THK

NEW

Caged Ball™

LM Guide Actuators Featuring Caged Ball Technology

Caged Ball Technology Offers

Long life and long-term, maintenance-free operation
Excellent high speed performance
Reduced variations in rolling resistance and low noise

SKR

THK CO., LTD.
TOKYO. JAPAN

Catalog No. 309-3E

Type SKR LM Guide Actuator with Caged Ball Technology

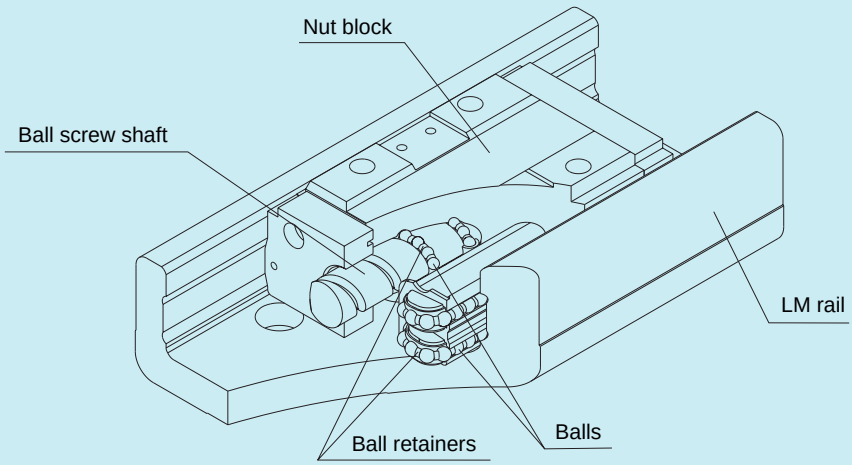


Figure 1 Construction of SKR-type LM Guide Actuator with Caged Ball Technology

Construction and Features

The SKR-type LM guide actuator with Caged Ball Technology is a compact actuator that places a nut block(s) that integrates an LM block and ball screw nut onto the inside of the LM rail of a U-shaped cross-sectional form. Moreover, the addition of the LM guide and ball screw sections with Caged Ball Technology allows the SKR-type LM guide actuator to achieve higher speed, lower noise, longer maintenance-free operation, and other features in comparison with the conventional KR-type.

1. Four-way Equal Load Rating

Each row of balls is arranged at a contact angle of 45° so that loads acting on the nut block in the four directions (radial, reverse-radial, and two lateral directions) show the same rated load. Thus, the SKR-type LM guide actuators can be used in any position.

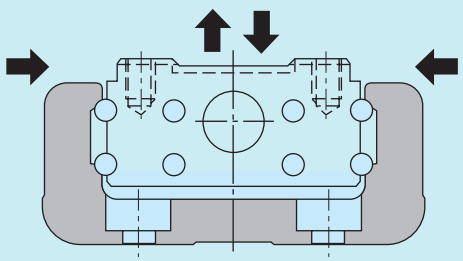


Figure 2 Load-carrying Capacity and Contact Angles of the SKR

2. High Rigidity

The adoption of the LM rail of a U-shaped cross-sectional form allows improved rigidity against moment

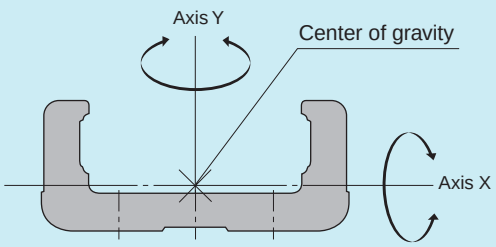


Figure 3 Sectional View of LM Rail

Table 1 LM Rail Cross-sectional Characteristics

Unit:mm^4

Model	I_X	I_Y	Mass:m(kg/100mm)
SKR33	5.35×10^4	3.52×10^5	0.61
SKR46	2.05×10^5	1.45×10^6	1.26

I_X = geometrical moment of inertia around axis X

I_Y = geometrical moment of inertia around axis Y

3. High Precision

The linear motion guide raceway has four rows of circular arc grooves that provide smooth motion by mere pre-load; clearance-free, highly rigid guidance is obtained. In addition, changes in frictional resistance resulting from load variations are minimized, allowing the SKR-type to achieve high-precision feed.

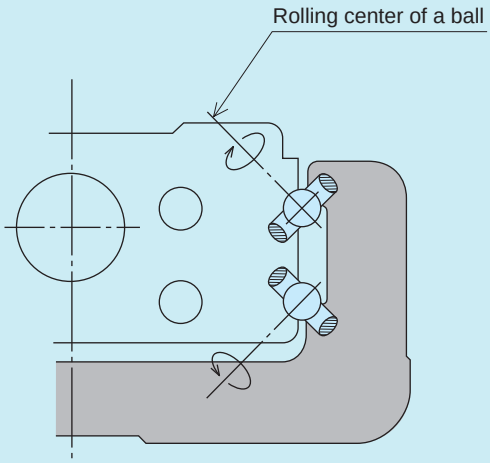
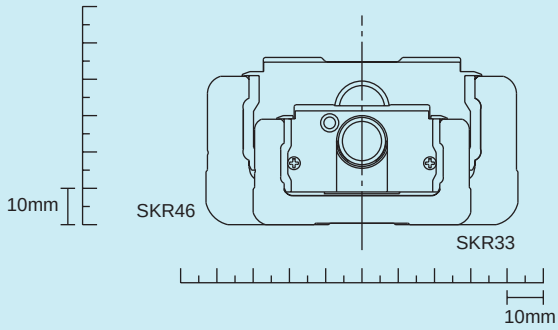


Figure 4 Contact Structure of SKR-Type

4. Space Saving

The integration of a LM guide raceway on both side faces of a nut block and the integration of a ball screw nut at the center of the nut block allow the SKR-type to achieve high rigidity and high precision in a minimal space.



5. Long Life Span and Long-term Maintenance-free Operation

Thanks to the effectiveness of its ball retainers, the SKR has improved grease retention capability, allowing it to achieve a long life span and long-term maintenance-free operation.
The SKR achieves a longer life span because its basic dynamic rated load at the LM guide and ball screw sections is greater than that of the conventional KR models (in the case of the KR3310, three times greater). The rated life span can be calculated by the following equation.

LM guide

$L = (C / P)^3 \times 50$

where

L : rated life span (km)

C : basic dynamic rated load (N)

P : carrying load (N)

Ball screw

$L = (Ca / Fa)^3 \times 10^6$

where

L : rated life span (rev.)

Ca : basic dynamic rated load (N)

Fa : carrying load in axial direction (N)

From the noted equations, the greater the basic dynamic rated load, the longer the life span for both the LM guide and ball screw sections.

Table 2 Comparison of the Basic Dynamic Rated Loads between the SKR and Conventional KR Types

Unit: N

Basic Dynamic Rated Load		SKR3310	KR3310	SKR4620	KR4620
LM Guide	Long type block	17000	11600	39500	27400
	Short type block	11300	4900	28400	14000
Ball Screw		2700	1760	4240	3040

6. High Speed

Through the use of Caged Ball Technology, the SKR-type is compatible with the latest high-speed rotational AC servo-motors (6000 min^{-1}), achieving higher speeds than the conventional KR-type.
The ball screw lead settings of the conventional KR33 type were 6 mm and 10 mm. To achieve a higher feed rate, a 20 mm ball screw lead has been added to the new SKR 33 series.

Table 3 Maximum Traverse Rate

Model	Ball Screw´s Lead (mm)	LM Rail Length (mm)	Maximum Travel Speed (mm/sec)	
			Long Block	Short Block
SKR33	06	150	600	
		200	600	
		300	600	
		400	600	
		500	600	
		600	552	530
		700	393	364
	10	150	1,000	
		200	1,000	
		300	1,000	
		400	1,000	
		500	1,000	
		600	920	839
		700	656	607
	20	150	2,000	—
		200	2,000	—
		300	2,000	—
		400	2,000	—
		500	2,000	—
		600	1,780	—
		700	1,276	—
SKR46	10	340	1,000	—
		440	1,000	
		540	1,000	
		640	1,026	914
		740	736	667
		940	431	400
	20	340	2,000	
		440	2,000	
		540	2,000	
		640	1,988	1,774
		740	1,433	1,300
		940	845	784

The maximum travel speed of the SKR-type is limited by the critical speed of the ball screw shaft, regardless of the maximum rotational speed (6000 min^{-1}) of the motor. Please keep this in mind when using the SKR-type in high-speed applications.
Please contact THK if you are considering using an SKR model at a rate higher than the maximum travel speed noted above.

7. Excellent Sliding Capability

Caged Ball Technology also helps the SKR-type eliminate ball-to-ball friction, significantly improving the torque characteristics. It minimizes torque variations, allowing excellent sliding capability.

Item	Value
Shaft diameter/lead	Ø13/10 mm
Shaft rotational speed	60 min^{-1}

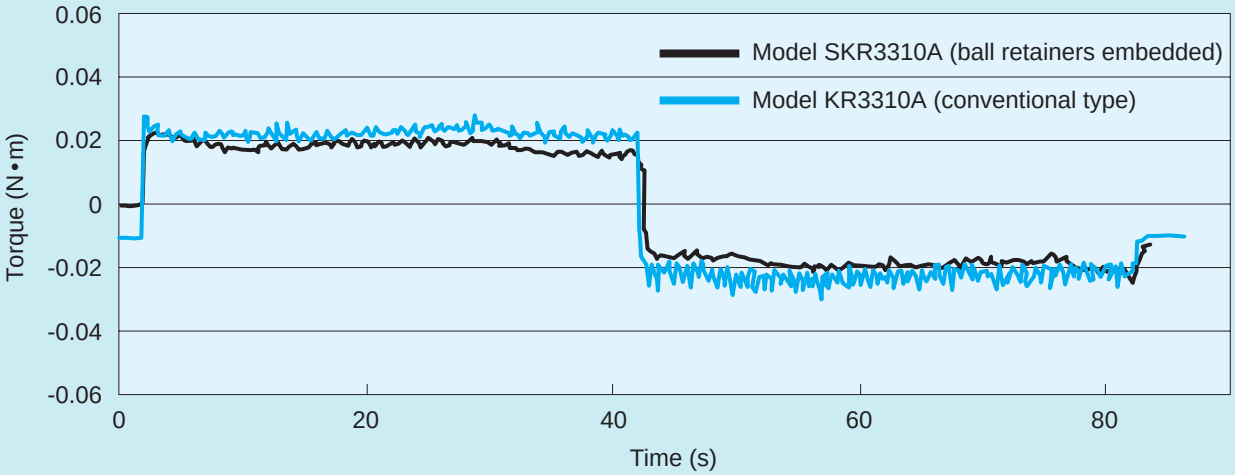


Figure 5 Comparison of Torque Variations between the SKR and KR Types

8. Low Noise

The use of Caged Ball Technology in the LM guide and ball screw allows the SKR-type to eliminate the noise caused by the balls colliding. This lets the SKR-type achieve low noise emission and a pleasing sound quality.

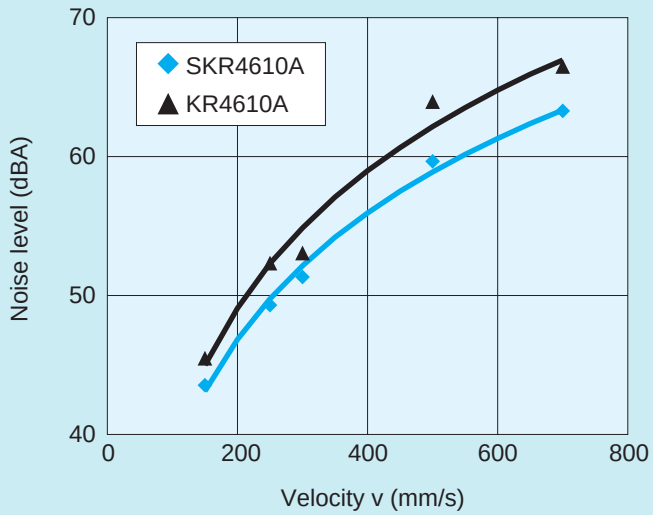
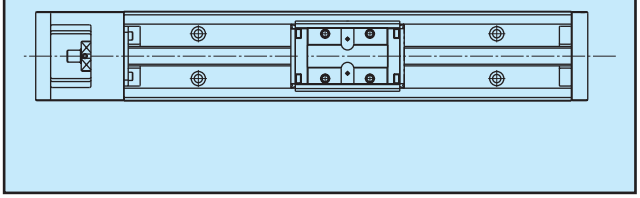


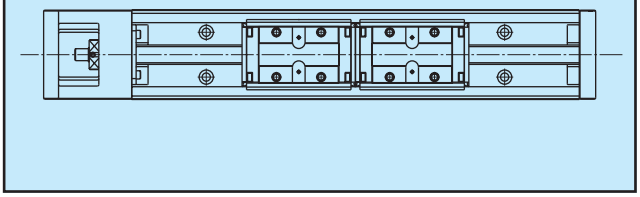
Figure 6 Comparison of the Noise Levels of the SKR4610A and KR4610A Models

SKR-A



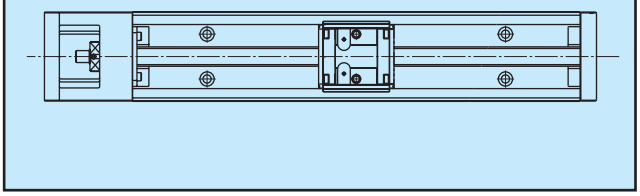
This is the typical SKR model.

SKR-B



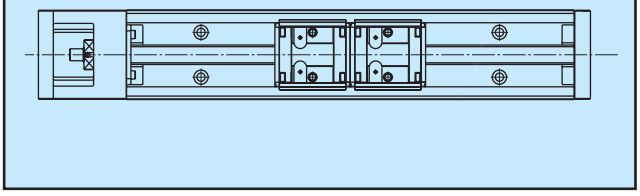
This is the model in which two nut blocks of the SKR-A model are provided to achieve higher rigidity, higher load capacity, and higher precision.

SKR-C



This is the model in which the full length of the SKR-A model nut block is shortened to have a longer stroke.
Note that the SKR3320 model has no short type block.

SKR-D

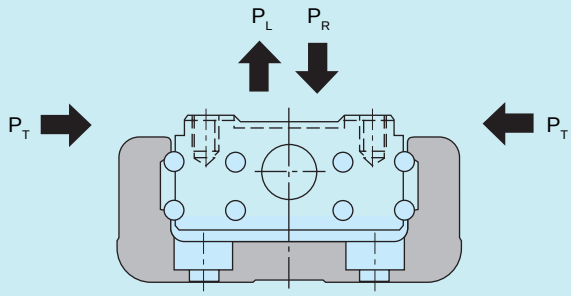


This is the model in which two SKR-C model nut blocks are provided. By placing two blocks, it achieves high rigidity within the application limits.
Note that the SKR3320 model has no short type block.

Rated Load and Static Permissible Moment in Each Direction

Rated Load

The SKR-type LM guide actuators with Caged Ball Technology consist of the LM guide, ball screw, and support bearing. Table 4 shows the rated loads.



- **LM guide section**
  The SKR-type can carry loads in all directions, i.e., the radial, reverse-radial, and two lateral directions. The basic rated load is the same in these four directions and their values are shown in Table 4.
- **Ball screw section**
  The SKR-type can carry loads in the axial direction since it incorporates a ball screw nut in the nut block. The basic rated load value is shown in Table 4.
- **Support bearing**
  The SKR-type can carry loads in the axial direction since it incorporates an angular bearing in housing A. The basic rated load value is shown in Table 4.

Equal Load (in the LM Guide)

When loads are simultaneously applied to the SKR-type's LM guide in all directions, the equivalent load is obtained by the following equation.

$P_E = P_R (P_L) + P_T$

where

P_E : equivalent load (N)
In the radial direction
In the reverse-radial direction
In the lateral directions
P_R : radial load (N)
P_L : reverse-radial load (N)
P_T : load in the lateral directions (N)

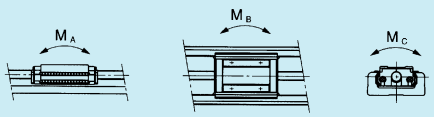
Table 4 Rated Loads

Model			SKR33			SKR46	
LM Guide	Basic dynamic rated load C (N)	Long type block, types A & B	17000			39500	
		Short type block, types C & D	11300			28400	
	Basic static rated load C_0 (N)	Long type block, types A & B	20400			45900	
		Short type block, types C & D	11500			28700	
	Radial clearance (mm)	Standard/high quality	0 to –0.004			0 to –0.006	
		Precision quality	–0.004 to –0.012			–0.006 to –0.016	
Ball Screw	Screw shaft outer diameter (mm)		13			15	
	Lead (mm)		6	10	20	10	20
	Root diameter (mm)		10.8			12.5	
	Ball center diameter (mm)		13.5			15.75	
	Basic dynamic rated load C_a (N)		4400	2700	2620	4350	4240
	Basic static rated load C_{0a} (N)		6290	3780	3770	6990	7040
Support Bearing	Basic dynamic rated load C_a (N)		6250			6700	
	Permissible static load P_{0a} (N)		2700			3330	

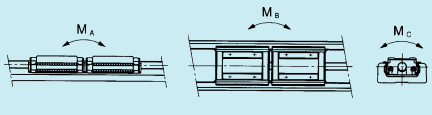
Notes: • The rated load of the LM guide is the rated load per nut block.
• Model SKR3320 has no short type block.

Permissible Moment (LM Guide)

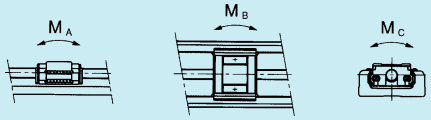
The SKR-type's LM guide section can carry moment loads in all directions, even though it uses only one nut block. Table 5 shows the permissible static moment values in the M_A, M_B, and M_C directions.



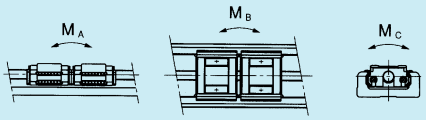
Use of one long type block (type A)



Use of one short type block (type C)



Use of two long type blocks closely linked together (type B)



Use of two short type blocks closely linked together (type D)

Figure 7 Permissible Static Moment in Each Direction

Table 5 Permissible Static Moment Unit: N·m

Model	Permissible Static Moment		
	M_A	M_B	M_C
SKR33 - A	173	173	424
SKR33 - B	990	990	848
SKR33 - C	58	58	240
SKR33 - D	390	390	480
SKR46 - A	579	579	1390
SKR46 - B	3240	3240	2780
SKR46 - C	236	236	870
SKR46 - D	1460	1460	1740

Note 1: Symbol A, B, C, or D at the end of the model number represents the type of nut block and the number of them in use.
A: long type block, one piece used
B: long type block, two pieces closely linked together
C: short type block, one piece used
D: short type block, two pieces closely linked together

Note 2: The permissible static moments for the SKR-B or SKR-D type show a value applicable when two nut blocks are used and closely linked together.

Life Span

The SKR-type LM guide actuator with Caged Ball Technology consists of the LM guide, ball screw, and support bearing. The life span of each constituting component can be calculated based on the basic dynamic rated load shown in Rated Loads (Table 4 on p. 6).

Calculation of Life Span

1) LM Guide

■ Rated Life Span

The rated life span (L) refers to the total traveling distance that 90% of a group of the same LM guides can achieve without flaking (flakes peeling off the metal surface) when these LM guides are individually moved under the same conditions. The rated life span of the LM guide can be obtained by equation (1).

$$L = \left(\frac{f_C \cdot C}{f_W \cdot P_C}\right)^3 \times 50 \quad \text{(1)}$$

where

L	: rated life span	(km)
C	: basic dynamic rated load	(N)
Pc	: calculated carrying load	(N)
fw	: load factor	(see Table 7)
fc	: contact factor	(see Table 6)

- If moment is acted on the SKR-type when using the SKR-A/-C type or the SKR-B/-D type of closely linked double nut blocks, multiply the acting moment by the equivalent coefficient shown in Table 8 to calculate equivalent load.

$$P_m = K \cdot M$$

where

Pm	: Equivalent load (per block)	(N)
K	: Moment-equivalent factor	
M	: Operating moment	(N·mm)

(If the SKR-type is used using three or more nut blocks or with the span separated, contact THK.)

Particularly, if moment acts upon the SKR-B or SKR-D, use the following equation:

$$P_m = \frac{K_C \cdot M_C}{2}$$

- If a radial load (P) and moment load act on the SKR-type simultaneously, use the following equation to calculate the life span:

$$P_E = P_m + P$$

where

PE	: Total equivalent radial load	(N)

■ **Life Span**

When the rated life span (L) is obtained, the life span can be calculated by equation (2) if the stroke length and reciprocations of the system per minute are defined.

$$L_h = \frac{L \times 10^6}{2 \cdot \ell_s \cdot n_1 \times 60} \quad (2)$$

where

L_h	: life span	(h)
ℓ_s	: stroke length	(mm)
n_1	: reciprocations per minute	(min^{-1})

2) Ball Screw and Support Bearing

■ **Rated Life Span**

The rated life span (L) refers to the total number of revolutions that 90% of a group of the same ball screws (support bearings) can achieve without flaking when individually operated under the exact conditions.
The rated life of the ball screws or support bearings is calculated by equation (3).

$$L = \left(\frac{C_a}{f_w \cdot F_a}\right)^3 \times 10^6 \quad (3)$$

where

L	: rated life span	(rev.)
C_a	: basic dynamic rated load	(N)
F_a	: axial load	(N)
f_w	: load factor	(see Table 7)

■ **Life Span**

When the rated life span (L) is obtained, the life span can be calculated by equation (4) if the stroke length and reciprocations of the system per minute are defined.

$$L_h = \frac{L \cdot \ell}{2 \cdot \ell_s \cdot n_1 \times 60} \quad (4)$$

where

L_h:	life span	(h)
ℓ_s:	stroke length	(mm)
n_1:	reciprocations per minute	(min^{-1})
ℓ:	ball screw lead	(mm)

● f_C: contact factor

If two nut blocks are used and closely linked together in the SKR-B or SKR-D type, multiply the basic rated load by the contact factor shown in Table 6.

Table 6 Contact Factor (f_C)

Types of Nut Blocks	Contact Factor f_C
A/C Type	1.0
B/D Type	0.81

● f_w: load factor

Table 7 shows the load factor.

Table 7 Load Factor (f_w)

Vibration or Impact	Velocity (V)	f_w
Minute	For crawling:V ≦ 0.25 m/s	1.0 to 1.2
Small	For slow speed:0.25 < V ≦ 1.0 m/s	1.2 to 1.5
Medium	For intermediate speed:1.0 < V ≦ 2.0 m/s	1.5 to 2.0
Large	For high speed:V > 2.0 m/s	2.0 to 3.5

● K: moment equivalent coefficient (LM guide)

If a moment load is incurred, the load-carrying distribution on the LM guide increases locally. In this case, multiply the moment value with the moment equivalent coefficient shown in Table 8 to make the load calculation.
K_A, K_B, and K_C show the moment equivalent coefficients in the M_A, M_B, and M_C directions respectively.

Table 8 Moment Equivalent Coefficient (K)

Model	K_A	K_B	K_C
SKR33 - A	1.42×10^{-1}	1.42×10^{-1}	5.05×10^{-2}
SKR33 - B	2.47×10^{-2}	2.47×10^{-2}	5.05×10^{-2}
SKR33 - C	2.39×10^{-1}	2.39×10^{-1}	5.05×10^{-2}
SKR33 - D	3.54×10^{-2}	3.54×10^{-2}	5.05×10^{-2}
SKR46 - A	9.51×10^{-2}	9.51×10^{-2}	3.46×10^{-2}
SKR46 - B	1.70×10^{-2}	1.70×10^{-2}	3.46×10^{-2}
SKR46 - C	1.46×10^{-1}	1.46×10^{-1}	3.46×10^{-2}
SKR46 - D	2.36×10^{-2}	2.36×10^{-2}	3.46×10^{-2}

K_A: moment equivalent coefficient in the M_A direction K_B: moment equivalent coefficient in the M_B direction
K_C: moment equivalent coefficient in the M_C direction
Note: For the SKR-B and SKR-D types, the moment equivalent coefficient shows the value applied when two nut blocks are closely linked together.

Accuracy Criteria

The tables below show the accuracy criteria of the SKR-type.

Table 9 Accuracy Criteria

Table 9-1 Standard Quality (No Symbol Assigned)

Unit: mm

Model	Rail Length	Repetitive Positioning Accuracy	Positioning Accuracy	Traveling Parallelism	Backlash	Starting Torque (N-cm)
SKR33	150	± 0.010	Not specified	Not specified	0.020	7
	200					
	300					
	400					
	500					
	600					
	700					
SKR46	340	± 0.010	Not specified	Not specified	0.020	10
	440					
	540					
	640					
	740					
	940					

Table 9-2 High Quality (H)

Unit: mm

Model	Rail Length	Repetitive Positioning Accuracy	Positioning Accuracy	Traveling Parallelism	Backlash	Starting Torque (N-cm)
SKR33	150	± 0.005	0.060	0.025	0.020	7
	200					
	300					
	400					
	500		0.100	0.035		
	600					
	700		0.120	0.040		
SKR46	340	± 0.005	0.100	0.035	0.020	10
	440					
	540					
	640					
	740		0.120	0.040		
	940		0.150	0.050		

Table 9-3 Precision Quality (P)

Unit: mm

Model	Rail Length	Repetitive Positioning Accuracy	Positioning Accuracy	Traveling Parallelism	Backlash	Starting Torque (N-cm)
SKR33	150	± 0.003	0.020	0.010	0.003	15
	200					
	300					
	400					
	500		0.025	0.015		
	600					
	700		0.030	0.020		
SKR46	340	± 0.003	0.025	0.015	0.003	15
	440					
	540					
	640					17
	740		0.030	0.020		

The evaluation method of the accuracy criteria complies with the THK standards.
The starting torque shows a value achieved when THK AFB-LF grease is used with the product.

If high-viscosity grease, such as vacuum grease or clean room grease, is used, there are cases where the criteria value is exceeded. In such a case, exercise care when selecting the motor.

Accuracy Standards

The precision of the SKR is determined by repetitive positioning accuracy, positioning accuracy, backlash, and traveling parallelism.

Repetitive Positioning Accuracy

Repeat the measurement seven times from the same direction to a certain point. Divide the maximum difference by two. Conduct the same test at three points, the “center” of the stroke, and on both the approximate maximum and minimum positions of travel. Add ± to the largest difference. This accuracy is generally measured with a laser interferometer and sometimes with a dial-gauge.
(Taken from THK Accuracy & Measurement Standards.)

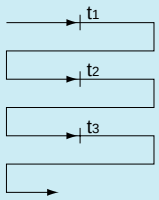


Figure. 8 Repetitive Positioning Accuracy

Positioning Accuracy

The maximum stroke is taken as the reference length, and the maximum error between the actual distance traveled from the reference position and the instructed value is expressed as an absolute value.

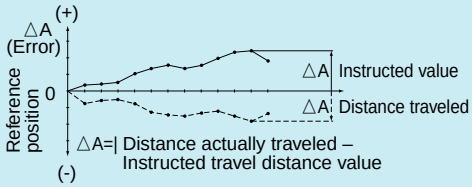


Figure. 9 Positioning Accuracy

Backlash

Lock the actuator’s carriage into a fixed position via the actuator’s drive mechanism. Do not lock the actuator’s carriage by “fixing” it rigidly. Push the carriage from one direction with a predetermined external force using a push/pull gauge. Zero out the dial-gauge while the axial force is being applied-release the external force and read the dial-gauge. Measure at three separate points along the stroke, at the center and the end of travel positions. Backlash is the maximum measured value.

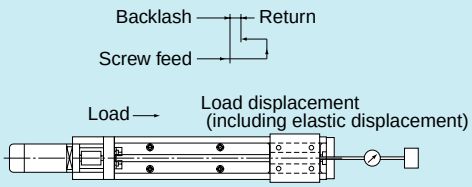


Figure. 10 Backlash

Travel Parallelism

A straightedge is placed on a leveling plate mounted with the SKR, and parallelism is measured over almost the entire distance traveled using a test indicator. The maximum error in the reading within the distance traveled is taken as the measurement value.

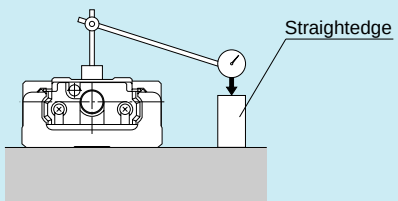
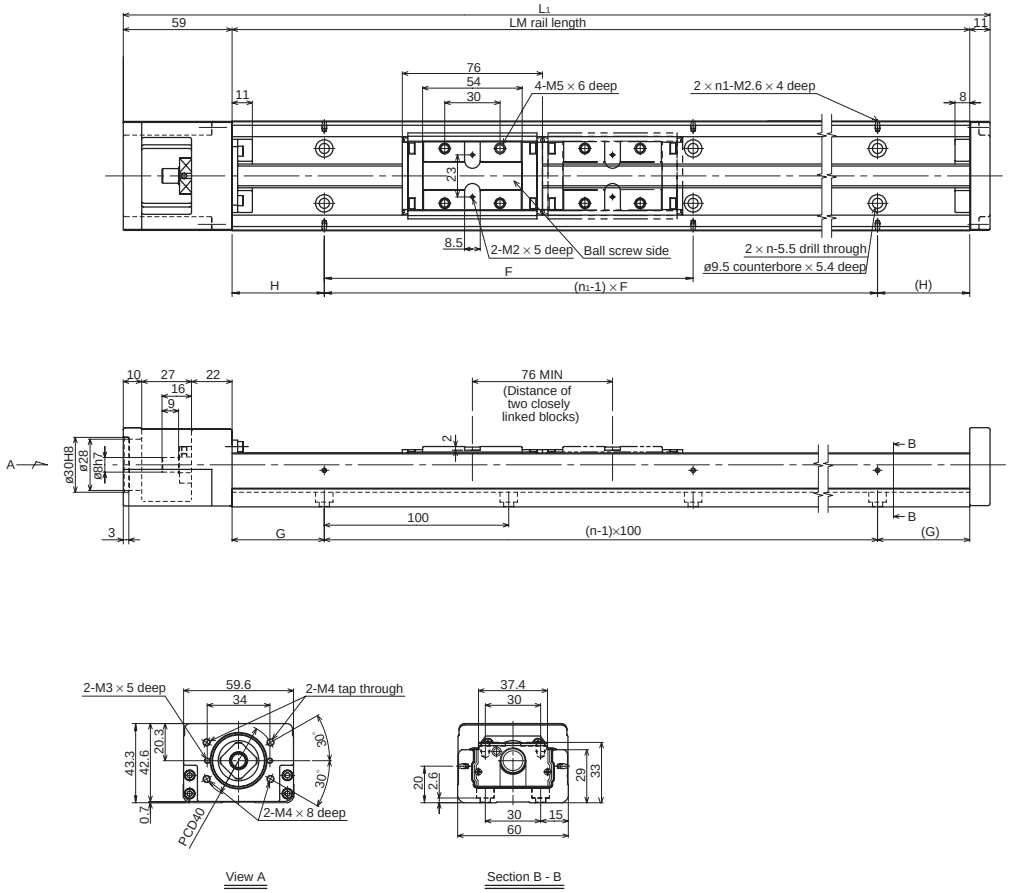


Figure. 11 Travel Parallelism

SKR33 □□□ Standard Specifications

SKR33 □□ A (With one nut block)

SKR33 □□ B (with two long blocks)



LM Rail Length (mm)	Full Length L1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	F (mm)	n	n1	Unit's Total Weight (kg)	
		Type A	Type B						Type A	Type B
150	220	55	——	25	25	100	2	2	1.7	——
200	270	105	——	50	50	100	2	2	2.1	——
300	370	205	129	50	50	200	3	2	2.8	3.1
400	470	305	229	100	50	200	4	2	3.5	3.8
500	570	405	329	50	50	200	5	3	4.2	4.5
600	670	505	429	100	50	200	6	3	5.0	5.3
700	770	605	529	50	50	200	7	4	5.7	6.0

The possible stroke range of SKR33□□B shows a value applicable when the product is used with two long type blocks closely linked together.

How to Interpret the Model Number

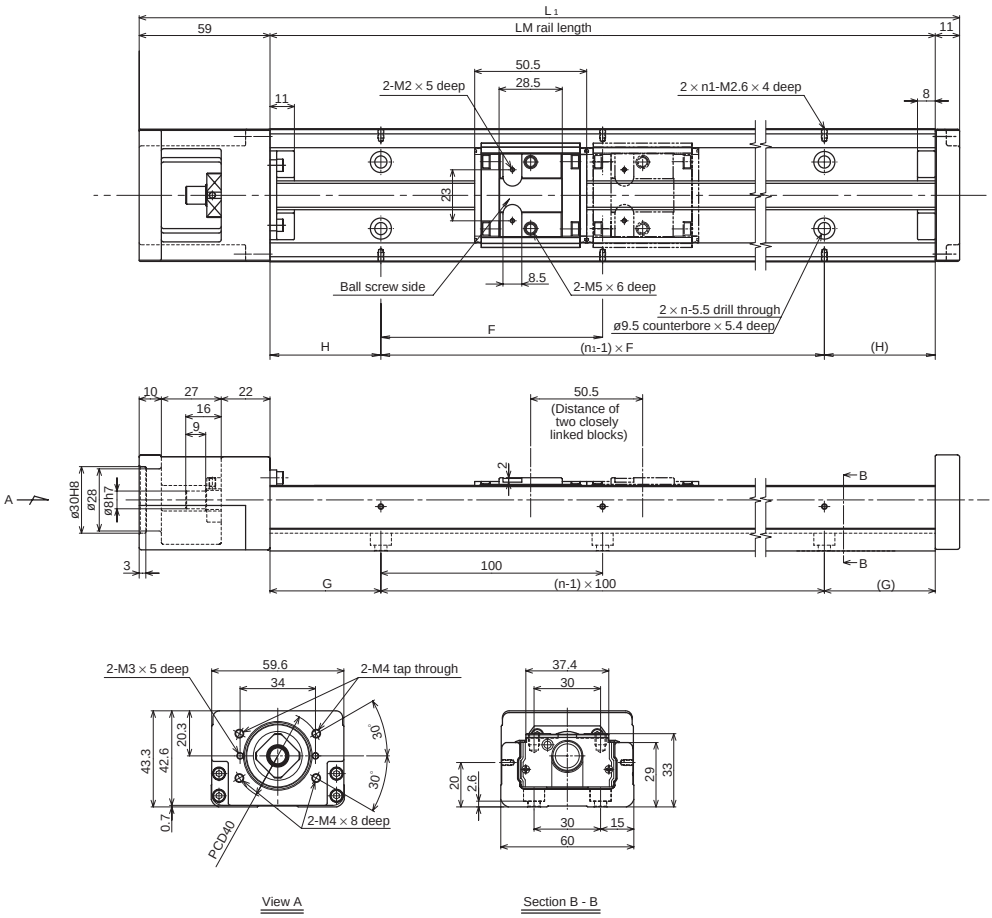
SKR33 20 A + 700L P 0 - 0 0 0 0

1 2 3 4 5 6 7 8 9 10 11

1 Model number 2 Ball screw lead (mm) 3 Type of nut block 4 LM rail length (mm)
5 Accuracy grade 6 Presence/Absence of a motor 7 Presence/Absence of a cover
8 Sensor specifications 9 Type of housing – A: 0 10 Type of intermediate flange (see page 20)
11 Control number

SKR33 □□ C (with one short block)

SKR33 □□ D (with two short blocks)



LM Rail Length (mm)	Full Length L_1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	F (mm)	n	n_1	Unit's Total Weight (kg)	
		Type C	Type D						Type C	Type D
150	220	80.5	30	25	25	100	2	2	1.6	1.8
200	270	130.5	80	50	50	100	2	2	2.0	2.1
300	370	230.5	180	50	50	200	3	2	2.7	2.8
400	470	330.5	280	100	50	200	4	2	3.4	3.6
500	570	430.5	380	50	50	200	5	3	4.1	4.3
600	670	530.5	480	100	50	200	6	3	4.8	5.0
700	770	630.5	580	50	50	200	7	4	5.5	5.7

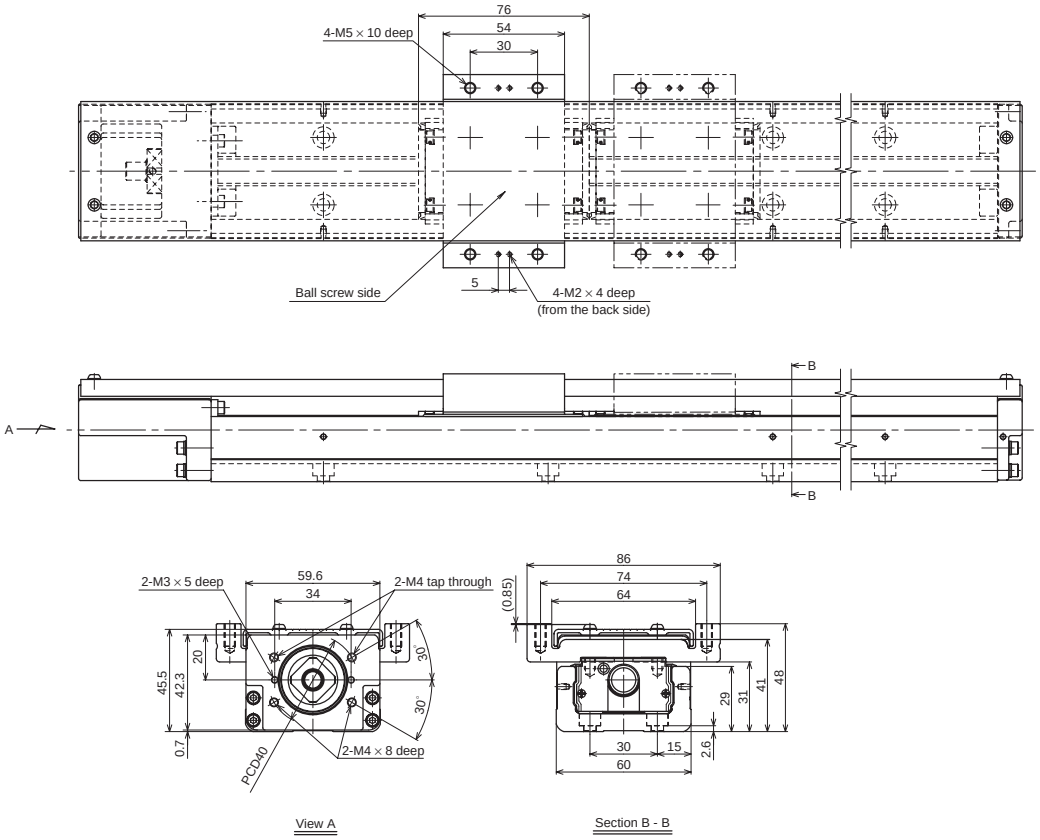
The possible stroke range of SKR33□□D shows a value applicable when the product is used with two short type blocks closely linked together.

5 Accuracy Class	Symbol	Standard quality			High quality			Precision quality				
	Description	No Symbol			H			P				
6 Provision of Motor	Symbol	Not provided			Provided							
	Description	0			1							
7 Provision of Cover	Symbol	Not provided			Provided							
	Description	0			1							
8 Sensor Specifications	Description	None	With a sensor rail	Photosensor EE-SX671 (Omron)	Proximity sensor (ON if an item approaches) GL-12F (SUNX)	Proximity sensor (ON if an item approaches) GXL-N12F (SUNX)	Photosensor EE-SX674 (Omron)	Proximity sensor (ON if an item approaches) APM-D3A1 (Yamatake)	Proximity sensor (ON if an item approaches) GL-N12F (SUNX)	Proximity sensor (ON if an item moves away) GL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) GXL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) APM-D3B1 (Yamatake)
	Symbol	0	1	2	4	5	6	7	8	9	A	B

SKR33 □□□ (with the Cover)

SKR33 □□ A (with one long block)

SKR33 □□ B (with two long blocks)



LM Rail Length (mm)	Full Length L_1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	F (mm)	n	n_1	Unit's Total Weight (kg)	
		Type A	Type B						Type A	Type B
150	220	55	——	25	25	100	2	2	1.9	——
200	270	105	——	50	50	100	2	2	2.3	——
300	370	205	129	50	50	200	3	2	3.1	3.5
400	470	305	229	100	50	200	4	2	3.8	4.2
500	570	405	329	50	50	200	5	3	4.6	5.0
600	670	505	429	100	50	200	6	3	5.3	5.7
700	770	605	529	50	50	200	7	4	6.1	6.5

The possible stroke range of SKR33□□B shows a value applicable when the product is used with two long type blocks closely linked together.

How to Interpret the Model Number

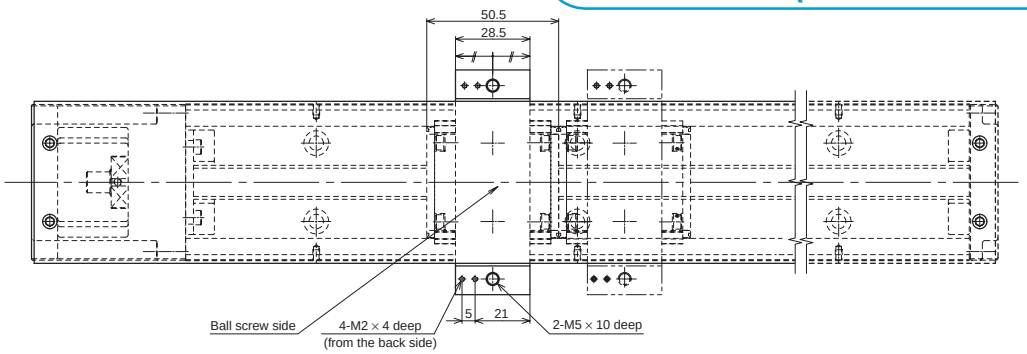
SKR33 20 A + 700L P 0 - 0 0 0 0

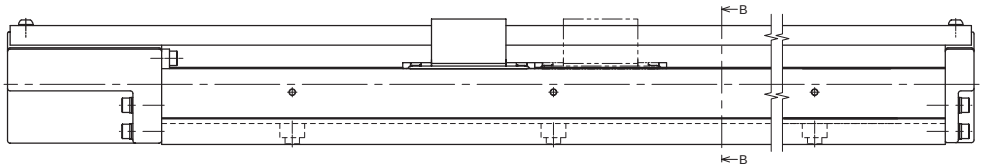
1 2 3 4 5 6 7 8 9 10 11

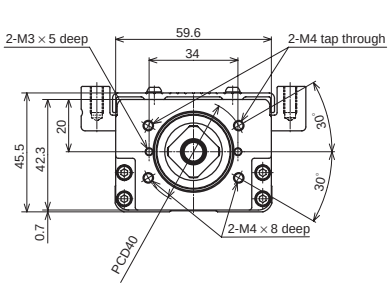
1 Model number
2 Ball screw lead (mm)
3 Type of nut block
4 LM rail length (mm)
5 Accuracy grade
6 Presence/Absence of a motor
7 Presence/Absence of a cover
8 Sensor specifications
9 Type of housing – A: 0
10 Type of intermediate flange (see page 20)
11 Control number

SKR33 □□ C (with one short block)

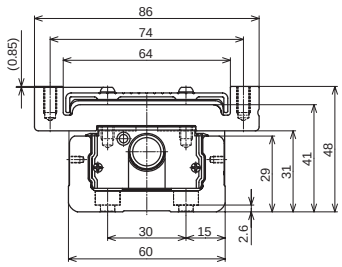
SKR33 □□ D (with two short blocks)







View A



Section B - B

LM Rail Length (mm)	Full Length L_1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	F (mm)	n	n_1	Unit's Total Weight (kg)	
		Type C	Type D						Type C	Type D
150	220	80.5	30	25	25	100	2	2	1.8	2.0
200	270	130.5	80	50	50	100	2	2	2.2	2.3
300	370	230.5	180	50	50	200	3	2	2.9	3.1
400	470	330.5	280	100	50	200	4	2	3.7	3.8
500	570	430.5	380	50	50	200	5	3	4.4	4.6
600	670	530.5	480	100	50	200	6	3	5.2	5.3
700	770	630.5	580	50	50	200	7	4	5.9	6.1

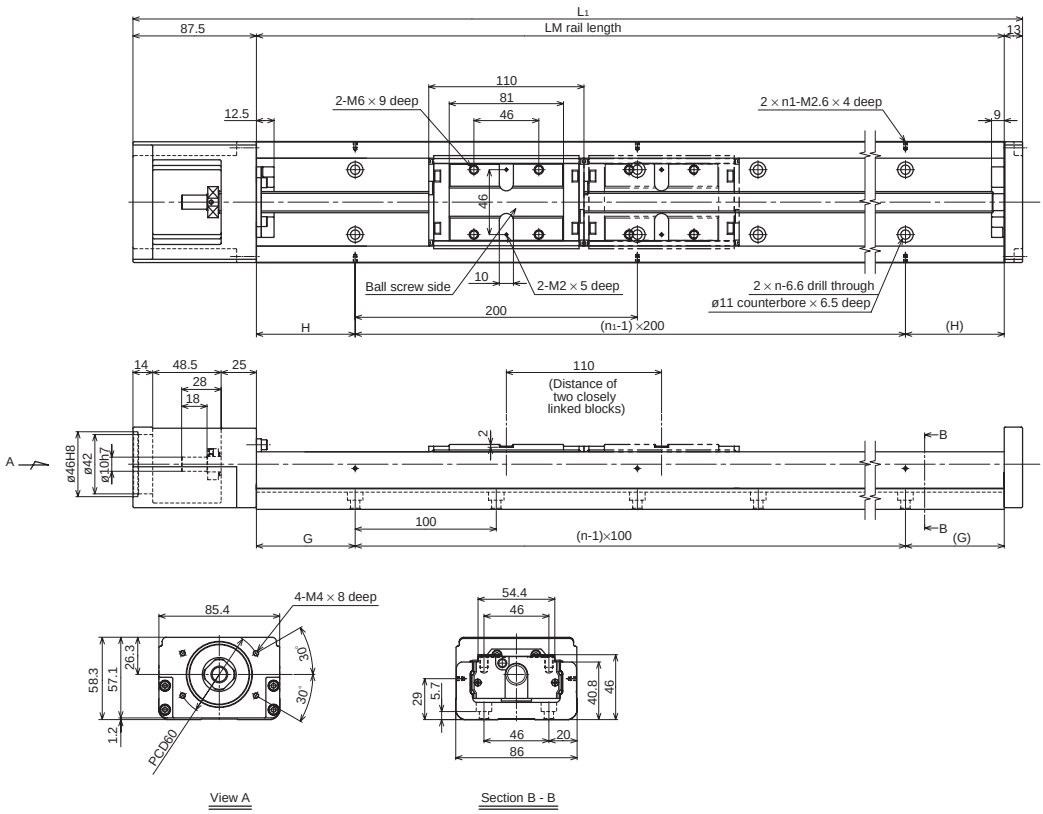
The possible stroke range of SKR33□□D shows a value applicable when the product is used with two short type blocks closely linked together.

5 Accuracy Class	Symbol	Standard quality			High quality			Precision quality				
	Description	No Symbol			H			P				
6 Provision of Motor	Symbol	Not provided						Provided				
	Description	0						1				
7 Provision of Cover	Symbol	Not provided						Provided				
	Description	0						1				
8 Sensor Specifications	Description	None	With a sensor rail	Photosensor EE-SX671 (Omron)	Proximity sensor (ON if an item approaches) GL-12F (SUNX)	Proximity sensor (ON if an item approaches) GXL-N12F (SUNX)	Photosensor EE-SX674 (Omron)	Proximity sensor (ON if an item approaches) APM-D3A1 (Yamatake)	Proximity sensor (ON if an item approaches) GL-N12F (SUNX)	Proximity sensor (ON if an item moves away) GL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) GXL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) APM-D3B1 (Yamatake)
	Symbol	0	1	2	4	5	6	7	8	9	A	B

SKR46 □□□ Standard Specifications

SKR46 □□ A (with one long block)

SKR46 □□ B (with two long blocks)



LM Rail Length (mm)	Full Length L_1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	n	n_1	Unit's Total Weight (kg)	
		Type A	Type B					Type A	Type B
340	440.5	208.5	98.5	70	70	3	2	6.4	7.4
440	540.5	308.5	198.5	20	70	4	3	7.8	8.7
540	640.5	408.5	298.5	70	70	5	3	9.2	10.1
640	740.5	508.5	398.5	20	70	6	4	10.6	11.5
740	840.5	608.5	498.5	70	70	7	4	12.0	12.9
940	1040.5	808.5	698.5	70	70	9	5	14.8	15.7

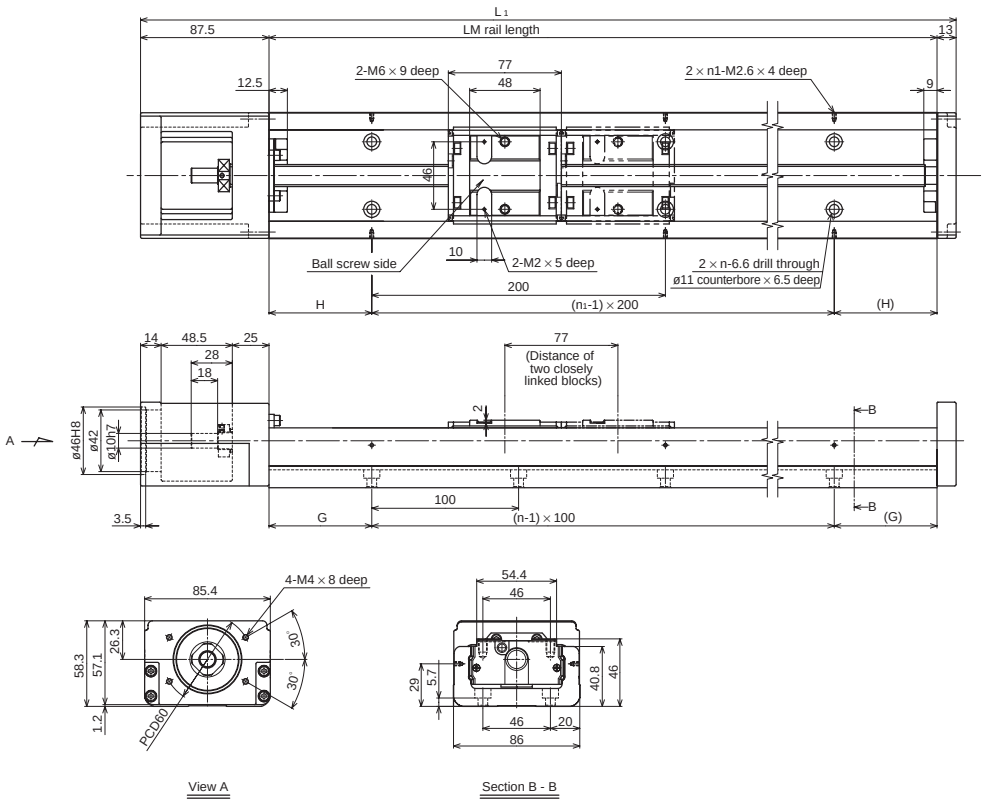
The possible stroke range of SKR46□□B shows a value applicable when the product is used with two long type blocks closely linked together.

How to Interpret the Model Number

SKR46 20 A + 940L P 0 - 0 0 0 0

1 2 3 4 5 6 7 8 9 10 11

1 Model number 2 Ball screw lead (mm) 3 Type of nut block 4 LM rail length (mm)
5 Accuracy grade 6 Presence/Absence of a motor 7 Presence/Absence of a cover
8 Sensor specifications 9 Type of housing – A: 0 10 Type of intermediate flange (see page 20)
11 Control number



LM Rail Length (mm)	Full Length L1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	n	n1	Unit's Total Weight (kg)	
		Type A	Type B					Type A	Type B
340	440.5	241.5	164.5	70	70	3	2	6.1	6.7
440	540.5	341.5	264.5	20	70	4	3	7.5	8.1
540	640.5	441.5	364.5	70	70	5	3	8.9	9.5
640	740.5	541.5	464.5	20	70	6	4	10.3	10.8
740	840.5	641.5	564.5	70	70	7	4	11.7	12.2
940	1040.5	841.5	764.5	70	70	9	5	14.5	15.0

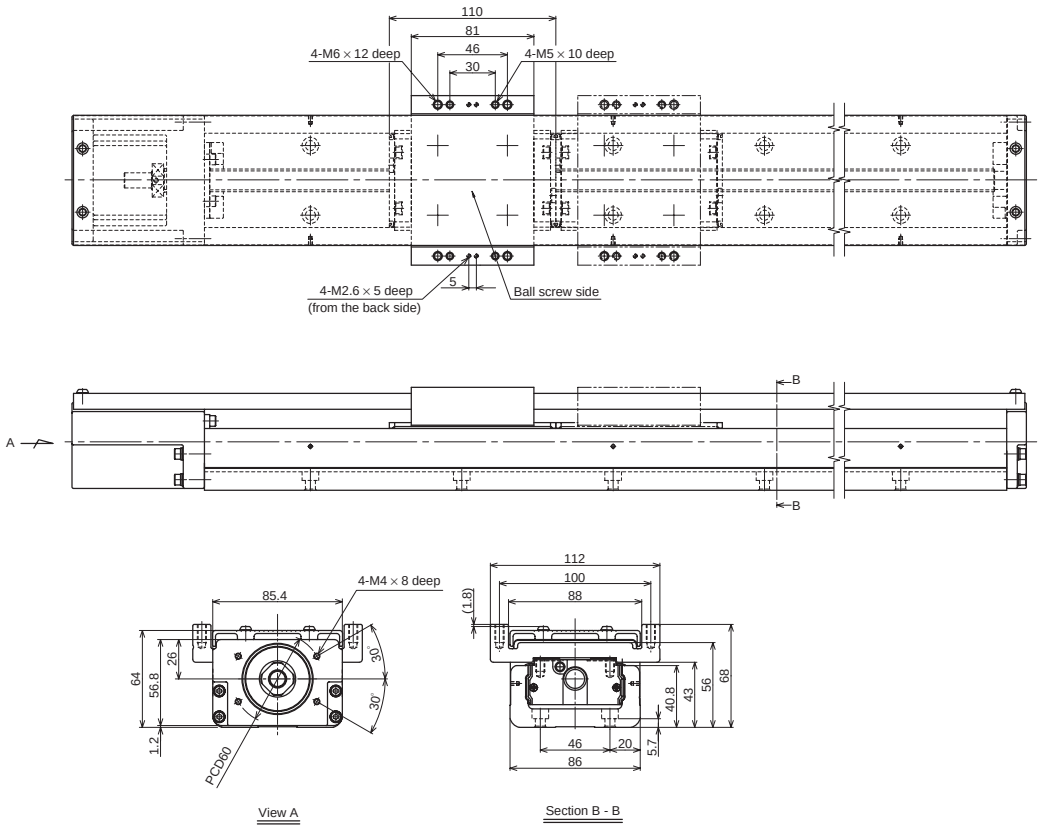
The possible stroke range of SKR46□□D shows a value applicable when the product is used with two short type blocks closely linked together.

5 Accuracy Class	Symbol	Standard quality			High quality			Precision quality				
	Description	No Symbol			H			P				
6 Provision of Motor	Symbol	Not provided						Provided				
	Description	0						1				
7 Provision of Cover	Symbol	Not provided						Provided				
	Description	0						1				
8 Sensor Specifications	Description	None	With a sensor rail	Photosensor EE-SX671 (Omron)	Proximity sensor (ON if an item approaches) GL-12F (SUNX)	Proximity sensor (ON if an item approaches) GXL-N12F (SUNX)	Photosensor EE-SX674 (Omron)	Proximity sensor (ON if an item approaches) APM-D3A1 (Yamatake)	Proximity sensor (ON if an item approaches) GL-N12F (SUNX)	Proximity sensor (ON if an item moves away) GL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) GXL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) APM-D3B1 (Yamatake)
	Symbol	0	1	2	4	5	6	7	8	9	A	B

SKR46 □□□ (with the Cover)

SKR46 □□ A (with one long block)

SKR46 □□ B (with two long blocks)



LM Rail Length (mm)	Full Length L_1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	n	n_1	Unit's Total Weight (kg)	
		Type A	Type B					Type A	Type B
340	440.5	208.5	98.5	70	70	3	2	7.1	8.3
440	540.5	308.5	198.5	20	70	4	3	8.6	9.8
540	640.5	408.5	298.5	70	70	5	3	10.0	11.3
640	740.5	508.5	398.5	20	70	6	4	11.5	12.7
740	840.5	608.5	498.5	70	70	7	4	13.0	14.2
940	1040.5	808.5	698.5	70	70	9	5	16.0	17.2

The possible stroke range of SKR46□□B shows a value applicable when the product is used with two long type blocks closely linked together.

How to Interpret the Model Number

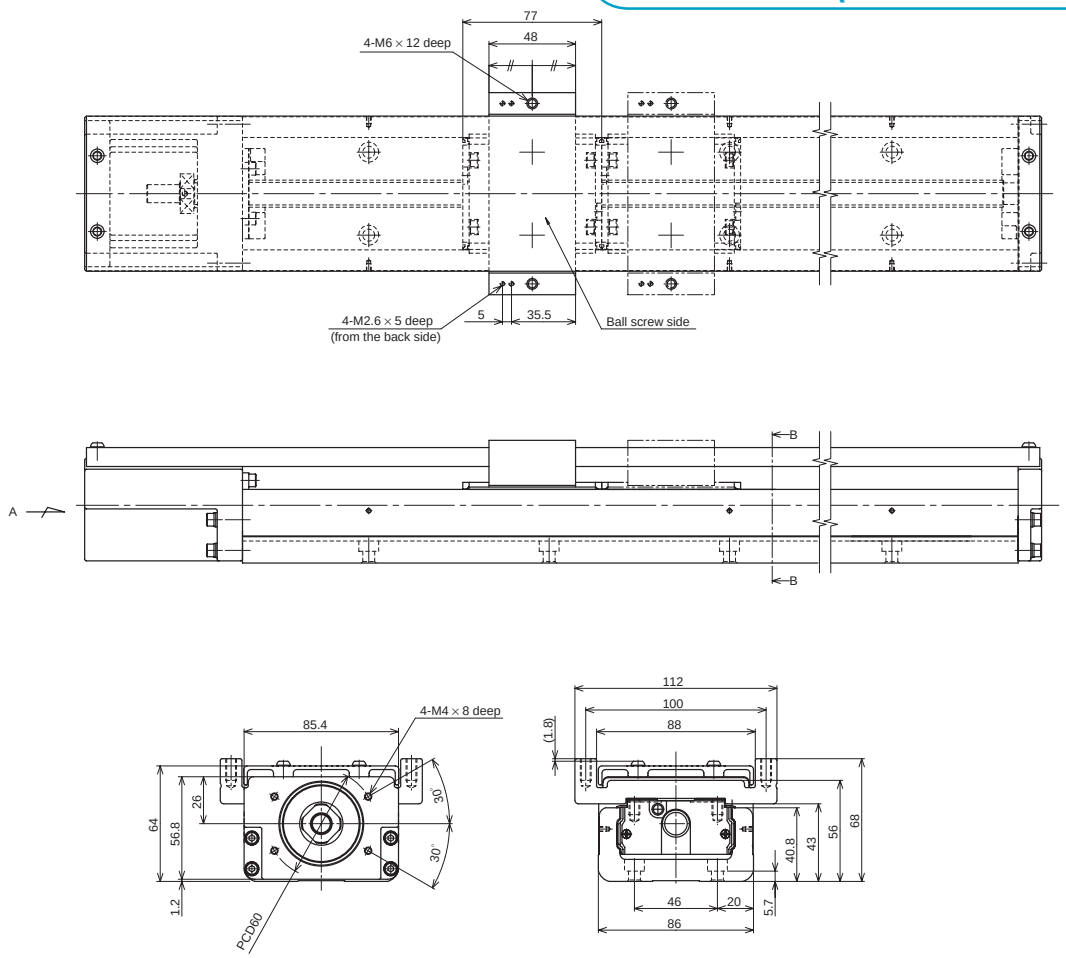
SKR46 20 A + 940L P 0 - 0 0 0 0

1 2 3 4 5 6 7 8 9 10 (11)

1 Model number
2 Ball screw lead (mm)
3 Type of nut block
4 LM rail length (mm)
5 Accuracy grade
6 Presence/Absence of a motor
7 Presence/Absence of a cover
8 Sensor specifications
9 Type of housing – A: 0
10 Type of intermediate flange (see page 20)
11 Control number

SKR46 □□ C (with one short block)

SKR46 □□ D (with two short blocks)



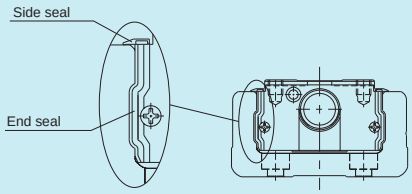
LM Rail Length (mm)	Full Length L_1 (mm)	Possible Stroke Range (mm)		H (mm)	G (mm)	n	n_1	Unit's Total Weight (kg)	
		Type C	Type D					Type C	Type D
340	440.5	241.5	164.5	70	70	3	2	6.6	7.4
440	540.5	341.5	264.5	20	70	4	3	8.1	8.9
540	640.5	441.5	364.5	70	70	5	3	9.6	10.3
640	740.5	541.5	464.5	20	70	6	4	11.0	11.8
740	840.5	641.5	564.5	70	70	7	4	12.5	13.3
940	1040.5	841.5	764.5	70	70	9	5	15.5	16.3

The possible stroke range of SKR46□□D shows a value applicable when the product is used with two short type blocks closely linked together.

5 Accuracy Class	Symbol	Standard quality				High quality				Precision quality		
	Description	No Symbol				H				P		
6 Provision of Motor	Symbol	Not provided						Provided				
	Description	0						1				
7 Provision of Cover	Symbol	Not provided						Provided				
	Description	0						1				
8 Sensor Specifications	Description	None	With a sensor rail	Photosensor EE-SX671 (Omron)	Proximity sensor (ON if an item approaches) GL-12F (SUNX)	Proximity sensor (ON if an item approaches) GXL-N12F (SUNX)	Photosensor EE-SX674 (Omron)	Proximity sensor (ON if an item approaches) APM-D3A1 (Yamatake)	Proximity sensor (ON if an item approaches) GL-N12F (SUNX)	Proximity sensor (ON if an item moves away) GL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) GXL-N12FB (SUNX)	Proximity sensor (ON if an item moves away) APM-D3B1 (Yamatake)
	Symbol	0	1	2	4	5	6	7	8	9	A	B

Seals

The SKR is equipped with an end seal and side seal as standard for dust-proofing.



Sensors

Sensors

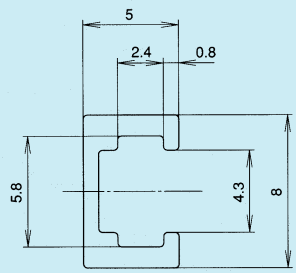
Proximity sensors and photosensors are available as options for the SKR33 and SKR46. When a customer specifies a model with a sensor, specially designed sensor rails and sensor dogs are supplied with the product.

Proximity sensors	GL-12 (SUNX)	3 units
	GL-N12F (B) (SUNX)	3 units
	GXL-N12F (B) (SUNX)	3 units
	APM-D3A1-001 (Yamatake)	3 units
	(APM-D3B1-003)	
Photosensors	EE-SX671 (OMRON)	3 units
	EE-SX674 (OMRON)	3 units
Connectors	EE-1001 (OMRON)	3 units

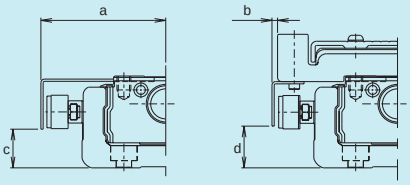
Note: Connectors come as standard with photosensors.

Sensor rails

It is also possible to install a sensor rail only.



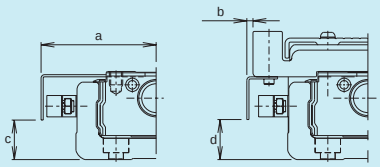
Proximity sensors GL-12F, GL-N12F (B), and GXL-N12F (B) (SUNX)



Unit: mm

Model	a	b	c	d
SKR33	44.7	2	13.8	14
SKR46	57.7	1.8	24.8	22

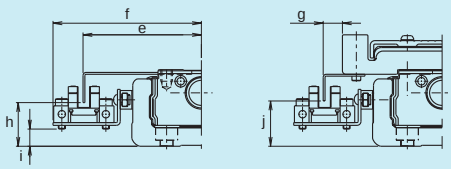
Proximity sensors APM-D3A1 and APM-D3B1 (Yamatake)



Unit: mm

Model	a	b	c	d
SKR33	43.05	0.3	14.8	15
SKR46	56.2	0.2	26.8	22

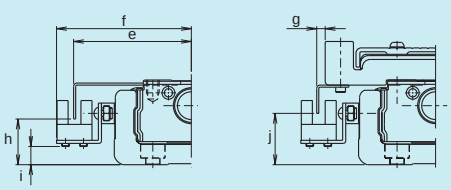
Photosensor EE-SX671 (Omron)



Unit: mm

Model	e	f	g	h	i	j
SKR33	51.1	63.6	8.3	18.8	7.4	19.5
SKR46	64.1	76.6	8.3	29.8	16.4	26.5

Photosensor EE-SX674 (Omron)



Unit: mm

Model	e	f	g	h	i	j
SKR33	45.9	52.1	3.3	17.8	7.1	20
SKR46	58.9	65.1	3.2	28.8	16.1	27

Intermediate Flanges

Applicable Motors and Applicable Intermediate Flanges

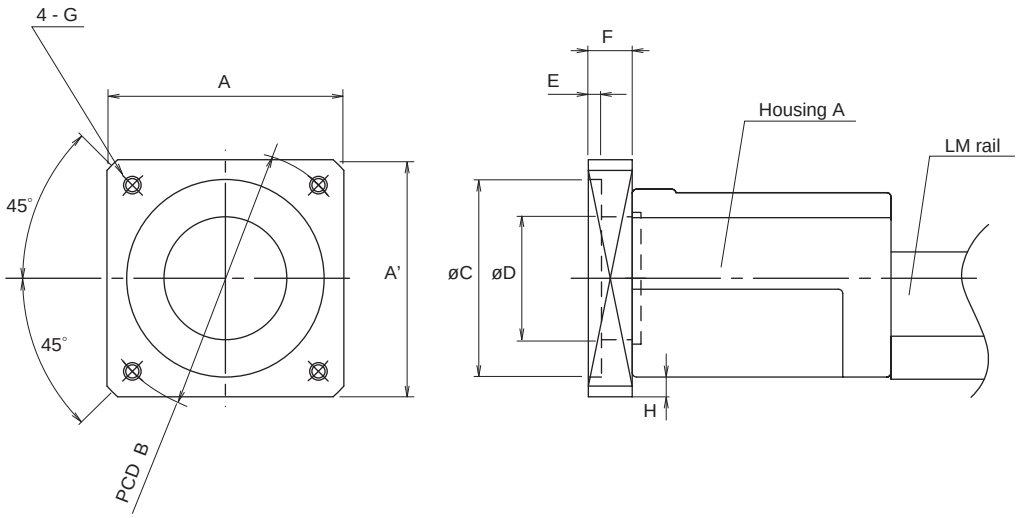
The SKR-type is provided with intermediate flanges so that a variety of motors can be installed. The table below shows the control number of the intermediate flanges meeting the applicable motors on a model number basis. At the time of order, specify the intermediate flange control number.

Table 11 Correspondence between the Applicable Motors and Available Intermediate Flanges

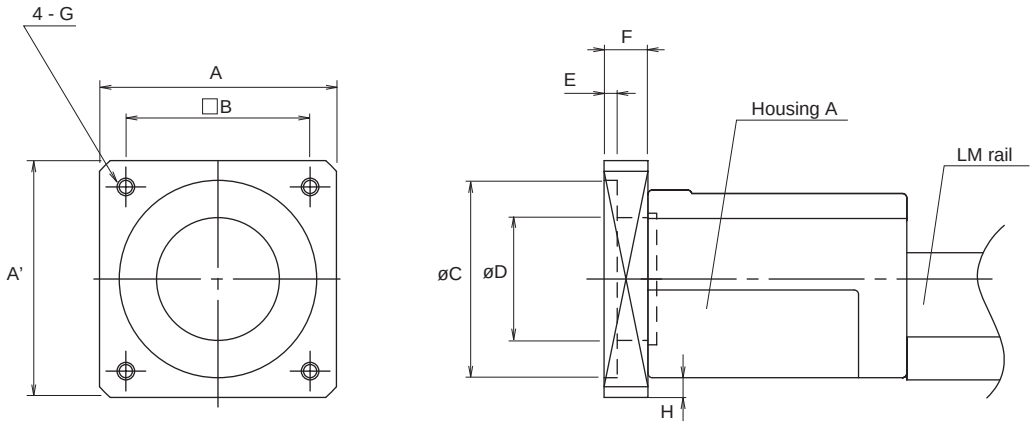
Motor Model No.					Flange angle	SKR33	SKR46
Servo Motors	Yaskawa Electric	Σ-Π		SGMAH-A3 (30W)	□40	0H	0F
				SGMAH-A5 (50W)		0H	0F
				SGMAH-01 (100W)		0H	0F
				SGMPH-01 (100W)	□60	—	04
				SGMAH-02 (200W)		—	04
				SGMAH-04 (400W)		—	04
	Mitsubishi Electric	MELSERVO	J2 Super	HC-MFS 053 (50W)	□40	0H	0F
				HC-KFS 053 (50W)		0H	0F
				HC-MFS 13 (100W)		0H	0F
				HC-KFS 13 (100W)		0H	0F
				HC-MFS 23 (200W)	□40	—	04
				HC-KFS 23 (200W)		—	04
				HC-MFS 43 (400W)		—	04
				HC-KFS 43 (400W)		—	04
	Matsushita Electric	MINAS A		MSMA 3A (30W)	□38	0K	0G
				MSMA 5A (50W)		0K	0G
				MSMA 01 (100W)		0K	0G
				MQMA 01 (100W)	□60	—	03
				MSMA 02 (200W)		—	03
				MSMA 04 (400W)		—	03
	Sanyo Denki	SANMOTION Q1		Q1AA04003D (30W)	□40	0H	0F
				Q1AA04005D (50W)		0H	0F
				Q1AA04010D (100W)		0H	0F
				Q 1AA0640D (200W)	□60	—	04
				Q1AA06040D (400W)		—	04
	Fanuc	ßis series		ß0.2/5000is (50W)	□40	0H	0F
				ß0.3/5000is (100W)		0H	0F
				ß0.4/5000is (125W)	□60	—	04
				ß0.5/5000is (200W)		—	04
				ß1/5000is (400W)		—	04
Stepper Motors	Oriental Motor	αStep		AS 46, ASC46	□42	0I	—
				AS 6□, ASC66	□60	0G	01
		Five phase	RK	RK54□	□42	0I	—
				RK56□	□60	0G	01
		Two-phase	UMK	UMK24□	□42	0I	—
				UMK26□	□56.4	0F	—
			CSK	CSK24□	□42	0I	—
				CSK26□	□56.4	0F	—

Note: Symbols in the SKR type columns show the lower two digits of the intermediate flange control numbers.

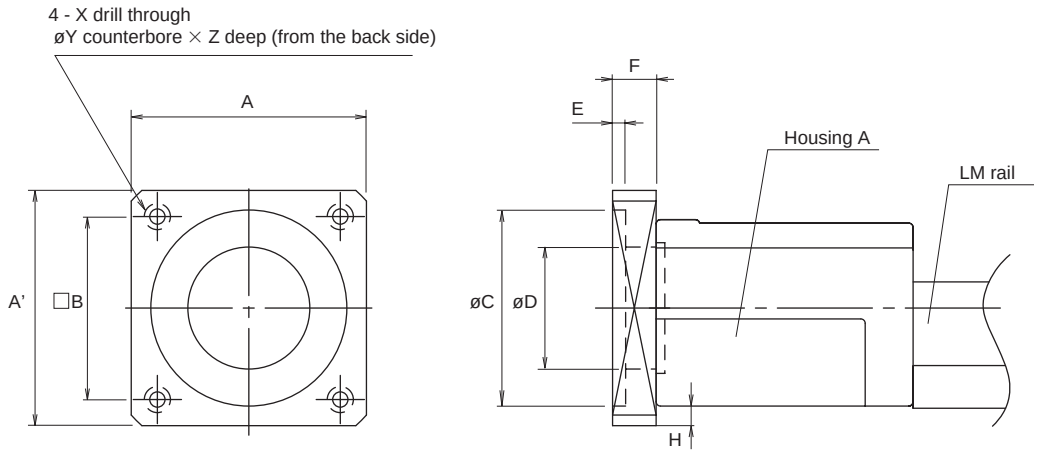
Dimensions of the Intermediate Flanges



	Control number	A × A'	B	C	D	E	F	G	H
SKR33	0B	54 × 54	60	50	28	3	10	M4	4
	0H	42 × 40	46	30	28	3	10	M4	—
	0K	42 × 38	45	30	28	3.5	10	M3	—
SKR46	02	62 × 60	60	50	42	3.5	10	M4	—
	03	62 × 60	70	50	42	3.5	10	M4	—
	04	62 × 60	70	50	42	4	10	M5	—
	0A	76 × 76	90	70	42	3.5	12	M5	6
	0F	62 × 53	46	30	—	—	10	M4	—
	0G	62 × 53	45	30	—	—	10	M3	—



	Control number	A×A'	B	C	D	E	F	G	H
SKR33	0F	56.4×56.4	47.14	38.1	28	2	10	M4	5.2
	0G	60×60	50	36	28	2	10	M4	7
SKR46	01	62×60	50	36	—	—	10	M4	—



	Control number	A×A'	B	C	D	E	F	X	Y	Z
SKR33	0I	42×42	31	22	—	—	7	3.5	6	4

THK LM-Guide Actuator SKR-type

⚠ Precautions on Use

Handling

- Exercise care when handling the product. Dropping or tapping it may result in breakage.
- Do not disassemble the product unless it is unavoidable. Disassembling the product unnecessarily may result in the entry of foreign matter or cause accuracy degradation.
- Operating the product exceeding the permissible revolution speed may lead to part breakage or accidents. The operating revolution speed should be limited to the range specified by THK.

Operating temperature range

- Do not use the product at temperatures exceeding 80°C. Should it be required to use it at 80°C or higher, contact THK.

Lubrication

- To deliver the full extent of SKR-type functions, lubrication is essential. Use of the product without lubrication may result in increased abrasion at the rolling section or shorter life.
- Wipe the rust-preventive oil from the product sufficiently and then fill it with lubricant before use.
- Do not mix and use lubricants with different properties.
- The greasing intervals differ with the operating conditions. It is recommended that the greasing intervals be determined at the initial inspection.
- If the product is used in locations constantly exposed to vibration or in special environments such as clean rooms, vacuums, low temperatures, or high temperatures, there are cases where ordinary greases cannot be used. In such cases, contact THK.

Use and Lubrication in Special Environments

- If locations are constantly exposed to vibration or in special environments such as clean rooms, vacuums, low temperatures, or high temperatures, consult THK.

- **“LM Guide”, “Caged Ball”, “**  **” and “QZ” are the registered trademarks of THK Co., Ltd.**
- There may be differences between products appearing in photographs and the actual product.
- The appearance, specifications, and other information are subject to change without prior notice to improve reliability, function, etc. When deciding to adopt the product, contact us beforehand.
- We have exercised great care in preparing this catalog, but it is still possible that there are misspellings, omissions of letters, etc. THK assumes no responsibility or liability for damage resulting from such errors possibly contained herein.
- We employ the basic policy of observing the Foreign Exchange and Foreign Trade Control Law of Japan with regard to the export of our products/technologies or sales for export. For export of our products as discrete components, consult THK beforehand.

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20060105 Printed in Japan