

MicroGuide™ Standard & Wide Stainless Steel Linear Guides

TECHNICAL BULLETIN

Features & Benefits:

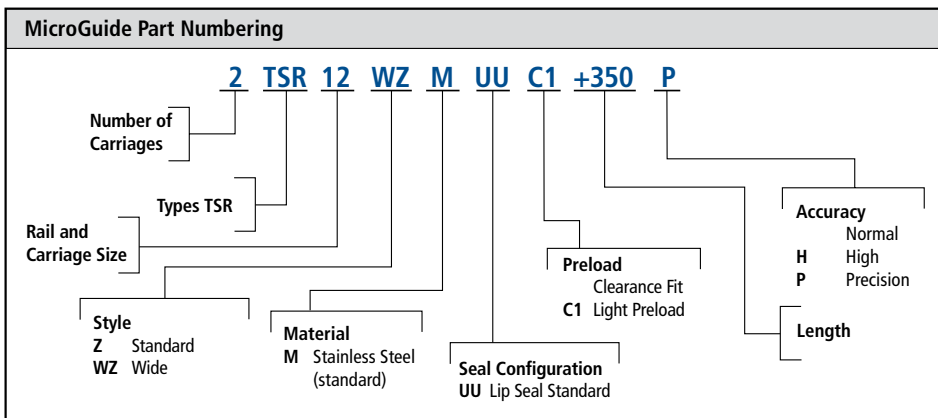
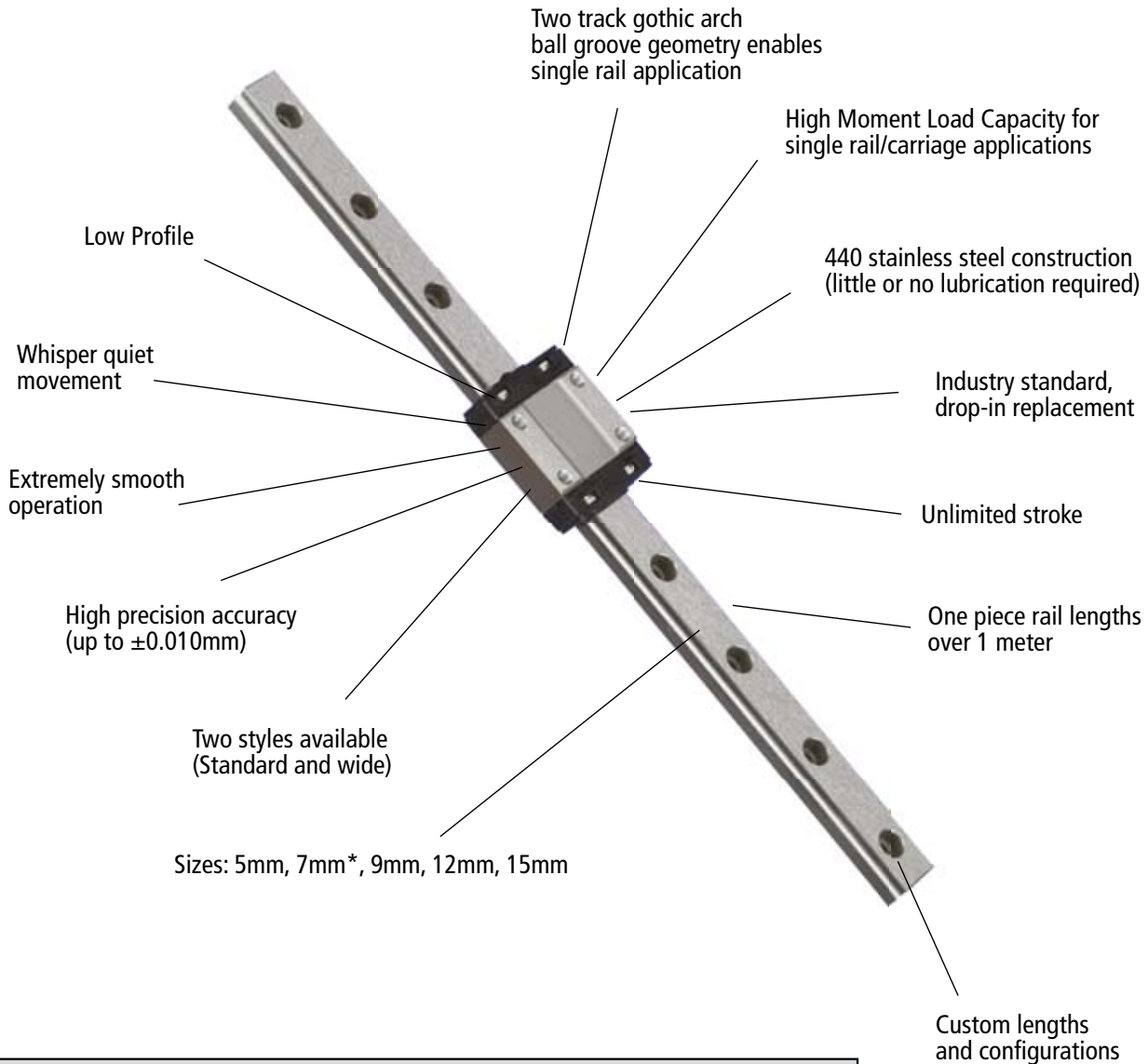
- Industry standard drop-in replacement
- 440 stainless steel construction (corrosion resistance, little or no lubrication)
- High precision accuracy (up to $\pm 0.010\text{mm}$)
- Extremely smooth, quiet operation
- Unlimited stroke
- Low Profile
- High Moment Load Capacity for single rail / carriage applications
- Whisper quiet movement
- Gothic arch ball groove geometry provides enables single rail application
- Sizes: 5mm, 7mm, 9mm, 12mm, 15mm (MicroGuide standard)
- Sizes: 7mm, 9mm, 12mm, 15mm (MicroGuide wide)
- Technical engineering support from Danaher Motion
- One-piece length up to 1 meter (in sizes 7mm - 15mm)
- Contact Danaher Motion for custom lengths and configurations

Typical Applications Include:

- Front end semiconductor processing equipment
- Backend semiconductor packaging and handling equipment
- Medical diagnostic and imaging equipment
- Laboratory automation equipment
- Testing and inspection equipment



Profile Rail

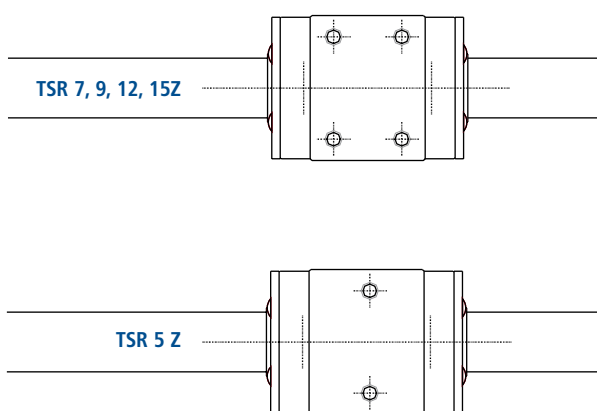
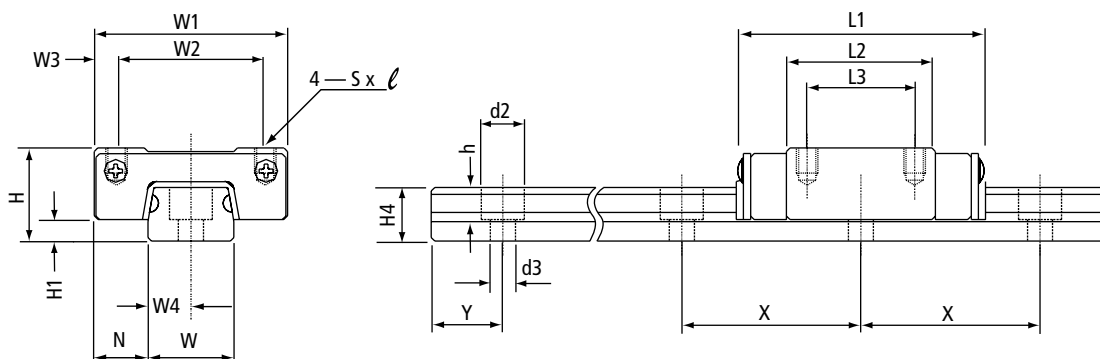


*For 7mm size, there are only 2 mounting holes per carriage.

For more information, or to place an order, please contact your local authorized Thomson™ distributor or Danaher Motion at 1-540-633-3400, Fax: 1-540-633-4162, or E-mail at profilerail@DanaherMotion.com.

Profile Rail

TSR-Z Standard



Standard Lengths of Rail

| Sizes | 5 | 7 | 9 | 12 | 15 |
|------------------|-----|-----|------|-----|------|
| Standard Lengths | 40 | 40 | 55 | 70 | 150 |
| | 55 | 55 | 75 | 95 | 230 |
| | 70 | 70 | 95 | 120 | 310 |
| | 100 | 85 | 115 | 145 | 430 |
| | 130 | 100 | 135 | 170 | 550 |
| | 160 | 130 | 155 | 195 | 670 |
| | | | 175 | 220 | 1030 |
| | | | 195 | 245 | |
| | | | 275 | 270 | |
| | | | 1015 | 320 | |
| | | | 370 | | |
| | | | 470 | | |
| | | | 1020 | | |
| X | 15 | 15 | 20 | 25 | 40 |
| Y | 5 | 5 | 7.5 | 10 | 15 |

Longer lengths may be supplied with butt-joints on sizes 7 through 15.

MicroGuide™ TSR-Z (Standard)

| Size | Assembly Dimensions | | | Carriage Dimensions | | | | | | | Rail Dimensions | | | | | | | |
|------|---------------------|-----|-----|---------------------|----|-----|------|------|----|---------------------|-----------------|-----|-----|-----|-----|-----|-----|----|
| | H | H1 | N | W1 | W2 | W3 | L1 | L2 | L3 | Sxℓ | W | W4 | H4 | d2 | d3 | h | Y | X |
| 5 | 6 | 1.5 | 3.5 | 12 | 8 | 2 | 17 | 12.8 | - | M2X1.5 ¹ | 5 | 2.5 | 4 | 3.5 | 2.4 | 1 | 5 | 15 |
| 7 | 8 | 1.5 | 5 | 17 | 12 | 2.5 | 23.5 | 13.5 | 8 | M2X2.5 | 7 | 3.5 | 4.7 | 4.2 | 2.4 | 2.3 | 5 | 15 |
| 9 | 10 | 2.2 | 5.5 | 20 | 15 | 2.5 | 31 | 20.0 | 10 | M3X3 | 9 | 4.5 | 5.5 | 6 | 3.5 | 3.3 | 7.5 | 20 |
| 12 | 13 | 3 | 7.5 | 27 | 20 | 3.5 | 35 | 20.8 | 15 | M3X3.5 | 12 | 6 | 7.5 | 6 | 3.5 | 4.5 | 10 | 25 |
| 15 | 16 | 4 | 8.5 | 32 | 25 | 3.5 | 43 | 25.7 | 20 | M4X6 | 15 | 7.5 | 9.5 | 6 | 3.5 | 4.5 | 15 | 40 |

(1) For 5mm size, there are only 2 mounting holes per carriage.

Note All: Dimensions in mm except where noted otherwise. Longer lengths are available with butt joints on sizes 7-15. Sizes in between standards are available, Y dimensions will be the same unless specified at time of ordering.

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Profile Rail

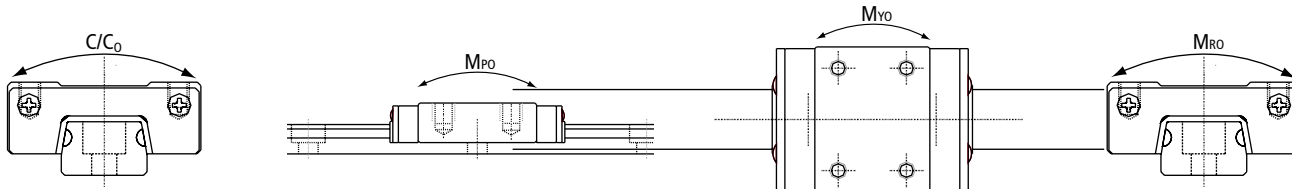
TSR-Z Standard

Dynamic Load and Moment Ratings

C = Dynamic load rating

Static Load and Moment Capacities

C = Static load rating
 M_{PO} = Static pitch moment capacity
 M_{YO} = Static yaw moment capacity
 M_{RO} = Static roll moment capacity



| Size | Load Capacity (N) | | Moments (Nm) | | | Mass | |
|------|------------------------|-----------------------|-----------------|-----------------|-----------------|---------------|-------------|
| | Dynamic C ¹ | Limit Co ² | M _{PO} | M _{YO} | M _{RO} | Carriage [kg] | Rail [kg/m] |
| 5 | 336 | 620 | 0.8 | 0.8 | 1.47 | 0.01 | 0.14 |
| 7 | 924 | 1440 | 2.55 | 2.55 | 5.10 | 0.02 | 0.23 |
| 9 | 1544 | 2360 | 5.10 | 5.10 | 10.4 | 0.02 | 0.32 |
| 12 | 2780 | 4220 | 8.04 | 8.72 | 14.7 | 0.04 | 0.58 |
| 15 | 4410 | 6570 | 16.5 | 17.9 | 30.2 | 0.07 | 0.93 |

Notes:

1. The dynamic load and moment ratings are based upon 50km travel life.
2. The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.
3. The load limit is the maximum load that may be applied to a system. It is important to analyze the application so that peak and/or shock loads do not exceed the load limit.

Load/Life Calculations

| | |
|---|---|
| <p>To determine proper carriage size:</p> $C = \frac{100}{L}$ | <p>To determine travel life:</p> $L = \frac{C}{F}$ <p>L = normal travel life (km) C = rated dynamic load capacity of carriage (N) F = equivalent load on carriage (N)</p> |
|---|---|

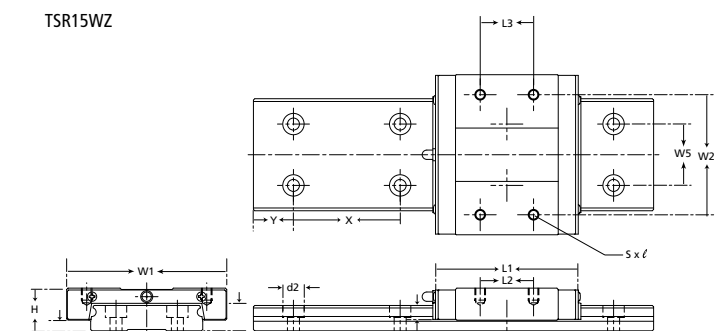
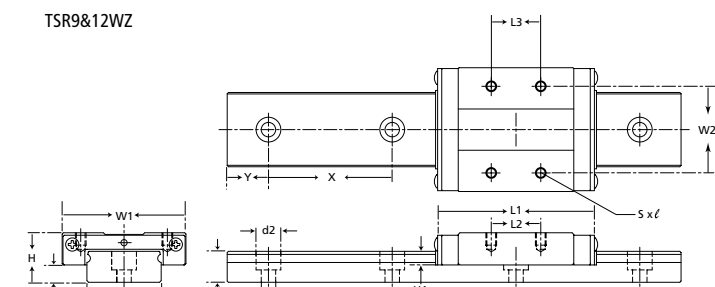
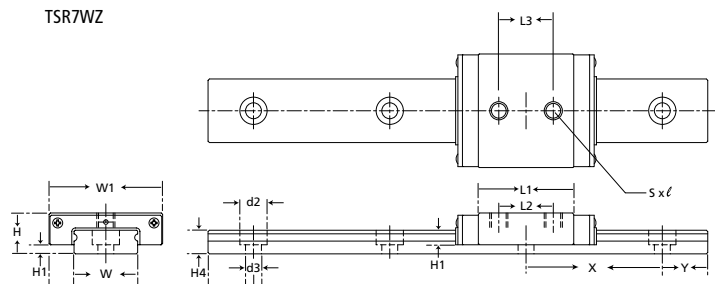
Operating Parameters

Maximum Velocity: 3 m/s
 Maximum Acceleration: 50 m/s

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Profile Rail

TSR-WZ Wide



Standard Lengths of Rail

| Sizes | 7 | 9 | 12 | 15 |
|------------------|-----|------|------|------|
| Standard Lengths | 50 | 50 | 70 | 110 |
| | 85 | 110 | 150 | 190 |
| | 170 | 260 | 310 | 270 |
| | 100 | 350 | 390 | 430 |
| | 130 | 440 | 470 | 590 |
| | 260 | 530 | 630 | 750 |
| | 350 | 620 | 790 | 910 |
| | 440 | 800 | 950 | 1030 |
| | 530 | 1010 | 1030 | |
| | 620 | | | |
| | 800 | | | |
| 1010 | | | | |
| X | 30 | 30 | 40 | 40 |
| Y | 10 | 10 | 15 | 15 |

MicroGuide™ TSR-WZ Wide

| Size | Assembly Dimensions | | | Carriage Dimensions | | | | | | Rail Dimensions | | | | | | | |
|------|---------------------|-----|-----|---------------------|----|------|------|----|--------|-----------------|----|-----|----|-----|-----|----|----|
| | H | H1 | N | W1 | W2 | L1 | L2 | L3 | S x l | W | W5 | H4 | d2 | d3 | h | Y | X |
| 7 | 9 | 2 | 5.5 | 25 | - | 31 | 21.5 | 12 | M4X3.5 | 14 | - | 5.2 | 6 | 3.5 | 3.2 | 10 | 30 |
| 9 | 12 | 4.2 | 6 | 30 | 21 | 39 | 28 | 12 | M2.6X3 | 18 | - | 7.5 | 6 | 3.5 | 4.5 | 10 | 30 |
| 12 | 14 | 4 | 8 | 40 | 28 | 44.5 | 30.5 | 15 | M3X3.5 | 24 | - | 8.5 | 8 | 4.5 | 4.5 | 15 | 40 |
| 15 | 16 | 4 | 9 | 60 | 45 | 55.5 | 38.5 | 20 | M4X4.5 | 42 | 23 | 9.5 | 8 | 4.5 | 4.5 | 15 | 40 |

Note: All dimensions in mm except where noted otherwise. Longer lengths are available with butt joints.
 Sizes in between standards are available, Y dimensions will be the same unless specified at time of ordering.

*For 7mm size, there are only 2 mounting holes per carriage.

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Profile Rail

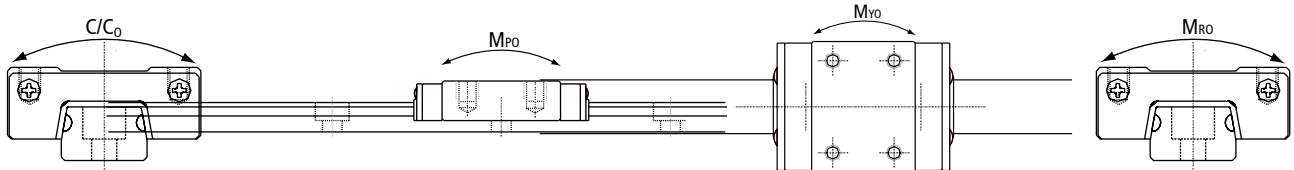
TSR-WZ Wide

Dynamic Load and Moment Ratings

C = Dynamic load rating

Static Load and Moment Capacities

C = Static load rating
 M_{PO} = Static pitch moment capacity
 M_{YO} = Static yaw moment capacity
 M_{RO} = Static roll moment capacity



| Size | Load Capacity (N) | | Moments (Nm) | | | Mass | |
|------|------------------------|-----------------------|-----------------|-----------------|-----------------|---------------|-------------|
| | Dynamic C ¹ | Limit Co ² | M _{PO} | M _{YO} | M _{RO} | Carriage [kg] | Rail [kg/m] |
| 7 | 1370 | 2160 | 5.39 | 5.39 | 15.2 | 0.03 | 0.51 |
| 9 | 2450 | 3920 | 16.3 | 16.3 | 36.0 | 0.04 | 1.08 |
| 12 | 4020 | 6080 | 17.2 | 18.6 | 47.6 | 0.08 | 1.5 |
| 15 | 6660 | 9800 | 35.2 | 38.2 | 137 | 0.17 | 3.0 |

Notes:

1. The dynamic load and moment ratings are based upon 50 km travel life.
2. The static load and moment capacities are the maximum radial load and moment load that should be applied to the bearing while there is no relative motion between the carriage and rail.
3. The load limit is the maximum load that may be applied to a system. It is important to analyze the application so that peak and/or shock loads do not exceed the load limit.

Load/Life Calculations

| | |
|--|--|
| <p>To determine proper carriage size:</p> $C_{min} = F \cdot \left(\frac{100}{L}\right)^{1/3}$ <p>C_{min} = minimum required dynamic load capacity of carriage (N)</p> <p>F = equivalent load on carriage (N)</p> <p>L = required travel life (km)</p> | <p>To determine travel life:</p> $L = \left(\frac{C}{F}\right)^3 \cdot 100$ <p>L = normal travel life (km)</p> <p>C = rated dynamic load capacity of carriage (N)</p> <p>F = equivalent load on carriage (N)</p> |
|--|--|

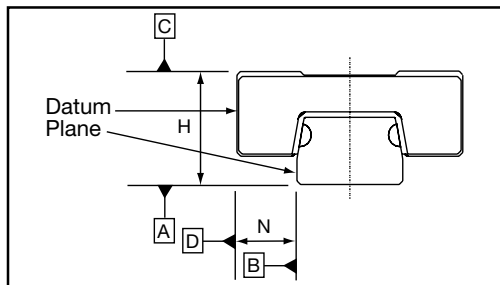
Operating Parameters

Maximum Velocity: 3 m/s
 Maximum Acceleration: 50 m/s²

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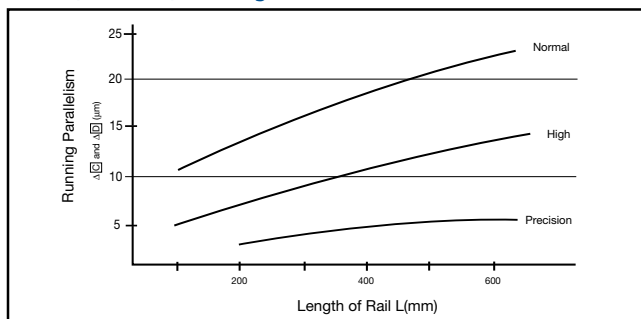
Profile Rail

TSR-Z (Standard) Accuracy Tolerance



| Accuracy of each part | | TSR5 Z | | TSR7 Z, TSR9 Z, TSR12 Z & TSR15 Z | | |
|-----------------------|-----------------------|----------------|-------------|-----------------------------------|--------|-------------|
| | | Normal (blank) | Precision P | Normal (blank) | High H | Precision P |
| Height H | Dimensional Tolerance | ±0.030 | ±0.015 | ±0.040 | ±0.020 | ±0.010 |
| | Pair Tolerance | 0.015 | 0.005 | 0.030 | 0.015 | 0.007 |
| Width N | Dimensional Tolerance | ±0.030 | ±0.015 | ±0.040 | ±0.025 | ±0.015 |
| | Pair Tolerance | 0.015 | 0.005 | 0.030 | 0.020 | 0.010 |

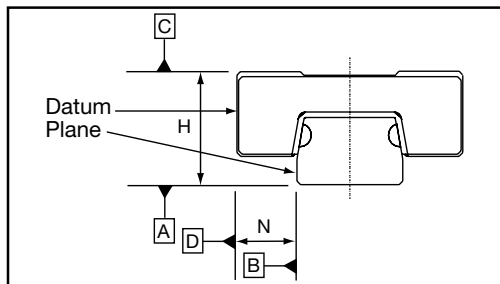
TSR-Z (Standard) Running Parallelism



TSR-Z (Standard) Fit Up

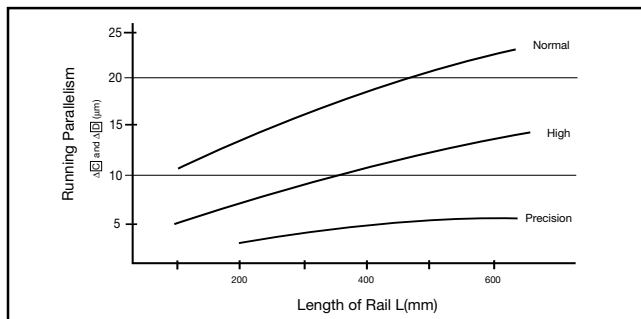
| Series Type, Size, and Style | Radial Clearances (µm) | |
|------------------------------|------------------------|------------------|
| | clearance fit (blank) | light preload C1 |
| TSR5 Z | 0~+1.5 | -1.5~0 |
| TSR7 Z | ±2 | -3~0 |
| TSR9 Z | ±2 | -4~0 |
| TSR12 Z | ±3 | -6~0 |
| TSR15 Z | ±5 | -10~0 |

Accuracy Tolerance Running Parallelism



| Accuracy of each part | | TSR WZ | | |
|-----------------------|-----------------------|----------------|--------|-------------|
| | | Normal (blank) | High H | Precision P |
| Height H | Dimensional Tolerance | ±0.040 | ±0.020 | ±0.010 |
| | Pair Tolerance | 0.030 | 0.015 | 0.007 |
| Width N | Dimensional Tolerance | ±0.040 | ±0.025 | ±0.015 |
| | Pair Tolerance | 0.030 | 0.020 | 0.010 |

TSR-WZ (Wide) Running Parallelism



TSR-WZ (Wide) Fit Up

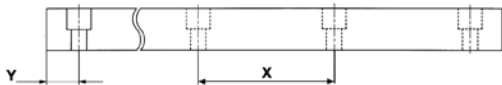
| Series Type, Size, and Style | Radial Clearances (µm) | |
|------------------------------|------------------------|------------------|
| | clearance fit (blank) | light preload C1 |
| TSR7 WZ | ±2 | -3~0 |
| TSR9 WZ | ±2 | -4~0 |
| TSR12 WZ | ±3 | -6~0 |
| TSR15 WZ | ±5 | -10~0 |

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Profile Rail

Standard Lengths of Rail

| Sizes | 7 WZ | 9 WZ | 12 WZ | 15 WZ |
|------------------|------|------|-------|-------|
| Standard Lengths | 50 | 50 | 70 | 110 |
| | 110 | 110 | 150 | 190 |
| | 170 | 170 | 230 | 270 |
| | 260 | 260 | 310 | 430 |
| | 350 | 350 | 390 | 590 |
| | 440 | 440 | 470 | 750 |
| | 530 | 530 | 630 | 910 |
| | 620 | 620 | 790 | 1030 |
| | 800 | 800 | 950 | |
| | 1010 | 1010 | 1030 | |
| X | 30 | 30 | 40 | 40 |
| Y | 10 | 10 | 15 | 15 |



Load/Life Calculations

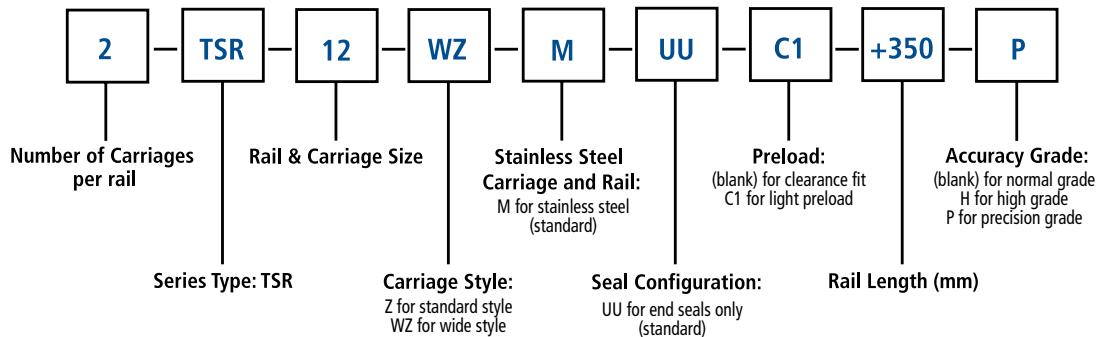
| | |
|---|---|
| To determine proper carriage size: $C_{min} = F \cdot \left(\frac{50}{L}\right)^{1/3}$ C_{min} = minimum required dynamic load capacity of carriage (N) F = equivalent load on carriage (N) L = required travel life (km) | To determine travel life: $L = \left(\frac{C}{F}\right)^3 \cdot 50$ L = normal travel life (km) C = rated dynamic load capacity of carriage (N) F = equivalent load on carriage (N) |
|---|---|

Conversions

| | |
|-----------------|------------------------|
| 1 lbf = 4.448 N | 1 km = 39,370 inches |
| 1 kgf = 9.8 N | 1 Nm = 0.7376 lbf - ft |

Maximum Travel Speed: $V_{max} = 3 \text{ m/s}$
 Maximum Acceleration: $a_{max} = 50 \text{ m/s}^2$

How To Order



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