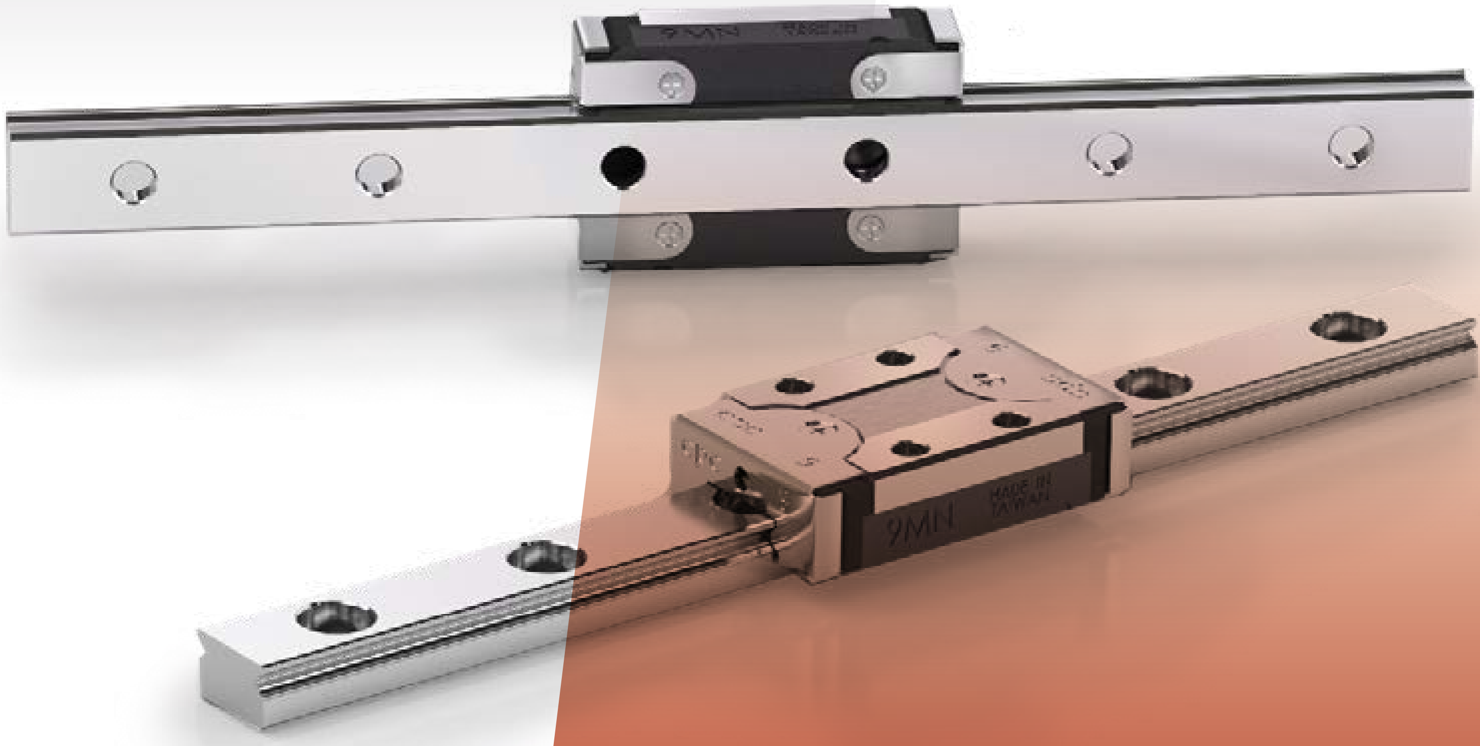
LINEAR MOTION TECHNOLOGY

MR - Miniature Linear Guide Series

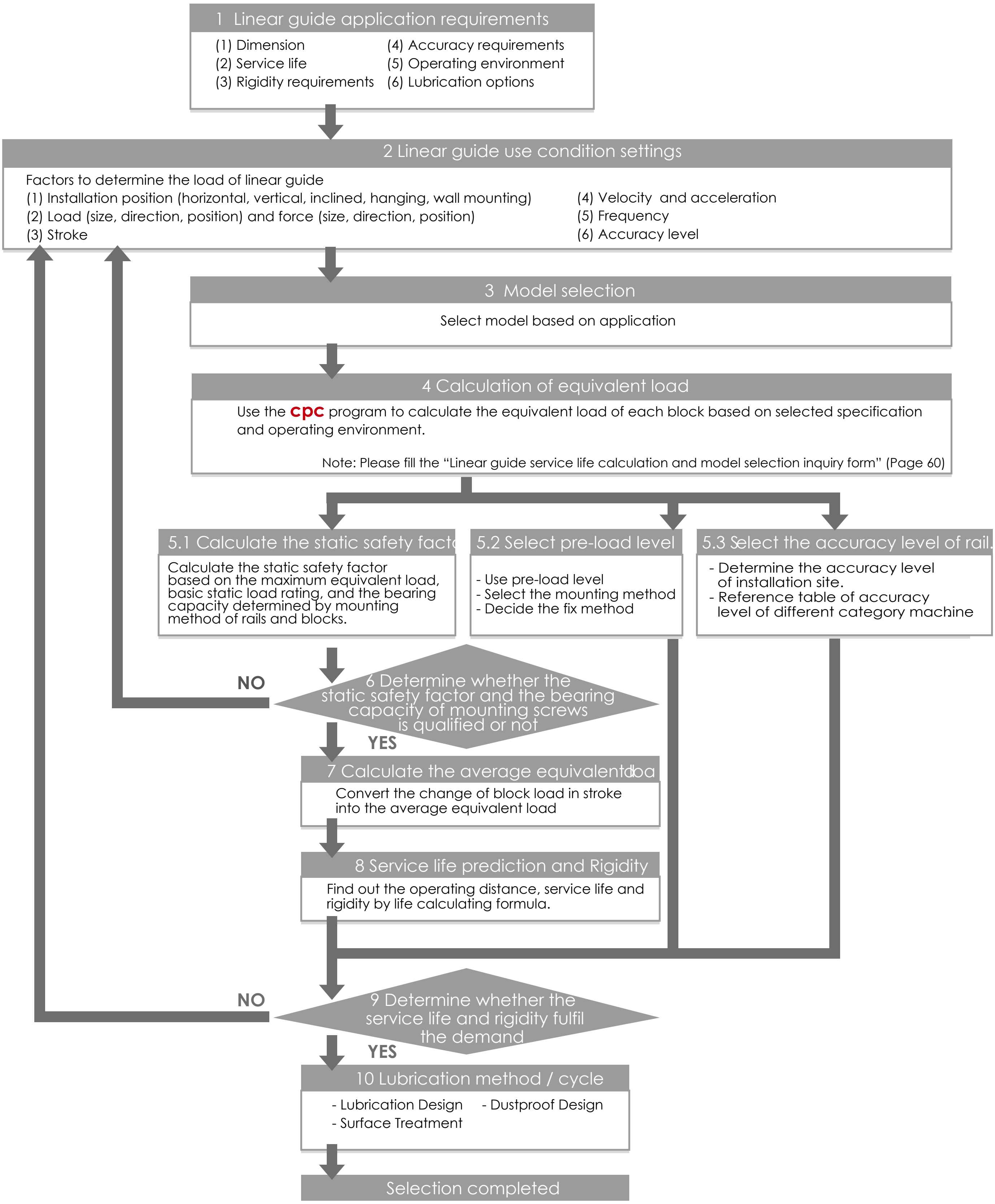
ST - Miniature Stroke Slide Series



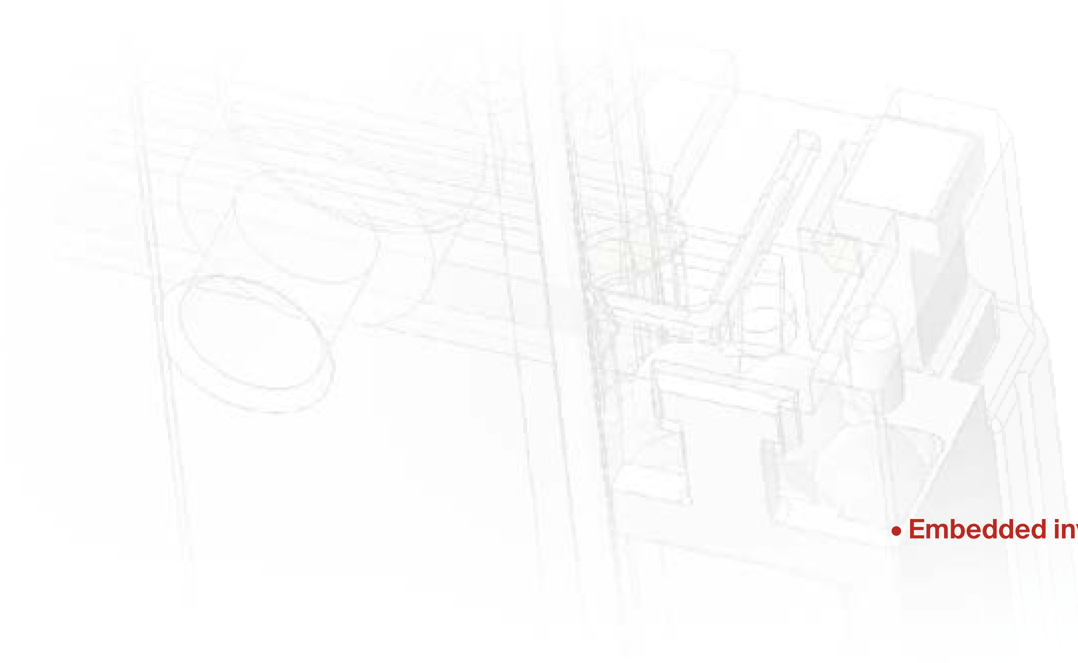
cpc

Contents

The Flow Chart of Model Selection



1. Product Introduction



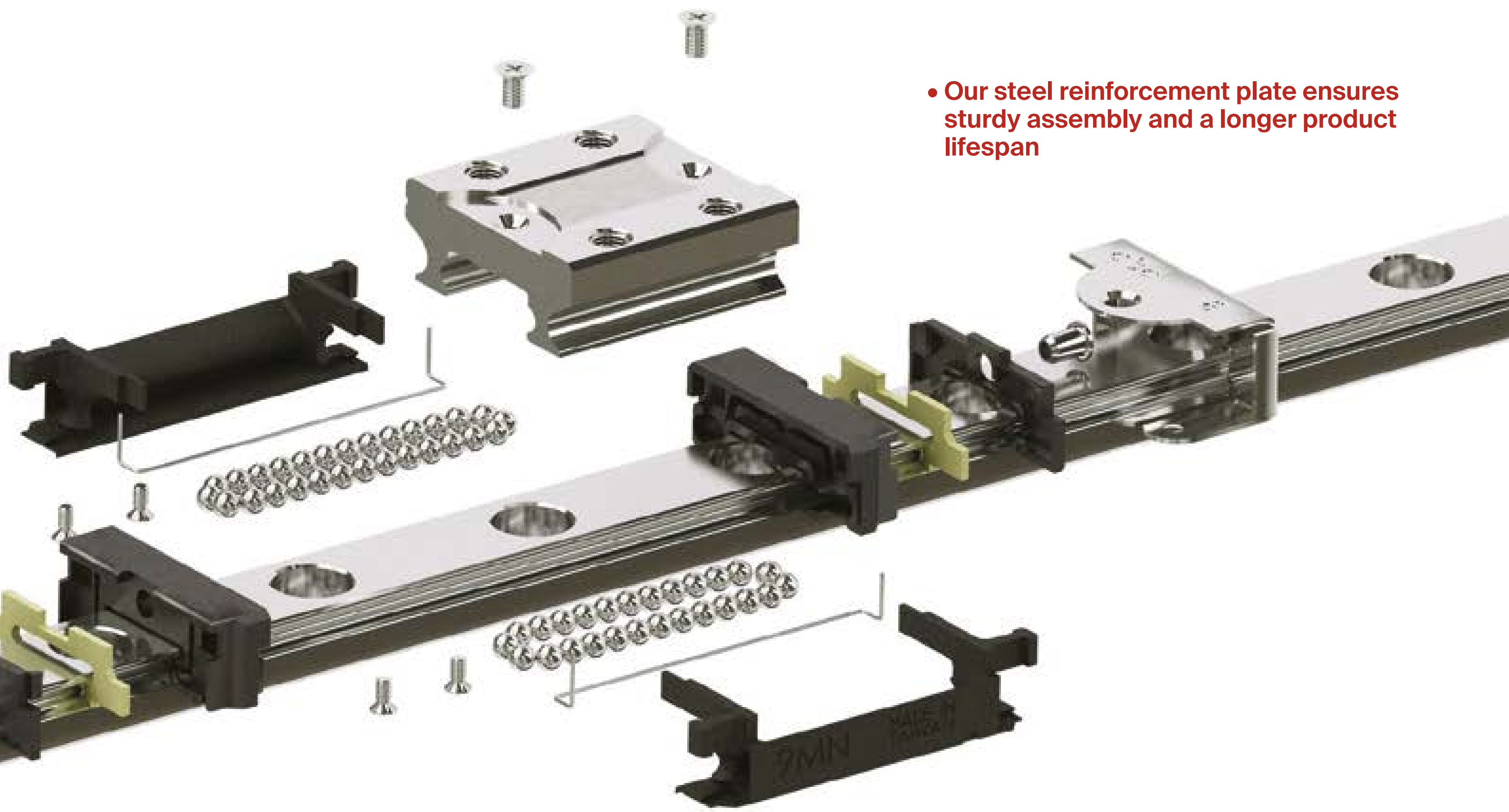
- **Embedded inverse hook design**

- **Designed for high load, high moment applications**

- **Precision**
  MR Miniature linear guide series have three accuracy grades for design selections: Precision (P), High (H), Normal (N).

- **Unique ball re-circulation design**

- **Our steel reinforcement plate ensures sturdy assembly and a longer product lifespan**



- **Built-in bottom seal**
  * We recommend this new design as a priority purchase.

- **Lubrication storage**
  Our Environmentally-friendly system requires less lubricant.

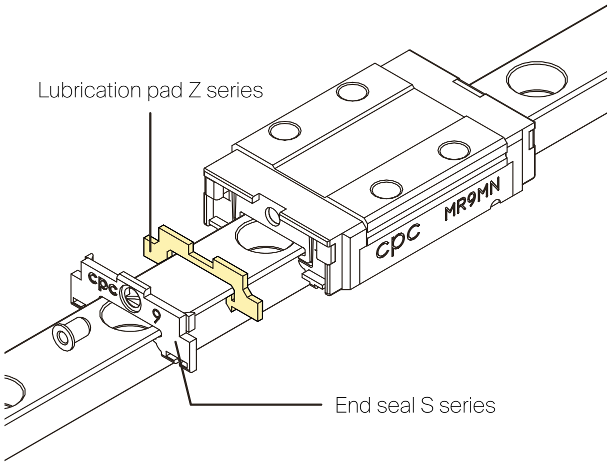
- **Material**
  All of our MR miniature linear guide series are made from heat treated stainless steel material.

1. Product Introduction

Dustproof design

SS series-end seal

The standard end seal design can be hermetically sealed and dustproofed. This extends the product lifespan, reduces lubrication grease consumption, and ensuresa long-lasting lubrication effect. The special seal slip design also ensures a low friction force so as not to affect the product's running smoothness.



Environmentally friendly lubrication design

ZZ series-end seal and lubrication pad

The two ends of the runner block feature a hermetic lubrication grease injection design. This is capable of bringing the lubrication grease to the raceway via continuous steel ball circulation, thereby achieving an effective long-term lubrication effect. A built-in lubrication pad can also be utilized toward prolonging lubrication further for long-term motion, reducing maintenance costs while demonstrating a superior lubrication capability during short stroke motion.

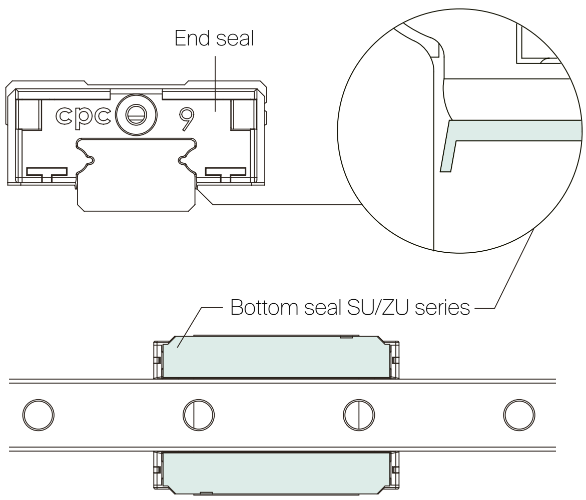
Brand new U series

Features: the built-in bottom seal does not affect the friction resistance if a clearance is smaller than 0.1mm.

SU series - end, bottom seals

In addition to a normally equipped end seal, our newly designed runner block is equipped with an extra bottom seal. This prevents foreign matter from entering via the lower side of the runner block into the running rail, thereby extending the working life of the runner block.

* the new design is recommended for priority purchase.



ZU series - end, bottom seals and lubrication pad

grease from spilling below the runner block. In addition, a built-in mounted lubrication pad further strengthens the series' grease-saving effects while extending its re-greasing interval.

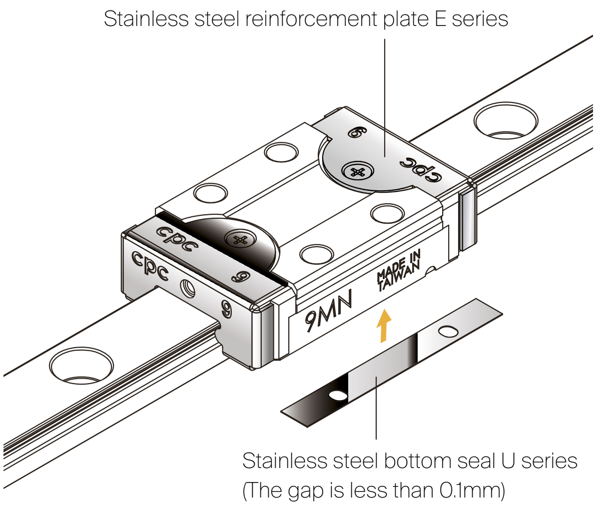
* the new design is recommended for priority purchase.

End reinforcing design

EE series-end seal and reinforcement plate

This series utilizes two stainless steel reinforcement plates to cover the two plastic ends of the slide block completely and stainless steel screws to secure the upper and lower sides of the runner steel block, thereby strengthening the rigidity and increasing the coverage area of the end cap. This ensures faster running speeds while a gap sealing design between the reinforcement plate and slide rail enables an added wiping function.

Running speed Vmax=10m/s , amax=300m/s^2 (60m/s^2 can be reached without prepressing)



EZ series - end seal, reinforcing plate and lubrication pad

The built-in lubrication pads at the two ends of the runner block conform to environmental protection requirements and reduce maintenance costs.

EU series - end seal, stainless steel bottom seal and reinforcement plate

The stainless steel bottom seal protects the runner block from unnecessary damage caused by collision with foreign objects. Due to this runner block series having our strongest protective capability, its use is recommended for environments with many iron scraps around.

UZ series - end seal, stainless steel bottom seal, reinforcement plate and lubrication pad

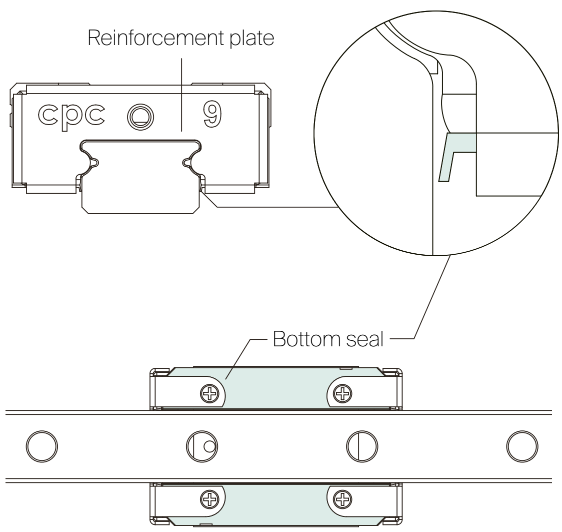
The lubrication pad can provide highly rigid runner blocks with better lubrication and grease storage capabilities, and reduce re-greasing time.

Brand new UE series

SUE series - end seal, bottom seal and reinforcement plate

our new design includes an in-built bottom seal. This strengthens the runner block's bottom dustproofing capability while its stainless steel reinforcement plate prevents hard and rigid objects from striking at the plastic cap from the end position. This is why its dustproofing effect is the strongest among all of our product series.

* the new design is recommended for priority purchase.



ZUE series - end seal, bottom seal, reinforcing plate and lubrication pad

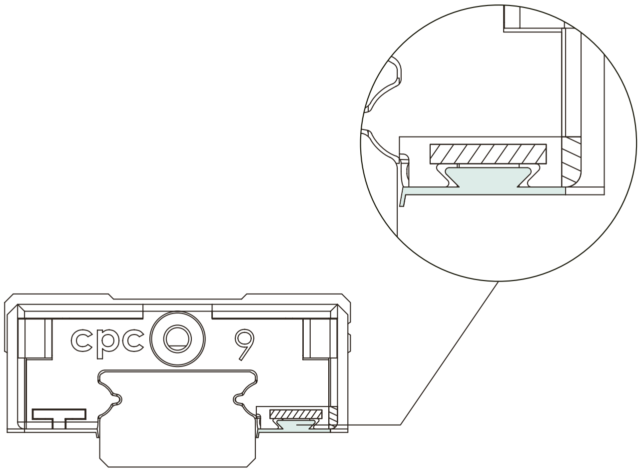
The newly designed bottom seal protects lubrication grease from spilling below the runner block. with our built-in lubrication pad, an additional grease saving effect is attained, further prolonging prolonging our product's re-lubrication timeframe.

* the new design is recommended for priority purchase.

1. Product Introduction

Embedded inverse hook design for reinforced mechanical integration

When the runner block is in motion and chenging direction, the circulating stainless steel balls inside the raceway generate impact force against the plastic end cap. As the demand for rapid motion in the automation industry has increased, cpc has invented inverse plastic hooks to tightly secure our miniature blocks by effectively distributing the applied stress over a larger area.

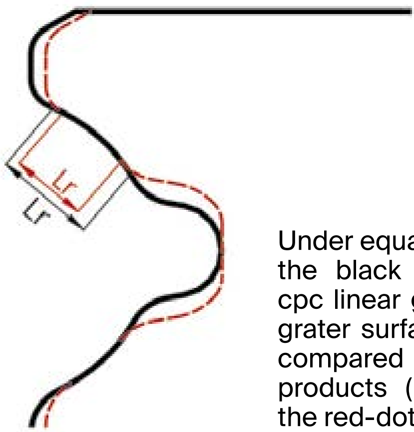


Brand new design

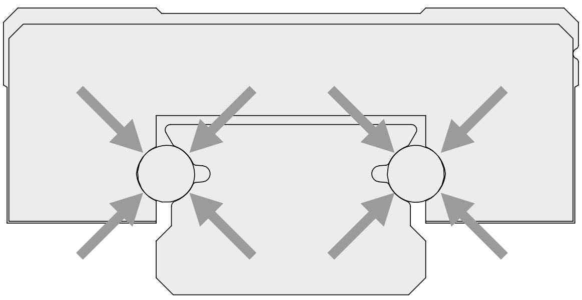
Suitable for:
High speed belt driven mechanisms
High speed carrier designs Automation linkage between station

High load and high moment capacity

The MR Miniature Linear Guide Series is designed using two rowsof recirculating balls. The design uses a Gothic profile in all directions. Within the restriction of limited space, langer stainless steel balls are used to enhance load and torsion resistance capacity.

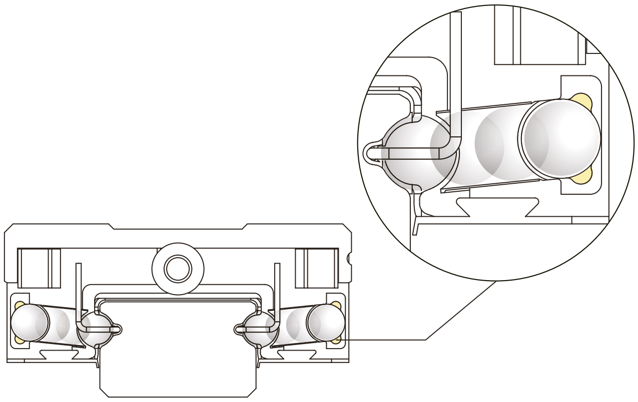


Under equal widthed rails, the black line indicated cpc linear guides provide grater surface contact as compared to competing products (indicated with the red-dotted line).



Dust Proof Design

Our standard design comes equipped with an end seal that effectively restricts dust contamination and prolongs lubrification, ensuring longer product life. Our specially-designed low friction seal do not affect running smoothness.



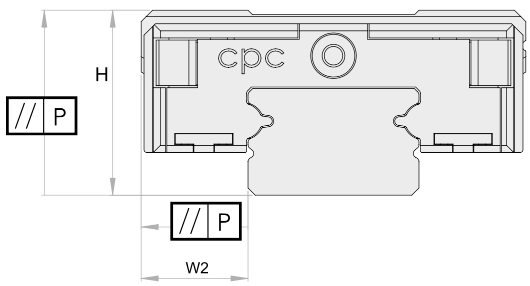
2. Technical Information

2.1 Precision

Accuracy

MR miniature linear guides series have three accuracy grades (P, H, N) for your choice.

Table of accuracy



Accuracy grades (μm)		Precision P	Hight H	Normal N
Admissible height H dimension Tolerance	H	± 10	± 20	± 40
Height variation for different runner blocks on the same rail position	ΔH	7	15	25
Admissible width W dimension tolerance	W_2	± 15	± 25	± 40
Width variation for different runner blocks on the same rail position	ΔW_2	10	20	30

Speed

The maximum speed for the standard MR-SS/ZZ,SU/ZU type is:

Vmax = 3 m/s

Maximum acceleration

αmax = 250 m/s²

(If preload is at V0, capability of reaching 40m/s²)

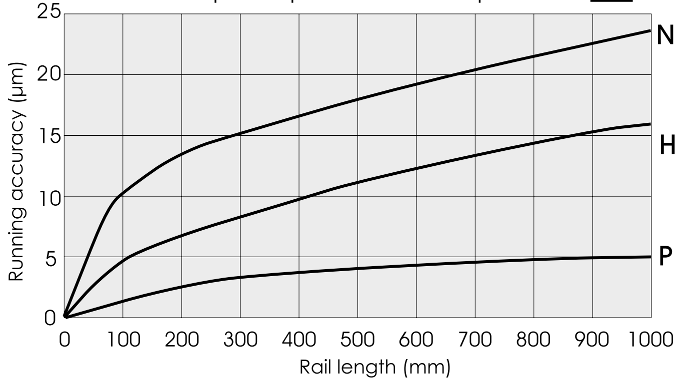
The maximum speed for the standard MR-EE/EZ,EU/UZ,SUE/ZUE type is:

Vmax > 5 m/s

Maximum acceleration **αmax = 300 m/s²**

(If preload is at V0, capability of reaching 60m/s²)

Linear block relative to linear rail, datum plane parallel motion precision // P



2. Technical Information

2.2 Preload

Preload

The MR Miniature Linear Guide series has three degrees of preload capacity: V0, VS and V1 (as described in the preload table below). Appropriate preload levels can enhance the stiffness, precision, and torsion resistance performance of the linear guide. But an inappropriate application thereof can also negatively affect the product life and its motional resistance levels.

Table Preload

Preload type	Model code	Clearance (um)						Application
		3	5	7	9	12	15	
Clearance	V0	+3 – 0	+3 – 0	+4 – 0	+4 – 0	+5 – 0	+6 – 0	Very smooth
Standard	VS	+1 – 0	+1 – 0	+2 – 0	+2 – 0	+2 – 0	+3 – 0	Smooth and high precision
Light preload	C1	0 – -0.5	0 – -1	0 – -3	0 – -4	0 – -5	0 – -6	High rigidity Minimizes vibration High precision Load balance

Operating Temperature

The MR Miniature Linear Guide can operate in a range of temperatures from -40°C~ + 80°C. For short term operation, it can reach up to +100°C.

Friction Force in Average

Unit: N

Block		without endseals(SS/SU)			endseal (SS/SU)	Oilpad supplied with Oil (ISO / VG 32)
		Preload class				
size	weight (g)	Clearance (V0)	VS	V1 (min~max)		
MR 3MN	0.9	0.02	0.03	0.06(max)	0.05	-
MR 5MN	3.5	0.03	0.04	0.08(max)	0.05	0.05
MR 7MN	8	0.03	0.05	0.10~0.20	0.05	0.15
MR 9MN	18	0.04	0.12	0.20~0.50	0.05	0.15
MR 12MN	34	0.04	0.16	0.30~1.00	0.05	0.20
MR 15MN	61	0.10	0.20	0.40~1.50	0.05	0.20

Unit: N

Block		without endseals(SS/SU)			endseal (SS/SU)	Oilpad supplied with Oil (ISO / VG 32)
		Preload class				
size	weight (g)	Clearance (V0)	VS	V1 (min~max)		
MR 3WN	3.4	0.04	0.06	0.08(max)	0.05	-
MR 5WN	6	0.10	0.15	0.20(max)	0.10	0.05
MR 7WN	19	0.10	0.25	0.30~0.70	0.10	0.20
MR 9WN	37	0.20	0.30	0.40~1.10	0.10	0.20
MR 12WN	65	0.20	0.35	0.40~1.40	0.10	0.30
MR 15WN	137	0.40	0.50	0.60~1.80	0.20	0.40

Unit: N

Block		without endseals(SS/SU)			endseal (SS/SU)	Oilpad supplied with Oil (ISO / VG 32)
		Preload class				
size	weight (g)	Clearance (V0)	VS	V1 (min~max)		
MR 3ML	1.2	0.02	0.03	0.08(max)	0.05	-
MR 5ML	4	0.04	0.06	0.10(max)	0.05	0.05
MR 7ML	14	0.04	0.07	0.10~0.30	0.05	0.15
MR 9ML	28	0.06	0.14	0.20~0.60	0.05	0.15
MR 12ML	51	0.08	0.20	0.40~1.30	0.05	0.20
MR 15ML	90	0.20	0.20	0.50~2.80	0.05	0.20

Unit: N

Block		without endseals(SS/SU)			endseal (SS/SU)	Oilpad supplied with Oil (ISO / VG 32)
		Preload class				
size	weight (g)	Clearance (V0)	VS	V1 (min~max)		
MR 3WL	3.4	0.04	0.06	0.08(max)	0.05	-
MR 5WL	8	0.10	0.15	0.20(max)	0.10	0.05
MR 7WL	27	0.10	0.30	0.30~0.80	0.10	0.20
MR 9WL	51	0.20	0.30	0.40~1.40	0.10	0.20
MR 12WL	93	0.20	0.35	0.50~1.50	0.10	0.30
MR 15WL	200	0.40	0.60	0.80~3.10	0.20	0.40

2.3 Lubrication

Function

When operating the linear guide under sufficient lubrication conditions, a one-micron layer of oil forms at the contact zone, separating the loaded rolling components and the raceway.
Sufficient lubrication will:

- Reduce friction
- Reduce wear
- Reduce oxidation
- Dissipate heat and increase service life

Lubrication Caution

- ZZ/ZU/EZ/UZ/ZUE Lubrication Storage block
  1. The block already contains lubricants which can be directly installed on the machine, without the need for additional washing.
  2. When first washing the blocks, please do not soak them in the lubricant before both the detergent and cleaning naphtha within are totally dry. The block is ready for installation only after the lubrication storage is full of the lubricant.
- The linear guide must be lubricated for protection before first time use. Contaminants of any kind, weather liquid or solid, should be avoided.
- The runner block should be moved back and forth during lubrication.
- The lubricant can be added either manually or automatically directly onto the rail raceway.
- The lubricant can be injected into the lubrication holes on either end of the runner block.
- A thin layer of observable lubricant should be maintained on the surface of the rail .
- Re-lubrication must be completed before contamination or discoloration of the lubricant occurs.
- Please notify us if product is intended for use in acidic, alkaline, or clean room applications.
- Please contact our technical department for lubrication assistance if the runner block is intended for use in a wall mount configuration.
- The re-lubrication interval must be shortened if the travel stroke is < 2 or > 15 times the length of the steel body of the runner block.

Grease lubrication

When grease lubrication is applied, we recommend synthetic oil-based lithium soap grease with a viscosity between ISO VG32-100.

Oil lubrication

For oil lubrication, we recommend synthetic oils CLP, CGLP (based on DIN 51517) or HLP (based on DIN 51524) with a viscosity range of between ISO VG32-100 and a working temperature range between 0°C~+70°C. (We recommend ISO VG10 for use in lower temperature environments.)

2. Technical Information

2.3 Lubrication - continued

Re-lubrication

- Re-lubrication shall be applied before the lubricant in the block is contaminated or changes color.
- The amount of the lubricant applied should be 1/2 of the first lubrication. When applying lubricant, this should be done until it seeps out from the device.
- Re-lubrication shall be applied under steady operating temperature, with the runner block moved back and forth throughout for optimum distribution.
- If the stroke is smaller than twice or greater than 15 times the steel body length of the block, the re-lubrication interval shall be shortened.

Table 1

Model code	First lubrication (cm^3)	Model code	First lubrication (cm^3)
2 MN	0.02	2 WN	0.03
3 MN	0.02	3 WN	0.03
3 ML	0.03	3 WL	0.04
5 MN	0.03	5 WN	0.04
5 ML	0.04	5 WL	0.05
7 MN	0.12	7 WN	0.19
7 ML	0.16	7 WL	0.23
9 MN	0.23	9 WN	0.30
9 ML	0.30	9 WL	0.38
12 MN	0.41	12 WN	0.52
12 ML	0.51	12 WL	0.66
15 MN	0.78	15 WN	0.87
15 ML	1.05	15 WL	1.11

Re-lubrication Interval

The re-lubrication interval depends on individual use, as the speed, load, stroke length and operating environment are all factors. Careful observation of rails and blocks is the basis to determine the optimal re-lubrication interval; as a rule of thumb, re-lubricate at least once per year. Do not apply water-based coolant liquid on the linear rails or slide. Inject lubricant through injection holes on both ends of the runner block with the recommended cpc brand injector.

Lubrication grease

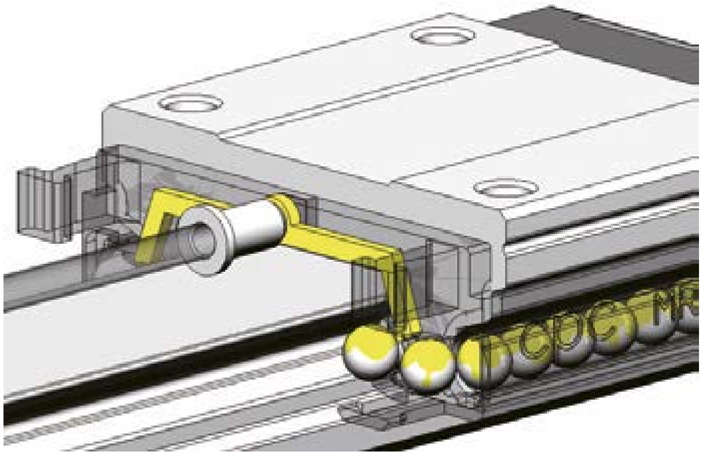
00 For general applications
01 For low-friction, low-noise applications
02 For clean room applications
03 For clean room and vacuum environment applications
04 For high-speed applications
05 For micro-oscillation applications

Lubrication oil

11 For general applications, ISO V32-68

Ordering of the lubrification injector

LUB — 01 — 18G	
Lubricant :	Needle model :
00	21G: 5M/5W
01	19G: 7M/7W
02	18G: 9M/9W
03	18G: 12M/12W
04	15G: 15M/15W
05	
11	



Lubrificant amount: 10ml

2. Technical Information

2.4 Friction

Friction

The MR Miniature Linear Guide Series has low-friction characteristics with a stable and minor starting friction.

Sealing Design

The MR Miniature Linear Guide Series are enclosed by end seals on both ends of the runner block. Optional side seals can also create an all-around sealing system.

Friction

$$F_m = \mu \cdot F \quad \text{(1)}$$

F Load (N)

F_m Friction (N)

The MR Miniature Linear Guide Series friction factor is app μ = 0.002~0.003

Friction Factors

- Sealing system.
- Collision between the balls during operation.
- Collision between the balls and the return path.
- Number of balls in the gothic arch load zone.
- Resistance from lubricant to ball pressure.
- Resistance caused by contaminants.

2.5 Load Capacity and Rating Life

Static Load Rating C_0

Measuring the static load of the travel force along the acting direction, the maximum stress between the rolling balls and raceway is as follows:

- If the curvature radius is lower or equal to 0.52: 4200 MP
- If the curvature radius is equal or higher to 0.6: 4600 MP.

Note: Under maximum stress levels, a permanent deformation will be generated at the contact point.
This corresponds roughly to about 0.0001 times the rolling element diameter.
(The above is according to ISO 14728-2)

Static load safety factor calculation

$$S_0 = C_0/P_0 \quad (11)$$

$$S_0 = M_0/M \quad (12)$$

$$P_0 = F_{max} \quad (13)$$

$$M_0 = M_{max} \quad (14)$$

Operation condition	S_0
Normal operation	1 ~ 2
Load with vibration or impact	2 ~ 3
High accuracy and smooth running	≥ 3

Static load P_0 and moment M_0

The permissible static and applied static load of the MR Miniature Linear Guide Series is limited by:

- The static load of the linear guide.
- The permissible load of fixed screws.
- The permissible load for the connected parts of the mechanism.
- The static load safety factor required for the application.

The equivalent static load and static torque are the largest load and torque, please consult with formulas (13) and (14).

Static load safety factor S_0

In order for the linear bearing to permanently withstand potential deformation while delivering a guaranteed accuracy and reliable motion, the static load safety factor, So should be calculated with formulas (11) and (12).

S_0 static load safety factor

C_0 basic static load in acting direction N

P_0 equivalent static load in acting direction N

M_0 basic static moment in acting direction Nm

M equivalent static moment in acting direction Nm

2. Technical Information

2.5 Load capacity and rating life - continued

Dynamic load rating C_{100B}

For constant sized and directional loads, when the linear bearing is under such a load, the rating life of a linear guide can reach a theoretical travel distance of 100km. (The above is according to ISO 14728-1.)

Rating life calculation

$$C_{50B} = 1.26 \cdot C_{100B} \qquad (2)$$

$$C_{100B} = 0.79 \cdot C_{50B} \qquad (3)$$

$$L = \left(\frac{C_{100B}}{P}\right)^3 \cdot 10^5 \qquad (4)$$

$$L_h = \frac{L}{2 \cdot s \cdot n \cdot 60} = \frac{L}{V_m \cdot 60} \qquad (5)$$

L	= rating life for 100,000 meter travel distance	(m)
L_h	= rating life in hours	(h)
C_{100B}	= dynamic load rating	(N)
P	= equivalent load	(N)
s	= length of stroke	(m)
n	= stroke repetition	(min^{-1})
V_m	= average speed	(m/min)

Rating Life L

90% survival rate for an individual linear guide or a batch of identical linear guides in standard product material and operation conditions is calculated as above (according to ISO 14728-1 standards).
When using the 50km travel standard, the dynamic load rating will exceed the ISO 14728-1 standard value by 20% or more. Formula (2) describes the relationship between the two load ratings.

Calculation of rating life

Formulas (4) and (5) can be used when the equivalent dynamic load and the average speeds are constant.

Equivalent dynamic load and speed

If the load and speed are not constant, it is important to take into account the actual load and speed as both will influence life expectancy.

Equivalent dynamic load

If there is a change in load only, the equivalent dynamic load can be calculated according to formula (6).

Equivalent speed

If there is a change in speed only, the equivalent speed can be calculated according to formula (7).

If there are changes in both load and speed, the equivalent dynamic load can be calculated according to formula (8).

Equivalent load capacities and speed calculation

$$P = \sqrt[3]{\frac{q_1 \cdot F_1^3 + q_2 \cdot F_2^3 + ... + q_n \cdot F_n^3}{100}} \quad (6)$$

$$\bar{v} = q_1 \cdot v_1 + q_2 \cdot v_2 + ... + q_n \cdot v_n \quad (7)$$

$$P = \sqrt[3]{\frac{q_1 \cdot v_1 \cdot F_1^3 + q_2 \cdot F_2^3 + ... + q_n \cdot v_n \cdot F_n^3}{100\ \bar{v}}} \quad (8)$$

$$P = |F_x| + |F_y| \quad (9)$$

$$P = |F| + |M| \cdot \frac{C_0}{M_0} \quad (10)$$

L	= Equivalent dynamic load	(N)
q	= Percentage of stroke	(%)
F_1	= Discrete load steps	(N)
$\bar{v}$	= Average speed	(m/min)
v	= Discrete speed steps	(m/min)
F	= External dynamic load	N
F_y	= External dynamic load, vertical	N
F_x	= External dynamic load, horizontal	N
C_0	= Static load rating	N
M	= Static moment	Nm
M_0	= Static moment in direction of action	Nm

Combined Equivalent Dynamic Load

If the linear guide bears the load from arbitrary angels so that the acting force does not conform to horizontal and vertical directions, its equivalent dynamic load is calculated as shown on formula (9).

Under the condition with the moment

If the linear guide bears the load and the moment simultaneously, its equivalent dynamic load is calculated with formula (10).
According to ISO 14728-1, when equivalent dynamic load tolerance rates below ≤ 0.5C, P ≤ C0m, a realiable product life value can be calculated.

Single Block Bearing the Moment

For a given structure, if the block needs to bear torque moments from Mp and My directions, the maximum moment that the block can withstand while still maintain smooth running conditions measures at about 0.3-0.1 times the static moment rating. The higher the preload, the higher the loading value and vice versa.

In the case of any design questions, please contact the **cpc** technical department.

2. Technical Information

2.6 Line chart

Under pressure

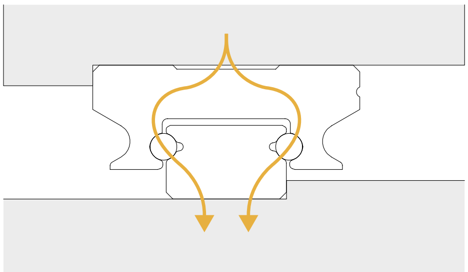


Figure A

Pull up

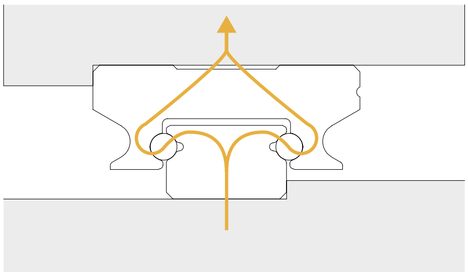


Figure B

Lateral force 1

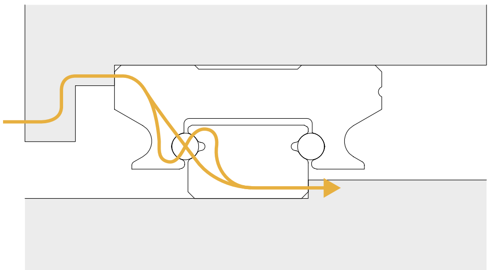


Figure C

Lateral force 1

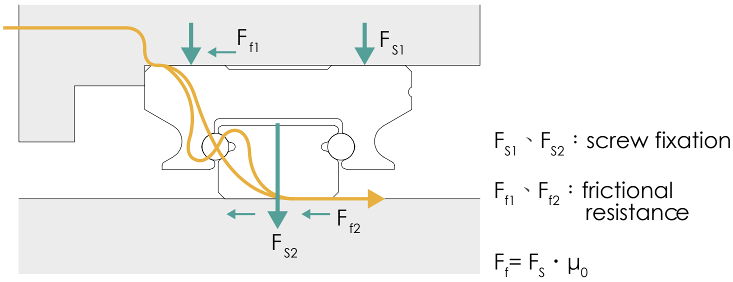


Figure D

As can be seen from the three diagrams in Figure A to Figure D, when subjected to upward, downward and lateral loads, the force flow will be distributed to the two ball transfer.

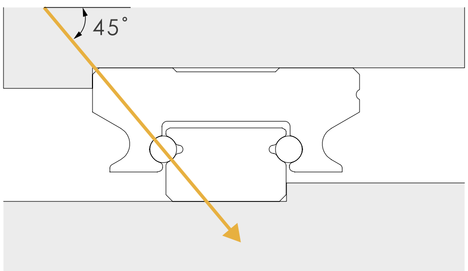


Figure E

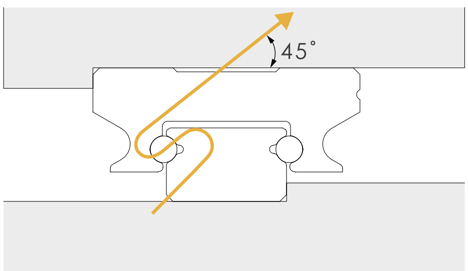


Figure F

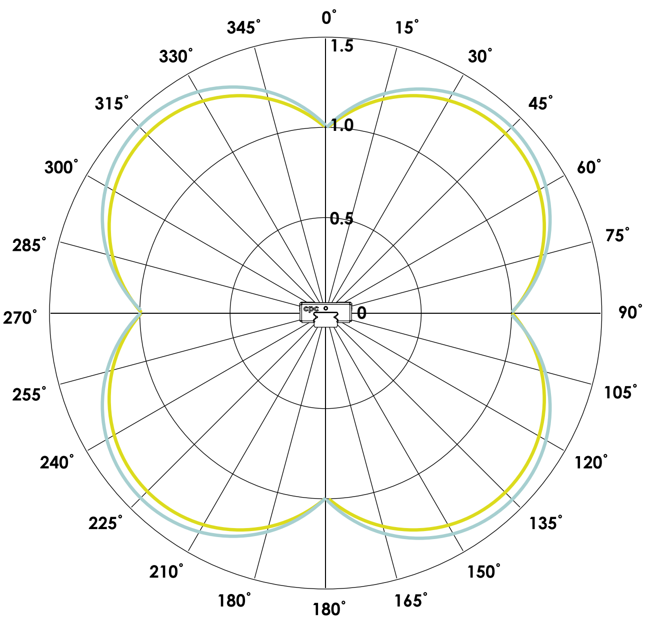
As shown in the two diagrams in Figures E and F, the load acting on the 45-degree angle has the greatest effect on the system's life because the transfer of force is limited to a single row of balls.

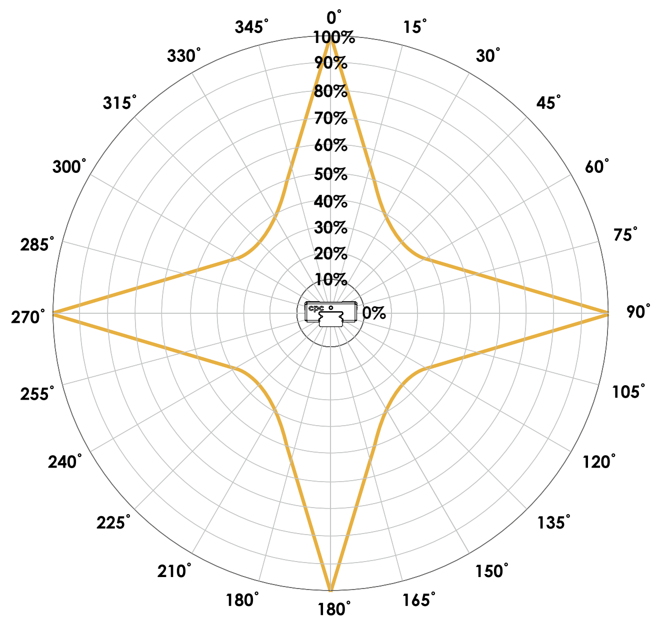
When the load is applied horizontally or vertically (0°, 90°, 180°, 270°), the equivalent load of the slide is equal to the actual load. When the load angle is 45 , its equivalent load is approximately 1.414 times that of the main direction. (as shown in formula (13)

When the same load is at different angles, the comparison of equation (13) and the actual equivalence load is as shown in the following figure.

Therefore, in order to increase the service life of the linear system, it should be installed in the appropriate direction to bear the load. Otherwise, the service life will be greatly reduced, as shown in the figure below. Since the relationship between life and load is as the power of formula (8), when the acceptance angle is 45°, the service life will be significantly reduced.

The following is the life L comparison chart (in %) for different angles under the same load.



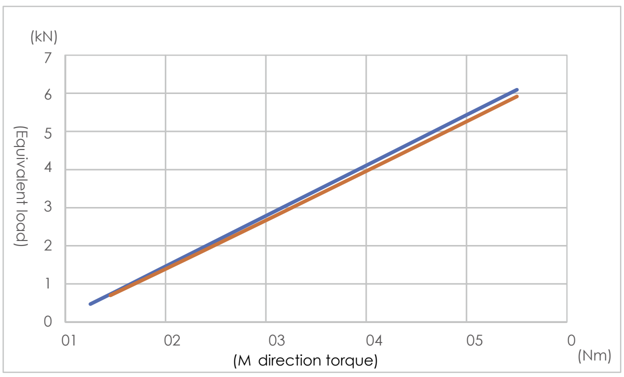


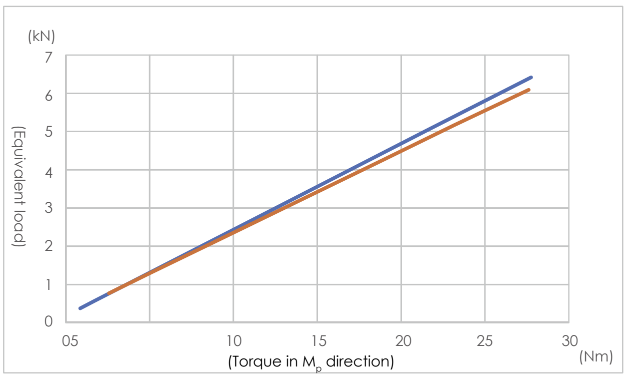
Equation (13) (Page 15) calculates the approximate value of the equivalent load

Actual equivalence load

Ball

The following is a comparison diagram of the equivalent load approximate value and the actual equivalent load calculated by Equation (14). The example uses the MR15MN linear guide to withstand a fixed down pressure and the torque gradually increases. The above figure shows the torque in the Mr direction. The figure below shows the torque in the $M_{p/y}$ direction.





Equation (14) (Page 15) Calculate the approximate value of the equivalent load $\left| \frac{M_r}{M_{r0}} \right| \cdot C_0$

Actual equivalence load

Equation (14) (Page 15) calculates the approximate value of the equivalent load $\left| \frac{M_{p/y}}{M_{p0/y0}} \right| \cdot C_0$

Actual equivalence load

2. Technical Information

2.7 Loading, Lifetime, & Rigidity Analysis Software of Linear Guide System (LLRAS)

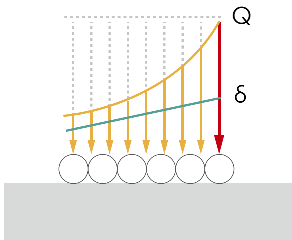
1. The load exert on the linear guide would varies due to the position of object's center of gravity, thrust position and acceleration / deceleration induced inertia.
2. Because of the uneven distribution of force on linear guide, when a certain part of rail, or when a force exertion point is damaged, the linear guide system would start to malfunction.
3. The point with largest force exertion must be identified, and be used reference to calculate the equivalent load, to ensure the reliability of service life calculation.

Ball

$$Q \propto F\left(Dw^{\frac{1}{2}},\ \delta^{\frac{3}{2}},\ C_{\delta}^{-\frac{3}{2}}\right)$$

Q = load
δ = amount of rolling element deformation
Dw = ball diameter
C_δ = geometric constant

As shown by the formula, the relationship between the amount of deformation of the rolling element and load is not linear. A larger deformation will cause the non-linear increase of load.

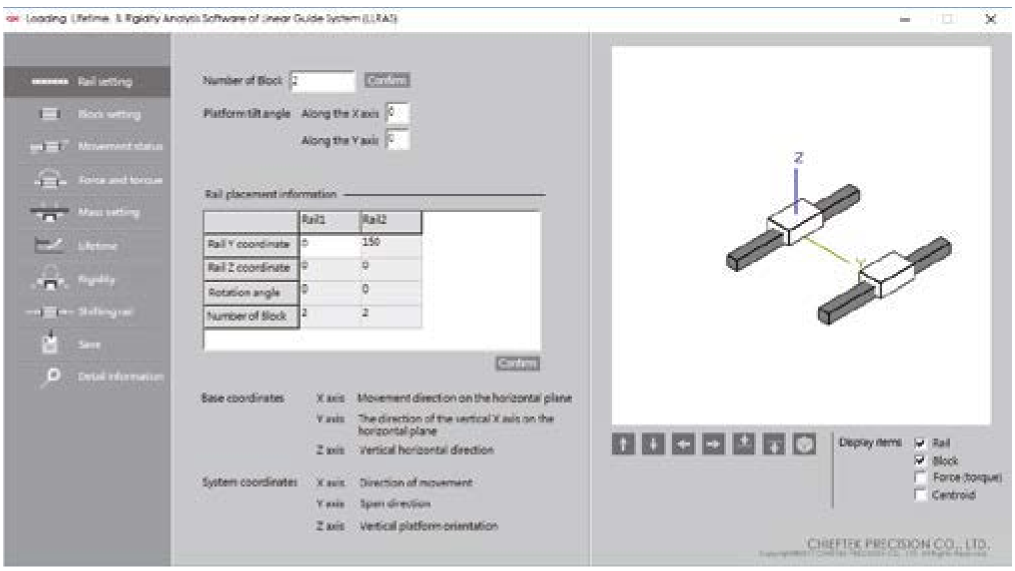


Q = load
δ = amount of rolling element deformation

Therefore by using the **cpc** self-developed program, the "Loading, Lifetime, & Rigidity Analysis Software of Linear Guide System (LLRAS)", a precise service life estimation can be derived. This is done by optimum calculation of deformation and rotation when a linear guide experience load, in this case the accurate equivalent load can be calculated.

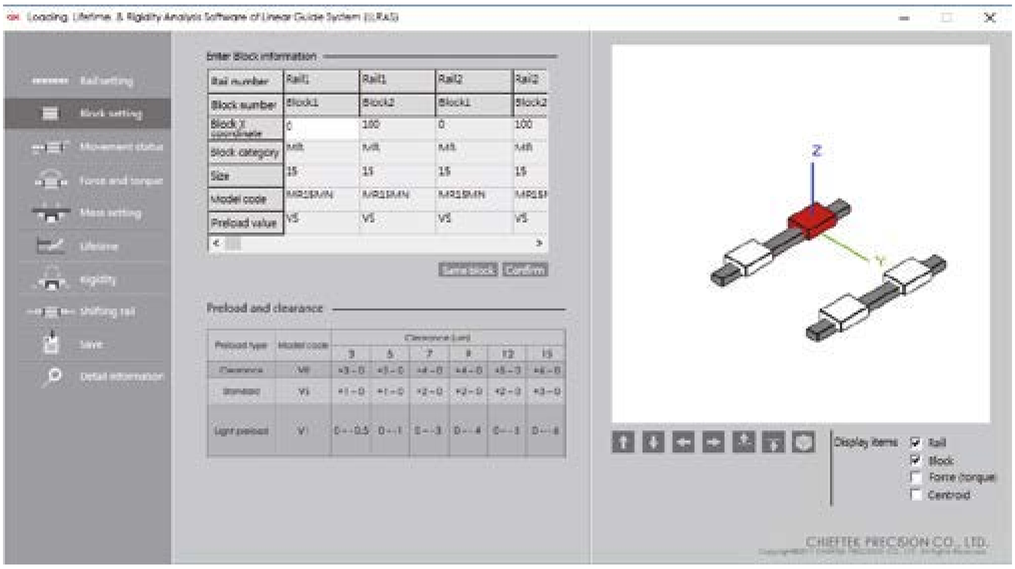
Loading, Lifetime, & Rigidity Analysis Software of Linear Guide System (LLRAS)
Data input guidance

1. Set the slide rail position, the number of slides on the slide



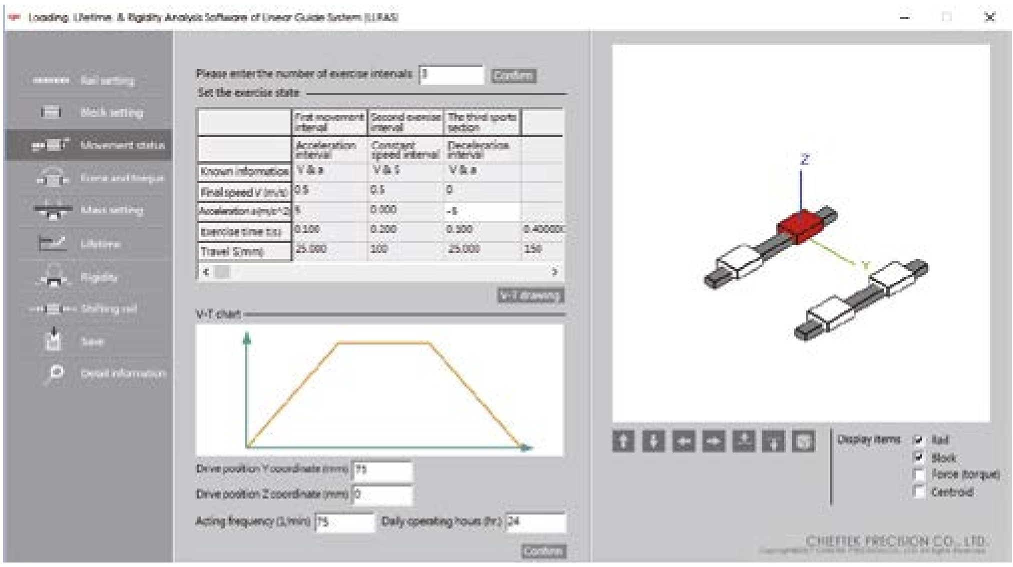
Variables can be set:
- Linear guide span
- Linear guide height
- Linear guide placement angle
- Platform inclination
- Number of block

2. Set the carriage size model



Variables can be set:
- Block span
- Block type
- Block preload

3. Set the exercise state

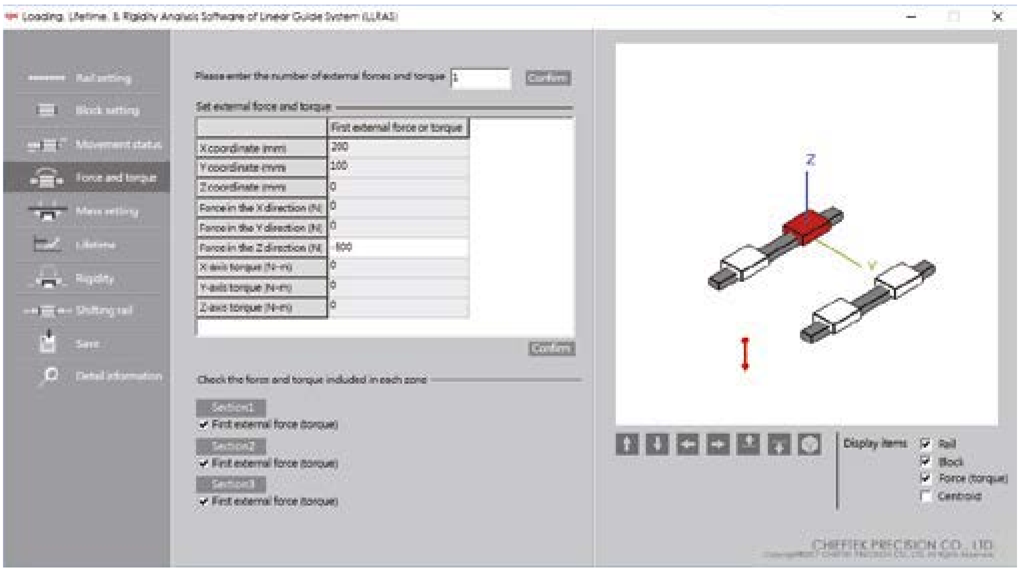


Variables can be set:
- Working status
- Drive position
- Actuation frequency

2. Technical Information

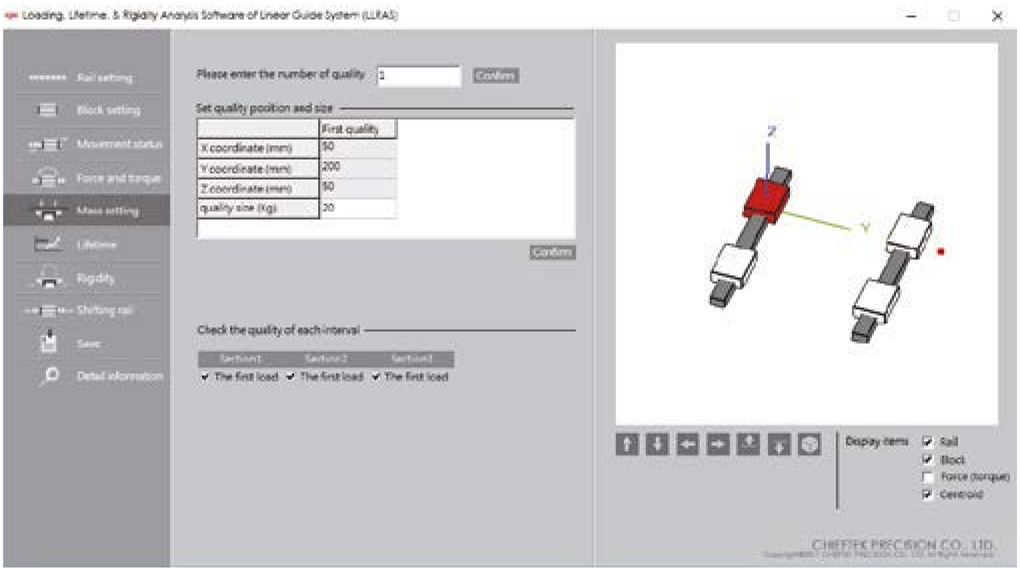
2.7 Loading, Lifetime, & Rigidity Analysis Software of Linear Guide System (LLRAS)

4. Set external force and torque position, size, direction



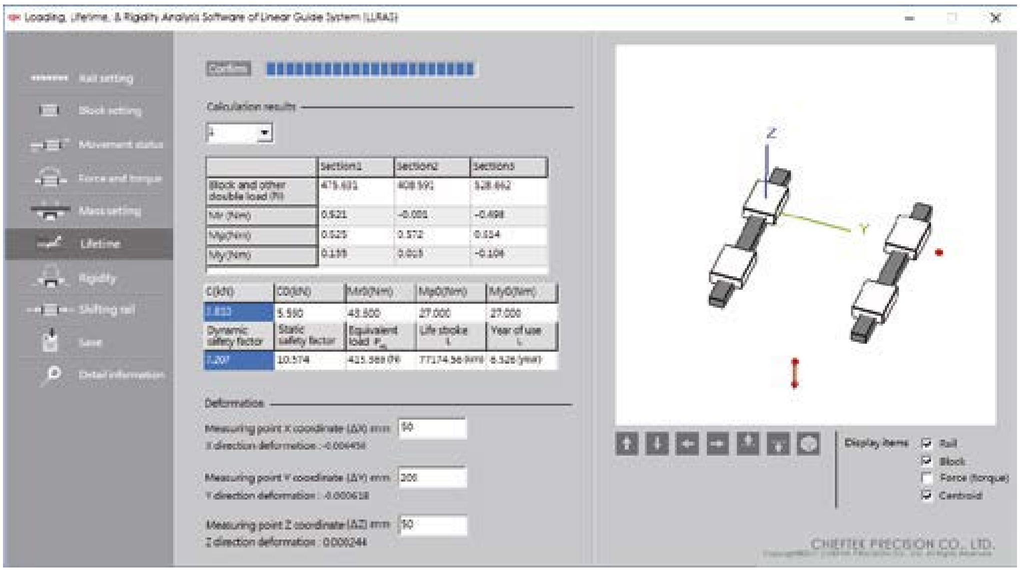
Variables can be set:
- External force (torque) intensity
- External force (torque) position
- External force (torque) working zone

5. Set the quality position size



Variables can be set:
- Center of gravity position
- Center of gravity dimension
- Load range

6. Check if the settings are correct from the 3D chart



The calculation results are shown in the figure, and the information such as force and equivalent load P_{eq}, dynamic safety factor S, static safety factor S_0, and lifetime L(km/year) of each section can be obtained, and the deformation of any measured point can also be obtained.*

This program can be used to calculate the installation and dimension design of various linear slide rails under different load and movement conditions. The obtained information such as deformation amount, force distribution, and life span can help to provide appropriate and correct design recommendations.

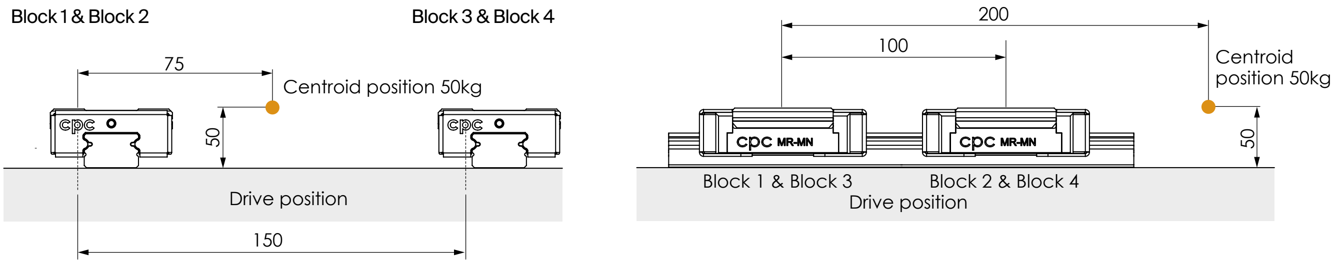
* For the calculation of amount of deformation, only the rolling object is considered. For actual deformation the steel body of block must be considered as well. When the load > 20% C0, the actual deformation is 1.5 times larger than calculated deformation. When Load = C0, the actual deformation is 2~2.5 times of calculated deformation.

* If there is any information needed, please contact R&D department.

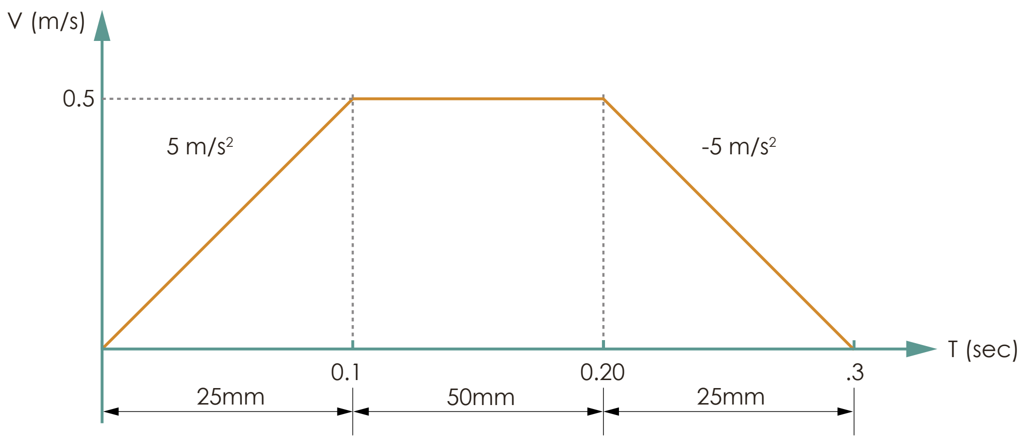
2. Technical Information

Application Example

Using the MR 15 MN VS block, the schematic diagram of the mechanism is as follows:



Motion status is as follows



cpc

Unit: N

	Block 1	Block 2	Block 3	Block 4
At acceleration	261.2	536.1	261.2	536.1
At constant velocity	344.4	619.4	344.4	619.4
At deceleration	427.4	702.5	427.4	702.5
Average load	354.3	625.4	354.3	625.4

Traditional calculated results obtained by geometric distribution.

Unit: N

	Block 1	Block 2	Block 3	Block 4
At acceleration	183	432	183	432
At constant velocity	246	495	246	495
At deceleration	309	558	309	558
The maximum value of average load	499			

Results calculated by program

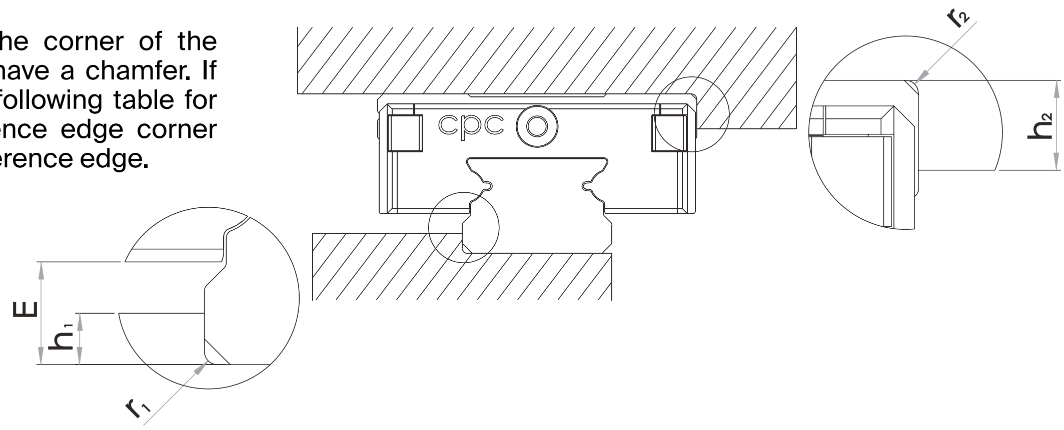
In this case, the calculated result of equivalent load is 25% higher than result obtained by traditional geometric distribution method, and the service life is about 2 times different.

If there is a demand for life and rigidity calculation, please fill in form of (Linear guide service life calculation and model selection) and contact **cpc** technical department.

3. Installation Illustration

Height and chamfer of reference edge

To avoid interference, the corner of the reference edge should have a chamfer. If not, please refer to the following table for the height of the reference edge corner and the height of the reference edge.



Height and chamfer of the reference surface

Dimension	h2	r2max	r1max	SS/ZZ		SU/ZU		EE/EZ		EU/UZ		SUE/ZUE	
				h1	E	h1	E	h1	E	h1	E	h1	E
2M	1	0.1	0.05	-	-	0.4	0.6	-	-	-	-	-	-
3M	1.5	0.3	0.1	0.8	1	0.4	0.6	-	-	-	-	-	-
5M	1.9	0.3	0.2	1.1	1.3	0.8	1.0	0.8	1.1	-	-	0.7	1.0
7M	2.8	0.3	0.2	1.2	1.4	0.5	0.7	-	-	-	-	-	-
9M	3	0.3	0.2	1.8	2.1	1.2	1.4	1.3	1.7	1	1.4	1.1	1.5
12M	4	0.5	0.3	2.6	2.9	1.9	2.1	1.9	2.3	1.6	2	1.7	2.1
15M	4.5	0.5	0.3	3.6	3.9	2.7	2.9	2.8	3.2	2.5	2.9	2.4	2.9

Dimension	h2	r2max	r1max	SS/ZZ		SU/ZU		EE/EZ		EU/UZ		SUE/ZUE	
				h1	E	h1	E	h1	E	h1	E	h1	E
2WL	1.5	0.3	0.1	0.6	0.1	-	-	0.5	0.7	-	-	0.4	0.6
3W	1.7	0.3	0.1	0.4	0.1	0.4	0.6	-	-	-	-	-	-
5W	2	0.3	0.2	1.2	0.2	0.9	1.1	-	-	-	-	-	-
7W	2.8	0.3	0.2	1.7	0.2	1.3	1.5	1.2	1.5	-	-	1.1	1.4
9W	3	0.3	0.2	3	0.2	2.4	2.6	2.4	2.8	2.1	2.5	2.2	2.6
12W	4	0.5	0.3	3.5	0.3	2.5	2.7	2.9	3.3	2.4	2.8	2.4	2.8
15W	4.5	0.5	0.3	3.5	0.3	2.9	3.1	2.8	3.2	2.4	2.8	2.4	2.8

Screw tightening torque (Nm)

Screw grade12.9 Alloy Steel Screw	Steel	Cast Iron	Non Iron Metal
M2	0.6	0.4	0.3
M2.5/M2.6	1.2	0.8	0.6
M3	1.8	1.3	1
M4	4	2.5	2

ISO 3506-1 A2-70 Stainless Screw	Cast Iron
M1.6	0.15
M2	0.3
M2.5/M2.6	0.6
M3	1.1
M4	2.5

The mounting surface

The mounting surface should be ground or fine milled to reach a surface roughness of Ra1.6 μm.

3. Installation Illustration

Geometric and positional accuracy of the mounting surface

Inaccurate mounting surfaces will affect the operational accuracy of the linear guide when the mounting surface height differential is greater than the values calculated by formulas (15), (16), and (17). The rating lifetime will also be shortened.

Reference edge

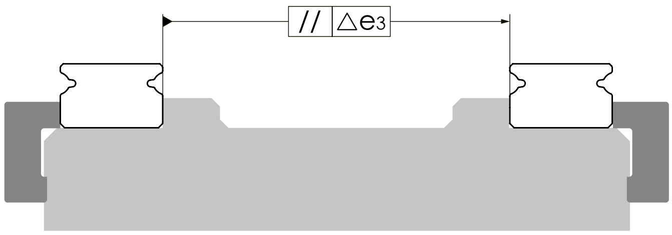
Rail: Both sides of the track rail can serve as the reference edge without any special marking.

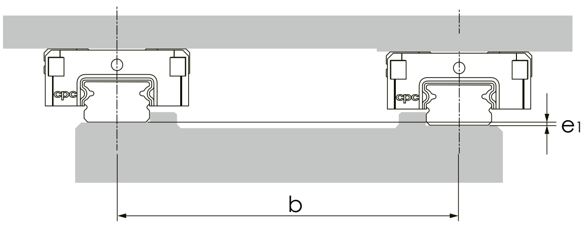
Block: Reference edge is opposite to the groove markingside.

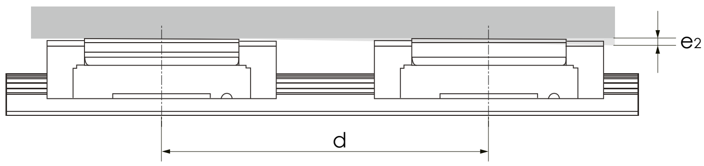
(15) $e1\ (mm) = b\ (mm) \cdot f1 \cdot 10^{-4}$

(16) $e2\ (mm) = d\ (mm) \cdot f2 \cdot 10^{-5}$

(17) $e3\ (mm) = f3 \cdot 10^{-3}$



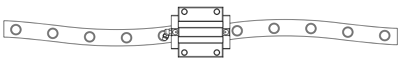
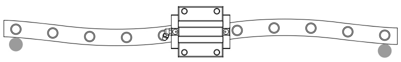
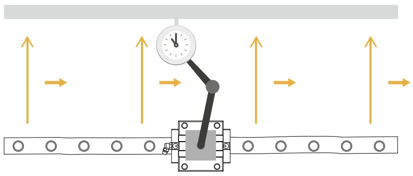
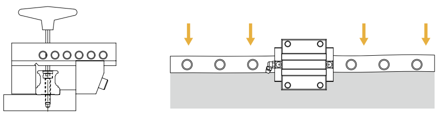
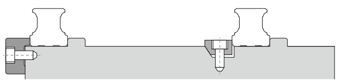




Dimension	V0/VS			V1		
	f1	f2	f3	f1	f2	f3
3MN	4.5	3.0	3	3.1	2.1	2
5MN			3			2
7MN			5			4
9MN			7			5
12MN			9			6
15MN			12			8
3ML	4.3	2.0	3	2.9	1.3	2
5ML			3			2
7ML			5			4
9ML			6			4
12ML			8			6
15ML			11			7

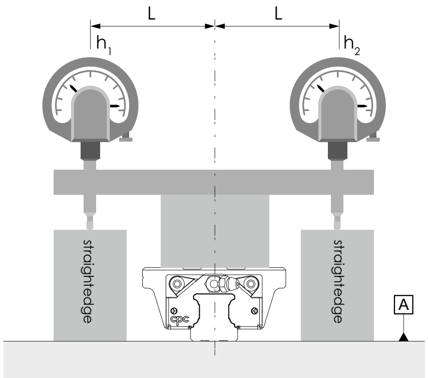
Dimension	V0/VS			V1		
	f1	f2	f3	f1	f2	f3
3WN	2.5	2.1	3	1.7	1.4	2
5WN			3			2
7WN			5			3
9WN			7			5
12WN			9			6
15WN			11			8
2WL	2	1.4	2	1.6	0.9	2
3WL			2			2
5WL			3			2
7WL			5			3
9WL			5			3
12WL			8			5
15WL			10			7

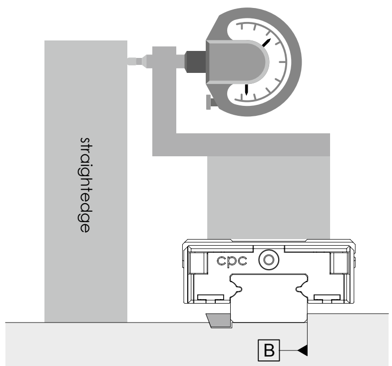
Rail installation

Diagram	Description	Feature
	• No Straightening • Not allowed	• No precision • Low lateral bearing capacity
	• Straightening by pin • Not suggested	• Low precision • Low lateral bearing capacity
	• Straightening based on straight edge, calibrated by meter	• Low to mid precision • Low lateral bearing capacity
	• Place the rail on a supporting edge (Precision vise applied)	• High precision • One side with high lateral bearing capacity
	• With support edge and lateral mounting screw	• Very high precision • High lateral bearing capacity on both sides.

Recommended precision measurement method

The working accuracy of linear guide is defined by the parallelism between block and rail(height, side). In practical application the linear accuracy is required, the measuring method is diverse, so we would suggest following measure to acquire the linear accuracy of linear guide.





H The horizontal working accuracy [// | P]+
base plane flatness [▱ | A] = | h_1-h_2 | total length
(above mentioned method can be used to exclude the skew error of rail on roll direction)
* When the error of flatness of base plane is 0, the value is the linear working accuracy of rail at the certain (Please refer to table of working precision page 07)

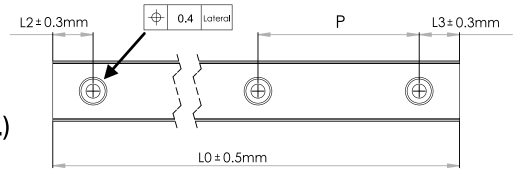
W2 The horizontal working accuracy [// | P]+
the straightness of rail installation [— | B]

*When the error of the straightness of the rail is 0, the value is the horizontal working accuracy on the side. (Please refer to table of working precision page 07)

4. Ordering information

Length of Rail

Butt-jointing is required when lengths exceed Lmax.
(For more detailed information, please contact **cpc** for technical support.)



Model Code

MR	U	15	M	N	K	EE	2	V1	P	-310L	-15	-15	II	J

- J: Customization codew
- II: Number of rails on the same moving axis
- -15: End hole pitch (mm)
- -15: Starting hole pitch(mm)
- -310L: Rail length (mm)
- P: Accuracy Grades: P (Precision), H (High), N (Normal)
- V1: Preload classes: V0: clearance VS: standard V1: light preload
- 2: Block quantity: Quantity of the runner block
- EE:
  SS: with end seal
  ZZ: end seal + lubrication storage
  SU: end seal + bottom seal
  ZU: end seal + bottom seal + lubrication storage
  EE: end seal + reinforcement plate
  EZ: end seal + reinforcement plate + lubrication storage
  EU: end seal + reinforcement plate + stainless bottom seal
  UZ: end seal + reinforcement plate + stainless bottom seal + lubrication storage
  SUE: end seal + bottom seal + reinforcement plate
  ZUE: end seal + bottom seal + reinforcement plate + lubrication storage
- K: Rail material : No Mark : standard rail K : carbon steel (Now available: size 9, 12, and 15.)
- N: Block type: L: long N: standard
- M: Rail type: M: standard W: wide
- 15: Rail dimension: The width of rail ex. : 2,3,5,7,9,12,15
- U: Special Rail U: upward screwing rail No Mark: standard rail
- MR: Product Type: MR: Miniature Linear Guide

Standard type

Unit: mm

Size	2M	3M	5M	7M	9M	12M	15M
Standard length of one rail	32 40 56 80	30 40 50	40 55 70 85 100	40 55 70 85 100 130	55 75 95 115 135 155 175 195 275 375	70 95 120 145 170 195 220 245 270 320 370 470 570	70 110 150 190 230 270 310 350 390 430 470 550 670 870
Pitch	8	10	15	15	20	25	40
L2, L3min.	2.5	3	3	3	4	4	4
L2, L3max.	6.5	5	10	10	20	20	35
L0 max.	500	300	1000	1000	1000	1000	1000

Wide type

Unit: mm

Size	2W	3W	5W	7W	9W	12W	15W
Standard length of one rail	30 40 50	40 55 70	50 70 90 110 130 150 170	50 80 110 140 170 200 260 290	50 80 110 140 170 200 260 290 320	70 110 150 190 230 270 310 390 470 550	110 150 190 230 270 310 430 550 670 790
Pitch	10	15	20	30	30	40	40
L2, L3min.	3	3	4	3	4	4	4
L2, L3max.	5	10	15	25	25	35	35
L0 max.	500	300	1000	1000	1000	1000	1000

Customization Requirement

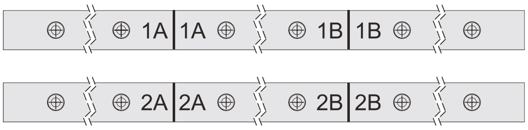
The meaning of suffix characters:

J : slide rail connection
G : customer designated lubricant
I : with Inspection report

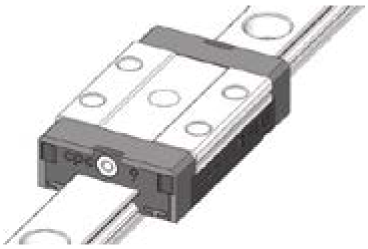
R : special process for rail
B : special processing for block
S : special straightness requirements for rail

C3 : Cap M3
C4 : Cap M4
MS: Metal Stopper on stainless steel Rail

J: slide rail connection
When the required length of rail exceeds the standard rail length, a butt-joint can be specified. The rail butt-joint indication is marked as illustrated below.



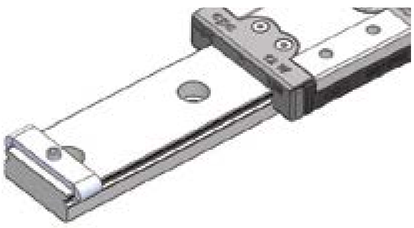
B: special processing for block
For special process requirements, please contact technical support.



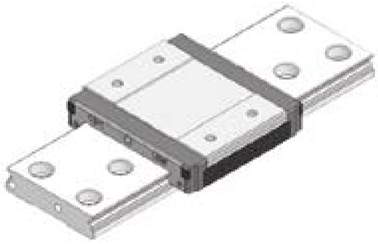
I: with Inspection report
Please contact technical support.

S: special straightness requirements for rail
The straightness of the linear guide rail is specially calibrated by precision fine grinding.

MS: Metal Stopper on Stainless Steel Rail
1. To prevent the block from separating from the rail during transportation or installation; this may cause item damage or scattering.
2. Perfect for rails installed on the vertical axis (Z-axis) to prevent gravity induced block separation from the rail.
3. The stoppers and screws are made of stainless steel material with an anti-corrosion function.
4. Strongly recommended NOT to use as a mechanical travel limiter or breaking system.



R: special process for rail
For special process requirements, please contact technical support.



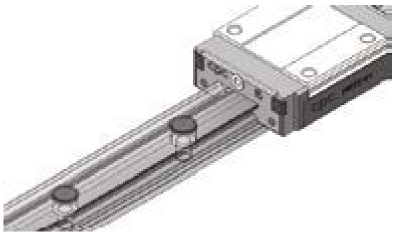
G: customer designated lubricant
According to application environment.

GN: no lubricant

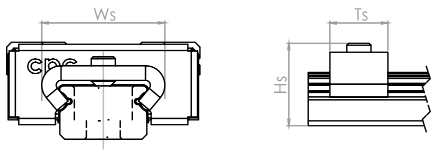
GC: low dust generation
Suitable for clean room environments.

C3 CapM3:
Applies to MR9M, MR12M, MR15M, MR7W & MR9W rails.

C4 CapM4:
Applies to MR12W, MR15W rails.



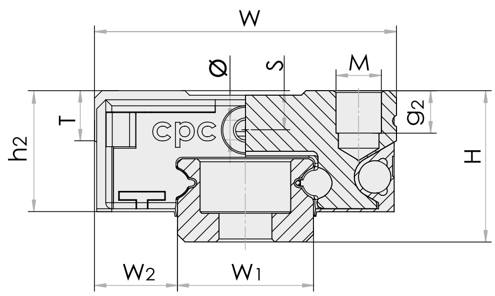
Dimension



Rail Size	Ws max	Ts	Hs max
MR-7M	10	5	8
MR-9M	13	6	9
MR-12M	17	7	12
MR-15M	19	7	14
MR-7W	18	6	9
MR-9W	23	6	11
MR-12W	29	7	13
MR-15W	47	7	14

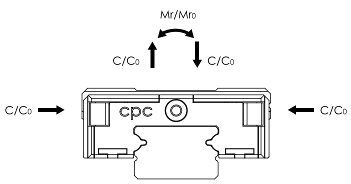
5. Dimensions and Specifications

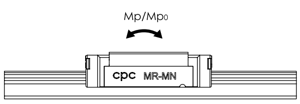
5.1 MR-M SU Series (End seal , Bottom Seal) MR-M ZU Series (End seal , Bottom Seal , Lubrication Storage)

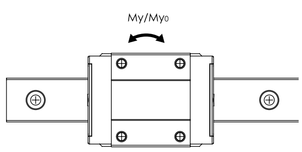


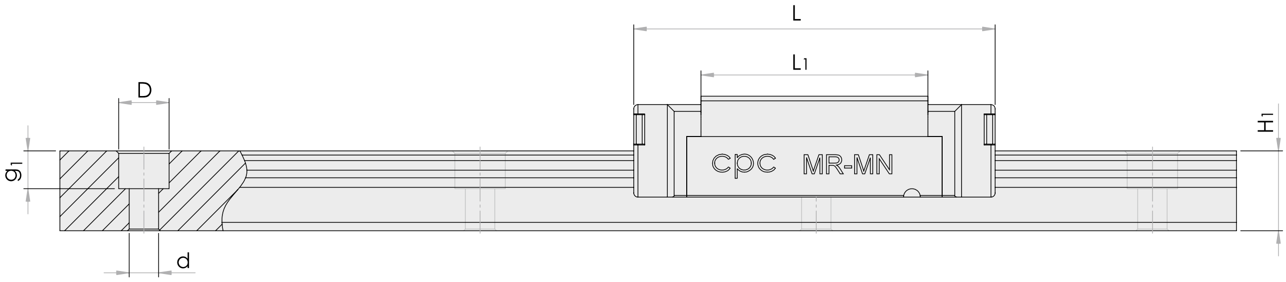
Model Code	Fabricate Dimensions		Rail Dimensions(mm)				Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	Dxdxg 1	W	L	L_1	h_2	P_1	P_2
MR 15ML SU/ZU	16	8.5	15	9.5	40	6x3.5x4.5	32	60.4	44	12.5	25	25
MR 15MN SU/ZU	16	8.5	15	9.5	40	6x3.5x4.5	32	43.5	27	12.5	20	25
MR 12ML SU/ZU	13	7.5	12	7.5	25	6x3.5x4.5	27	48	34	10.5	20	20
MR 12MN SU/ZU	13	7.5	12	7.5	25	6x3.5x4.5	27	35.7	22	10.4	15	20
MR 9ML SU/ZU	10	5.5	9	5.5	20	6x3.5x3.5	20	41.1	30.8	8.2	16	15
MR 9MN SU/ZU	10	5.5	9	5.5	20	6x3.5x3.5	20	30.9	20.5	8.3	10	15
MR 7ML SU/ZU	8	5	7	4.7	15	4.2x2.4x2.3	17	31.4	21.8	6.9	13	12
MR 7MN SU/ZU	8	5	7	4.7	15	4.2x2.4x2.3	17	24	14.3	7.0	8	12
MR 5ML SU/ZU	6	3.5	5	3.5	15	3.5x2.4x1	12	19.9	13.5	4.9	7	-
MR 5MN SU/ZU	6	3.5	5	3.5	15	3.5x2.4x1	12	16.3	10	4.9	-	8
MRU 3ML SU*/ZU*	4	2.5	3	2.6	10	M1.6	8	16.1	11	3.5	5.5	-
MRU 3MN SU/ZU	4	2.5	3	2.6	10	M1.6	8	11.8	6.7	3.5	3.5	-
MRU 2MN SU/ZU	3.2	2	2	2	8	M1	6	12.5	8.8	2.6	4	-

* Anticipated
Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$

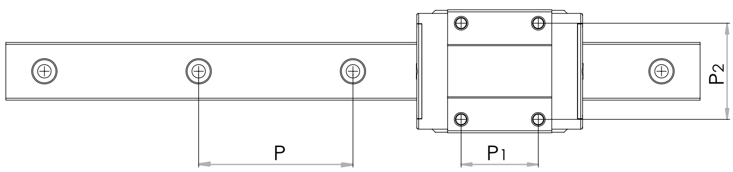






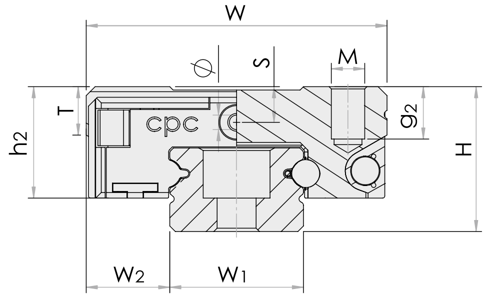


Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	M_{R0}	M_{P0}	M_{Y0}	Block (g)	Rail (g/m)	
M3x5.5	1.8	3.3	4.3	5350	9080	70	63.3	63.3	90	930	MR 15ML SU/ZU
M3x5.5	1.8	3.3	4.3	3810	5590	43.6	27	27	61	930	MR 15MN SU/ZU
M3x5.5	1.3	3.2	4.3	3240	5630	34.9	30.2	30.2	51	602	MR 12ML SU/ZU
M3x5.5	1.3	3.2	4.3	2308	3465	21.5	12.9	12.9	34	602	MR 12MN SU/ZU
M3x3.0	1.3	2.2	3.3	2135	3880	18.2	12.4	12.4	28	301	MR 9ML SU/ZU
M3x3.0	1.3	2.2	3.3	1570	2495	11.7	6.4	6.4	18	301	MR 9MN SU/ZU
M2x2.5	1.1	1.6	2.8	1310	2440	9	7.7	7.7	14	215	MR 7ML SU/ZU
M2x2.5	1.1	1.6	2.8	890	1440	5.2	3.3	3.3	8	215	MR 7MN SU/ZU
M2.6x2.0	0.7	1.3	2	470	900	2.4	2.1	2.1	4	116	MR 5ML SU/ZU
M2x1.5	0.7	1.3	2	335	550	1.7	1	1	3.5	116	MR 5MN SU/ZU
M2x1.1	0.3	0.7	1.5	295	575	0.9	1.1	1.1	1.2	53	MRU 3ML SU*/ZU*
M1.6x1.1	0.3	0.7	1.5	190	310	0.6	0.4	0.4	0.9	53	MRU 3MN SU/ZU
M1.4x1.1	-	-	-	158	349	0.43	0.54	0.54	0.8	28	MRU 2MN SU/ZU



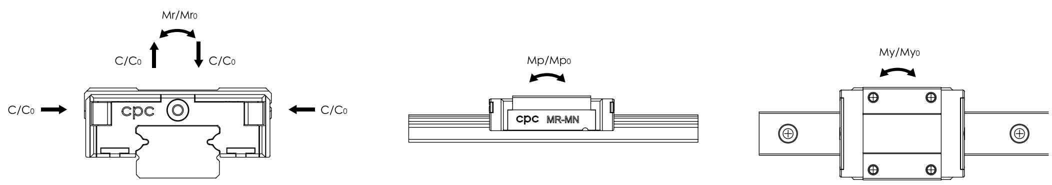
5. Dimensions and Specifications

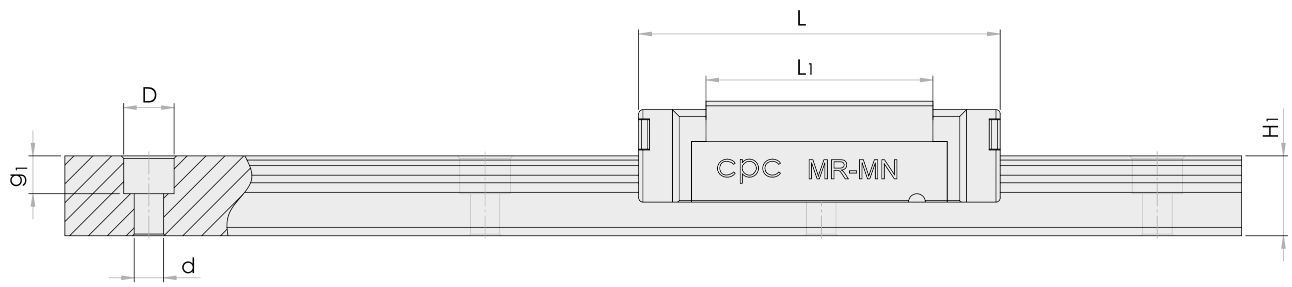
5.2 MR-M SS Series (End seal)
MR-M ZZ Series (End seal, Lubrication Storage)



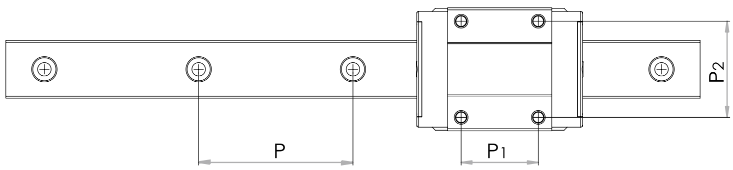
Model Code	Fabricate Dimensions		Rail Dimensions(mm)				Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	Dxdxg 1	W	L	L_1	h_2	P_1	P_2
MR 15ML SS/ZZ	16	8.5	15	9.5	40	6x3.5x4.5	32	60.2	44	12.2	25	25
MR 15MN SS/ZZ	16	8.5	15	9.5	40	6x3.5x4.5	32	43.4	27	12.2	20	25
MR 12ML SS/ZZ	13	7.5	12	7.5	25	6x3.5x4.5	27	47.8	34	10.2	20	20
MR 12MN SS/ZZ	13	7.5	12	7.5	25	6x3.5x4.5	27	35.8	22	10.1	15	20
MR 9ML SS/ZZ	10	5.5	9	5.5	20	6x3.5x3.5	20	41.1	30.8	8	16	15
MR 9MN SS/ZZ	10	5.5	9	5.5	20	6x3.5x3.5	20	30.9	20.5	7.9	10	15
MR 7ML SS/ZZ	8	5	7	4.7	15	4.2x2.4x2.3	17	31.5	21.8	6.7	13	12
MR 7MN SS/ZZ	8	5	7	4.7	15	4.2x2.4x2.3	17	24.1	14.3	6.6	8	12
MR 5ML SS/ZZ	6	3.5	5	3.5	15	3.5x2.4x1	12	19.7	13.5	4.6	7	-
MR 5MN SS/ZZ	6	3.5	5	3.5	15	3.5x2.4x1	12	16.3	10	4.7	-	8
MRU 3ML SS/ZZ	4	2.5	3	2.6	10	M1.6	8	16.1	11	3.2	5.5	-
MRU 3MN SS/ZZ	4	2.5	3	2.6	10	M1.6	8	11.9	6.7	3.2	3.5	-

Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$



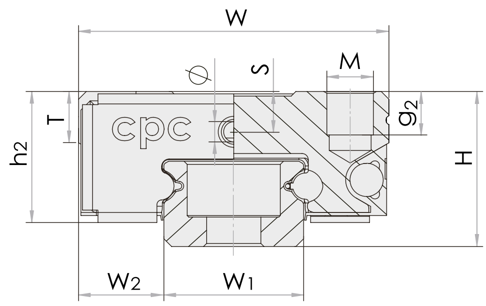


	Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
	Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	M_{Ro}	M_{Po}	M_{Yo}	Block (g)	Rail (g/m)	
	M3x5.5	1.8	3.3	4.3	5350	9080	70	63.3	63.3	90	930	MR 15ML SS/ZZ
	M3x5.5	1.8	3.3	4.3	3810	5590	43.6	27	27	61	930	MR 15MN SS/ZZ
	M3x5.5	1.3	3.2	4.3	3240	5630	34.9	30.2	30.2	51	602	MR 12ML SS/ZZ
	M3x5.5	1.3	3.2	4.3	2308	3465	21.5	12.9	12.9	34	602	MR 12MN SS/ZZ
	M3x3.0	1.3	2.2	3.3	2135	3880	18.2	12.4	12.4	28	301	MR 9ML SS/ZZ
	M3x3.0	1.3	2.2	3.3	1570	2495	11.7	6.4	6.4	18	301	MR 9MN SS/ZZ
	M2x2.5	1.1	1.6	2.8	1310	2440	9	7.7	7.7	14	215	MR 7ML SS/ZZ
	M2x2.5	1.1	1.6	2.8	890	1440	5.2	3.3	3.3	8	215	MR 7MN SS/ZZ
	M2.6x2.0	0.7	1.3	2	470	900	2.4	2.1	2.1	4	116	MR 5ML SS/ZZ
	M2x1.5	0.7	1.3	2	335	550	1.7	1	1	3.5	116	MR 5MN SS/ZZ
	M2x1.1	0.3	0.7	1.5	295	575	0.9	1.1	1.1	1.2	53	MRU 3ML SS/ZZ
	M1.6x1.1	0.3	0.7	1.5	190	310	0.6	0.4	0.4	0.9	53	MRU 3MN SS/ZZ



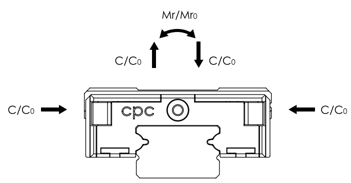
5. Dimensions and Specifications

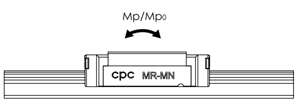
5.3 MR-M SUE Series (End seal, Bottom Seal, Reinforcement Plate) MR-M ZUE Series (End seal, Bottom Seal, Reinforcement Plate, Lubrication Storage)

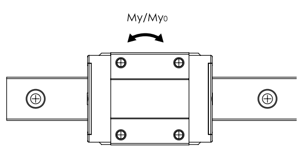


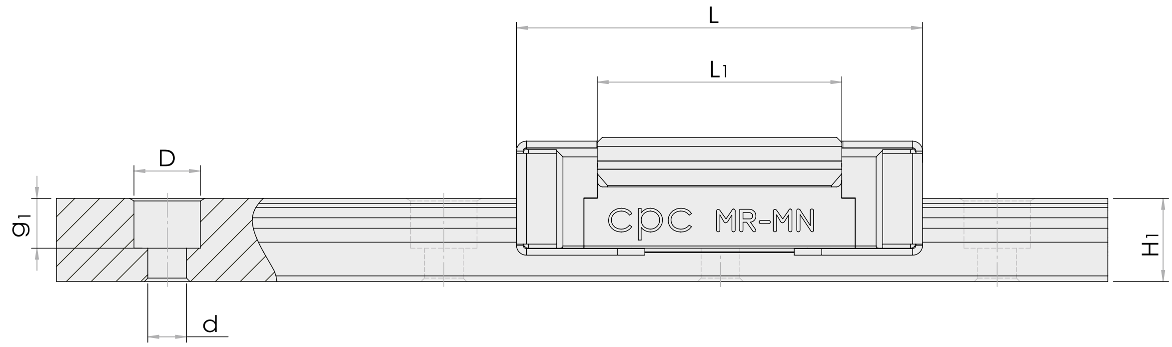
Model Code	Fabricate Dimensions		Rail Dimensions(mm)				Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	Dxdxg 1	W	L	L_1	h_2	P_1	P_2
MR 15ML SUE/ZUE	16	8.5	15	9.5	40	6x3.5x4.5	32	62	44	13.1	25	25
MR 15MN SUE/ZUE	16	8.5	15	9.5	40	6x3.5x4.5	32	45.1	27	13.3	20	25
MR 12ML SUE/ZUE	13	7.5	12	7.5	25	6x3.5x4.5	27	49	34	11.1	20	20
MR 12MN SUE/ZUE	13	7.5	12	7.5	25	6x3.5x4.5	27	37	22	11.2	15	20
MR 9ML SUE/ZUE	10	5.5	9	5.5	20	6x3.5x3.5	20	42	30.8	8.6	16	15
MR 9MN SUE/ZUE	10	5.5	9	5.5	20	6x3.5x3.5	20	31.9	20.5	8.7	10	15
MR 5ML SUE/ZUE	6	3.5	5	3.5	15	3.5x2.4x1	12	20.3	13.5	5.1	7	-
MR 5MN SUE/ZUE	6	3.5	5	3.5	15	3.5x2.4x1	12	16.8	10	5	-	8

Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$

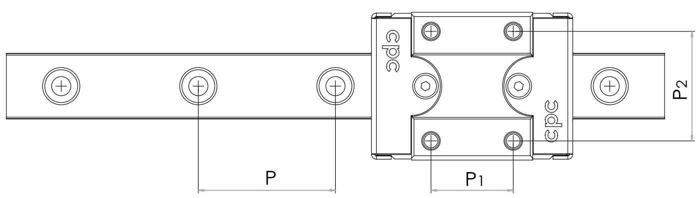






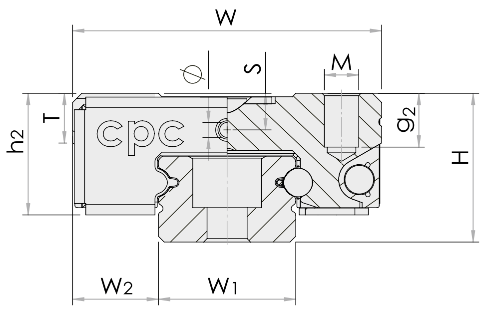


	Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
	Mx g 2	Ø	S	T	C100B (dyn)	Co (stat)	Mro	Mpo	Myo	Block (g)	Rail (g/m)	
	M3x5.5	1.8	3.3	4.3	5350	9080	70	63.3	63.3	90	930	MR 15ML SUE/ZUE
	M3x5.5	1.8	3.3	4.3	3810	5590	43.6	27	27	61	930	MR 15MN SUE/ZUE
	M3x5.5	1.3	3.2	4.3	3240	5630	34.9	30.2	30.2	51	602	MR 12ML SUE/ZUE
	M3x5.5	1.3	3.2	4.3	2308	3465	21.5	12.9	12.9	34	602	MR 12MN SUE/ZUE
	M3x3.0	1.3	2.2	3.3	2135	3880	18.2	12.4	12.4	28	301	MR 9ML SUE/ZUE
	M3x3.0	1.3	2.2	3.3	1570	2495	11.7	6.4	6.4	18	301	MR 9MN SUE/ZUE
	M2.6x2.0	0.7	1.3	2	470	900	2.4	2.1	2.1	4	116	MR 5ML SUE/ZUE
	M2x1.5	0.7	1.3	2	335	550	1.7	1	1	3.5	116	MR 5MN SUE/ZUE



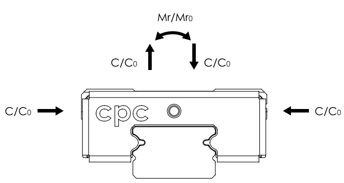
5. Dimensions and Specifications

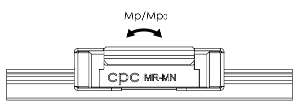
5.4 MR-M EE Series (End seal, Reinforcement Plate)
MR-M EZ Series (End seal, Reinforcement Plate, Lubrication Storage)

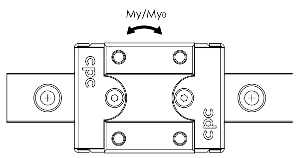


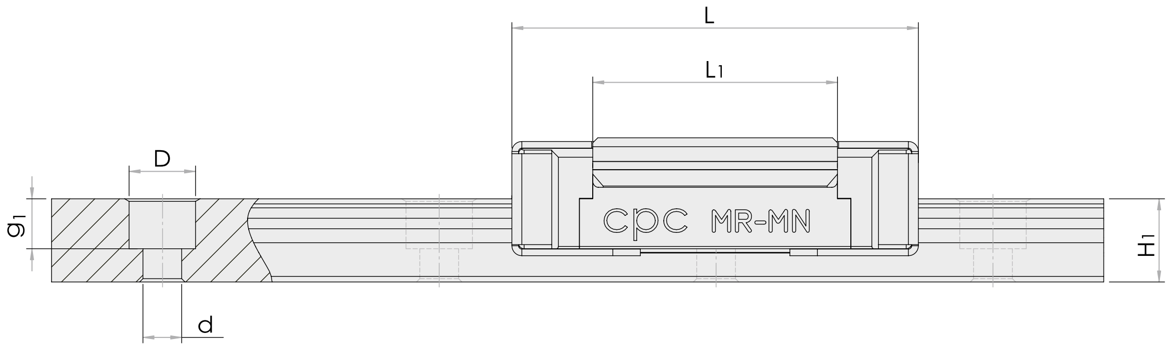
Model Code	Fabricate Dimensions		Rail Dimensions(mm)				Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	Dxdxg 1	W	L	L_1	h_2	P_1	P_2
MR 15ML EE/EZ	16	8.5	15	9.5	40	6x3.5x4.5	32	62.1	44	13.2	25	25
MR 15MN EE/EZ	16	8.5	15	9.5	40	6x3.5x4.5	32	45.2	27	13.2	20	25
MR 12ML EE/EZ	13	7.5	12	7.5	25	6x3.5x4.5	27	49	34	10.9	20	20
MR 12MN EE/EZ	13	7.5	12	7.5	25	6x3.5x4.5	27	37	22	10.9	15	20
MR 9ML EE/EZ	10	5.5	9	5.5	20	6x3.5x3.5	20	42	30.8	8.4	16	15
MR 9MN EE/EZ	10	5.5	9	5.5	20	6x3.5x3.5	20	31.7	20.5	8.4	10	15
MR 5ML EE/EZ	6	3.5	5	3.5	15	3.5x2.4x1	12	20.4	13.5	5	7	-
MR 5MN EE/EZ	6	3.5	5	3.5	15	3.5x2.4x1	12	16.9	10	5	-	8

Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$

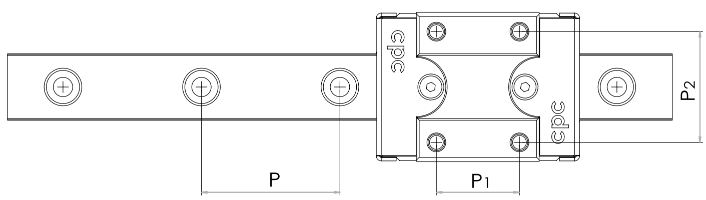






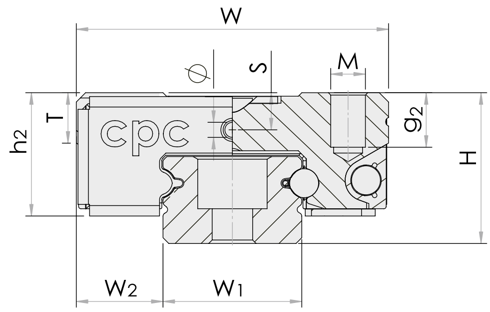


	Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
	Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	M_{R0}	M_{P0}	M_{Y0}	Block (g)	Rail (g/m)	
	M3x5.5	1.8	3.3	4.3	5350	9080	70	63.3	63.3	90	930	MR 15ML EE/EZ
	M3x5.5	1.8	3.3	4.3	3810	5590	43.6	27	27	61	930	MR 15MN EE/EZ
	M3x5.5	1.3	3.2	4.3	3240	5630	34.9	30.2	30.2	51	602	MR 12ML EE/EZ
	M3x5.5	1.3	3.2	4.3	2308	3465	21.5	12.9	12.9	34	602	MR 12MN EE/EZ
	M3x3.0	1.3	2.2	3.3	2135	3880	18.2	12.4	12.4	28	301	MR 9ML EE/EZ
	M3x3.0	1.3	2.2	3.3	1570	2495	11.7	6.4	6.4	18	301	MR 9MN EE/EZ
	M2.6x2.0	0.7	1.3	2	470	900	2.4	2.1	2.1	4	116	MR 5ML EE/EZ
	M2x1.5	0.7	1.3	2	335	550	1.7	1	1	3.5	116	MR 5MN EE/EZ



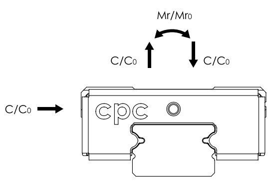
5. Dimensions and Specifications

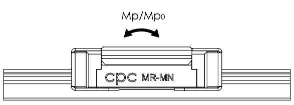
5.5 MR-M EU Series (End seal, Reinforcement Plate, Stainless Bottom Seal) MR-M UZ Series (End seal, Reinforcement Plate, Stainless Bottom Seal, Lubrication Storage)

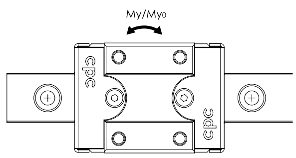


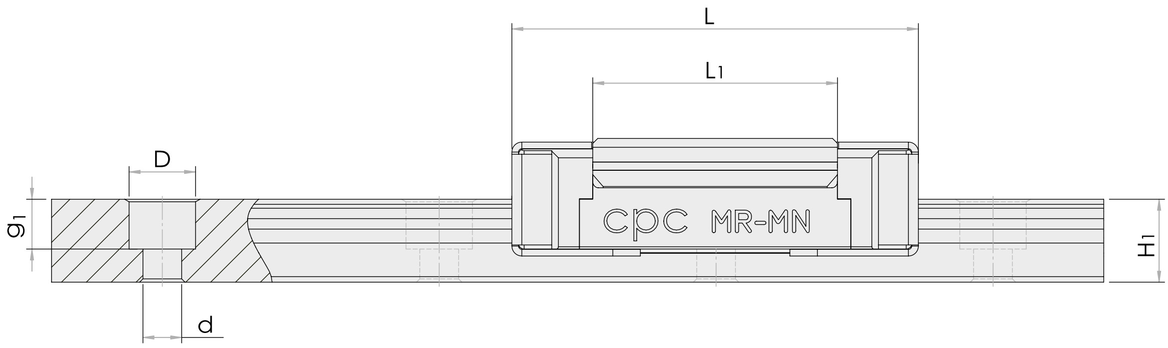
Model Code	Fabricate Dimensions		Rail Dimensions(mm)				Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	$Dxdxg_1$	W	L	L_1	h_2	P_1	P_2
MR 15ML EU/UZ	16	8.5	15	9.5	40	6x3.5x4.5	32	62.1	44	13.2	25	25
MR 15MN EU/UZ	16	8.5	15	9.5	40	6x3.5x4.5	32	45.1	27	13.1	20	25
MR 12ML EU/UZ	13	7.5	12	7.5	25	6x3.5x4.5	27	49	34	11	20	20
MR 12MN EU/UZ	13	7.5	12	7.5	25	6x3.5x4.5	27	37	22	11	15	20
MR 9ML EU/UZ	10	5.5	9	5.5	20	6x3.5x3.5	20	42	30.8	8.5	16	15
MR 9MN EU/UZ	10	5.5	9	5.5	20	6x3.5x3.5	20	31.9	20.5	8.5	10	15

Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$

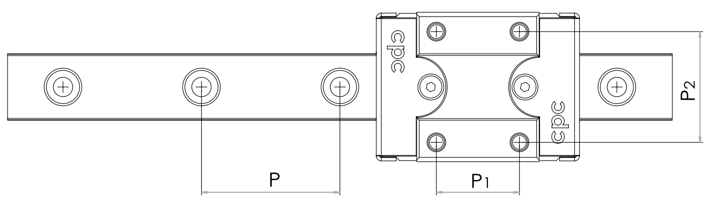






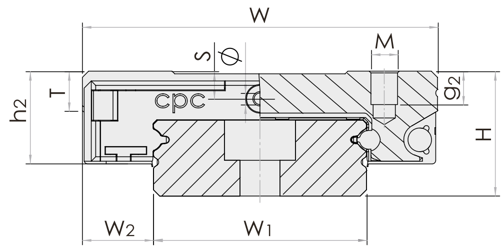


	Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
	Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	M_{r0}	M_{p0}	M_{y0}	Block (g)	Rail (g/m)	
	M3x5.5	1.8	3.3	4.3	5350	9080	70	63.3	63.3	90	930	MR 15ML EU/UZ
	M3x5.5	1.8	3.3	4.3	3810	5590	43.6	27	27	61	930	MR 15MN EU/UZ
	M3x5.5	1.3	3.2	4.3	3240	5630	34.9	30.2	30.2	51	602	MR 12ML EU/UZ
	M3x5.5	1.3	3.2	4.3	2308	3465	21.5	12.9	12.9	34	602	MR 12MN EU/UZ
	M3x3.0	1.3	2.2	3.3	2135	3880	18.2	12.4	12.4	28	301	MR 9ML EU/UZ
	M3x3.0	1.3	2.2	3.3	1570	2495	11.7	6.4	6.4	18	301	MR 9MN EU/UZ



5. Dimensions and Specifications

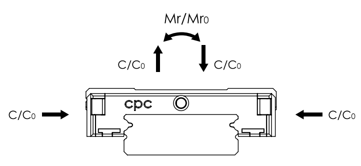
5.6 MR-W SU Series (End seal, Bottom Seal) MR-W ZU Series (End seal, Bottom Seal, Lubrication Storage)

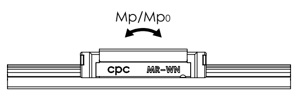


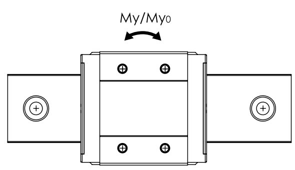
MR 2W-MR 12W

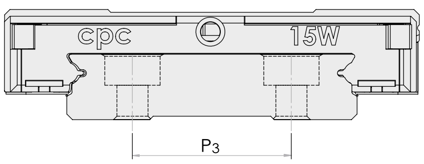
Model Code	Fabricate Dimensions		Rail Dimensions(mm)					Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	P_3	Dxdxg $_1$	W	L	L_1	h_2	P_1	P_2
MR 15WL SU/ZU	16	9	42	9.5	40	23	8x4.5x4.5	60	74.8	57.6	12.6	35	45
MR 15WN SU/ZU	16	9	42	9.5	40	23	8x4.5x4.5	60	55.7	38.5	12.6	20	45
MR 12WL SU/ZU	14	8	24	8.5	40	-	8x4.5x4.5	40	59.8	46	10.7	28	28
MR 12WN SU/ZU	14	8	24	8.5	40	-	8x4.5x4.5	40	44.7	31	10.5	15	28
MR 9WL SU/ZU	12	6	18	7.3	30	-	6x3.5x4.5	30	51	39.5	9	24	23
MR 9WN SU/ZU	12	6	18	7.3	30	-	6x3.5x4.5	30	39.4	27.9	9.1	12	21
MR 7WL SU/ZU	9	5.5	14	5.2	30	-	6x3.5x3.5	25	40.9	30.1	7.4	19	19
MR 7WN SU/ZU	9	5.5	14	5.2	30	-	6x3.5x3.5	25	32	21.2	7.3	10	19
MR 5WL SU/ZU	6.5	3.5	10	4	20	-	5.5x3x1.6	17	27.5	21.2	5.5	11	13
MR 5WLC SU/ZU	6.5	3.5	10	4	20	-	5.5x3x1.6	17	27.5	21.2	5.5	11	13
MR 5WN SU/ZU	6.5	3.5	10	4	20	-	5.5x3x1.6	17	21.4	15.1	5.4	6.5	13
MR 5WNC SU/ZU	6.5	3.5	10	4	20	-	5.5x3x1.6	17	21.4	15.1	5.4	6.5	13
MR 3WL SU/ZU*	4.5	3	6	2.7	15	-	4x2.4x1.5	12	20.3	15.1	4	8	-
MR 3WN SU/ZU*	4.5	3	6	2.7	15	-	4x2.4x1.5	12	15.4	10	3.9	4.5	-
MR 2WL SU /ZU*	3	3	4	2.6	10	-	2.8x1.8x1.0	10	17	11.9	3.1	6.5	-

* Anticipated
Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$

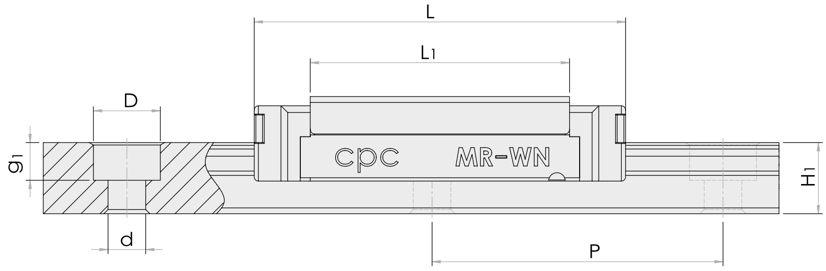




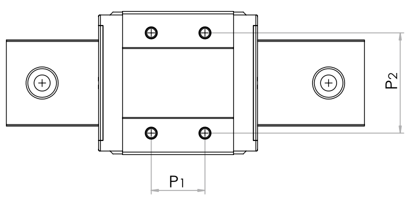


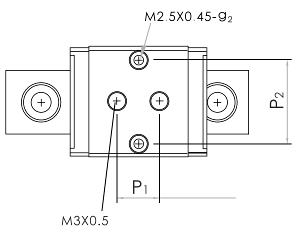


MR 15W



Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	M_{R0}	M_{P0}	M_{Y0}	Block (g)	Rail (g/m)	
M4x4.5	1.8	3.3	4.5	6725	12580	257.6	93.1	93.1	200	2818	MR 15WL SU/ZU
M4x4.5	1.8	3.3	4.5	5065	8385	171.1	45.7	45.7	137	2818	MR 15WN SU/ZU
M3x3.5	1.3	3.1	4.5	4070	7800	95.6	56.4	56.4	93	1472	MR 12WL SU/ZU
M3x3.5	1.3	3.1	4.5	3065	5200	63.7	26.3	26.3	65	1472	MR 12WN SU/ZU
M3x3	1.3	2.6	4	2550	4990	45.9	26.7	26.7	51	940	MR 9WL SU/ZU
M3x3	1.3	2.6	4	2030	3605	33.2	13.7	13.7	37	940	MR 9WN SU/ZU
M3x3	1.1	1.9	3.2	1570	3140	22.65	14.9	14.9	27	516	MR 7WL SU/ZU
M3x3	1.1	1.9	3.2	1180	2095	15	7.3	7.3	19	516	MR 7WN SU/ZU
M2.5x1.5	0.9	1.2	2.3	615	1315	6.8	4.1	4.1	8	280	MR 5WL SU/ZU
M3/M2.5x1.5	0.9	1.2	2.3	615	1315	6.8	4.1	4.1	8	280	MR 5WLC SU/ZU
M2.5x1.5	0.9	1.2	2.3	475	900	4.6	2.2	2.2	6	280	MR 5WN SU/ZU
M3/M2.5x1.5	0.9	1.2	2.3	475	900	4.6	2.2	2.2	6	280	MR 5WNC SU/ZU
M2x1.4	0.3	0.8	1.8	370	800	2.5	1.9	1.9	3.4	105	MR 3WL SU/ZU*
M2x1.4	0.3	0.8	1.8	280	530	1.6	0.9	0.9	3.4	105	MR 3WN SU/ZU*
M2x1.3	-	-	1.3	310	625	1.6	1.2	1.2	3.0	69	MR 2WL SU /ZU*

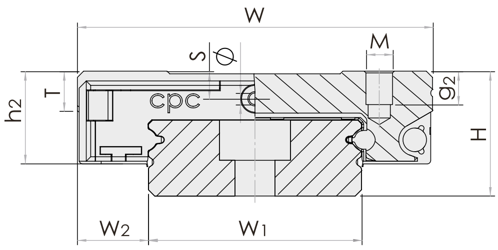




MR5WNC MR5WLC

5. Dimensions and Specifications

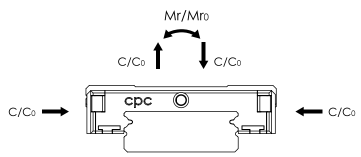
5.7 MR-W SS Series (End seal)
MR-W ZZ Series (End seal, Lubrication Storage)

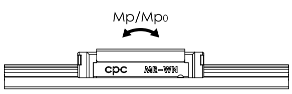


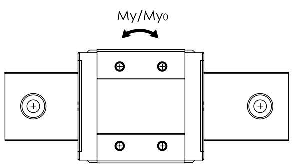
MR 2W-MR 12W

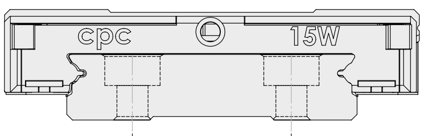
Model Code	Fabricate Dimensions		Rail Dimensions(mm)					Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	P_3	Dxdxg 1	W	L	L_1	h_2	P_1	P_2
MR 15WL SS/ZZ	16	9	42	9.5	40	23	8x4.5x4.5	60	74.9	57.6	12.3	35	45
MR 15WN SS/ZZ	16	9	42	9.5	40	23	8x4.5x4.5	60	55.7	38.5	12.3	20	45
MR 12WL SS/ZZ	14	8	24	8.5	40	-	8x4.5x4.5	40	60	46	10.3	28	28
MR 12WN SS/ZZ	14	8	24	8.5	40	-	8x4.5x4.5	40	44.9	31	10.3	15	28
MR 9WL SS/ZZ	12	6	18	7.3	30	-	6x3.5x4.5	30	50.8	39.5	8.8	24	23
MR 9WN SS/ZZ	12	6	18	7.3	30	-	6x3.5x4.5	30	39.4	27.9	8.9	12	21
MR 7WL SS/ZZ	9	5.5	14	5.2	30	-	6x3.5x3.5	25	40.8	30.1	7.1	19	19
MR 7WN SS/ZZ	9	5.5	14	5.2	30	-	6x3.5x3.5	25	31.9	21.2	7.1	10	19
MR 5WL SS	6.5	3.5	10	4	20	-	5.5x3x1.6	17	27.6	21.2	5.1	11	13
MR 5WLC SS	6.5	3.5	10	4	20	-	5.5x3x1.6	17	27.6	21.2	5.1	11	13
MR 5WN SS	6.5	3.5	10	4	20	-	5.5x3x1.6	17	21.4	15.1	5.1	6.5	13
MR 5WNC SS	6.5	3.5	10	4	20	-	5.5x3x1.6	17	21.4	15.1	5.1	6.5	13
MR 3WL SS/ZZ	4.5	3	6	2.7	15	-	4x2.4x1.5	12	20.3	15.1	3.9	8	-
MR 3WN SS/ZZ	4.5	3	6	2.7	15	-	4x2.4x1.5	12	15.3	10	3.9	4.5	-
MR 2WL SS/ZZ*	3	3	4	2.6	10	-	2.8x1.8x1.0	10	17.4	11.9	3.2	6.5	-

* Anticipated
Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$

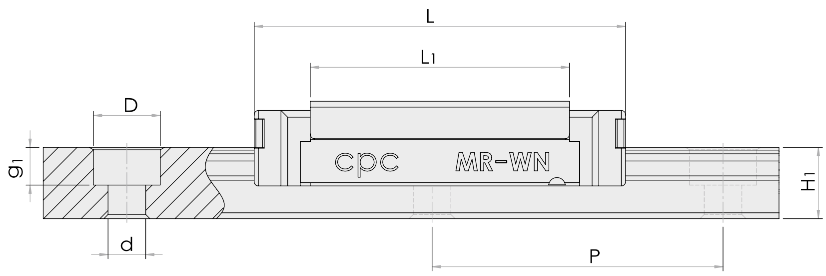




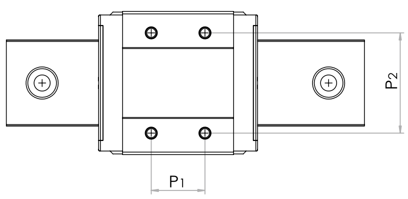


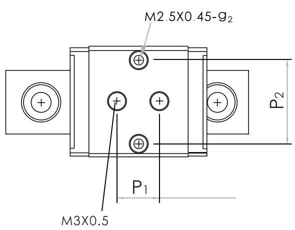


MR 15W



Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	Mr_0	Mp_0	My_0	Block (g)	Rail (g/m)	
M4x4.5	1.8	3.3	4.5	6725	12580	257.6	93.1	93.1	200	2818	MR 15WL SS/ZZ
M4x4.5	1.8	3.3	4.5	5065	8385	171.1	45.7	45.7	137	2818	MR 15WN SS/ZZ
M3x3.5	1.3	3.1	4.5	4070	7800	95.6	56.4	56.4	93	1472	MR 12WL SS/ZZ
M3x3.5	1.3	3.1	4.5	3065	5200	63.7	26.3	26.3	65	1472	MR 12WN SS/ZZ
M3x3	1.3	2.6	4	2550	4990	45.9	26.7	26.7	51	940	MR 9WL SS/ZZ
M3x3	1.3	2.6	4	2030	3605	33.2	13.7	13.7	37	940	MR 9WN SS/ZZ
M3x3	1.1	1.9	3.2	1570	3140	22.65	14.9	14.9	27	516	MR 7WL SS/ZZ
M3x3	1.1	1.9	3.2	1180	2095	15	7.3	7.3	19	516	MR 7WN SS/ZZ
M2.5x1.5	0.9	1.2	2.3	615	1315	6.8	4.1	4.1	8	280	MR 5WL SS
M3/M2.5x1.5	0.9	1.2	2.3	615	1315	6.8	4.1	4.1	8	280	MR 5WLC SS
M2.5x1.5	0.9	1.2	2.3	475	900	4.6	2.2	2.2	6	280	MR 5WN SS
M3/M2.5x1.5	0.9	1.2	2.3	475	900	4.6	2.2	2.2	6	280	MR 5WNC SS
M2x1.4	0.3	0.8	1.8	370	800	2.5	1.9	1.9	3.4	105	MR 3WL SS/ZZ
M2x1.4	0.3	0.8	1.8	280	530	1.6	0.9	0.9	3.4	105	MR 3WN SS/ZZ
M2x1.3	-	-	1.3	310	625	1.6	1.2	1.2	3.0	69	MR 2WL SS/ZZ*

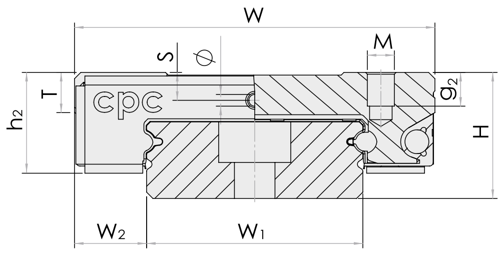




MR5WNC MR5WLC

5. Dimensions and Specifications

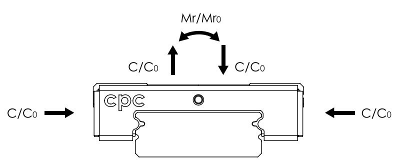
5.8 MR-W SUE Series (End seal, Bottom Seal, Reinforcement Plate) MR-W ZUE Series (End seal, Bottom Seal, Reinforcement Plate, Lubrication Storage)

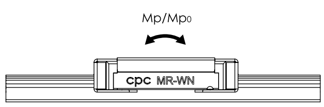


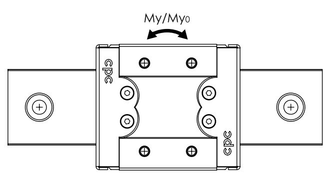
MR 2W-MR 12W

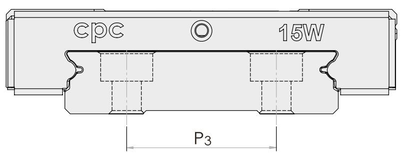
Model Code	Fabricate Dimensions		Rail Dimensions(mm)					Block Dimensions(mm)					
	H	W2	W1	H1	P	P3	Dxdxg 1	W	L	L1	h2	P1	P2
MR 15WL SUE/ZUE	16	9	42	9.5	40	23	8x4.5x4.5	60	76.5	57.6	13.2	35	45
MR 15WN SUE/ZUE	16	9	42	9.5	40	23	8x4.5x4.5	60	57.5	38.5	13.2	20	45
MR 12WL SUE/ZUE	14	8	24	8.5	40	-	8x4.5x4.5	40	61.1	46	11.4	28	28
MR 12WN SUE/ZUE	14	8	24	8.5	40	-	8x4.5x4.5	40	46.1	31	11.5	15	28
MR 9WL SUE/ZUE	12	6	18	7.3	30	-	6x3.5x4.5	30	51.9	39.5	9.6	24	23
MR 9WN SUE/ZUE	12	6	18	7.3	30	-	6x3.5x4.5	30	40.4	27.9	9.5	12	21
MR 7WL SUE/ZUE	9	5.5	14	5.2	30	-	6x3.5x3.5	25	41.6	30.1	7.9	19	19
MR 7WN SUE/ZUE	9	5.5	14	5.2	30	-	6x3.5x3.5	25	32.8	21.2	7.9	10	19
MR 2WL SUE * /ZUE*	4	3	4	3	10	-	2.8x1.8x1.0	10	17.5	11.9	3.4	6.5	-

* Anticipated
Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: C_{50B} = 1.26 x C_{100B}

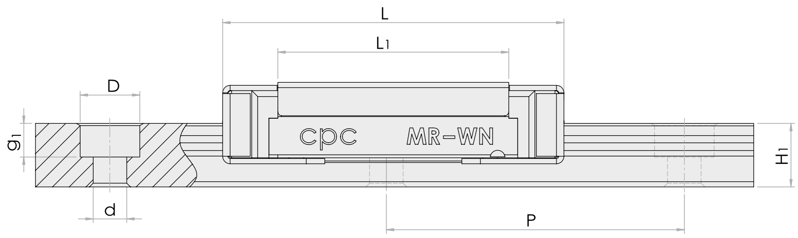




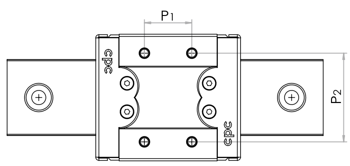




MR 15W

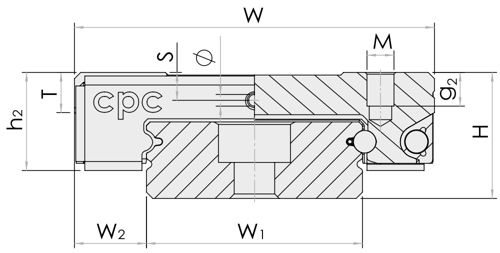


	Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
	Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	Mr_0	Mp_0	My_0	Block (g)	Rail (g/m)	
	M4x4.5	1.8	3.3	4.5	6725	12580	257.6	93.1	93.1	200	2818	MR 15WL SUE/ZUE
	M4x4.5	1.8	3.3	4.5	5065	8385	171.1	45.7	45.7	137	2818	MR 15WN SUE/ZUE
	M3x3.5	1.3	3.1	4.5	4070	7800	95.6	56.4	56.4	93	1472	MR 12WL SUE/ZUE
	M3x3.5	1.3	3.1	4.5	3065	5200	63.7	26.3	26.3	65	1472	MR 12WN SUE/ZUE
	M3x3	1.3	2.6	4	2550	4990	45.9	26.7	26.7	51	940	MR 9WL SUE/ZUE
	M3x3	1.3	2.6	4	2030	3605	33.2	13.7	13.7	37	940	MR 9WN SUE/ZUE
	M3x3	1.1	1.9	3.2	1570	3140	22.65	14.9	14.9	27	516	MR 7WL SUE/ZUE
	M3x3	1.1	1.9	3.2	1180	2095	15	7.3	7.3	19	516	MR 7WN SUE/ZUE
	M2x1.3	-	-	1.3	310	625	1.6	1.2	1.2	3.0	69	MR 2WL SUE * /ZUE*



5. Dimensions and Specifications

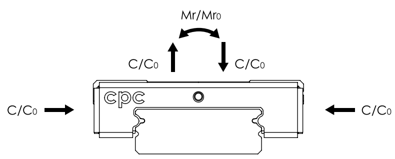
5.9 MR-W EE Series (End seal, Reinforcement Plate) MR-W EZ Series (End seal, Reinforcement Plate, Lubrication Storage)

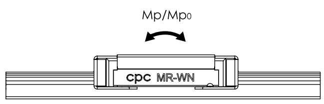


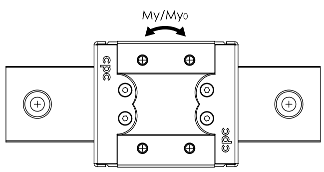
MR 2W-MR 12W

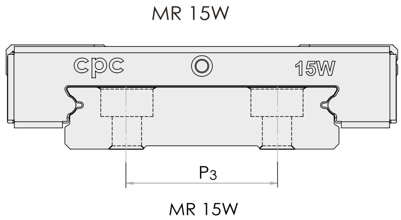
Model Code	Fabricate Dimensions		Rail Dimensions(mm)					Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	P_3	$Dxdxg_1$	W	L	L_1	h_2	P_1	P_2
MR 15WL EE/EZ	16	9	42	9.5	40	23	8x4.5x4.5	60	76.6	57.6	13	35	45
MR 15WN EE/EZ	16	9	42	9.5	40	23	8x4.5x4.5	60	57.4	38.5	12.9	20	45
MR 12WL EE/EZ	14	8	24	8.5	40	-	8x4.5x4.5	40	61.3	46	11.2	28	28
MR 12WN EE/EZ	14	8	24	8.5	40	-	8x4.5x4.5	40	46.2	31	11.2	15	28
MR 9WL EE/EZ	12	6	18	7.3	30	-	6x3.5x4.5	30	51.9	39.5	9.4	24	23
MR 9WN EE/EZ	12	6	18	7.3	30	-	6x3.5x4.5	30	40.4	27.9	9.5	12	21
MR 7WL EE/EZ	9	5.5	14	5.2	30	-	6x3.5x3.5	25	41.7	30.1	7.8	19	19
MR 7WN EE/EZ	9	5.5	14	5.2	30	-	6x3.5x3.5	25	32.8	21.2	7.6	10	19
MR 2WL EE/EZ*	4	3	4	3	10	-	2.8x1.8x1.0	10	17.9	11.9	3.5	6.5	-

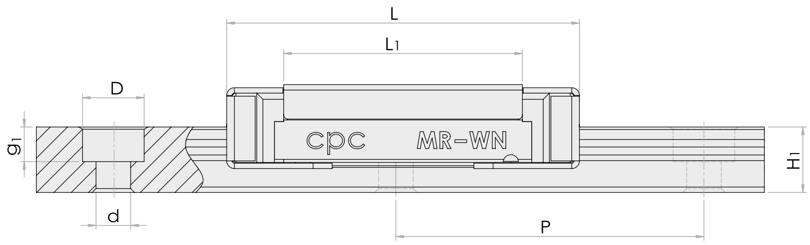
* Anticipated
Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$



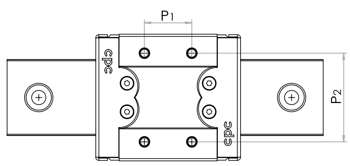






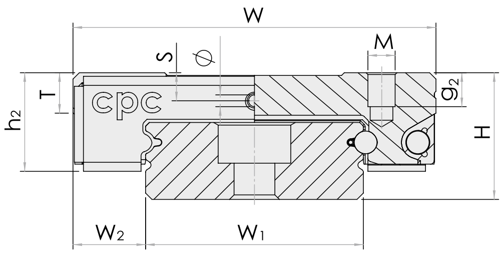


	Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
	Mx g_2	Ø	S	T	C_{100B} (dyn)	C_0 (stat)	M_{R0}	M_{P0}	M_{Y0}	Block (g)	Rail (g/m)	
	M4x4.5	1.8	3.3	4.5	6725	12580	257.6	93.1	93.1	200	2818	MR 15WL EE/EZ
	M4x4.5	1.8	3.3	4.5	5065	8385	171.1	45.7	45.7	137	2818	MR 15WN EE/EZ
	M3x3.5	1.3	3.1	4.5	4070	7800	95.6	56.4	56.4	93	1472	MR 12WL EE/EZ
	M3x3.5	1.3	3.1	4.5	3065	5200	63.7	26.3	26.3	65	1472	MR 12WN EE/EZ
	M3x3	1.3	2.6	4	2550	4990	45.9	26.7	26.7	51	940	MR 9WL EE/EZ
	M3x3	1.3	2.6	4	2030	3605	33.2	13.7	13.7	37	940	MR 9WN EE/EZ
	M3x3	1.1	1.9	3.2	1570	3140	22.65	14.9	14.9	27	516	MR 7WL EE/EZ
	M3x3	1.1	1.9	3.2	1180	2095	15	7.3	7.3	19	516	MR 7WN EE/EZ
	M2x1.3	-	-	1.3	310	625	1.6	1.2	1.2	3.0	69	MR 2WL EE/EZ*



5. Dimensions and Specifications

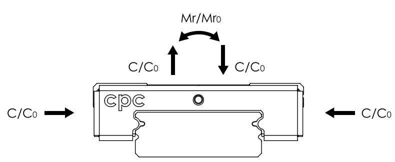
5.10 MR-W EU Series (End seal, Reinforcement Plate, Stainless Bottom Seal) MR-W UZ Series (End seal, Reinforcement Plate, Stainless Bottom Seal, Lubrication Storage)

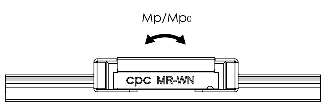


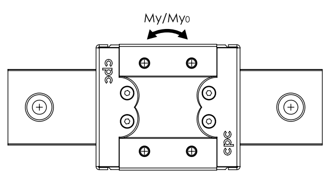
MR 9W-MR 12W

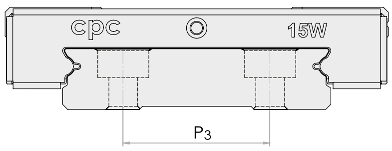
Model Code	Fabricate Dimensions		Rail Dimensions(mm)					Block Dimensions(mm)					
	H	W_2	W_1	H_1	P	P_3	$Dxdxg_1$	W	L	L_1	h_2	P_1	P_2
MR 15WL EU/UZ	16	9	42	9.5	40	23	8x4.5x4.5	60	76.7	57.6	13	35	45
MR 15WN EU/UZ	16	9	42	9.5	40	23	8x4.5x4.5	60	57.6	38.5	13.2	20	45
MR 12WL EU/UZ	14	8	24	8.5	40	-	8x4.5x4.5	40	61.2	46	11.2	28	28
MR 12WN EU/UZ	14	8	24	8.5	40	-	8x4.5x4.5	40	46.1	31	11.3	15	28
MR 9WL EU/UZ	12	6	18	7.3	30	-	6x3.5x4.5	30	51.9	39.5	9.4	24	23
MR 9WN EU/UZ	12	6	18	7.3	30	-	6x3.5x4.5	30	40.4	27.9	9.6	12	21

Load capacities are calculated according to ISO 14728. To compare the rating life definition and the load capacities: $C_{50B} = 1.26 \times C_{100B}$

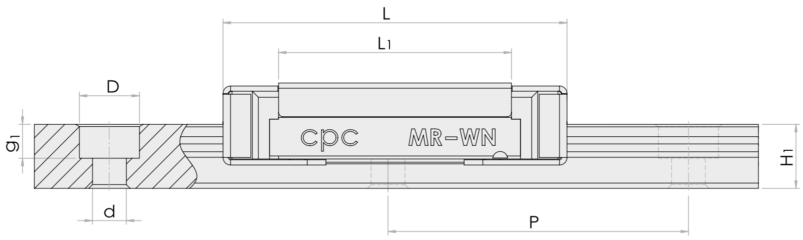




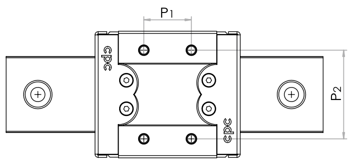




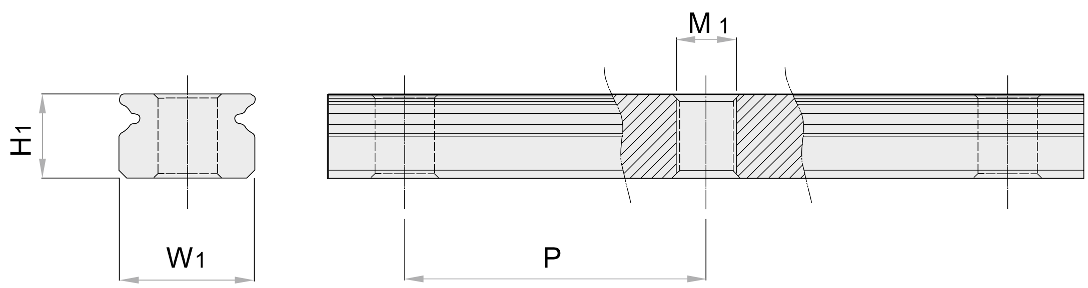
MR 15W



	Block Dimensions(mm)				Load Capacities (KN)		Static Moment (Nm)			Weight		Model Code
	Mx g 2	Ø	S	T	C100B (dyn)	Co (stat)	Mro	Mpo	Myo	Block (g)	Rail (g/m)	
	M4x4.5	1.8	3.3	4.5	6725	12580	257.6	93.1	93.1	200	2818	MR 15WL EU/UZ
	M4x4.5	1.8	3.3	4.5	5065	8385	171.1	45.7	45.7	137	2818	MR 15WN EU/UZ
	M3x3.5	1.3	3.1	4.5	4070	7800	95.6	56.4	56.4	93	1472	MR 12WL EU/UZ
	M3x3.5	1.3	3.1	4.5	3065	5200	63.7	26.3	26.3	65	1472	MR 12WN EU/UZ
	M3x3	1.3	2.6	4	2550	4990	45.9	26.7	26.7	51	940	MR 9WL EU/UZ
	M3x3	1.3	2.6	4	2030	3605	33.2	13.7	13.7	37	940	MR 9WN EU/UZ



5. Dimensions and Specifications



5.11 Standard MRU-M series - Tapped from bottom

Dimensions and Specifications

Model Code	Rail Dimensions (mm)			
	H_1	W_1	P	M_1
MRU 15M	9.5	15	40	M4x0.7
MRU 12M	7.5	12	25	M4x0.7
MRU 9M	5.5	9	20	M4x0.7
MRU 7M	4.7	7	15	M3x0.5
MRU 5M	3.5	5	15	M3x0.5
MRU 3M	2.6	3	10	M1.6x0.35
MRU 2M	2	2	8	M1x0.25

5.12 Wide MRU-W series - Tapped from bottom

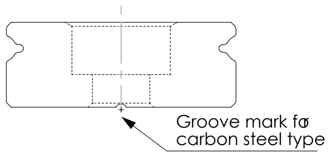
Dimensions and Specifications

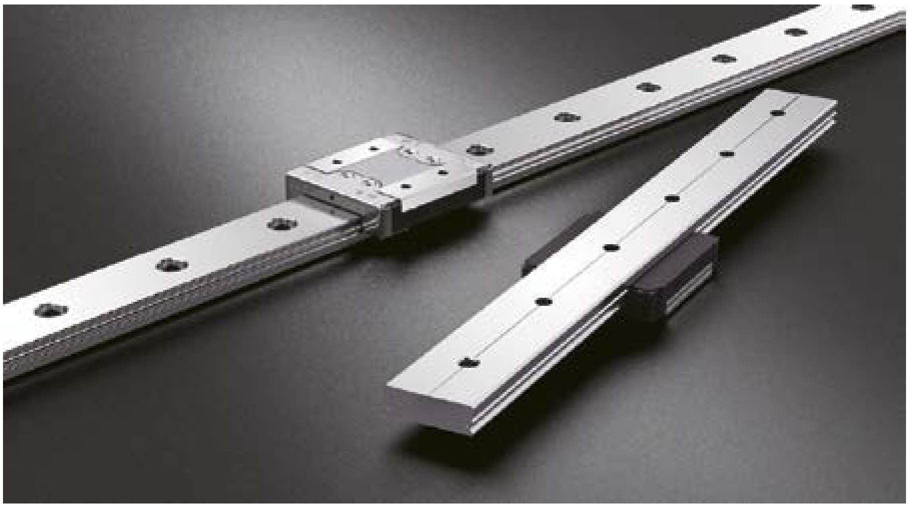
Model Code	Rail Dimensions (mm)			
	H_1	W_1	P	M_1
MRU 15W	9.5	42	40	M5x0.8
MRU 12W	8.5	24	40	M5x0.8
MRU 9W	7.3	18	30	M4x0.7
MRU 7W	5.2	14	30	M4x0.7
MRU 5W	4	10	20	M3x0.5
MRU 3W	2.7	6	15	M3x0.5

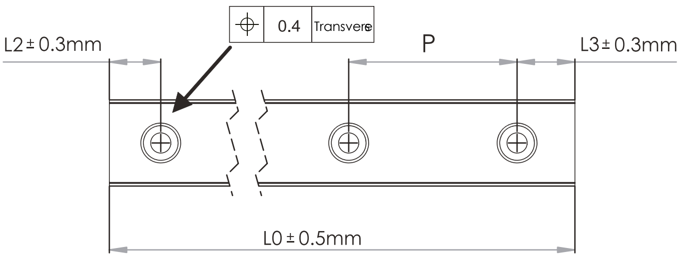
6. Carbon Steel

Characteristic

1. Provided max length: 3m.
2. Hardness of the ball runner rail surface : HRC 58 ~ 63
   Hardness of the center : About HRC 28
3. Applies to industrial machines in normal conditions.
4. Sizes are the same as with stainless steel products.
5. Very competitive prices.
6. Precision class available for N, H, and P Grade.
7. Product size, precision class, and other technical information are the same as the MR stainless series, please refer to the cpc MR Miniature Linear Guide Series Catalog for more information.



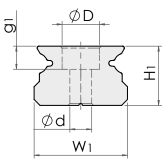




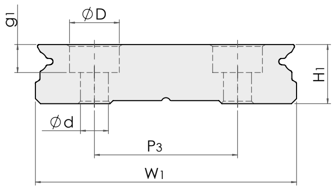
Suggestion length of one rail	Standard				Wide			
	Size				Size			
	7M	9M	12M	15M	7W	9W	12W	15W
Pitch(mm)	15	20	25	40	30	30	40	40
L2, L3 min	3	4	4	4	3	4	4	4
L2, L3 max	10	20	20	35	25	25	35	35
Maximum rail length L0 (mm)	1000	3000	3000	3000	1000	3000	3000	3000

6. Carbon Steel

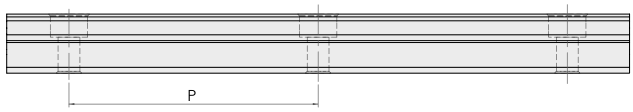
Standard Rail



MR-7M~15M
MR-7W~12W



MR15W



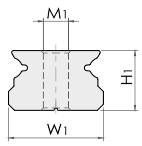
Standard MR-M series Rail

Model Code	Rail Dimensions (mm)				Weight(g/m)
	H_1	W_1	P	$Dxdxg_1$	
MR 15M	9.5	15	40	6x3.5x4.5	930
MR 12M	7.5	12	25	6x3.5x4.5	602
MR 9M	5.5	9	20	6x3.5x3.5	301
MR 7M	4.7	7	15	4.2x2.4x2.3	215

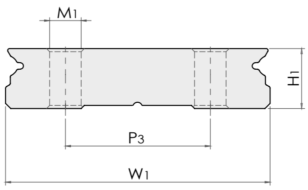
Wide MR-W series Rail

Model Code	Rail Dimensions (mm)					Weight(g/m)
	H_1	W_1	P	P_3	$Dxdxg_1$	
MR 15W	9.5	42	40	23	8x4.5x4.5	2818
MR 12W	8.5	24	40	-	8x4.5x4.5	1472
MR 9W	7.3	18	30	-	6x3.5x4.5	940
MR 7W	5.2	14	30	-	6x3.5x3.5	516

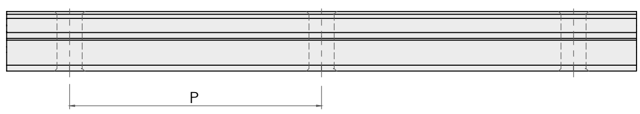
Tapped Rail



MRU-7M~15M
MRU-7W~12W



MRU15W



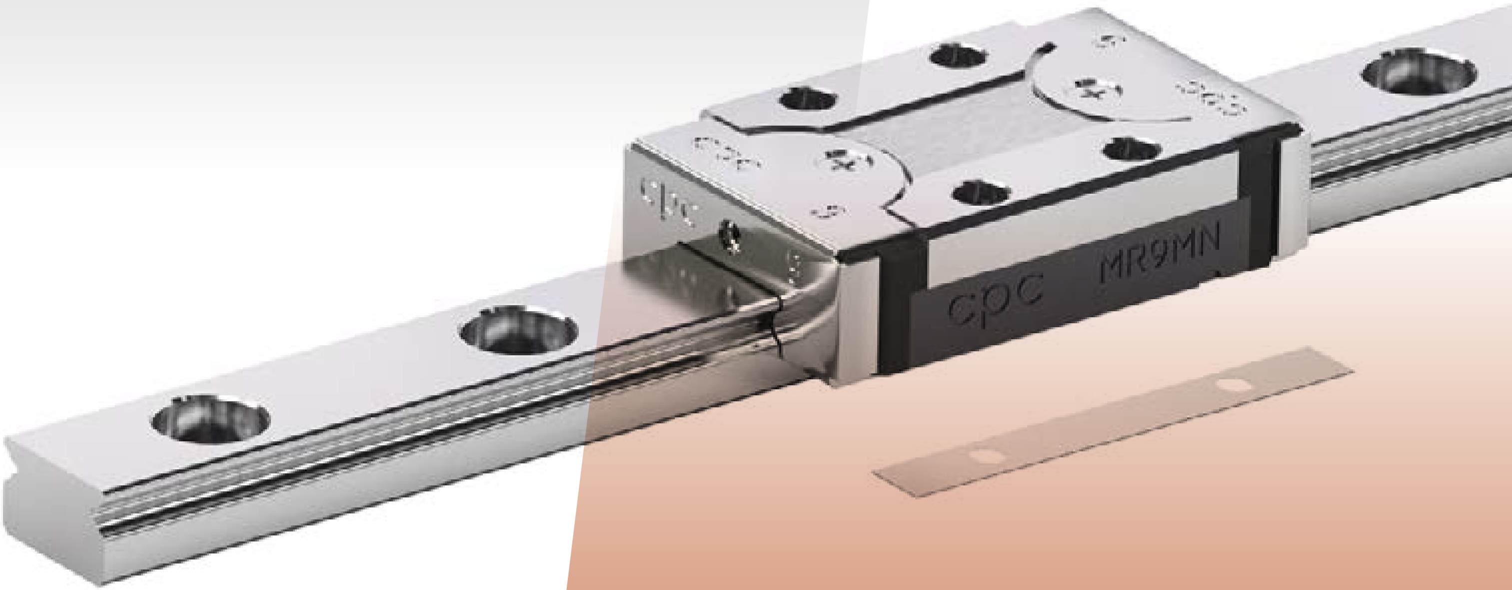
Standard MRU-M series - Tapped from bottom

Model Code	Rail Dimensions (mm)				Weight(g/m)
	H_1	W_1	P	M_1	
MRU 15M	9.5	15	40	M4x0.7	930
MRU 12M	7.5	12	25	M4x0.7	602
MRU 9M	5.5	9	20	M4x0.7	301
MRU 7M	4.7	7	15	M3x0.5	215

Wide MRU-W series - Tapped from bottom

Model Code	Rail Dimensions (mm)					Weight(g/m)
	H_1	W_1	P	P_3	M_1	
MRU 15W	9.5	42	40	23	M5x0.8	2818
MRU 12W	8.5	24	40	-	M5x0.8	1472
MRU 9W	7.3	18	30	-	M4x0.7	940
MRU 7W	5.2	14	30	-	M4x0.7	516

ST Miniature Stroke Slide series



1. Product Introduction

High load and high moment capaity

The ST Miniature Stroke Slide Series is designed with two rows of balls. The ball track has a gothic profile design with a 45 degree contact angle to achieve equal load capacity in a mono block. This provides more space for the larger rolling elements while enhancing the load and moment capacity.

High running accuracy and smoothness

The steel balls of the ST miniature stroke slide series roll on the rail without recirculation, resulting in excellent running behavior, smoothness, low friction, and high accuracy without vibration.

Temperature

The ST Miniature Stroke Slide Series can withstand temperatures of up to 150 oC.
There are two treatment options for higher temperature applications:

T1 : 200oC
T2 : 300oC

Applying treatments for higher temperature applications will reduce the load capacity.

Dual plate design

The ST Miniature Stroke Slide Series adopts a pair of end plates into the design. Both the center rail and bearing block sides have a plate installed that prevents the linear guide from over-stroking.

Easy mounting

The mounting of the ST Miniature Stroke Slide Series is accomplished by fitting the fixing screw downward into the count bore of the rail by intersecting the hole pattern on the block and cage within the hole pitch. The one piece cage therefore does not influence the mounting of the rail while the preload is preset by ball sorting.

Anti-corrosion feature

The ST Miniature Stroke Slide Series is composed of quenched hardened process stainless steel for the rail, block, and steel balls. The block plate and screws are made of stainless steel as well - providing a great model for maintenance and inspection applications.

2. Product Introduction

Accuracy

The ST Miniature Stroke Slide Series has three grades for accuracy. Precision (P), High (H) and Normal (N).

Preload

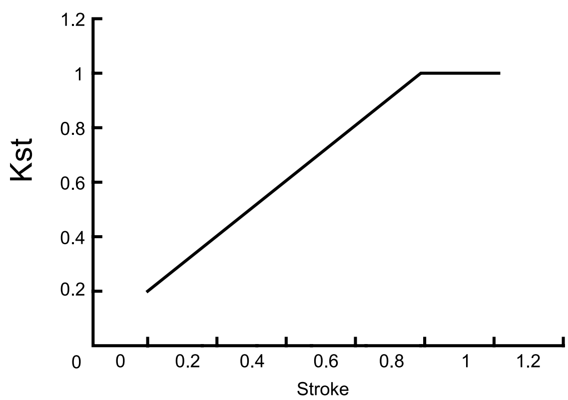
The ST Miniature Stroke Slide series has two preload classes, V0 and V1, as described in the MR miniature linear guide series preload table.

Rating life calculation

$$L = K_{st} \left(\frac{C_{100B}}{P} \right)^3 \cdot 10^5 \qquad (19)$$

$$L_h = \frac{L}{2 \cdot s \cdot n \cdot 60} = K_{st} \cdot \frac{L}{V_m \cdot 60} \qquad (20)$$

Short stroke factor diagram



According to ISO14728-1 short stroke factor

Lubrication

Lubrication of the ST Miniature Stroke Slide Series can be performed by adding the lubricant onto the raceway of the rail.

Rating life L

The rating life of the ST Miniature Stroke Slide Series can be calculated by formulas (19) and (20), in accordance with ISO 14728-1.

Geometric and positional accuracy of the mounting surface

The inaccuracy of the mounting surfaces will affect the running accuracy and reduce the operating lifetime of the ST Miniature Stroke Slide. If the inaccuracies of the mounting surface exceed the values calculated by formulas (15), (21), and (17), the lifetime will be shortened, as calculated by formulas (19) and (20).

$$e_1(mm) = b(mm) \cdot f_1 \cdot 10^{-4} \quad (15)$$

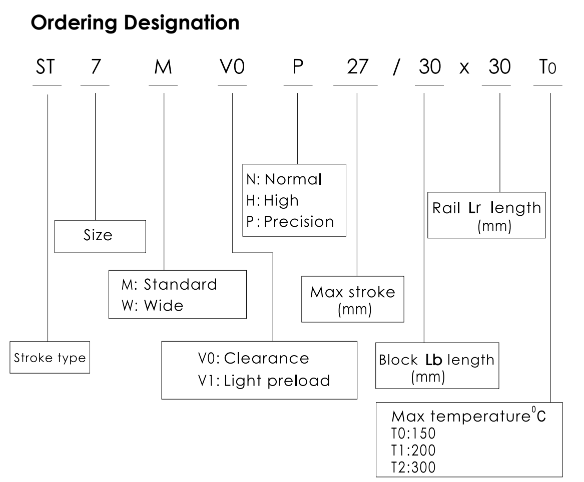
$$e_2(mm) = \left(\frac{d\,(mm)}{Lc\,(mm)}\right) \cdot f_2 \cdot 10^{-5} \quad (21)$$

$$e_3(mm) = f_3 \cdot 10^{-3} \quad (17)$$

The mounting surface geometric and positional accuracy factor

Size	V0			V1		
	f_1	f_2	f_3	f_1	f_2	f_3
7	5	200	4	3	130	3
9	5	300	6	4	200	4
12	6	380	8	4	250	6
15	7	530	12	5	350	8

Ordering designation



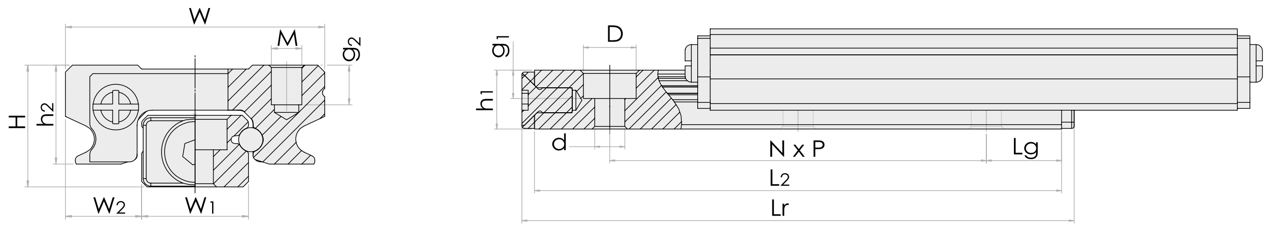
Height and Chamfered Reference Edge

The tables for the chamfered reference edge corner and the height of the reference edge for the MR Miniature Linear Guide Series are also suitable for the ST Miniature Stroke Slide Series.

3. Ordering Information

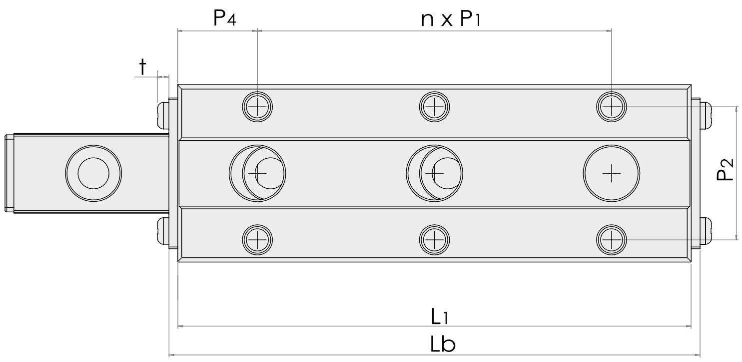
An example of the ST Miniature Stroke Slide Series part numbering system is shown above.

Dimensions and Specifications



Model Code	Fabricate Dimensions (mm)		Rail Dimensions (mm)			
	H	W2	P	W1	h1	Dxdxg 1
ST7M	8	5	15	7	4.7	4.2x2.4x2.3
ST9M	10	5.5	20	9	5.5	6x3.5x3.5
ST12M	13	7.5	25	12	7.5	6x3.5x4.5

Model Code	Max Stroke	Rail Dimensions (mm)				Block Dimensions (mm)	
	Ls	Lr	L2	Lg	N	Lb	L1
ST7M	27	30	28	6.5	1	30	28
ST7M	41	45	43	6.5	2	45	43
ST7M	55	60	58	6.5	3	60	58
ST9M	38	40	38	9	1	40	38
ST9M	58	60	58	9	2	60	58
ST9M	78	80	78	9	3	80	78
ST12M	44	50	47.4	11.2	1	50	47.4
ST12M	69	75	72.4	11.2	2	75	72.4
ST12M	94	100	97.4	11.2	3	100	97.4



Block Dimensions (mm)						Model Code
P_1	P_2	W	h_2	M x g $_2$	t	
15	12	17	6.5	M2x2.5	1	ST7M
20	15	20	7.8	M3x3.0	1.3	ST9M
25	20	27	10	M3x3.5	1.3	ST12M

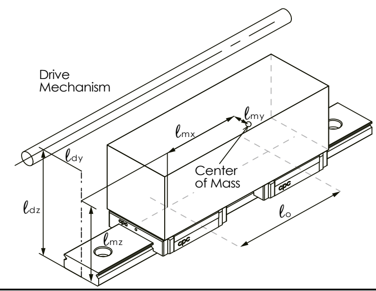
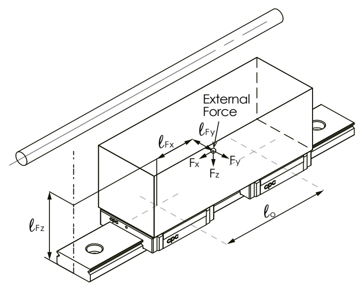
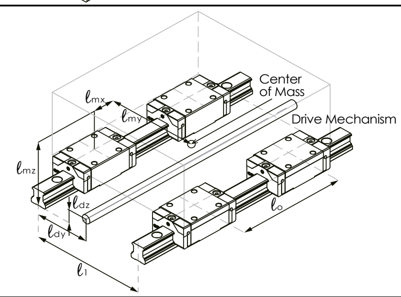
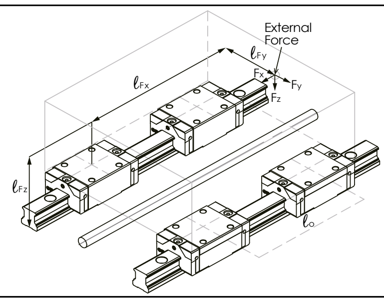
Block Dimensions (mm)		Load Capacities (N)		Static Moment (Nm)			Model Code
P_4	n	C_{100B} (dyn)	C_0 (stat)	M_{R0}	M_{P0}	M_{Y0}	
6.5	1	910	1580	5.9	3.4	3.4	ST7M
6.5	2	1220	2500	9.1	8	8	ST7M
6.5	3	1490	3330	12.4	14.6	14.6	ST7M
9	1	1590	2773	13.1	6.8	6.8	ST9M
9	2	2080	4170	19.7	16	16	ST9M
9	3	2520	5547	26.2	29.2	29.2	ST9M
11.2	1	2550	4340	27	16	16	ST12M
11.2	2	3350	6510	40.1	35.6	35.6	ST12M
11.2	3	4050	8670	54	62.8	62.8	ST12M

Linear Guide Service Life Calculation and Model Selection

Company /		Date (DD/MM/YEAR) /
Address /		Tel /
Contact /	Department /	Machine Model /
Application(Axial) /	Amount required per Machines /	Sample Required Date (DD/MM/YEAR)/
Application Drawing Provided? ☐ Yes ☐ No		Production Date (DD/MM/YEAR)/

Assembly Specification / Way of Assembling

☐ Horizontal ☐ Vertical ☐ Wall Hanging ☐ Hanging on the Ceiling ☐ Inclined 1(Degree: _____) ☐ Inclined 2(Degree: _____) ☐ Others (Please Draw a Sketch Above)

Rails per Axial	☐ I (1)	☐ II (2)	☐ III (3)	☐ Other ______
Blocks per Rail	☐ 1	☐ 2	☐ 3	☐ Other ______
Distribution of Blocks (mm)	ℓ_o : ______	(Distance Between Blocks on the same rail)	ℓ_1 : ______	(Distance Between Adjacent Blocks on different rails)
Center of Mass of load(mm)	ℓ_{mx} : ______	ℓ_{my} : ______	ℓ_{mz} : ______	
Mass of Load (kg)	______	(Please include mounting plate weight)		
Driver Position (mm)	ℓ_{dz} : ______	ℓ_{dy} : ______		
External Force Applying Position (mm)	ℓ_{Fx} : ______	ℓ_{Fy} : ______	ℓ_{Fz} : ______	
Axial Component (N)	Fx : ______	Fy : ______	Fz : ______	
One Rail Per Axial				
Two Rails Per Axial				

Motion Specification

Drive Mechanism	☐ Linear Motor ☐ Ball Screw ☐ Pneumatic Cylinder ☐ Belt ☐ Hydraulic cylinder ☐ Rack and Pinion ☐ Manual ☐ Other ______	
Specification	Stroke Distance (mm):	Maximum Speed (m/sec):
	Acceleration (m/sec²):	Deceleration (m/sec²):
	Stroke Time (sec)	Frequency (hr⁻¹):
	Daily Operation Time (hr):	Expected Service Life (Year):

Environment and Lubrication Requirements

Environment	☐ General ☐ Clean room(Grade/Class____) ☐ Vacuum / Low Pressure ☐ Small Amount of Dust (Substance______) ☐ Large Amount of Dust (Substance______) ☐ Liquid (Substance______) ☐ Special Gas (Substance____) ☐ Other______			
cpc Initial Lubrication	☐ Pre-lubricated (Regular Amount)	☐ Pre-lubricated (Small Amount)	☐ None	☐ Other______
cpc Initial Antirust Method	☐ Apply Antirust Oil On the Surface	☐ Apply Grease On the Surface	☐ None	☐ Other______
Customer Initial Lubrication	☐ cpc Grease only	☐ In addition to cpc Grease, Inject Customer's Grease (Grease :______)	☐ Remove cpc Grease And Inject Customer's Grease (Solvent:______) (Grease:______)	☐ Other______
End User Re-lubrication Method	☐ Manual	☐ Central Oiling System	☐ None	☐ Other______

Memo

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