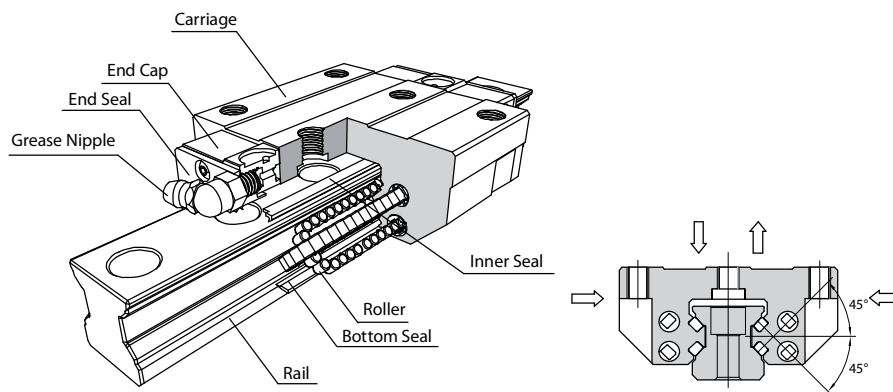

12.3 Full Roller Type, MSR Series

A. Construction

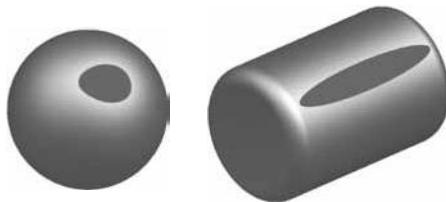


B. Characteristics

The full roller type linear guideway, MSR series, equip with rollers instead of the ball, and therefore the MSR series can provide higher rigidity and loading than the normal type with the same size. Especially suit for the requests of high accuracy, heavy load and high rigidity.

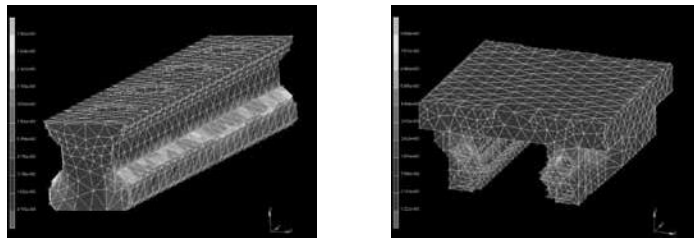
Ultra Heavy Load

MSR linear guideway through rollers have a line contact with carriage and rail. Relative to the general type linear guideway through balls have a point contact; the MSR type linear guideway can offer lower elastic deformation while bearing the same load. Base on the rollers have the same outer diameter with balls, the roller can bear the heavier load. The excellent characteristics of high rigidity and ultra heavy load can suitable for the high accuracy application that heavy load is processed even more.



The Optimization Design of Four Directional Load

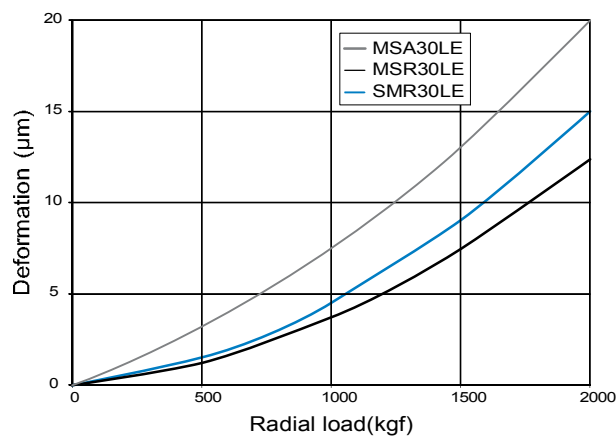
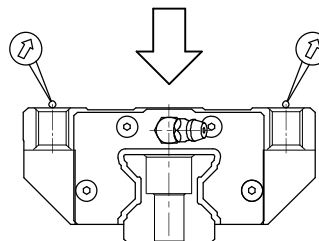
Through the structure stress analysis of finite element method, SMR series have four trains of rollers are designed to a contact angle of 45° and the section design for high rigidity. Except for bearing heavier loads in radial, reversed radial and lateral directions, a sufficient preload can be achieved to increase rigidity, and this makes it suitable for any kind of installation.



Ultra High Rigidity

Test data of rigidity

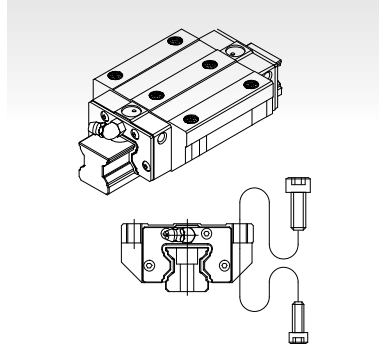
- Test samples : Ball type MSA30LE with preload F1
- Full roller type MSR30LE with preload F1
- Roller chain type SMR30LE with preload F1



C. Carriage Type

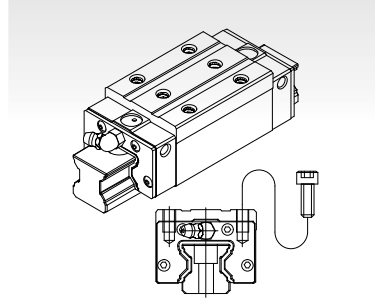
Heavy Load

MSR-E Type



This type offers the installation either from top or bottom side of carriage.

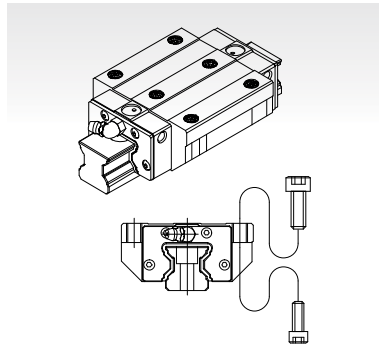
MSR-S Type



Square type with smaller width and can be installed from top side of carriage.

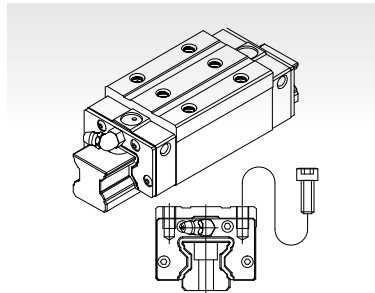
Ultra Heavy Load

MSR-LE Type



All dimensions are same as MSR-E except the length is longer, which makes it more rigid.

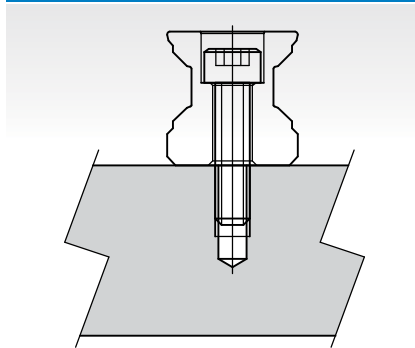
MSR-LS Type



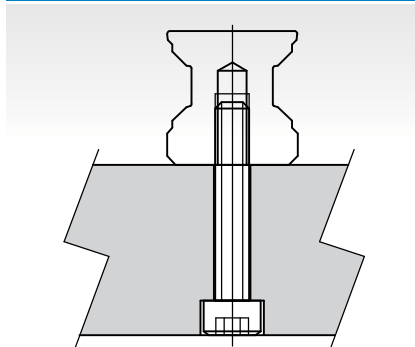
All dimensions are same as MSR-S except the length is longer, which makes it more rigid.

D. Rail Type

Counter bore (R type)



Tapped Hole (T type)



E. Description of Specification

(1) Non-interchangeable Type

| | MSR | 25 | E | 2 | SS | F0 |
|--|-----|----|---|---|----|----|
| Series : MSR | | | | | | |
| Size : 25, 30, 35, 45, 55, 65 | | | | | | |
| Carriage type : (1) Heavy load E : Flange type, mounting either from top or bottom S : Square type (2) Ultra heavy load LE : Flange type, mounting either from top or bottom LS : Square type | | | | | | |
| Number of carriages per rail : 1, 2, 3 ... | | | | | | |
| Dust protection option of carriage : No symbol, UU, SS, ZZ, DD, KK (refer to chapter 15.1 Dust Proof) | | | | | | |
| Preload : F0 (Medium preload), F1 (Heavy preload), F2 (Ultra Heavy Preload) | | | | | | |
| Code of special carriage : No symbol, A, B, C, D ... | | | | | | |
| Rail type : R (Counter bore type), T (Tapped hole type) | | | | | | |
| Rail length (mm) | | | | | | |
| Rail hole pitch from start side (E1 see Fig12.3) | | | | | | |
| Rail hole pitch to the end side (E2 see Fig12.3) | | | | | | |
| Accuracy grade : H, P, SP, UP | | | | | | |
| Code of special rail : No symbol, A, B ... | | | | | | |
| Dust protection option of rail : No symbol, /CC, /MC, /MD ... (refer to chapter 15.1 Code of contamination fro Rail) | | | | | | |
| Number of rails per axis : No symbol, II, III, IV ... | | | | | | |

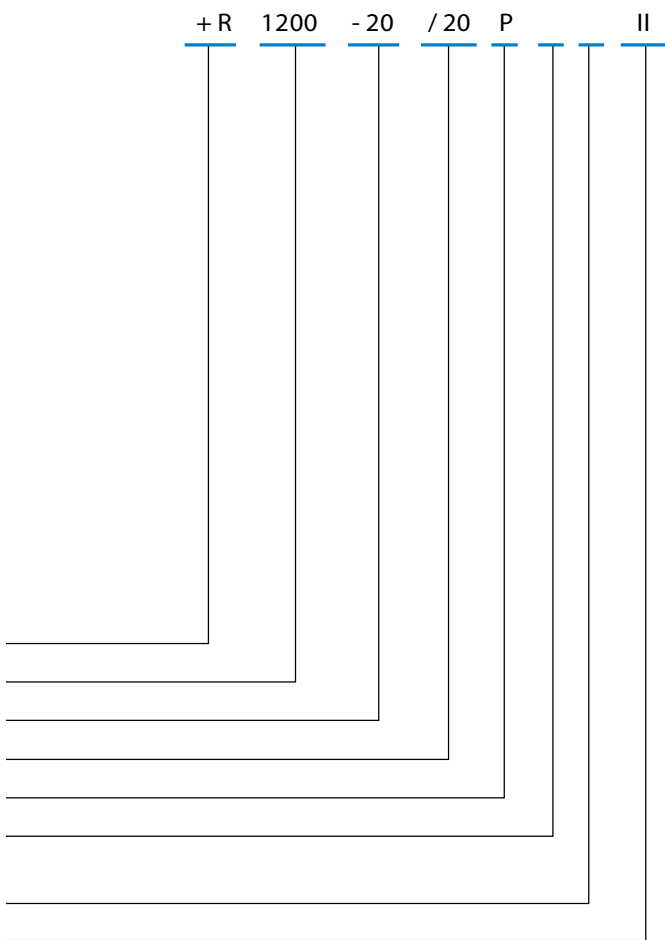
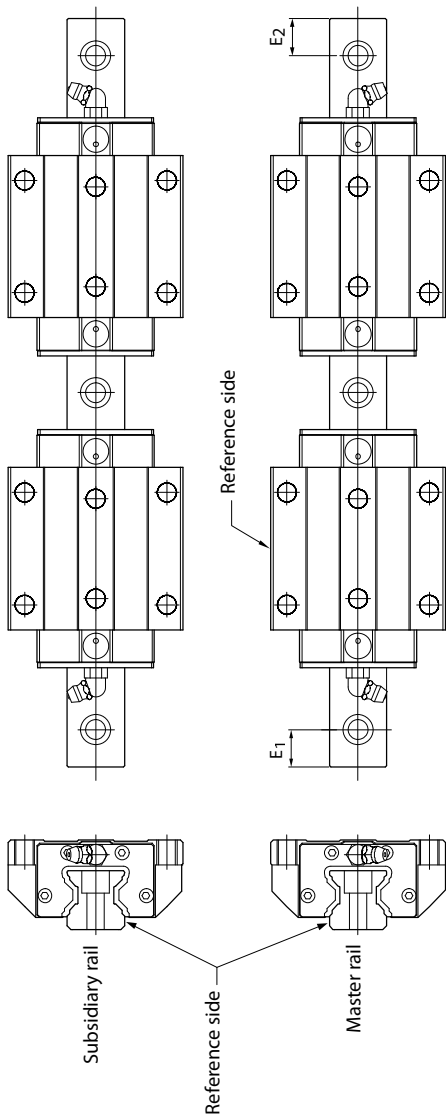
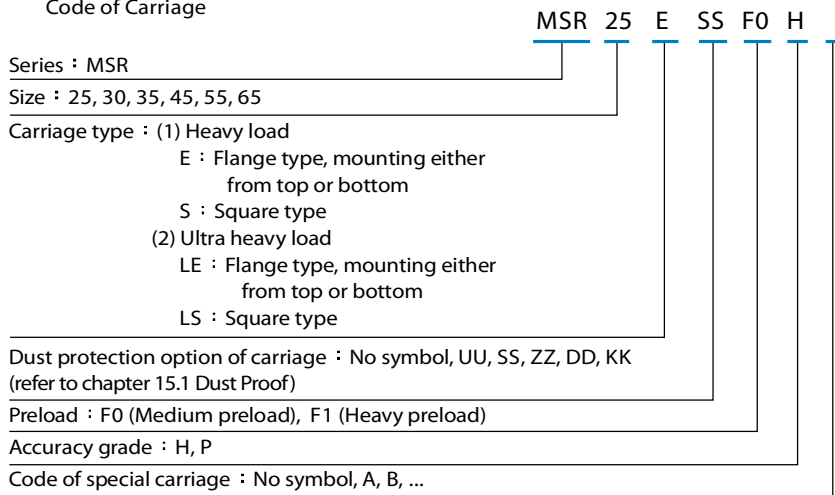


Fig. 12.3

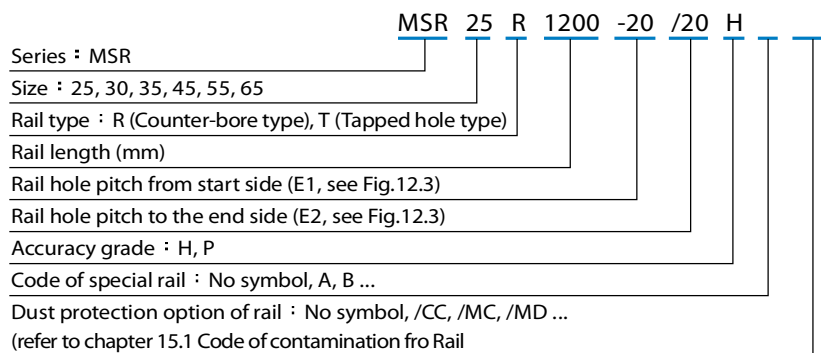


(2) Interchangeable Type

Code of Carriage



Code of Rail



F. Accuracy Grade

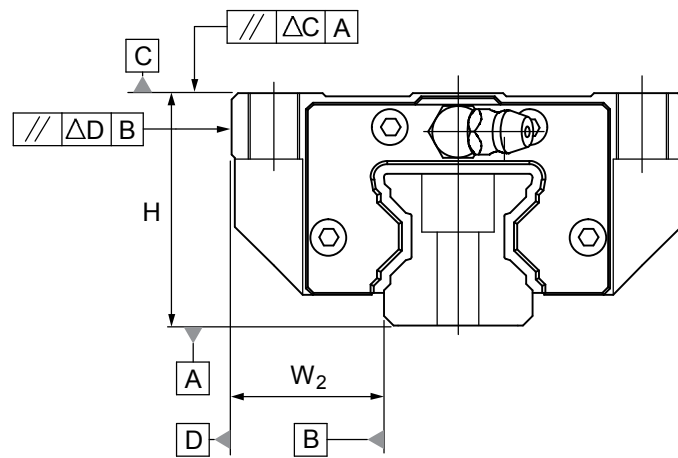


Table 1 Running Parallelism

| Rail length (mm) | | Running Parallelism Values (μm) | | | |
|------------------|---------|--|----|-----|-----|
| Above | Or less | H | P | SP | UP |
| 0 | 315 | 6 | 3 | 2 | 1.5 |
| 315 | 400 | 8 | 4 | 2 | 1.5 |
| 400 | 500 | 9 | 5 | 2 | 1.5 |
| 500 | 630 | 11 | 6 | 2.5 | 1.5 |
| 630 | 800 | 12 | 7 | 3 | 2 |
| 800 | 1000 | 14 | 8 | 4 | 2 |
| 1000 | 1250 | 16 | 10 | 5 | 2.5 |
| 1250 | 1600 | 18 | 11 | 6 | 3 |
| 1600 | 2000 | 20 | 13 | 7 | 3.5 |
| 2000 | 2500 | 22 | 15 | 8 | 4 |
| 2500 | 3000 | 24 | 16 | 9 | 4.5 |
| 3000 | 3500 | 25 | 17 | 11 | 5 |
| 3500 | 4000 | 26 | 18 | 12 | 6 |

A Non-Interchangeable Type

| Model No. | Item. | Accuracy Grade | | | |
|----------------|---|------------------------------|-------------|--------------------|--------------------|
| | | High H | Precision P | Super Precision SP | Ultra Precision UP |
| 25 30 35 | Tolerance for height H | ±0.04 | 0 -0.04 | 0 -0.02 | 0 -0.01 |
| | Height difference ΔH | 0.015 | 0.007 | 0.005 | 0.003 |
| | Tolerance for distance W_2 | ±0.04 | 0 -0.04 | 0 -0.02 | 0 -0.01 |
| | Difference in distance $W_2(\Delta W_2)$ | 0.015 | 0.007 | 0.005 | 0.003 |
| | Running parallelism of surface C with surface A | ΔC (see the table 1) | | | |
| | Running parallelism of surface D with surface B | ΔD (see the table 1) | | | |
| 45 55 | Tolerance for height H | ±0.05 | 0 -0.05 | 0 -0.03 | 0 -0.02 |
| | Height difference ΔH | 0.015 | 0.007 | 0.005 | 0.003 |
| | Tolerance for distance W_2 | ±0.05 | 0 -0.05 | 0 -0.03 | 0 -0.02 |
| | Difference in distance $W_2(\Delta W_2)$ | 0.02 | 0.01 | 0.007 | 0.005 |
| | Running parallelism of surface C with surface A | ΔC (see the table 1) | | | |
| | Running parallelism of surface D with surface B | ΔD (see the table 1) | | | |
| 65 | Tolerance for height H | ±0.07 | 0 -0.07 | 0 -0.05 | 0 -0.03 |
| | Height difference ΔH | 0.02 | 0.01 | 0.007 | 0.005 |
| | Tolerance for distance W_2 | ±0.07 | 0 -0.07 | 0 -0.05 | 0 -0.03 |
| | Difference in distance $W_2(\Delta W_2)$ | 0.025 | 0.015 | 0.01 | 0.007 |
| | Running parallelism of surface C with surface A | ΔC (see the table 1) | | | |
| | Running parallelism of surface D with surface B | ΔD (see the table 1) | | | |

B Interchangeable Type

| Model No. | Item. | Accuracy Grade | |
|----------------|---|------------------------------|-------------|
| | | High H | Precision P |
| 25 30 35 | Tolerance for height H | ±0.04 | 0 -0.04 |
| | Height difference ΔH | 0.015 | 0.007 |
| | Tolerance for distance W_2 | ±0.04 | 0 -0.04 |
| | Difference in distance $W_2(\Delta W_2)$ | 0.015 | 0.007 |
| | Running parallelism of surface C with surface A | ΔC (see the table 1) | |
| | Running parallelism of surface D with surface B | ΔD (see the table 1) | |
| 45 55 | Tolerance for height H | ±0.05 | 0 -0.05 |
| | Height difference ΔH | 0.015 | 0.007 |
| | Tolerance for distance W_2 | ±0.05 | 0 -0.05 |
| | Difference in distance $W_2(\Delta W_2)$ | 0.02 | 0.01 |
| | Running parallelism of surface C with surface A | ΔC (see the table 1) | |
| | Running parallelism of surface D with surface B | ΔD (see the table 1) | |
| 65 | Tolerance for height H | ±0.07 | 0 -0.07 |
| | Height difference ΔH | 0.02 | 0.01 |
| | Tolerance for distance W_2 | ±0.07 | 0 -0.07 |
| | Difference in distance $W_2(\Delta W_2)$ | 0.025 | 0.015 |
| | Running parallelism of surface C with surface A | ΔC (see the table 1) | |
| | Running parallelism of surface D with surface B | ΔD (see the table 1) | |

G. Preload Grade

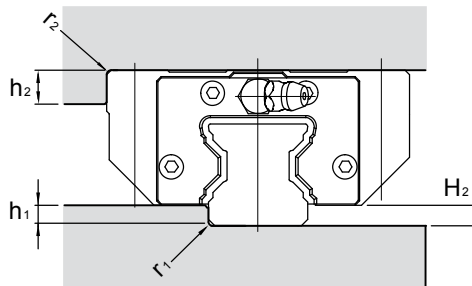
| Series | Preload grade | | |
|--------|---------------------|--------------------|--------------------------|
| | Medium preload (F0) | Heavy preload (F1) | Ultra heavy preload (F2) |
| MSR25 | 0.04~0.06C | 0.07~0.09C | 0.12~0.14C |
| MSR30 | | | |
| MSR35 | | | |
| MSR45 | | | |
| MSR55 | | | |
| MSR25L | 0.04~0.06C | 0.07~0.09C | 0.12~0.14C |
| MSR30L | | | |
| MSR35L | | | |
| MSR45L | | | |
| MSR55L | | | |
| MSR65L | | | |

Note: C is basic dynamic load rating in above table. Refer to the specification of products, please.

H. The Shoulder Height and Corner Radius for Installation

MSR series

Unit: mm



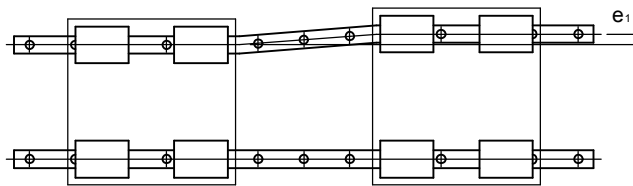
| Model No. | r_1 (max.) | r_2 (max.) | h_1 | h_2 | H_2 |
|-----------|--------------|--------------|-------|-------|-------|
| 25 | 0.5 | 0.5 | 4 | 8 | 4.8 |
| 30 | 0.5 | 0.5 | 5 | 8 | 6 |
| 35 | 1 | 1 | 5.5 | 10 | 6.5 |
| 45 | 1 | 1 | 6 | 12 | 8.1 |
| 55 | 1 | 1 | 8 | 15 | 10 |
| 65 | 1 | 1 | 10 | 15 | 12 |

I. Dimensional Tolerance of Mounting Surface

MSR Series

With the high rigidity, the minor dimensional error in mounting surface could be compensated and achieves smooth linear motion. The tolerances of parallelism between two axes are shown as below.

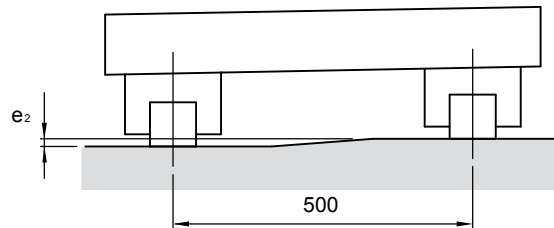
The parallel deviation between two axes (e_1)



Unit: μm

| Model No. | Preload Grade | | |
|-----------|---------------|----|----|
| | F0 | F1 | F2 |
| 25 | 9 | 7 | 5 |
| 30 | 11 | 8 | 6 |
| 35 | 14 | 10 | 7 |
| 45 | 17 | 13 | 9 |
| 55 | 21 | 14 | 11 |
| 65 | 27 | 18 | 14 |

Level difference between two axes (e_2)

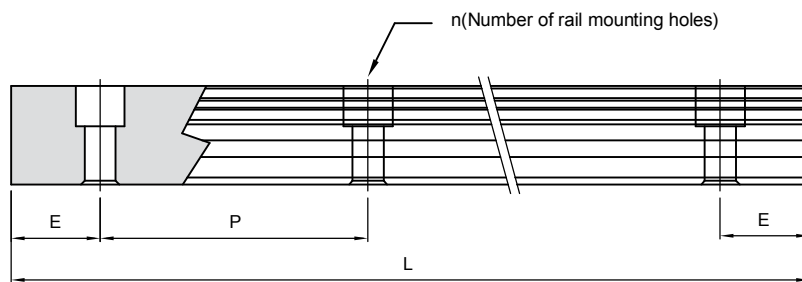


Unit: μm

| Model No. | Preload Grade | | |
|-----------|---------------|-----|----|
| | F0 | F1 | F2 |
| 25 | 150 | 105 | 55 |
| 30 | | | |
| 35 | | | |
| 45 | | | |
| 55 | | | |
| 65 | | | |

Note: The permissible values in table are applicable when the span is 500mm wide.

J. Rail Maximum Length and Standrad



$$L=(n-1)\times P+2\times E$$

L: Total Length of rail (*mm*)

n: Nuber of mounting holes

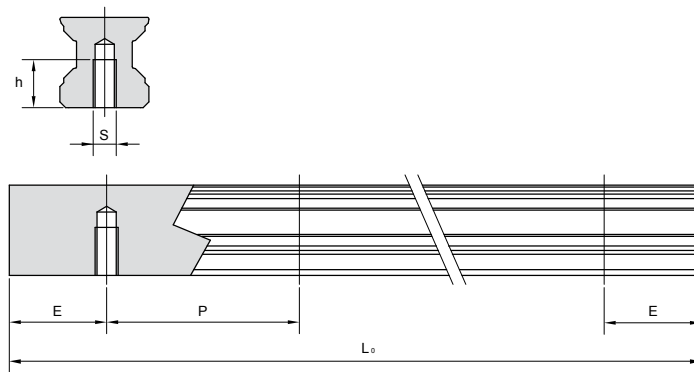
P: Distance between any two holes (*mm*)

E: Distance from the center of the last hole to the edge (*mm*)

Unit: mm

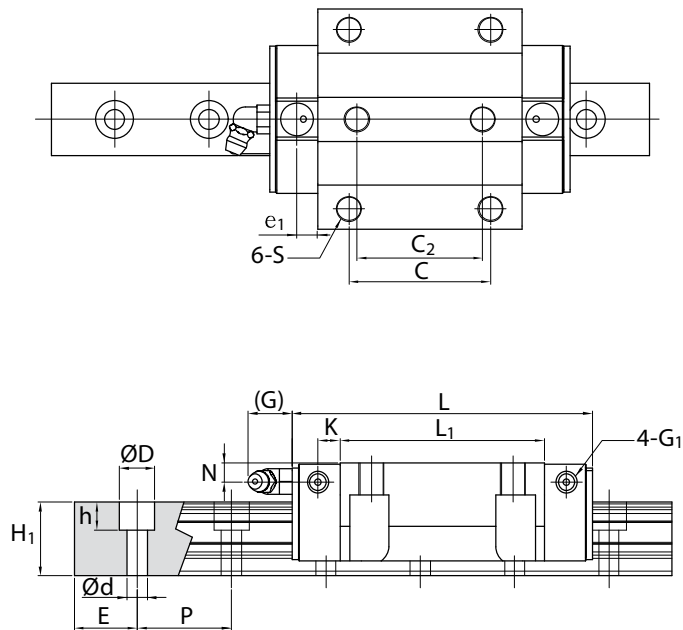
| Model No. | Standard Pitch (P) | Standard ($E_{std.}$) | Minimum ($E_{min.}$) | Max (L_0 max.) |
|-----------|--------------------|-------------------------|------------------------|-------------------|
| MSR 25 | 30 | 20 | 7 | 4000 |
| MSR 30 | 40 | 20 | 8 | 4000 |
| MSR 35 | 40 | 20 | 8 | 4000 |
| MSR 45 | 52.5 | 22.5 | 11 | 4000 |
| MSR 55 | 60 | 30 | 13 | 4000 |
| MSR 65 | 75 | 35 | 14 | 4000 |

K. Tapped-hole Rail Dimensions



| Rail Model | S | h(mm) |
|------------|-----|-------|
| MSR 25 T | M6 | 12 |
| MSR 30 T | M8 | 15 |
| MSR 35 T | M8 | 17 |
| MSR 45 T | M12 | 24 |
| MSR 55 T | M14 | 24 |
| MSR 65 T | M20 | 30 |

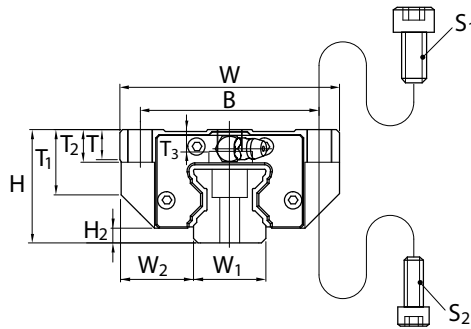
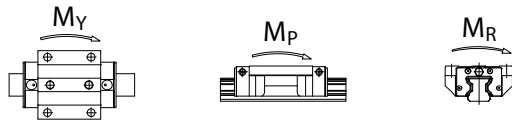
Dimensions of MSR-E / MSR-LE



Unit: mm

| Model No. | External dimension | | | | | Carriage dimension | | | | | | | | | | | | | Grease Nipple | |
|-----------------------|--------------------|---------|----------------|----------------|----------------|--------------------|-----|----------------|-----|----------------|------|----------------|----------------|----------------|------|------|-----|----------------|---------------|----------------|
| | Height H | Width W | Length L | W ₂ | H ₂ | B | C | C ₂ | S | L ₁ | T | T ₁ | T ₂ | T ₃ | N | G | K | e ₁ | | G ₁ |
| MSR 25 E MSR 25 LE | 36 | 70 | 97.5 115.5 | 23.5 | 4.8 | 57 | 45 | 40 | M8 | 65.5 83.5 | 9.5 | 20.2 | 10 | 5.8 | 6 | 12 | 6.6 | 6.5 | M6 | G-M6 |
| MSR 30 E MSR 30 LE | 42 | 90 | 112.4 135.2 | 31 | 6 | 72 | 52 | 44 | M10 | 75.9 98.7 | 10 | 21.6 | 13 | 6.7 | 7 | 12 | 8 | 7 | M6 | G-M6 |
| MSR 35 E MSR 35 LE | 48 | 100 | 125.3 153.5 | 33 | 6.5 | 82 | 62 | 52 | M10 | 82.3 110.5 | 12 | 27.5 | 15 | 9.5 | 8 | 12 | 8 | 7 | M6 | G-M6 |
| MSR 45 E MSR 45 LE | 60 | 120 | 154.2 189.4 | 37.5 | 8 | 100 | 80 | 60 | M12 | 106.5 141.7 | 14.5 | 35.5 | 15 | 12.5 | 10 | 13.5 | 10 | 10 | M6 | G-PT 1/8 |
| MSR 55 E MSR 55 LE | 70 | 140 | 185.4 235.4 | 43.5 | 10 | 116 | 95 | 70 | M14 | 129.5 179.5 | 17.5 | 41 | 18 | 15.5 | 11 | 13.5 | 12 | 7.95 | M6 | G-PT 1/8 |
| MSR 65 LE | 90 | 170 | 302 | 53.5 | 12 | 142 | 110 | 82 | M16 | 230 | 19.5 | 56 | 20 | 26 | 16.5 | 13.5 | 15 | 15 | M6 | G-PT 1/8 |

Note*: Single: Single carriage/ Double: Double carriages closely contacting with each other.

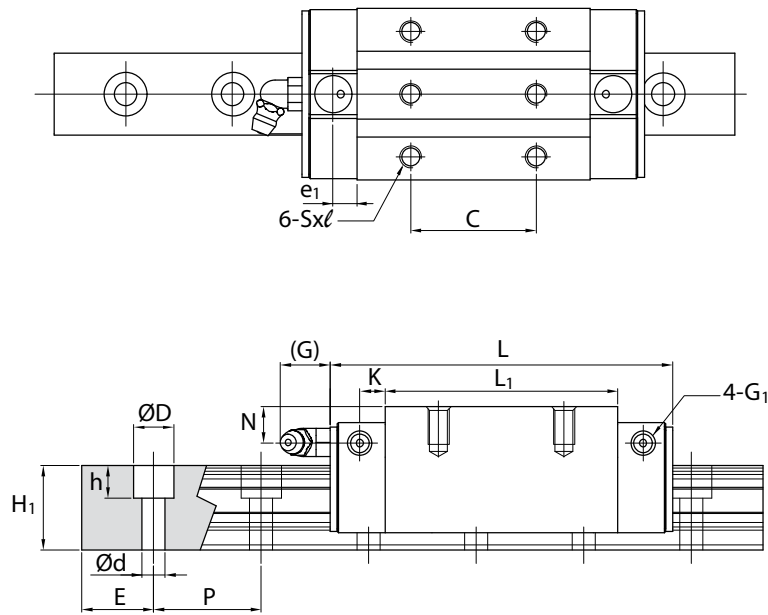


| Model No. | Bolt Size | |
|-----------|----------------|----------------|
| | S ₁ | S ₂ |
| MSR 25 | M8 | M6 |
| MSR 30 | M10 | M8 |
| MSR 35 | M10 | M8 |
| MSR 45 | M12 | M10 |
| MSR 55 | M14 | M12 |
| MSR 65 | M16 | M14 |

Unit: mm

| Model No. | Rail dimension | | | | | Basic load rating | | Static moment rating | | | | | Weight | |
|-----------------------|-------------------------|--------------------------|------------|-----------|-----------|-------------------|--------------------------|----------------------|----------------|----------------|----------------|----------------|----------------|--------------|
| | Width W ₁ | Height H ₁ | Pitch P | E std. | D × h × d | Dynamic C | Static C ₀ | M _p | | M _y | | M _R | Carriage kg | Rail kg/m |
| | | | | | | | | Single* | Double* | Single* | Double* | | | |
| MSR 25 E MSR 25 LE | 23 | 23.5 | 30 | 20 | 11×9×7 | 29.6 36.3 | 63.8 82.9 | 0.65 1.08 | 3.82 5.94 | 0.65 1.08 | 3.82 5.94 | 0.73 0.95 | 0.75 0.95 | 3.5 |
| MSR 30 E MSR 30 LE | 28 | 27.5 | 40 | 20 | 14×12×9 | 42.8 54.0 | 91.9 124.0 | 1.09 1.96 | 6.38 10.60 | 1.09 1.96 | 6.38 10.60 | 1.27 1.75 | 1.4 1.72 | 5 |
| MSR 35 E MSR 35 LE | 34 | 30.5 | 40 | 20 | 14×12×9 | 57.9 73.9 | 123.5 169.0 | 1.59 2.94 | 9.56 16.18 | 1.59 2.94 | 9.56 16.18 | 2.09 2.85 | 1.95 2.45 | 7 |
| MSR 45 E MSR 45 LE | 45 | 37 | 52.5 | 22.5 | 20×17×14 | 92.8 117.2 | 193.8 261.6 | 3.28 5.90 | 18.76 31.32 | 3.28 5.90 | 18.76 31.32 | 4.40 5.94 | 3.9 4.5 | 11.2 |
| MSR 55 E MSR 55 LE | 53 | 43 | 60 | 30 | 23×20×16 | 132.8 172.5 | 270.0 378.0 | 5.49 10.60 | 31.18 55.58 | 5.49 10.60 | 31.18 55.58 | 7.33 10.28 | 6 7.9 | 15.6 |
| MSR 65 LE | 63 | 52 | 75 | 35 | 26×22×18 | 277.0 | 624.0 | 22.50 | 117.87 | 22.50 | 117.87 | 20.02 | 17.6 | 22.4 |

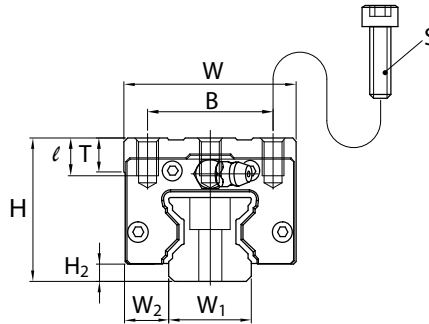
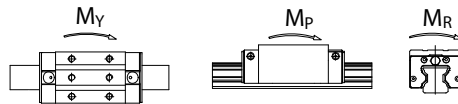
Dimensions of MSR-S / MSR-LS



Unit: mm

| Model No. | External dimension | | | | | Carriage dimension | | | | | | | | | | | Grease Nipple |
|-----------------------|--------------------|---------|----------------|----------------|----------------|--------------------|----------|-----|----|----------------|------|------|------|-----|----------------|----------------|---------------|
| | Height H | Width W | Length L | W ₂ | H ₂ | B | C | S | ℓ | L ₁ | T | N | G | K | e ₁ | G ₁ | |
| MSR 25 S MSR 25 LS | 40 | 48 | 97.5 115.5 | 12.5 | 4.8 | 35 | 35 50 | M6 | 9 | 65.5 83.5 | 9.5 | 10 | 12 | 6.6 | 6.5 | M6 | G-M6 |
| MSR 30 S MSR 30 LS | 45 | 60 | 112.4 135.2 | 16 | 6 | 40 | 40 60 | M8 | 12 | 75.9 98.7 | 10 | 10 | 12 | 8 | 7 | M6 | G-M6 |
| MSR 35 S MSR 35 LS | 55 | 70 | 125.3 153.5 | 18 | 6.5 | 50 | 50 72 | M8 | 14 | 82.3 110.5 | 12 | 15 | 12 | 8 | 7 | M6 | G-M6 |
| MSR 45 S MSR 45 LS | 70 | 86 | 154.2 189.4 | 20.5 | 8 | 60 | 60 80 | M10 | 19 | 106.5 141.7 | 17 | 20 | 13.5 | 10 | 10 | M6 | G-PT 1/8 |
| MSR 55 S MSR 55 LS | 80 | 100 | 185.4 235.4 | 23.5 | 10 | 75 | 75 95 | M12 | 19 | 129.5 179.5 | 18 | 21 | 13.5 | 12 | 7.95 | M6 | G-PT 1/8 |
| MSR 65 LS | 90 | 126 | 302 | 31.5 | 12 | 76 | 120 | M16 | 20 | 230 | 19.5 | 16.5 | 13.5 | 15 | 15 | M6 | G-PT 1/8 |

Note *: Single: Single carriage/ Double: Double carriages closely contacting with each other.



Unit: mm

| Model No. | Rail dimension | | | | | Basic load rating | | Static moment rating | | | | Weight | | |
|-----------------------|-------------------------|--------------------------|------------|-----------|-----------|--------------------|--------------------------------|------------------------|---------------------|------------------------|---------------------|------------------------|----------------|--------------|
| | Width W ₁ | Height H ₁ | Pitch P | E std. | D × h × d | Dynamic C kN | Static C ₀ kN | M _p kN-m | | M _y kN-m | | M _r kN-m | Carriage kg | Rail kg/m |
| | | | | | | | | Single ^a | Double ^a | Single ^a | Double ^a | | | |
| MSR 25 S MSR 25 LS | 23 | 23.5 | 30 | 20 | 11×9×7 | 29.6 36.3 | 63.8 82.9 | 0.65 1.08 | 3.82 5.94 | 0.65 1.08 | 3.82 5.94 | 0.73 0.95 | 0.65 0.85 | 3.5 |
| MSR 30 S MSR 30 LS | 28 | 27.5 | 40 | 20 | 14×12×9 | 42.8 54.0 | 91.9 124.0 | 1.09 1.96 | 6.38 10.60 | 1.09 1.96 | 6.38 10.60 | 1.27 1.72 | 1 1.22 | 5 |
| MSR 35 S MSR 35 LS | 34 | 30.5 | 40 | 20 | 14×12×9 | 57.9 73.9 | 123.5 169.0 | 1.59 2.94 | 9.56 16.18 | 1.59 2.94 | 9.56 16.18 | 2.09 2.85 | 1.65 2.15 | 7 |
| MSR 45 S MSR 45 LS | 45 | 37 | 52.5 | 22.5 | 20×17×14 | 92.8 117.2 | 193.8 261.6 | 3.28 5.90 | 18.76 31.32 | 3.28 5.90 | 18.76 31.32 | 4.40 5.94 | 3.2 4.1 | 11.2 |
| MSR 55 S MSR 55 LS | 53 | 43 | 60 | 30 | 23×20×16 | 132.8 172.5 | 270.0 378.0 | 5.49 10.60 | 31.18 55.58 | 5.49 10.60 | 31.18 55.58 | 7.33 10.26 | 5.1 7 | 15.6 |
| MSR 65 LS | 63 | 52 | 75 | 35 | 26×22×18 | 277.0 | 624.0 | 22.50 | 117.87 | 22.50 | 117.87 | 20.02 | 13.3 | 22.4 |