# EPF

## Caged Ball LM Guide Finite stroke Model EPF



Stopper

LM block

Ball

Cage

LM rail

45°

45°

45°

45°

Cross-section
(DB configuration)

*For the ball cage, see △1-90.

# Structure and Features

Balls are held in cages with spherical ball holders and the balls roll in four rows of circular-arc grooves in raceways on precision-ground LM rails and LM blocks.

## [Smooth motion]

Because a finite stroke is used, balls do not circulate and movement is smooth even with pre-loading. Also, because variations in rolling resistance are small, this model is ideal for locations where smooth movement is required with a short stroke.

## [High Rigidity]

Because model EPF uses a DB construction featuring 4 rows of circular-arc grooves, it offers particularly high rigidity with respect to moment in the $M_C$ direction. This makes it ideal for locations where $M_C$ moment is applied with one rail.

## [Miniature Type]

Because the mounting method is compatible with the Miniature LM Guide Model RSR-N, the models are dimensionally interchangeable.

## [4-way Equal Load]

Each row of balls is configured at a contact angle of 45° so that the rated loads applied to the LM block are uniform in the all directions (radial, reverse radial and lateral directions), enabling the LM Guide to be used in all orientations and in extensive applications.

## [Ball cage technology application 1]

Because the cage is formed out of plastic resin, there is no metal contact between the cage and the balls, providing excellent noise characteristics, low dust emissions and long product life.

## [Ball cage technology application 2]

Forming the cage in a spherical shape out of plastic resin allows lubricant to be held in grease pockets, enabling long periods of maintenance-free operation.
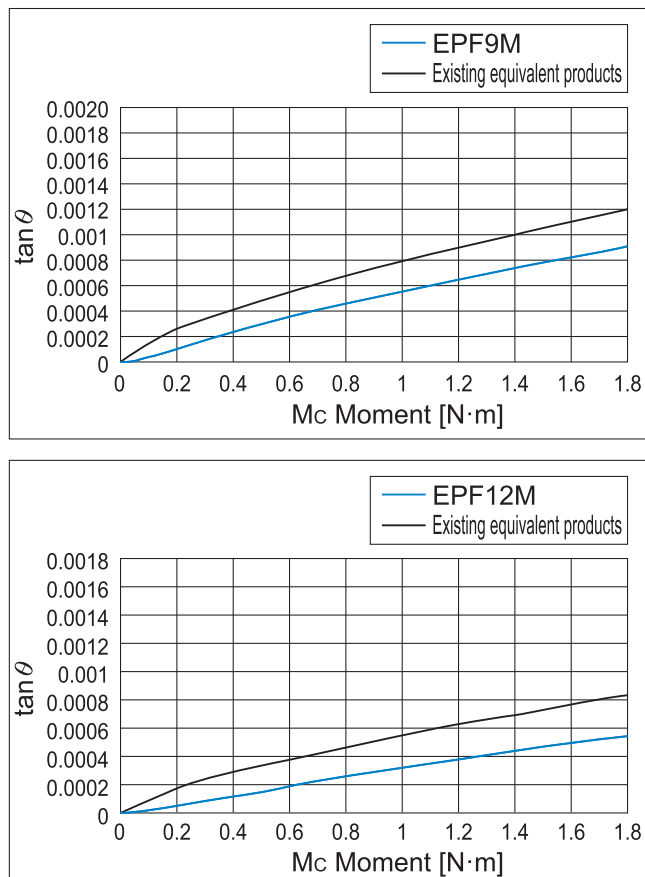


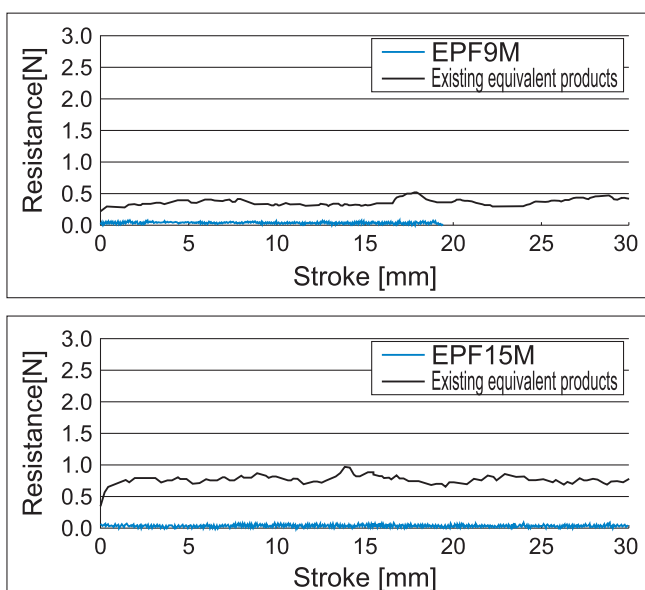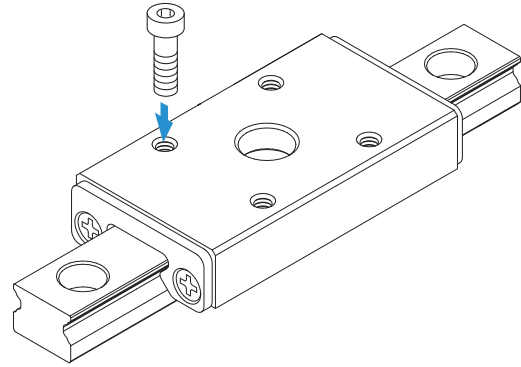Fig.1 Comparison of $M_C$ moment test data



Fig.2 Comparison of rolling resistance test data

# Types and Features

## Model EPF

# Accuracy of the Mounting Surface

If there is not sufficient precision in the LM rail and LM block mounting surfaces, the product may not function to its full potential.Table1 Machine to values no higher than those shown in...  (Recommended value: 70% of Table1)

Table1 Flatness of the LM Rail and the LM Block Mounting Surface

Unit: mm

| Model No. | Flatness error |
|---|---|
| EPF 7M, 9M | 0.015/200 |
| EPF 12M | 0.025/200 |
| EPF 15M | 0.035/200 |

Note) It is recommended that highly rigid materials such as iron or cast metal be used as the mounting material.
If a material with poor rigidity, such as aluminum, is used, unforeseen loading may be applied to the product. In such situations, contact THK.

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THK **A1-177**

# Model EPF
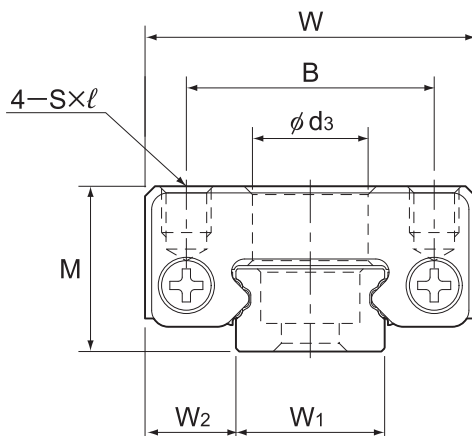


| Model No. | Outer dimensions | | | LM block dimensions | | | | | LM rail dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Height<br><br>M | Width<br><br>W | Length<br><br>$L_B$ | B | C | $d_3$ | $S \times \ell$ | $L_{B1}$ | $W_1$ | $W_2$ | $M_1$ |
| EPF 7M | 8 | 17 | 31.6 | 12 | 13 | 5 | M2×2.3 | 29.6 | 7 | 5 | 5 |
| EPF 9M | 10 | 20 | 37.8 | 15 | 16 | 7 | M3×2.8 | 35.8 | 9 | 5.5 | 5 |
| EPF 12M | 13 | 27 | 43.7 | 20 | 20 | 7 | M3×3.2 | 41.7 | 12 | 7.5 | 6.75 |
| EPF 15M | 16 | 32 | 56.5 | 25 | 25 | 7 | M3×3.5 | 54.5 | 15 | 8.5 | 9 |

Note) The M in the model number symbol indicates that the LM block, LM rail and balls are made of stainless steel.
      The stainless steel provides excellent corrosion and environmental resistance.

**Model number coding**

### EPF7M  16  +55L  P  M

Model No.

LM rail length
(in mm)

Guaranteed stroke
(in mm)

Rail material:
Stainless steel (standard)

Accuracy symbol (*1)

(*1) See A**1-87**.

Note) This model number indicates that a single-rail unit constitutes one set.

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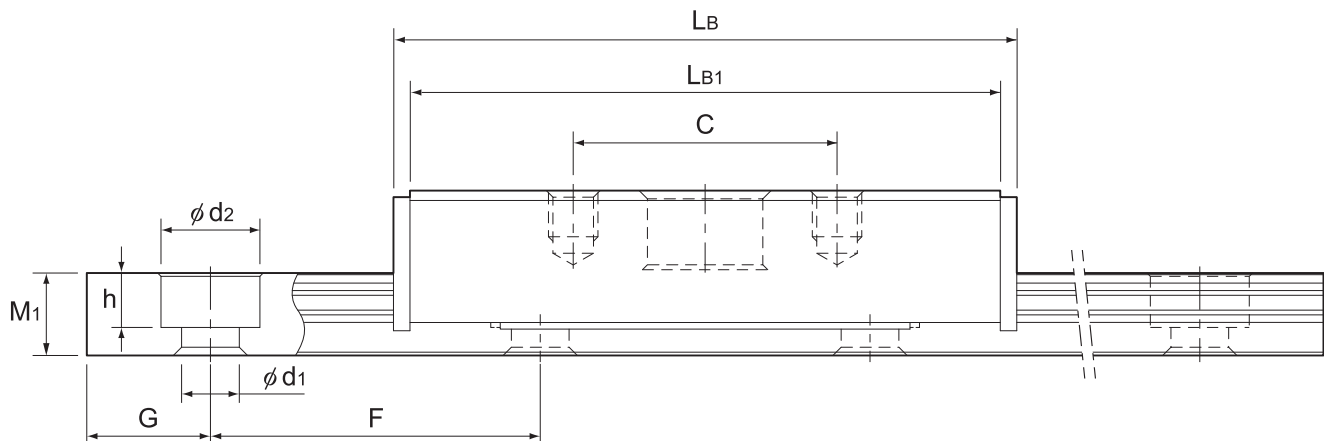
Unit: mm

| | | | Guaranteed stroke | Basic load rating | | Static permissible moment N·m* | | | Mass | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | C | C₀ | MA | MB | Mc | LM block | LM rail |
| G | F | d₁×d₂×h | $S_T$ | kN | kN | | | | kg | kg/m |
| 5 | 15 | 2.4×4.2×2.6 | 16 | 0.90 | 1.60 | 5.08 | 5.08 | 5.26 | 0.019 | 0.230 |
| 7.5 | 20 | 3.5×6×3.3 | 21 | 1.00 | 1.87 | 6.81 | 6.81 | 7.89 | 0.036 | 0.290 |
| 10 | 25 | 3.5×6×3.8 | 27 | 2.26 | 3.71 | 15.5 | 15.5 | 20.8 | 0.074 | 0.550 |
| 15 | 40 | 3.5×6×4 | 34 | 3.71 | 5.88 | 33.0 | 33.0 | 41.3 | 0.136 | 0.940 |

Note) Static permissible moment*: Static permissible moment value with 1 LM block

Recommended Tightening Torques of Mounting Bolts

Unit: N·m

| Model No. | Nominal bolt | Rated tightening torque | | |
|---|---|---|---|---|
| | | Iron | Casting | Aluminum |
| EPF 7M | M2 | 0.588 | 0.392 | 0.294 |
| EPF 9M | M3 | 1.96 | 1.27 | 0.98 |
| EPF 12M | | | | |
| EPF 15M | | | | |

Table2 Maximum slip resistance

Unit: N

| Model No. | Maximum slip resistance |
|---|---|
| EPF 7M | 20 |
| EPF 9M | 20 |
| EPF 12M | 30 |
| EPF 15M | 30 |

Note) While the cage used to hold the balls is designed to operate extremely precisely, factors such as impacts or inertial moment or drive vibration from the machine can cause cage distortion.
If using the EPF LM guide in the following conditions, contact THK.
• Vertical Orientation
• Under a large moment load
• Butting the guide's external stopper with the table
• For applications involving high acceleration/deceleration
If cage distortion occurs, the cage must be forcibly restored to its original shape.
Table 1 shows the required slip resistance in this event. Set the thrust so that it is no less than the maximum value shown in the table.

# Standard Length of the LM Rail

Table3 shows the standard LM rail lengths of model EPF.
For special rail lengths, it is recommended to use a value corresponding to the G,g dimension from the table. As the G,g dimension increases, this portion becomes less stable, and the accuracy performance is severely impacted.
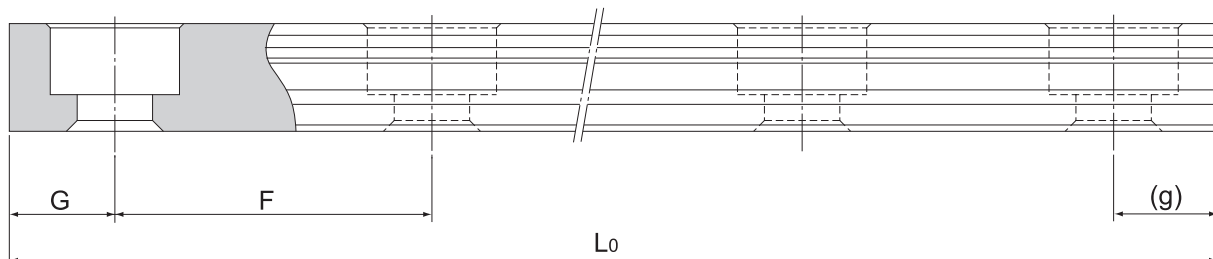


Table3 Standard Length of the LM Rail for Model EPF

Unit: mm

| Model No. | EPF 7M | EPF 9M | EPF 12M | EPF 15M |
|---|---|---|---|---|
| LM rail standard length ($L_0$) | 55 | 75 | 95 | 110 |
| Standard pitch F | 15 | 20 | 25 | 40 |
| G,g | 5 | 7.5 | 10 | 15 |

Note) Lengths other than the standard LM rail length ($L_0$) are also available. Contact THK for details.

**LM Guide**