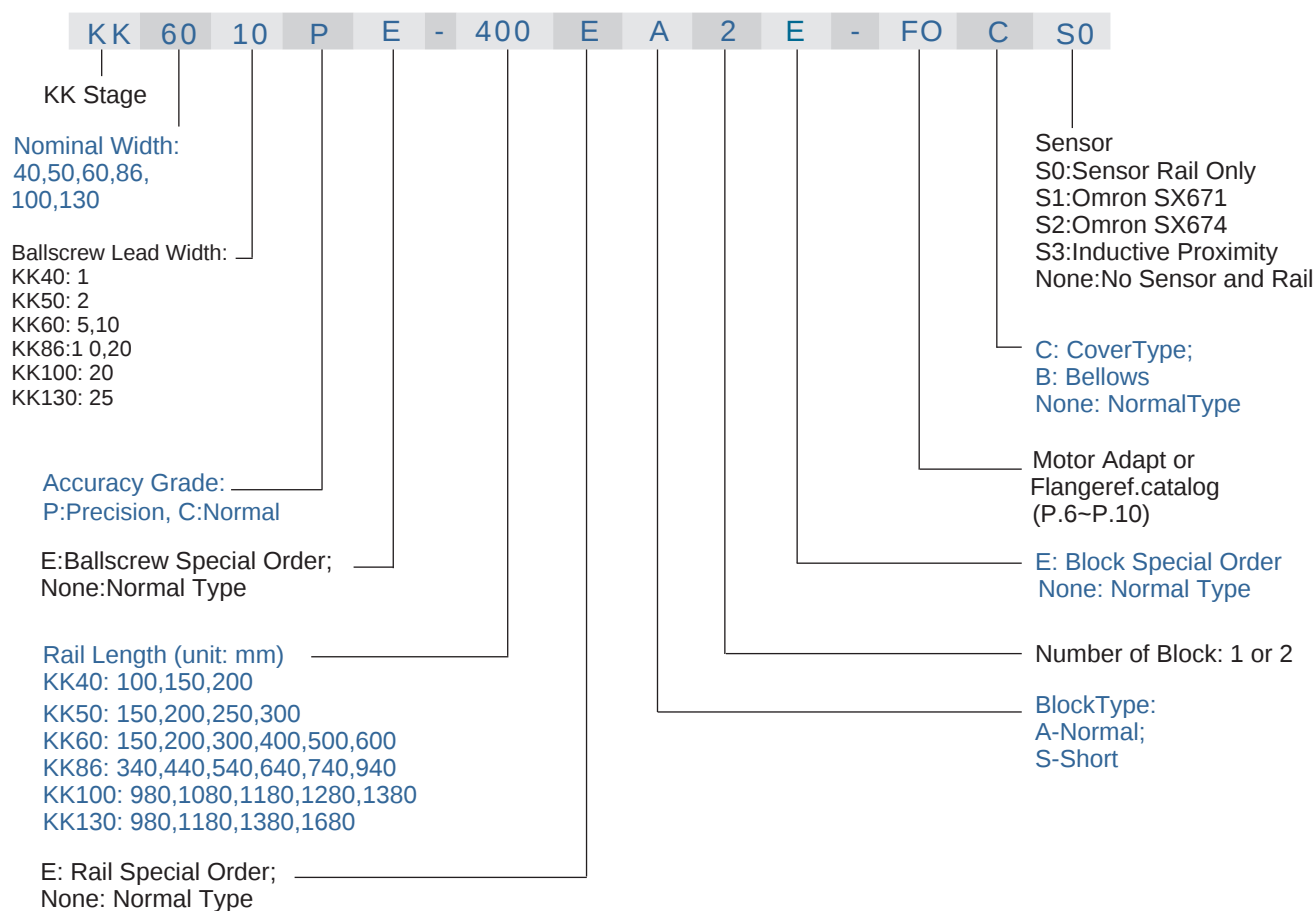
- Easy for system design, installation and maintenance
- Compact and light weight
- High accuracy
- High stiffness
- Complete selection of accessories for most any application.



The structure is designed for high stiffness and light weight. The FEM analysis is shown as follows:

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

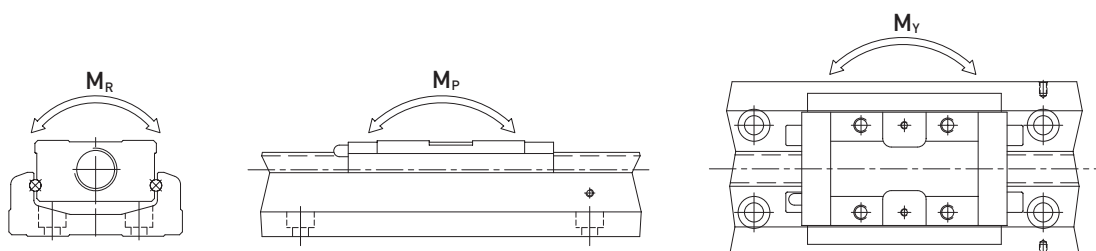




## 1.3 Maximum Speed Limit

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

## 1.4 Specifications



| Model No. |           | Ballscrow       |              |                                 |                                | Guideway                                  |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
|-----------|-----------|-----------------|--------------|---------------------------------|--------------------------------|-------------------------------------------|------------|---------------------------------------------------------------|------------|---------------------|-------------|-------------------------------------------------------------|-------------|-------------|-------------|--------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|--|--|
|           |           | Nominal<br>(mm) | Lead<br>(mm) | Basic<br>Dynamic<br>Load<br>(N) | Basic<br>Static<br>Load<br>(N) | Basic<br>Dynamic<br>Load<br>Rating<br>(N) |            | Basic<br>Static<br>Load<br>Rating<br>(N)                      |            | Static Rated Moment |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
|           |           |                 |              |                                 |                                |                                           |            | Allowable Static<br>Moment M <sub>P</sub> (N-m)<br>(pitching) |            |                     |             | Allowable Static<br>Moment M <sub>V</sub> (N-m)<br>(yawing) |             |             |             | Allowable Static<br>Moment M <sub>R</sub> (N-m)<br>(rolling) |             |             |             |             |             |  |  |
|           |           |                 |              |                                 |                                | Block<br>A                                | Block<br>S | Block<br>A                                                    | Block<br>S | Block<br>A1         | Block<br>A2 | Block<br>S1                                                 | Block<br>S2 | Block<br>A1 | Block<br>A2 | Block<br>S1                                                  | Block<br>S2 | Block<br>A1 | Block<br>A2 | Block<br>S1 | Block<br>S2 |  |  |
| KK4001    | Precision | 8               | 1            | 735                             | 1538                           | 3920                                      | -          | 6468                                                          | -          | 33                  | 182         | -                                                           | -           | 33          | 182         | -                                                            | -           | 81          | 162         | -           | -           |  |  |
|           | Normal    |                 |              | 676                             | 1284                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
| KK5002    | Precision | 8               | 2            | 2136                            | 3489                           | 8007                                      | -          | 12916                                                         | -          | 116                 | 278         | -                                                           | -           | 116         | 278         | -                                                            | -           | 222         | 444         | -           | -           |  |  |
|           | Normal    |                 |              | 1813                            | 2910                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
| KK6005    | Precision | 12              | 5            | 3744                            | 6243                           | 13230                                     | 7173       | 21462                                                         | 11574      | 152                 | 348         | 72                                                          | 205         | 152         | 348         | 72                                                           | 205         | 419         | 838         | 241         | 482         |  |  |
|           | Normal    |                 |              | 3377                            | 5625                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
| KK6010    | Precision |                 | 10           | 2410                            | 3743                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
|           | Normal    |                 |              | 2107                            | 3234                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
| KK8610    | Precision | 15              | 10           | 7144                            | 12642                          | 31458                                     | -          | 50674                                                         | -          | 622                 | 3050        | -                                                           | -           | 622         | 3050        | -                                                            | -           | 1507        | 3014        | -           | -           |  |  |
|           | Normal    |                 |              | 6429                            | 11387                          |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
| KK8620    | Precision |                 | 20           | 4645                            | 7655                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
|           | Normal    |                 |              | 4175                            | 6889                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
| KK10020   | Precision | 20              | 20           | 7046                            | 12544                          | 39200                                     | -          | 63406                                                         | -          | 960                 | 4763        | -                                                           | -           | 960         | 4763        | -                                                            | -           | 2205        | 4410        | -           | -           |  |  |
|           | Normal    |                 |              | 4782                            | 9163                           |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |
| KK13025   | Precision | 25              | 25           | 7897                            | 15931                          | 48101                                     | -          | 84829                                                         |            | 1536                | 7350        | -                                                           | -           | 1536        | 7350        | -                                                            | -           | 3885        | 7770        | -           | -           |  |  |
|           | Normal    |                 |              | 7092                            | 14352                          |                                           |            |                                                               |            |                     |             |                                                             |             |             |             |                                                              |             |             |             |             |             |  |  |

## 1.5 Accuracy Grade

Unit:mm

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



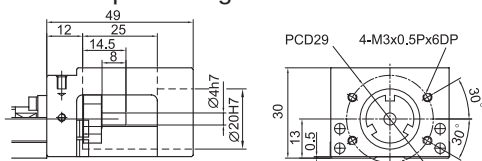
## 1.6.2 Motor and Motor Adaptor Flange

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

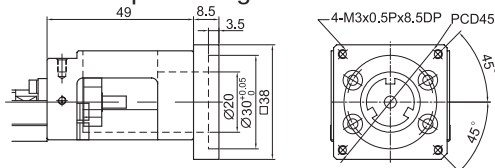
## 1.6.3 Motor Adaptor Flange

### KK40

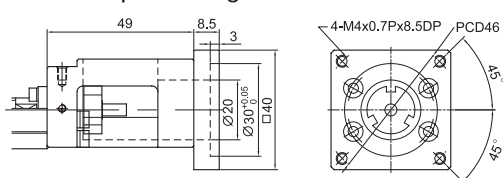
Motor Adaptor Flange F0



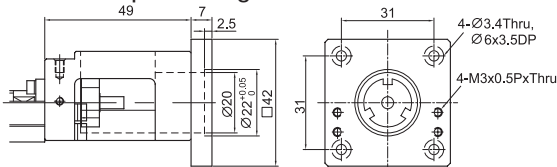
Motor Adaptor Flange F2



Motor Adaptor Flange F1

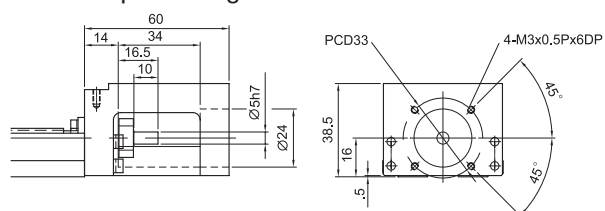


Motor Adaptor Flange F3

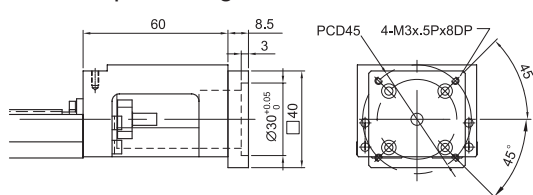


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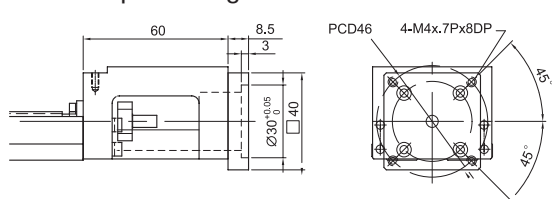
Motor Adaptor Flange F0



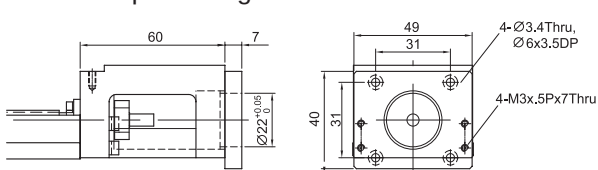
Motor Adaptor Flange F2



Motor Adaptor Flange F1

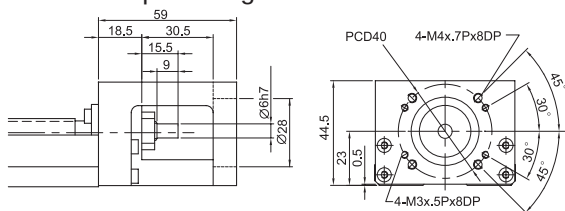


Motor Adaptor Flange F3

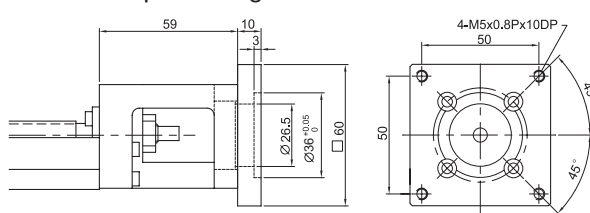


### KK60

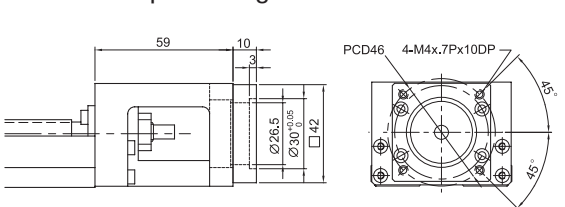
Motor Adaptor Flange F0



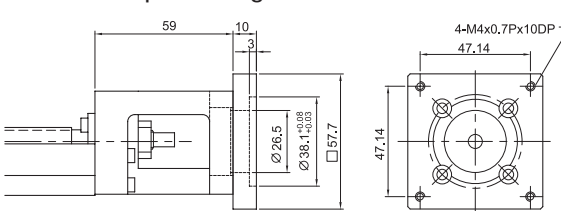
Motor Adaptor Flange F3



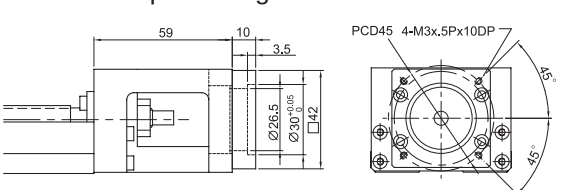
Motor Adaptor Flange F1



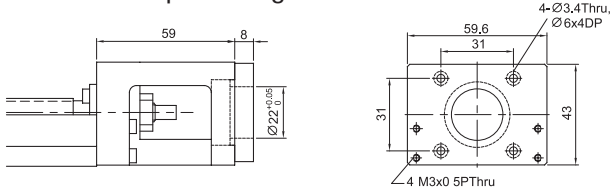
Motor Adaptor Flange F4



Motor Adaptor Flange F2



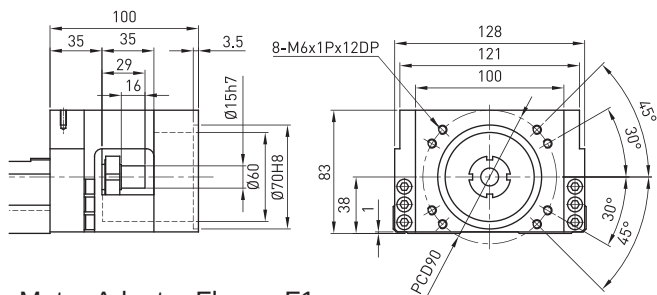
Motor Adaptor Flange F5



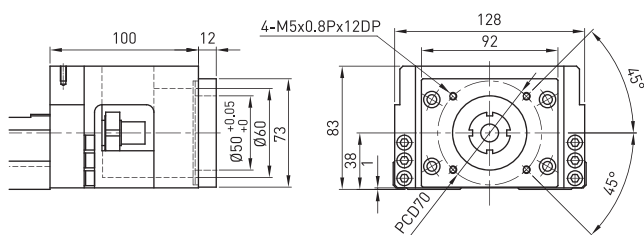


## KK130

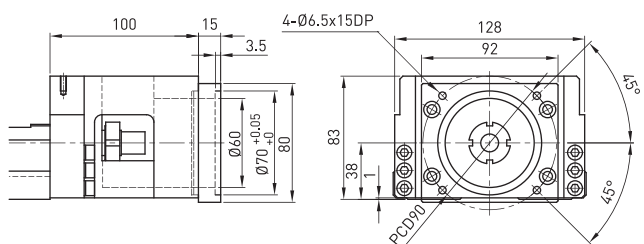
Motor Adaptor Flange F0



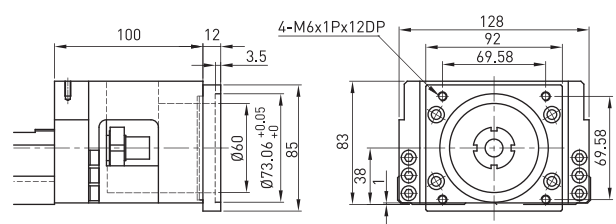
Motor Adaptor Flange F1



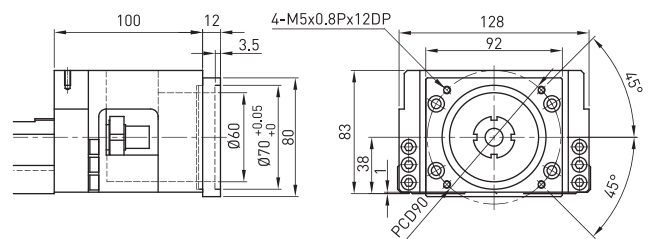
Motor Adaptor Flange F2



Motor Adaptor Flange F3

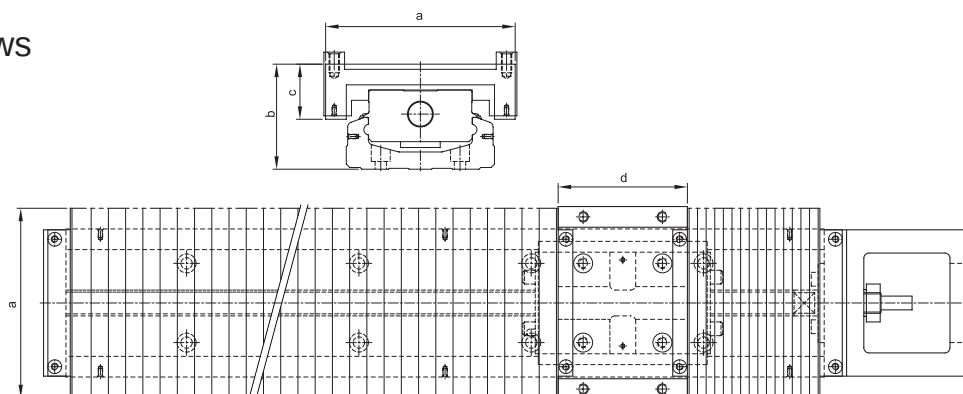


Motor Adaptor Flange F4



## 1.7 Optional Accessories

### 1.7.1 Bellows

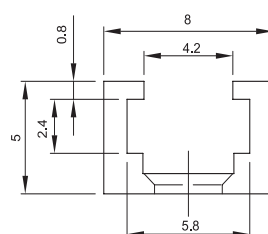


Unit : mm

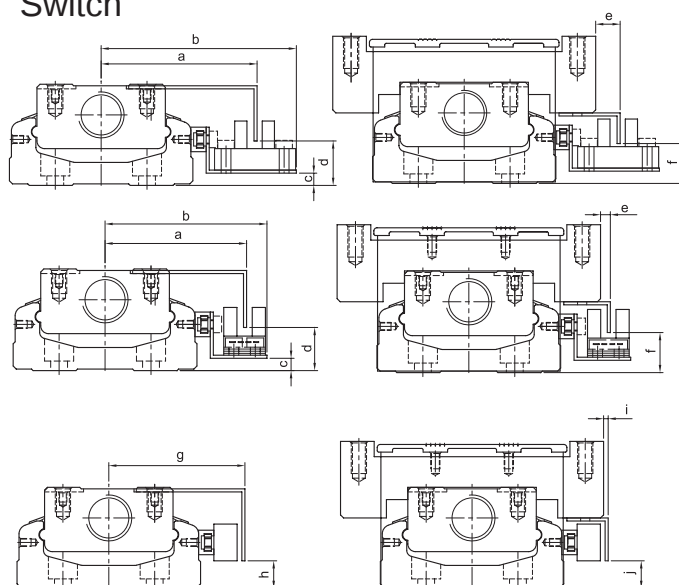
| Nominal Width | Rail Length | Stroke | Min. | Max. | a   | b    | c  | d  |
|---------------|-------------|--------|------|------|-----|------|----|----|
| KK60          | 150         | 56     | 16   | 80   | 84  | 45.5 | 24 | 54 |
|               | 200         | 106    | 20   | 126  |     |      |    |    |
|               | 300         | 166    | 40   | 206  |     |      |    |    |
|               | 400         | 234    | 56   | 290  |     |      |    |    |
|               | 500         | 306    | 70   | 376  |     |      |    |    |
|               | 600         | 366    | 90   | 456  |     |      |    |    |
| KK86          | 340         | 188    | 36   | 224  | 110 | 61   | 32 | 75 |
|               | 440         | 260    | 50   | 310  |     |      |    |    |
|               | 540         | 336    | 62   | 398  |     |      |    |    |
|               | 640         | 408    | 76   | 484  |     |      |    |    |
|               | 740         | 480    | 90   | 570  |     |      |    |    |
|               | 940         | 640    | 110  | 750  |     |      |    |    |

### 1.7.2 Switch

Switch rail



Switch



| Nominal Width | a    | b    | c  | d    | e  | f  |
|---------------|------|------|----|------|----|----|
| KK50          | 45.5 | 59   | 1  | 10   | 15 | 11 |
| KK60          | 51   | 63.8 | 4  | 14.5 | 8  | 13 |
| KK86          | 63.5 | 76.7 | 8  | 18   | 8  | 18 |
| KK100         | 71   | 84   | 10 | 20   | 9  | 20 |

Switch1: Omron EE-SX671

| Nominal Width | a    | b    | c  | d    | e    | f  |
|---------------|------|------|----|------|------|----|
| KK50          | 41.3 | 48   | 1  | 10.5 | 10.2 | 11 |
| KK60          | 46.2 | 52.8 | 4  | 14   | 3.2  | 13 |
| KK86          | 59   | 65.7 | 8  | 18   | 3    | 18 |
| KK100         | 66   | 73   | 10 | 20   | 4.2  | 20 |

Switch2: Omron EE-SX674

| Nominal Width | g    | h   | i   | j    |
|---------------|------|-----|-----|------|
| KK50          | 39.5 | 5.7 | 7   | 19.5 |
| KK60          | 44.5 | 9   | 2   | 9    |
| KK86          | 57   | 13  | 1   | 13   |
| KK100         | 64.5 | 15  | 2.5 | 15   |

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

## 1.8 Life Calculations

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

### 1.8.1 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 Loading Rate (N)  
 $P_n$  : Calculating 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)                          |                           |
| NoThrust             | $V < 15\text{m/min}$                 | 1.0~1.5                   |
| Low Vibration        | $15/\text{min} < V < 60\text{m/min}$ | 1.5~2.0                   |
| High Vibration       | $V > 60\text{m/min}$                 | 2.0~3.5                   |

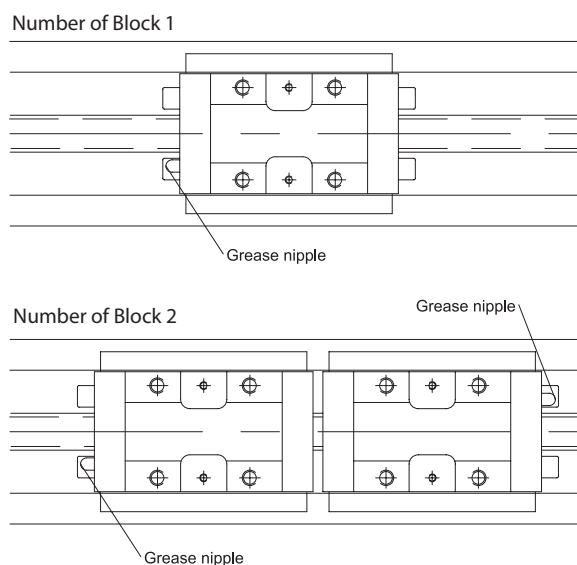
### 1.8.2 Ballscrew and Bearing

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

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

## 1.9 Lubrication

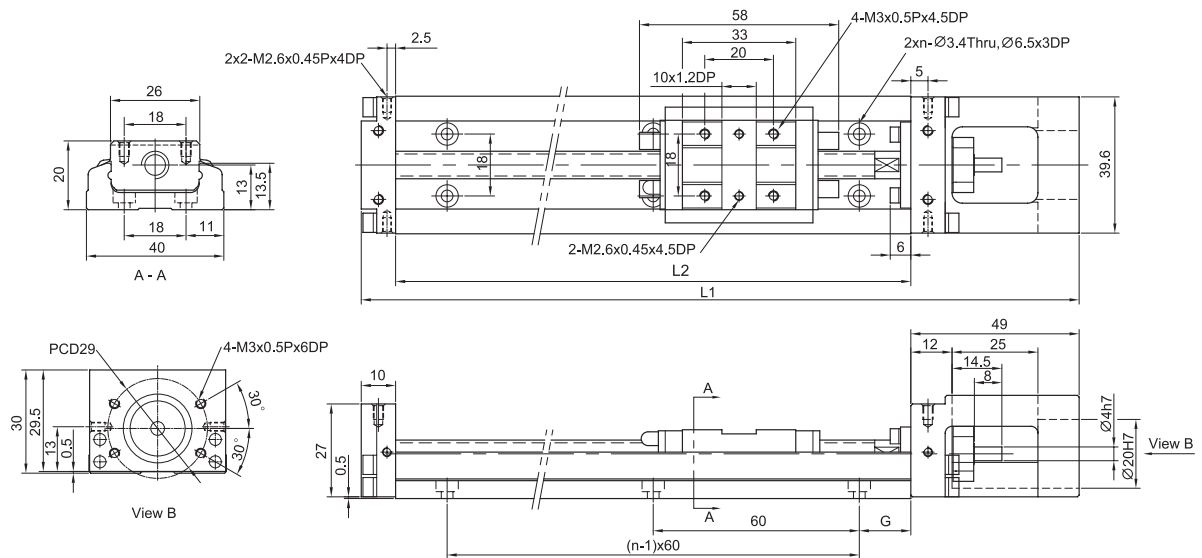
Replenishing the grease every 100km



## 1.10 Dimension

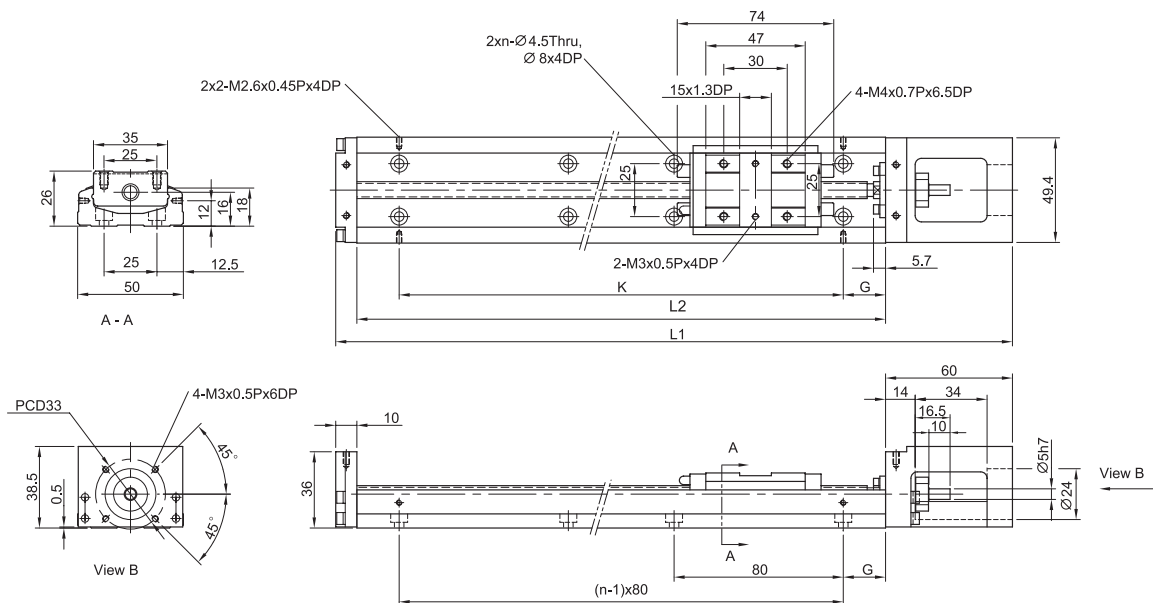
### 1.10.1 Without cover

#### KK40



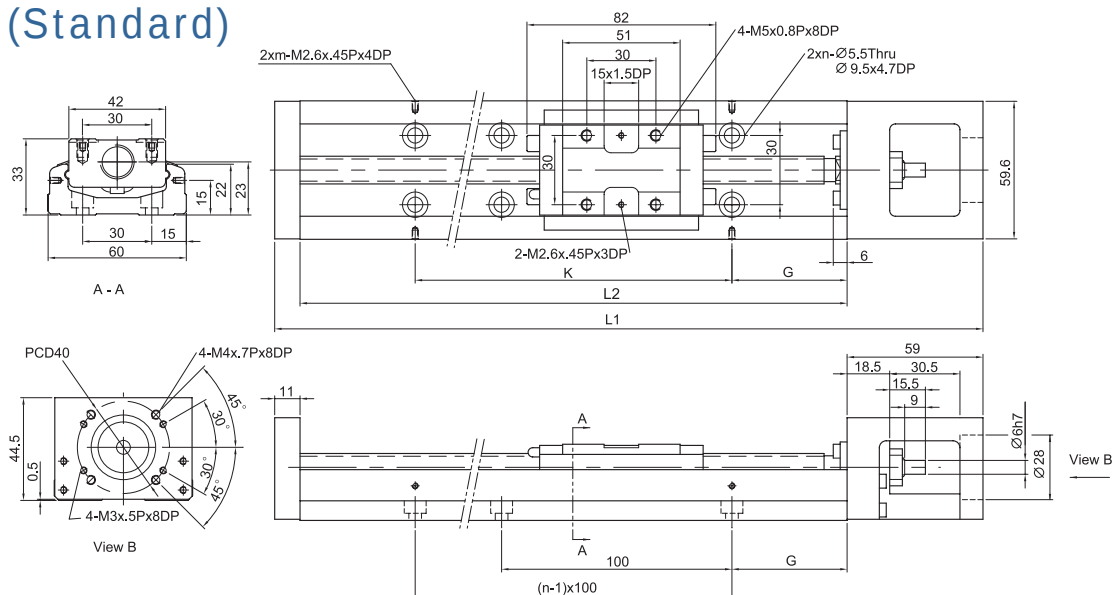
| Rail Length<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | n(mm) | Mass(kg) |          |
|-----------------------|------------------------|--------------------|----------|-------|-------|----------|----------|
|                       |                        | A1 Block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

#### KK50



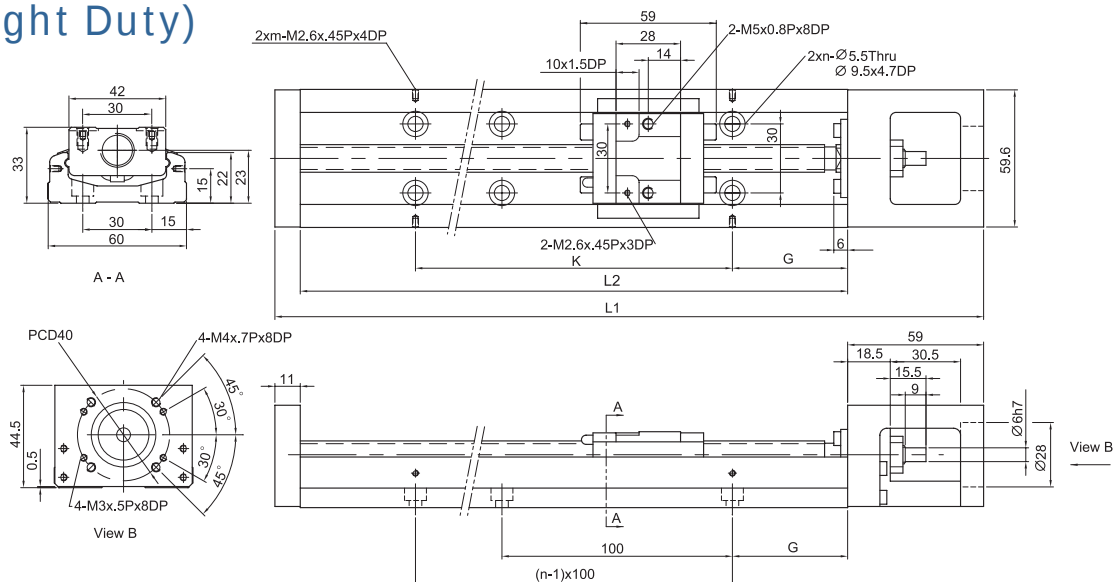
| Rail Length<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | K(mm) | n | Mass(kg) |          |
|-----------------------|------------------------|--------------------|----------|-------|-------|---|----------|----------|
|                       |                        | 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)



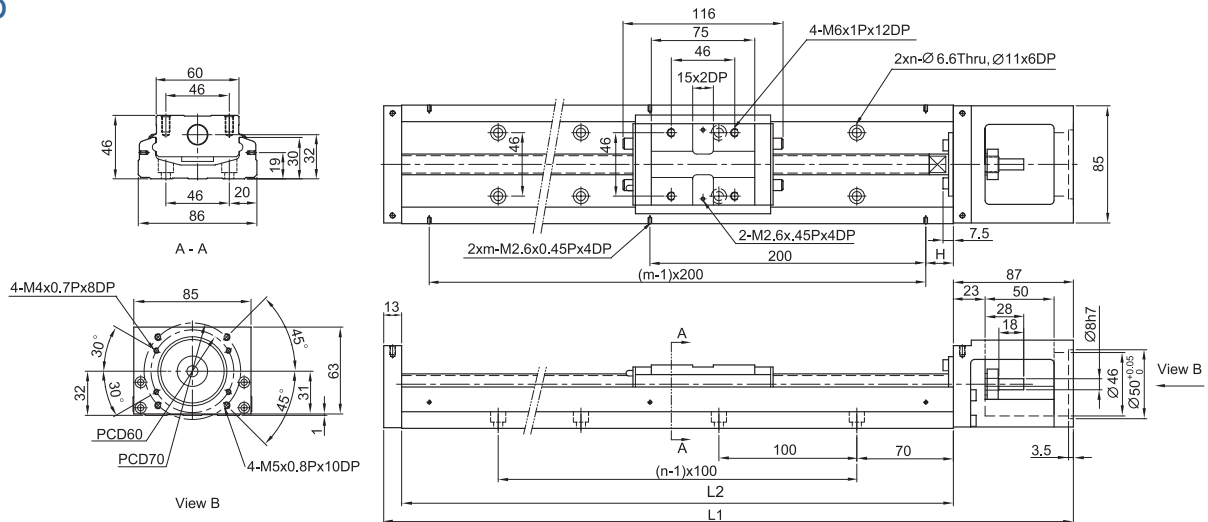
| RailLength<br>L2(mm) | TotalLength<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | K(mm) | n | m | Mass(kg) |          |
|----------------------|-----------------------|--------------------|----------|-------|-------|---|---|----------|----------|
|                      |                      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

## KK60(Light Duty)



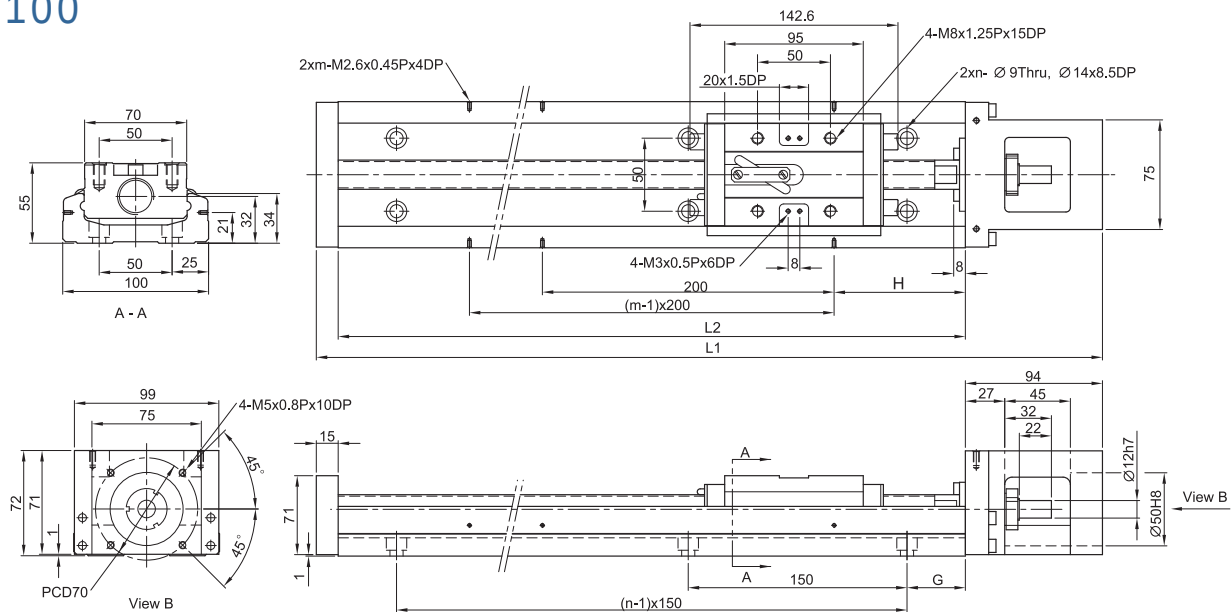
| RailLength<br>L2(mm) | TotalLength<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | K(mm) | n | m | Mass(kg) |          |
|----------------------|-----------------------|--------------------|----------|-------|-------|---|---|----------|----------|
|                      |                      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

## KK86



| Rail Length<br>L2(mm) | Total Length<br>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     |

## KK100

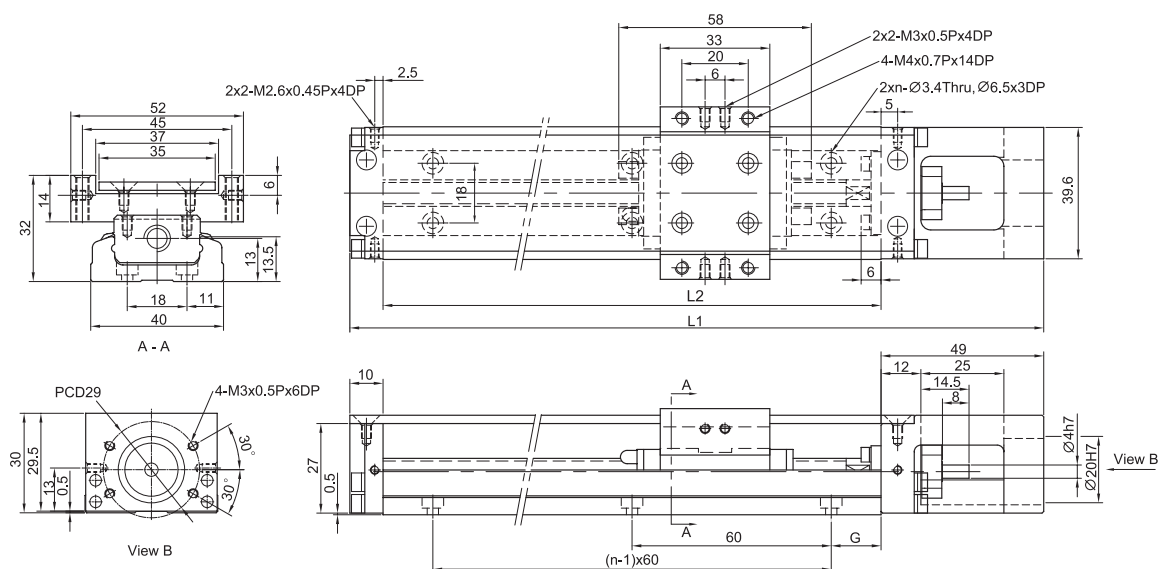


| Rail Length<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | H(mm) | n  | m | Mass(kg) |          |
|-----------------------|------------------------|--------------------|----------|-------|-------|----|---|----------|----------|
|                       |                        | 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     |



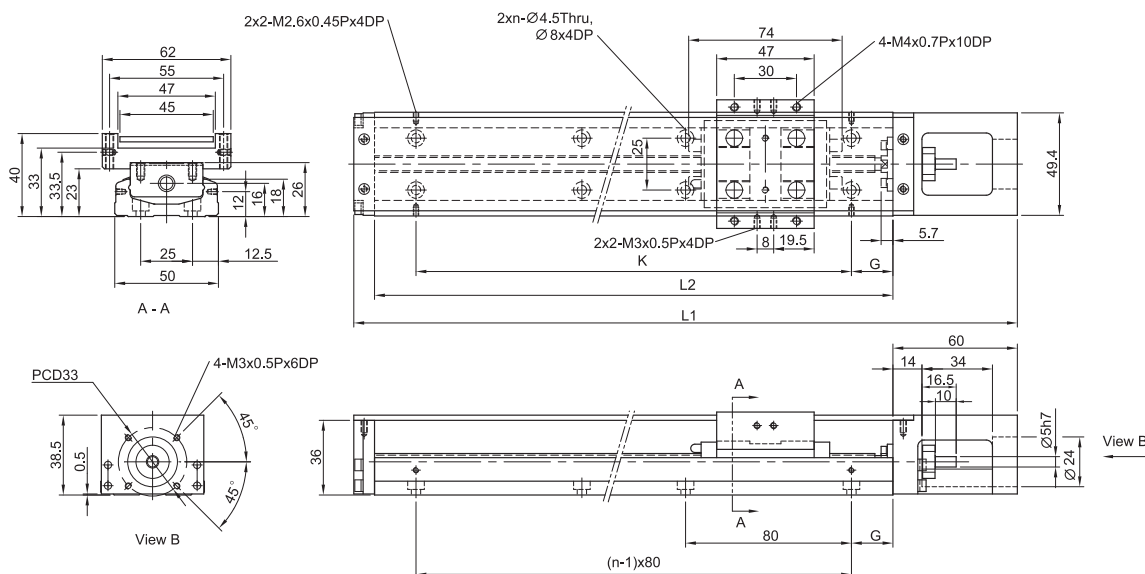
## 1.10.2 With cover

### KK40



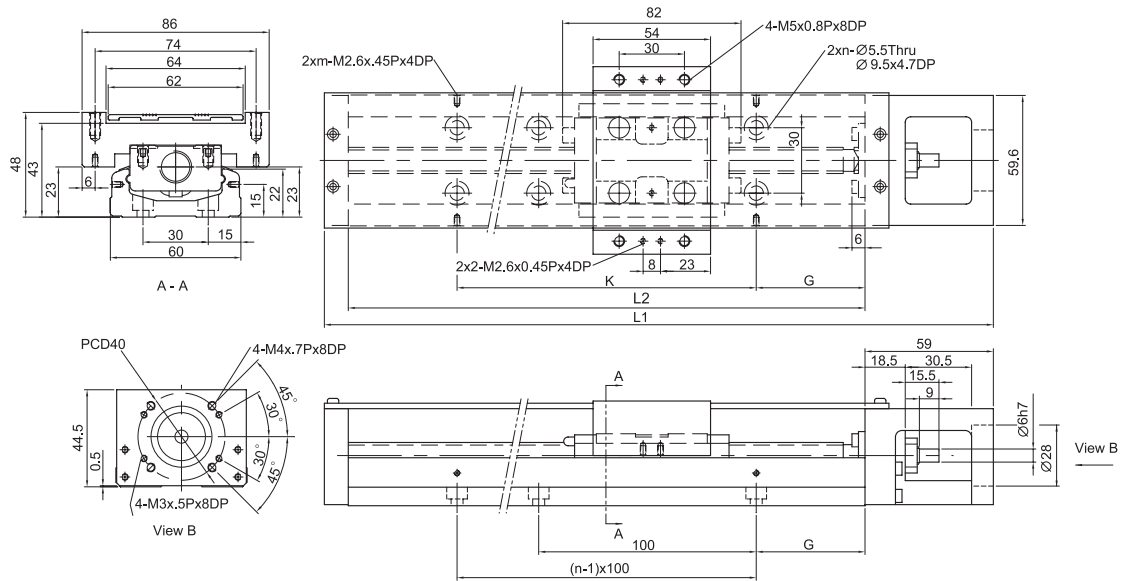
| RailLength<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | n | Mass(kg) |          |
|----------------------|------------------------|--------------------|----------|-------|---|----------|----------|
|                      |                        | A1 Block           | 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



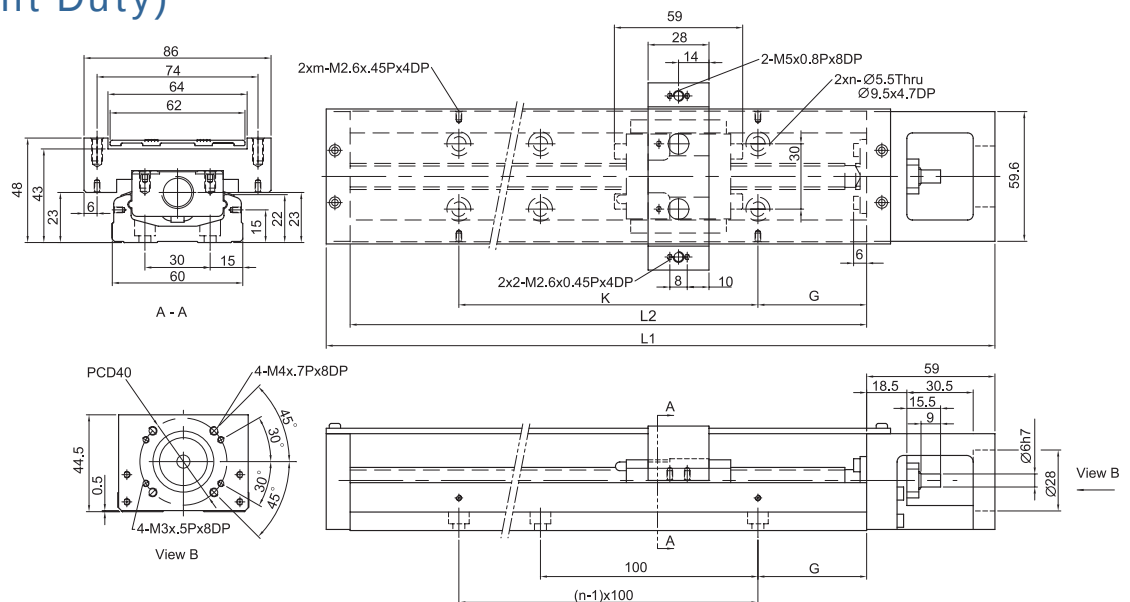
| Rail Length<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | K(mm) | n | Mass(kg) |          |
|-----------------------|------------------------|--------------------|----------|-------|-------|---|----------|----------|
|                       |                        | 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)



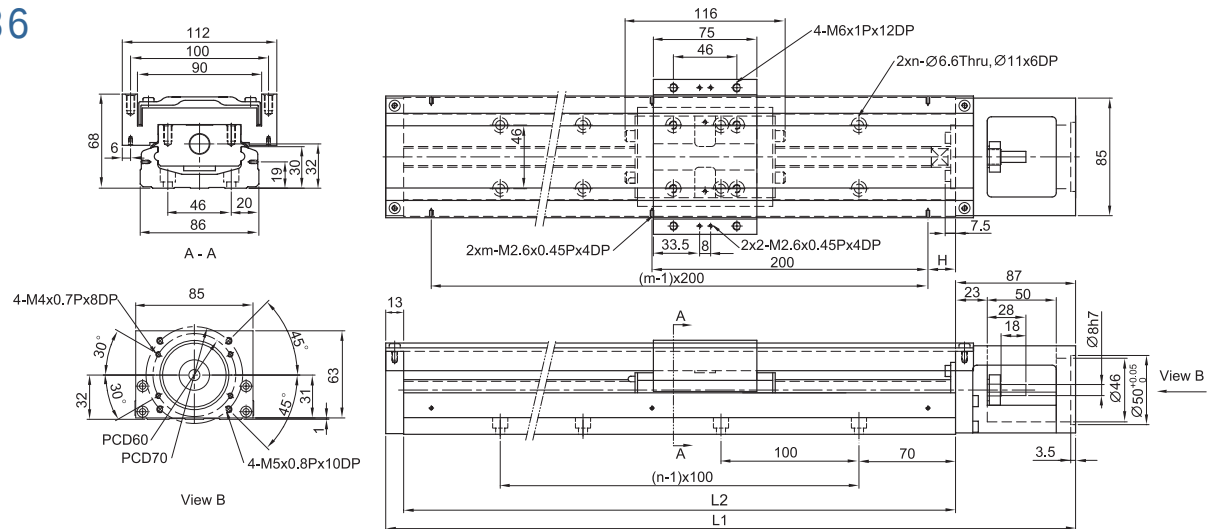
| Rail Length<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | K(mm) | n | m | Mass(kg) |          |
|-----------------------|------------------------|--------------------|----------|-------|-------|---|---|----------|----------|
|                       |                 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

## KK60(Light Duty)



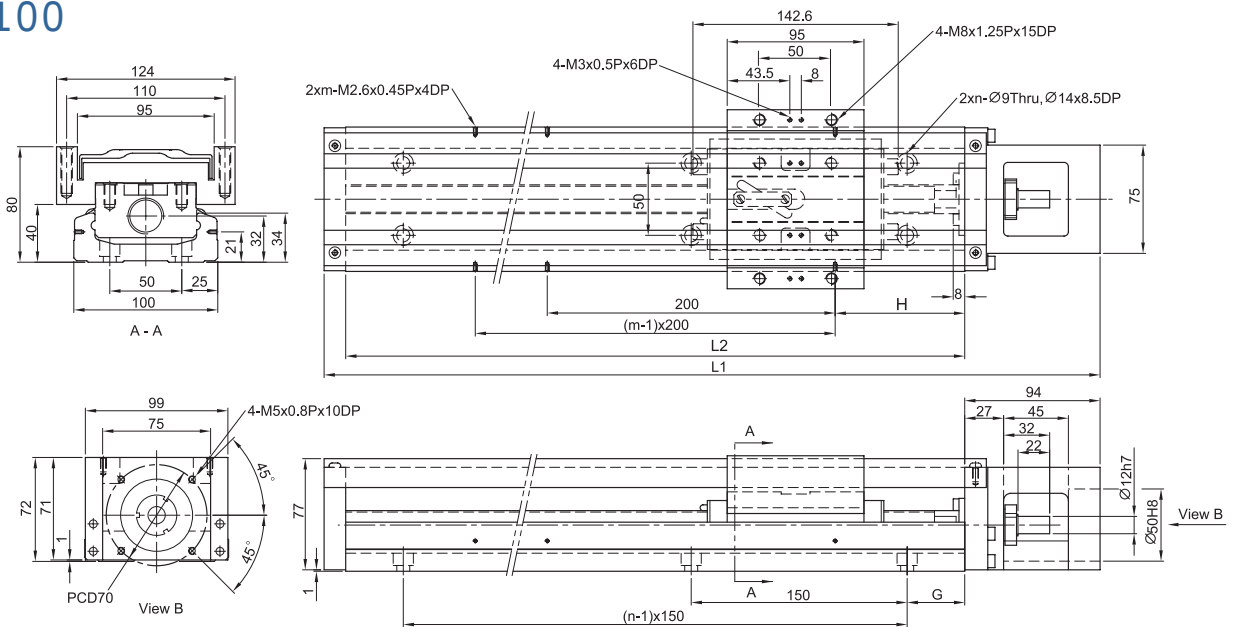
| Rail Length<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | K(mm) | n | m | Mass(kg) |          |
|-----------------------|------------------------|--------------------|----------|-------|-------|---|---|----------|----------|
|                       |                 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

## KK86



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

## KK100



| Rail Length<br>L2(mm) | Total Length<br>L1(mm) | Maximum Stroke(mm) |          | G(mm) | K(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     |