cpc

2007CATALOG

MR Miniature Linear Guide Series
ST Miniature Stroke Slide Series

cpc CHIEFTECH PRECISION CO., LTD.

Company Profile

Chieftech **P**recision **C**o., Ltd. “hereinafter **cpc** “ professional team devote every effort to miniature linear motion key components research and development, production, manufacture and continue operation.

Miniature linear guide begin from 1990, linear motion component of miniaturization for a start application on precision measurement, inspection instruments.

Recently global semiconductor machinery equipments, electronics and peripheral industry are rising and flourishing development, fast growth and product miniaturization, high function density requirement result in mechanical key component linear guide miniaturization also.

And extensively application to semiconductors machinery equipment, small machinery, ROBOT, fixture, tool, consumer OA products, high price computer peripheral equipment field.
The miniature linear guide actual is necessity of advance of modern technology.

cpc integrate domestic and international excellent professional constitute rigid technical operation team, take a broad view on development of global precision mechanical, be determined to be Leader of world miniature linear motion components.

Main products include :

- Miniature Linear Guide
- Standard Linear Guide
- Linear Motor
- Precision Miniature Ballscrew
- Miniature Linear Module

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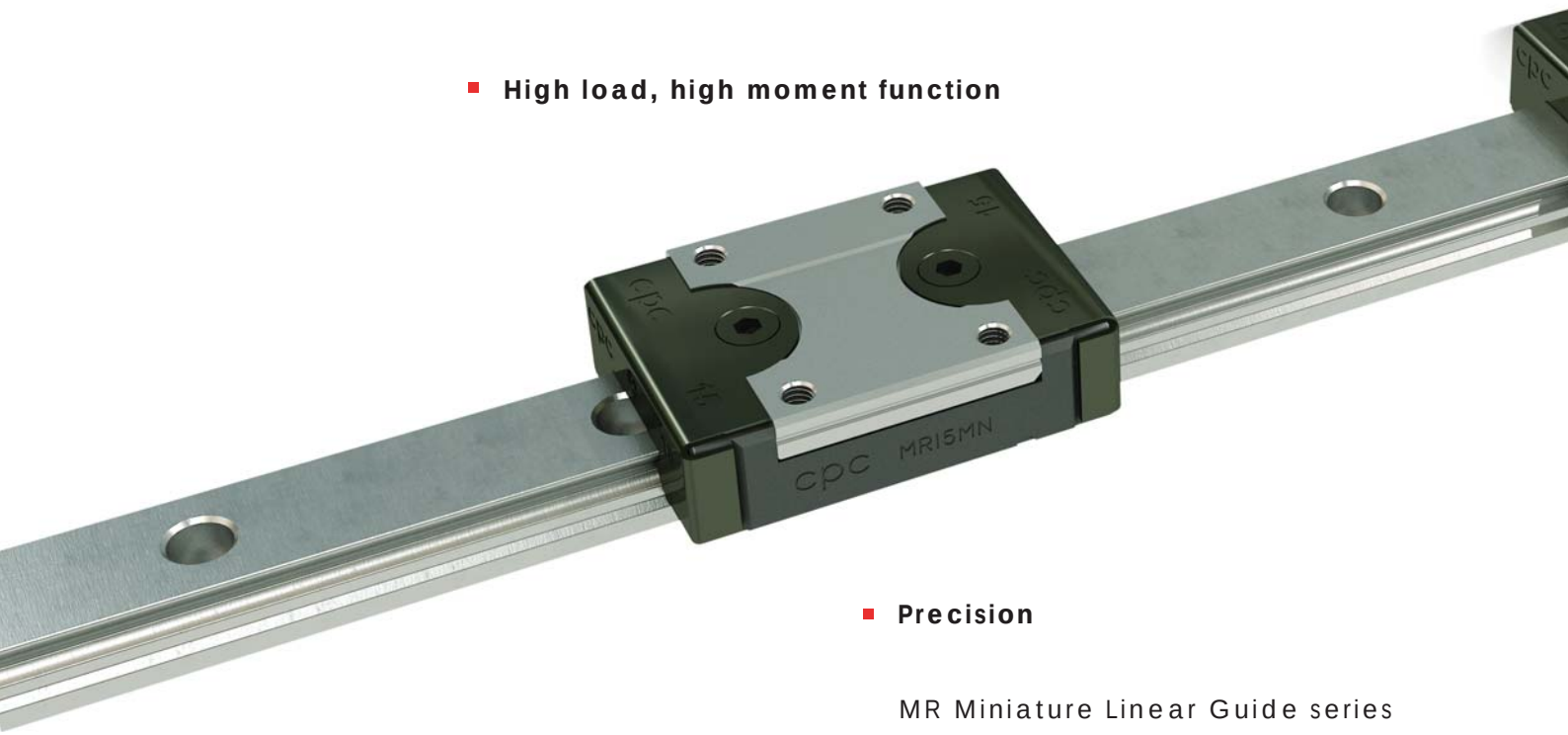
1.Products Introduction

1.1 MR Miniature Linear Guide series

- **Reinforcement steel plate design**

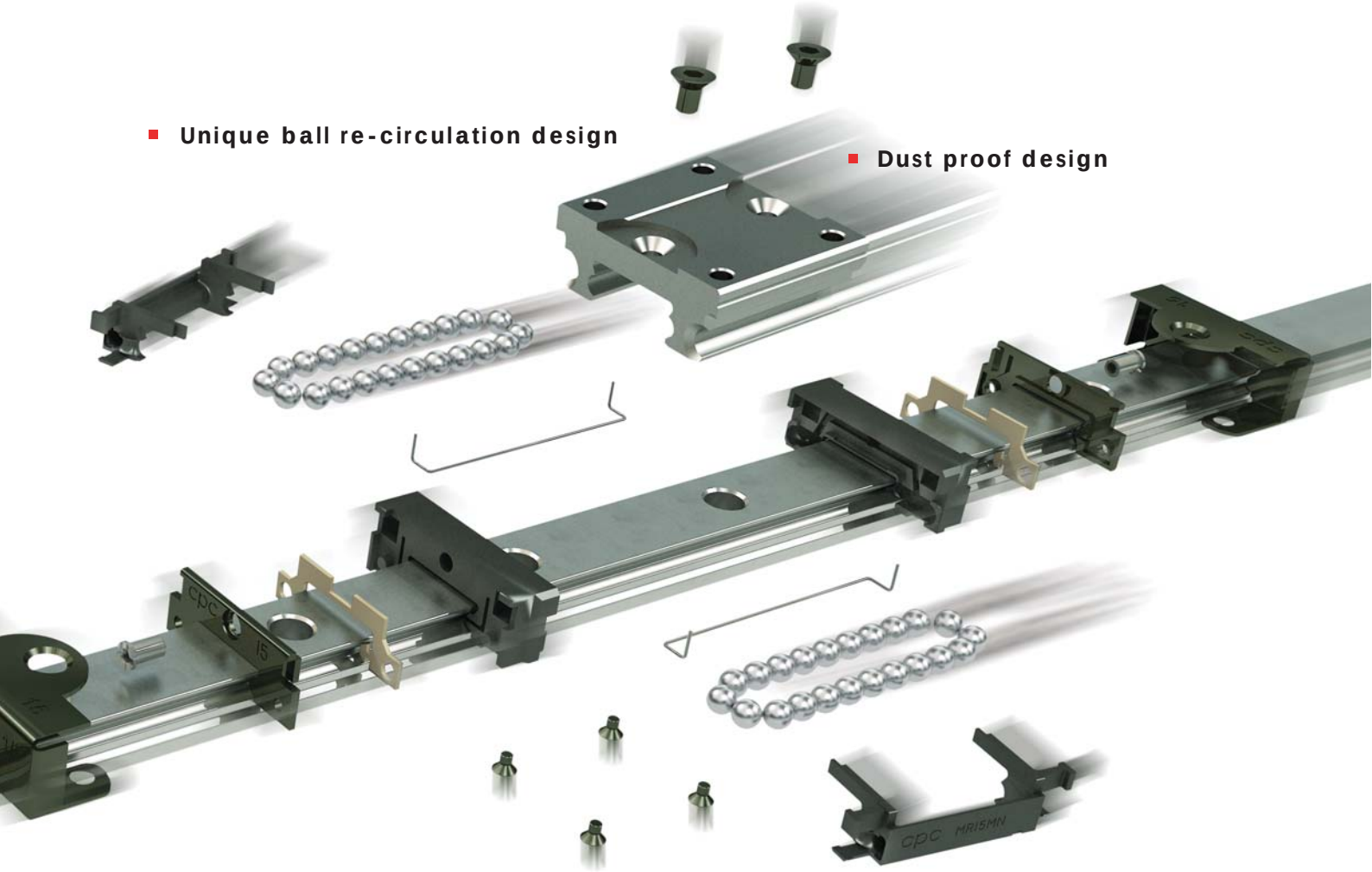
- **High load, high moment function**



- **Precision**

MR Miniature Linear Guide series have three accuracy options for design choice.
There are Precision(P)、High(H)、Normal(N).

- **Unique ball re-circulation design**
- **Dust proof design**



- **Embedded inverse hook design**
- **Lubrication storage design**
- **Material**

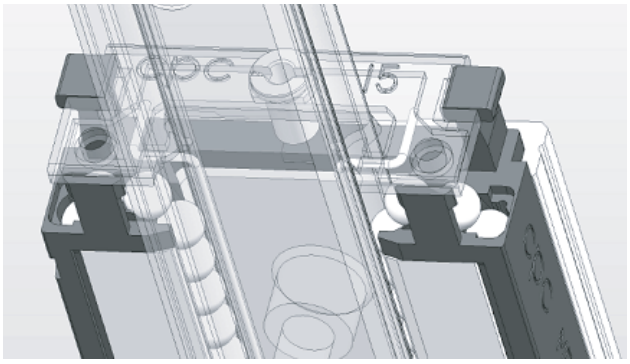
MR Miniature linear Guides series regardless of Steel Rail, Steel Body of Block or Steel Ball all use stainless steel quenched process material.

1.Products Introduction

1.2 New Design

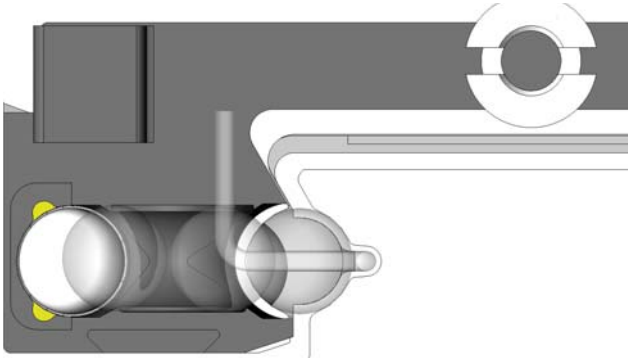
Embedded inverse hook design for reinforcement mechanical integration

This design have be approved to take higher running speed .
When Block be in motion , it's plastic end cap constantly receive strike force which generate by stainless steel ball re-circulation change direction.
And more higher running speed create more strike force. Considering automation and designing need more and more occasion demands of high-speed operation . So **cpc** design plastic inverse hook for reinforcement mechanical integration in MR Miniature Linear Guide 9W, 12M/W, 15M/W series.



Brand new design

Be suitable for use :
High speed belt driven mechanism
High speed carrier design
Automation linkage between station



Unique ball re-circulation design

The stainless steel ball re-circulation hole and channel construct of fully sealed by plastic frame and end cap. The structure uncomplicated but could substantially reduce contact surface between stainless steel ball and metal.
This design could achieve low noise running environment. The lubrication oil storage design embedded in circulation channel extend lubricate interval.

MR..EE series stainless steel reinforcement plates emerge high robustness

To adopt two stainless steel plates with fully covering design in order to completely wrap up plastic end cap of Block from end to end.

At the same time use stainless steel screw firmly lock on top and bottom of steel body, reinforce end cap rigidity use as support higher running speed.

Between the reinforcement plate and Rail is gap seal design, so the reinforcement plates also equip scraper function.

If choose preload design still more emerge higher speed, higher rigidity feature.

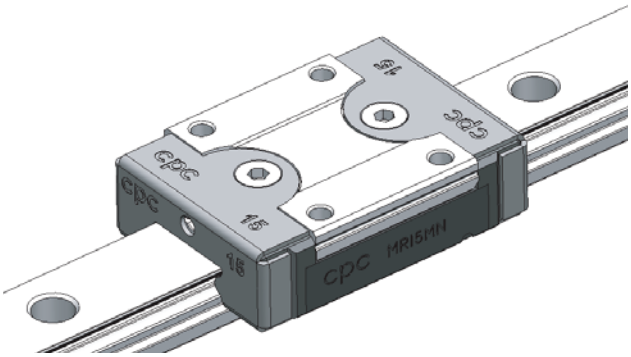
Be suitable for use :

High speed belt driven mechanism

Cold cathode rays process

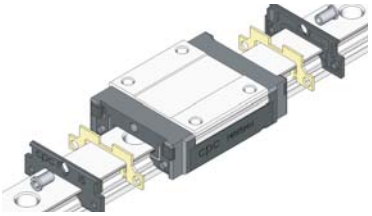
FPD glass cut process

High powder, dust and particle working environment



Lubrication storage design

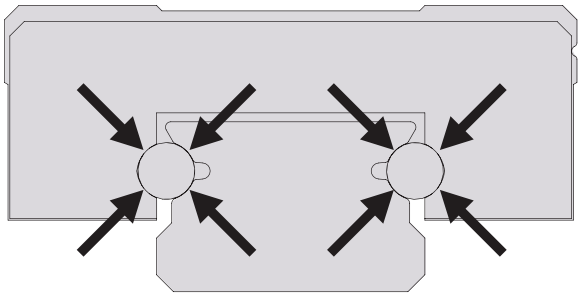
There are airtight types to lubricate the oil-injection hole to design in both ends of the Block, can take the lubricant to the running surface via steel ball circulation, get the result of lubricating. Option embedded lubricationl storage for use inside Block(12M/W, 15M/W), lubricated result guaranteeing to be operated for a long time, reduce the burden of maintaining, can represent extremely good lubricated ability even more when the short stroke is operated. Available for Block model code –ZZ, -EZ



1. Products Introduction

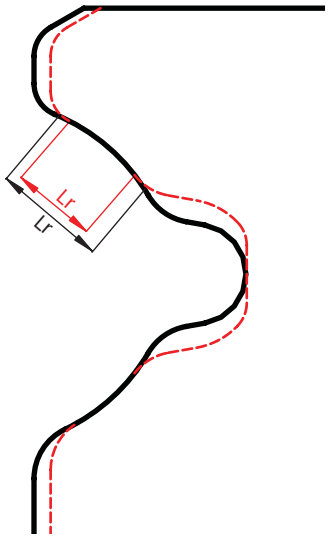
High load and high moment capacity

MR Miniature Linear Guide series incorporate the design of two rows of ball re-circulation, track has Gothic profile design with 45° contact angle to attain the effect of equal load capacity in all directions. Under the restriction of limited space, larger steel balls are used to enhance the load and torque capacity.



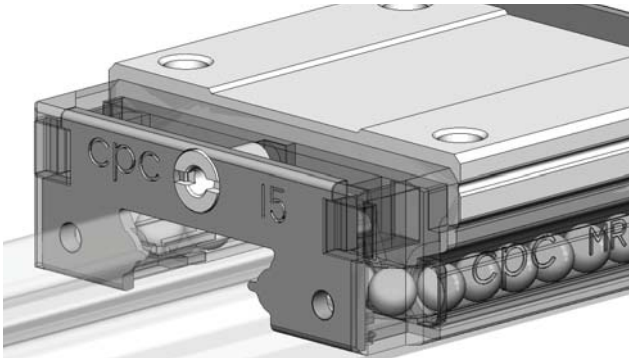
Gothic profile design with 45° contact angle to attain the effect of equal load capacity in all directions.

Under the width of the same Rail, **cpc** linear guide (black full line part) than the competitor products (red dotted line part) have larger area of contour outline.



Dust Proof Design

The end surface design allocated basically is sealed, can form effectively seal tight and dust proof, improve life of products, reduse lubricant loss, guarantee to lubricate the result for a long time.
Special sealed scraper designed, can give consideration to low friction obstruction, does not influence and operate smoothness.



2. Technical Information

2.1 Precision

Accuracy

MR Miniature Linear Guide series have three accuracy classes P, H, N for your choice.

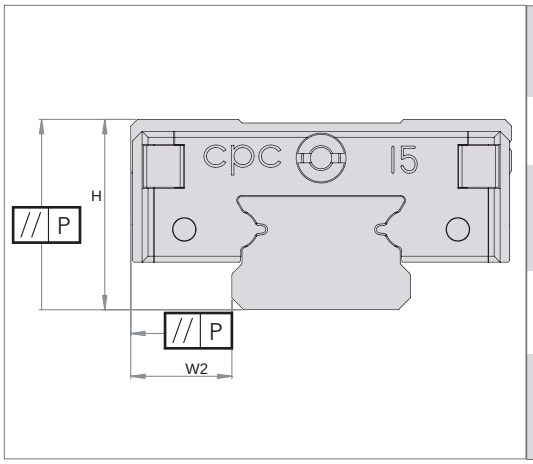


Table of accuracy

Accuracy classes (μm)		Precision P	High H	Normal N
Tolerance of dimension height H	H	±10	±20	±40
Variation of height for different runner Block on the same position of Rail	△H	7	15	25
Tolerance of dimension width W	W_2	±15	±25	±40
Variation of width for different runne Block on same position of Rail	$△W_2$	10	20	30

Speed

The maximum speed for the standard MR Miniature Linear Guide series is:

Vmax= +3 m/s

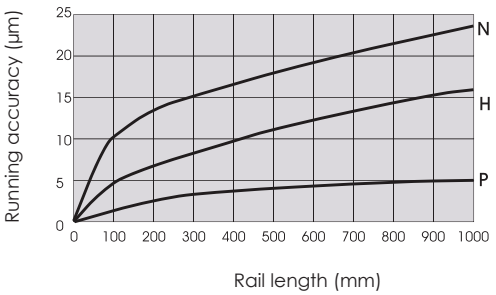
The maximum speed for the reinforcement MR..EE-V1. Miniature Linear Guide series can reach:

Vmax= 5 m/s

And the maximum acceleration:

αmax= 250 m/s²

Accuracy of the running parallelism



2. Technical Information

2.2 Preload

Preload Classes

The MR Miniature Linear Guide series have three classes of preload V0, Vs and V1 as described in the Table of Preload below. Preload can enhance stiffness, precision, and torque resistance, but will affect life and friction.

Table of 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 precision
Light preload	V1	0 – - 0.5	0 – -1	0 – - 3	0 – - 4	0 – - 5	0 – - 6	High rigidity Minimize vibration High precision Load balance

Operation 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.

2.3 Lubrication

Function

The loaded rolling elements and the raceway will be separated at the contact zone by an oil-film of microscopic thickness. The lubrication will therefore:

- Reduce friction
- Reduce wear
- Prevent corrosion
- Dissipate heat and increase service life

Lubrication Caution

- The MR Miniature Linear Guide must be lubricated use.
- The runner Block should be moved back and forth during the lubrication.
- Generally the lubricant is added onto Rail raceway.
- The lubricant can be injected into the lubrication holes on either end of the runner Block.
- A thin of lubricant should be maintained on the surface of the Rail raceway.
- Re-lubricate before contamination or discoloration of the lubricant occurs.
- Notify us in advance if use in acids and alkaline environment, or if the application will be utilized in a clean room.
- Consult our technical department if oil lubrication is used when the runner Block is 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 used we recommend synthetic oil based lithium-soap grease with a viscosity between ISO VG32-100.

Oil lubrication

We recommend the synthetic oil CLP or CGLP based on DIN 51517 or HLP based on DIN51524 and the viscosity ranges between ISO VG32-100 by the working temperature between0°C~+70°C are recommended (We recommend ISO VG 10 for use in lower temperature environment).

2.Technical Information

2.3 Lubrication

Re-lubrication

■ Re-lubrication shall be applied before the lubricant on the Block is contained or change the color.

■ The amount of the lubricant is the 1/2 of the first lubrication (see table 1).

■ Re-lubrication shall be applied under operation temperature and in the meantime the Block is moved back and forth.

■ If the stroke is smaller than twice or greater than 15 times of the steel body length of the Block; the re-lubrication interval shall be shorted.

Table 1

Model code	First lubrication (cm3)	Model code	First lubrication (cm3)
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 speed, the load, the stroke length and the operating environment affect re-lubrication interval. A safe re-lubrication interval can only be obtained by practical observation.
Re-lubrication interval shall not exceed one year.
Lubrication can be applied through the injection hole on the both ends of the Block by using a special injector. The injector is offered by **cpc.**

Lubrication grease

00 for general application
01 for low friction low nose application
02 for clean room application
03 for clean room and vacuum application
04 for high speed application
05 for micro vibration application

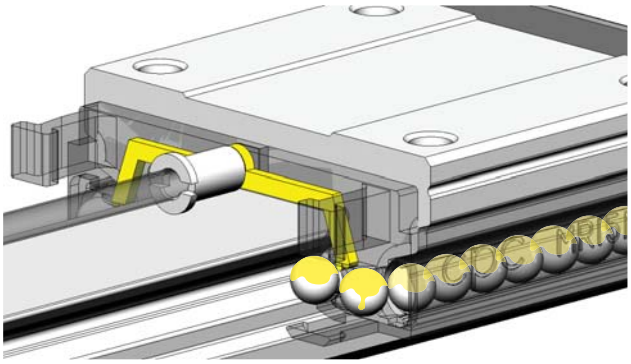
Lubrication oil

11 for general application ISO V32-68

Ordering of the lubrication injector

LUB — 01 — 18G

Lubricant :	Needle model :
00	21G : 5M/5W
01	20G : 7M
02	19G : 7W
03	18G : 9M/9W
04	18G : 12M/12W
05	15G : 15M/15W
11	



Lubricant amount : 10ml

2.Technical Information

2.4 Friction

Friction

The MR Miniature Linear Guide series have low friction characteristics, with a stable and consistent operation friction and slight starting friction.

Sealing Design

The MR Miniature Linear Guide series are sealed by endseal on both ends of the runner block. Optional side seals build an all-around closed sealing system.

Friction

$F_{rn} = \mu \cdot F$ ——(1)

F Load (N)

Frn Friction (N)

MR Miniature linear Guide series friction factor is μ=0.002-0.003 approximately

Friction with End Seal under lubrication

MR size	Friction with End Seal (Nmax) (under lubrication)	
	M	W
3	0.08	0.2
5	0.08	0.2
7	0.1	0.4
9	0.1	0.8
12	0.4	1.0
15	1.0	1.0

Source of friction

- Resistance of the sealing system.
- Resistance of the collision between the balls during operation.
- Resistance from the collision between the balls and the return path.
- Rolling resistance of the balls in the Gothic arch load zone.
- Resistance from the churning of the lubricant in the runner Block.
- Resistance from the penetrated contaminant.

2.5 Load capacity and rating life

Static load rating C_0

The static load along the acting direction; under this loading, the maximum calculated stress at the center of the highest loaded contact position between the rolling elements and the raceway by a curvature radius ≦ 0.52 is 4200MPa and by a curvature radius≧0.6 is 4600MPa.

Note：at this contact point under such stress，a permanent total deformation is generated corresponding to about 0.0001times of the rolling element diameter.（The above is according to DIN636 Part 2）.

Static load safty factor calculation

$$S_0 = C_0 / P_0 \quad \text{——(11)}$$

$$S_0 = M_0 / M \quad \text{——(12)}$$

$$P_0 = F_{max} \quad \text{——(13)}$$

$$M_0 = M_{max} \quad \text{——(14)}$$

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

Permissible static load

The applying static load of the MR Miniature Linear Guide is limited as follows:

- Static load of the linear guide.
- Permissible load of fixing screws.
- The permissible load of the related parts of the whole mechanism.
- The static load safety factor required for the application.

The equivalent static load and static moment are the largest load and moment, referred to formula (13) and (14).

Static load safety factor S_0

Under the static load safety factor, the linear guide system demonstrates a reliable operation and running accuracy as required in application. The static load safety factor S_0 is calculated by the formula (11) and (12).

S_0	static load safety factor	
C_0	basic static load in action direction	N
P_0	equivalent static load in action direction	N
M_0	basic static moment in action direction	Nm
M	equivalent static moment in action direction	Nm

2.Technical Information

Dynamic load rating C

When the dynamic loads are applied normal to the load zones with constant magnitude and direction ,the rating life of a linear guide can theoretically reach 100km of travel distance.(The above is according to DIN 636 Part 2).

Rating life calculation

$$C_{(50)} = 1.26 \cdot C_{(100)} \quad \text{——(2)}$$

$$C_{(100)} = 0.79 \cdot C_{(50)} \quad \text{——(3)}$$

$$L = \left(\frac{C}{P}\right)^3 \cdot 10^5 \quad \text{——(4)}$$

$$L_h = \frac{L}{2 \cdot s \cdot n \cdot 60} = \frac{L}{v_m} \cdot \left(\frac{C}{P}\right)^3 \quad \text{——(5)}$$

L	=	Rating life for travel distance 100,000 meter	(m)
L_h	=	Rating life in hour	(h)
C	=	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

An individual linear guide or a batch of identical linear guide under the same running conditions, using common materials with normal manufacturing quality and operating conditions can reach a 90% survival rate at the calculated life. (The above is according to DIN 636 Part 2)

When the standard of 50km travel distance is used, the dynamic load rating will exceed the value based on the standard DIN 636 by 20% or more. The relationship between two load ratings is based on formulas (2).

Calculation of rating life

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

Equivalent dynamic load and speed

If the load and speed are not constant, each actual load and speed must be taken into account and both will influence the life.

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 using formula (7).

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

Equivalent load capacities and speed calculation

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

$$\overline{v} = \frac{q_1 \cdot v_1 + q_2 \cdot v_2 + \cdots + q_n \cdot v_n}{100} \quad \text{——(7)}$$

$$P = \sqrt[3]{\frac{q_1 \cdot v_1 \cdot F_1^{\,3} + q_2 \cdot v_2 \cdot F_2^{\,3} + \cdots + q_n \cdot v_n \cdot F_n^{\,3}}{100}} \quad \text{——(8)}$$

$$P = |F_X| + |F_Y| \quad \text{——(9)}$$

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

P	=	Equivalent dynamic load	(N)
q	=	Percentage of stroke	(%)
F_1	=	Discrete load steps	(N)
$\overline{v}$	=	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 dynamic load

If the linear guide takes on load from an arbitrary angle, its equivalent dynamic load rating is calculated using formula (9).

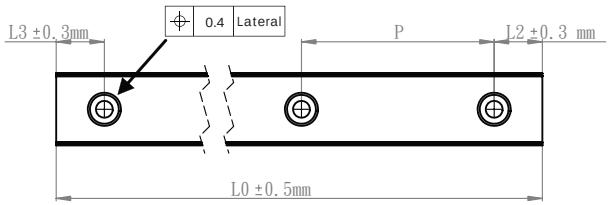
Combined load in combination with a moment

If both load and moment act on the linear guide, the equivalent dynamic load can be calculated by the formula (10).

According to DIN 636 Part 1, the equivalent load(P) shall not exceed 1/2C.

3.Order Information

3.1 Length of Rail



Model Code

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

- J: Customization code
- II: Number of Rail on the same moving axis
- -15: Starting hole pitch (mm)
- -15: End hole pitch (mm)
- -310: Rail length (mm)
- P: Accuracy classes: 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: Seals type SS：With End Seal; EE：With End Seal plus Reinforcement Plate(available for size12、15); ZZ : With End Seal plus Lubrication Storage; EZ : With End Seal plus Lubrication Storage plus Reinforcement Plate (available for size12、15)
- N: Block type : L : Long N : Standard
- M: Rail type : M : Standard W : Wide
- 15: Rail dimension : The width of Rail ex. : 3、5、7、9、12、15
- U: Special Rail U : Upward Screwing Rail No Mark : Standard Rail
- MR: Product type MR : Miniature Linear Guide; MRU : Miniature Upward Screwing Linear Guide; ST : Miniature Stroke Slide

Standard type

size	3M	5M	7M	9M	12M	15M
Standard length of one Rail (mm)	30	40	40	55	70	70
	40	55	55	75	95	110
	50	70	70	95	120	150
		85	85	115	145	190
		100	100	135	170	230
			130	155	195	270
				175	220	310
				195	245	350
				275	270	390
				375	320	430
					370	470
					470	550
					570	670
						870
Pitch (mm)	10	15	15	20	25	40
L2, L3min	3	3	3	4	4	4
L2, L3max	5	10	10	15	20	35
Lmax	300	1000	1000	1000	1000	1000

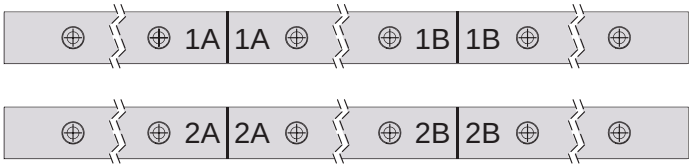
Wide type

size	3W	5W	7W	9W	12W	15W
Standard length of one Rail (mm)	40	50	50	50	70	110
	55	70	80	80	110	150
	70	90	110	110	150	190
		110	140	140	190	230
		130	170	170	230	270
		150	200	200	270	310
		170	260	260	310	430
			290	290	390	550
				320	470	670
					550	790
Pitch (mm)	15	20	30	30	40	40
L2, L3min	3	4	3	4	4	4
L2, L3max	10	15	25	25	35	35
Lmax	1000	1000	1000	1000	1000	1000

Customization Requirement

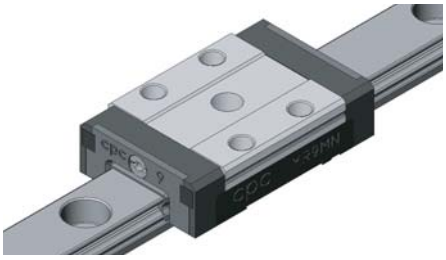
The meaning of suffix characters :

J	Butt-jointing track Rail	R	Special process for Rail
G	Customer designate lubricant	B	Special process for Block
I	Inspection report		
C3	Cap M3		
C4	Cap M4		



J : Butt-jointing track Rail

When the length of necessary Rail exceeds the range, can make in way of connection . The Rail indication for Butt-jointing is marked, show as chart:



B : Special process for Block

If have any special process requirement, please contact technical department.

I : Inspection report

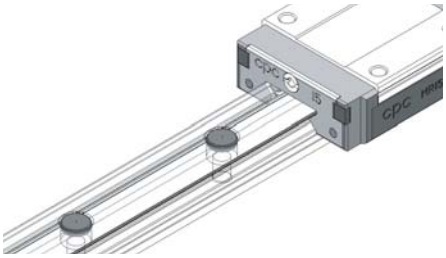
If require, please contact technical department.

G : Customer designate lubricant

according to application environment.

GN : No lubricant

GC : low dust generation, suit for clean room use.



C3 CapM3: apply to MR9M、MR12M、MR15M、MR7W & MR9W Rail

C4 CapM4: apply to MR12W、MR15W Rail

R: Special process for Rail

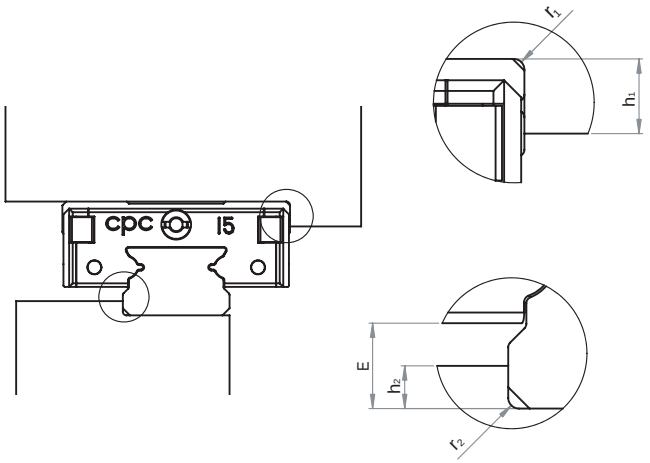
If have any special process requirement, please contact technical department.

If vacuum , acid , alkaline application environment, please contact technical department.

4.Installation Illustration

Height and chamfered the reference surface

To avoid any interference, the corner of the reference surface with chamfered is recommended. If not so, please refer to the following table for the height of the reference surface corner and the height of the reference surface.



Height and chamfered the reference surface

Dimension	h_1	r_1 max	h_2	r_2 max	E
3M	0.5	0.2	1.5	0.3	0.7
5M	1.2	0.2	1.9	0.3	1.5
7M	1.2	0.3	2.8	0.3	1.5
9M	1.5	0.3	3	0.3	2.2
12M	2.5	0.5	4	0.5	3
15M	2.5	0.5	4.5	0.5	4

Dimension	h_1	r_1 max	h_2	r_2 max	E
3W	0.7	0.2	1.7	0.3	1
5W	1.2	0.2	2	0.3	1.5
7W	1.2	0.3	2.8	0.3	2
9W	1.5	0.3	3	0.3	4.2
12W	2.5	0.5	4	0.5	4
15W	2.5	0.5	4.5	0.5	4

The mounting surface

Surface roughness

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

Screw tightening moment (Nm)

Screw grade 12.9	Steel	Cast Iron	Non Iron metal
M2	0.6	0.4	0.3
M3	1.8	1.3	1
M4	4	2.5	2

Geometric and positional accuracy of the mounting surface

The inaccuracy of the mounting surfaces will affect the running accuracy and reduce the operating linear guide. If the inaccuracies of the mounting surfaces exceed the values calculated by formulas (15), (16), and (17), the lifetime will become shortened, as calculated by formulas (4) and (5).

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

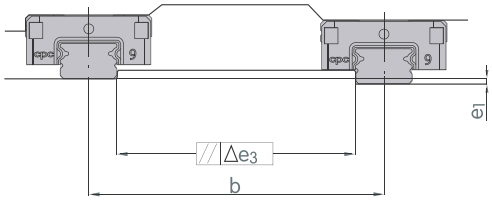
$e2(mm) = d(mm) \cdot f2 \cdot 10^{-5}$ —— (16)

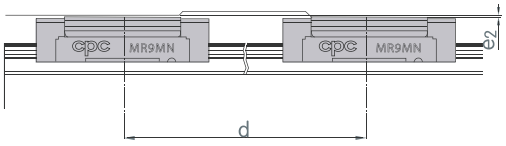
$e3(mm) = f3 \cdot 10-3$ —— (17)

Reference surface

Rail: Both sides of the track rail can be the reference surface without any special marking.

Block: There is a groove marking on one side of the steel body, which is not the reference surface.



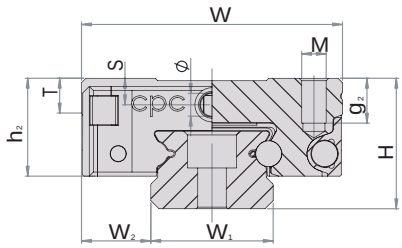


Dimension	V0			V1		
	f1	f2	f3	f1	f2	f3
3MN	4	9	2	3	9	1
5MN	4	8	2	2	8	2
7MN	5	11	4	3	10	3
9MN	5	11	6	4	10	4
12MN	6	13	8	4	12	6
15MN	7	11	12	5	10	8
3ML	4	5	2	3	5	1
5ML	3	5	2	2	5	1
7ML	4	6	4	3	6	3
9ML	5	7	5	3	7	4
12ML	5	8	8	3	7	5
15ML	7	8	11	4	8	7

Dimension	V0			V1		
	f1	f2	f3	f1	f2	f3
3WN	2	5	2	4	3	1
5WN	2	5	2	1	3	1
7WN	2	6	4	2	4	3
9WN	2	7	6	2	5	4
12WN	3	8	8	2	5	5
15WN	2	9	11	1	6	7
3WL	2	3	1	1	2	1
5WL	2	3	2	1	2	1
7WL	2	4	4	1	3	3
9WL	2	5	5	2	3	3
12WL	2	5	7	2	3	5
15WL	2	5	10	1	4	7

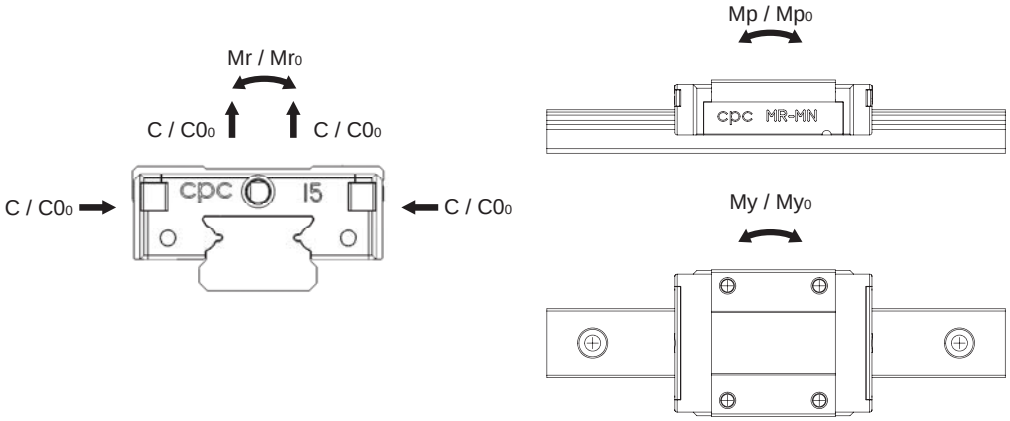
5.Dimensions and Specification

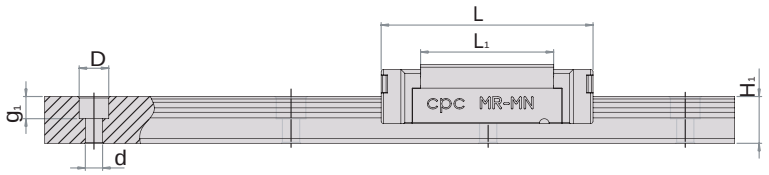
5.1 Standard MR-M series



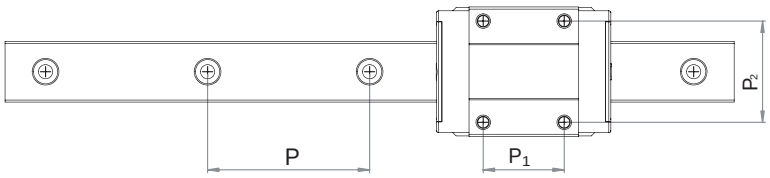
Model Code	Fabricate Dimension		Rail Dimensions (mm)				Block Dimensions (mm)					
	H	W_2	W_1	H_1	P	D×d×g_1	W	L	L_1	h_2	P_1	P_2
MR 15ML	16	8.5	15	9.5	40	6 x 3.5 x 4.5	32	60	44	12	25	25
MR 15ML EE	16	8.5	15	9.5	40	6 x 3.5 x 4.5	32	61.6	44	12.8	25	25
MR 15MN	16	8.5	15	9.5	40	6 x 3.5 x 4.5	32	43	27	12	20	25
MR 15MN EE	16	8.5	15	9.5	40	6 x 3.5 x 4.5	32	44.6	27	12.8	20	25
MR 12ML	13	7.5	12	7.5	25	6 x 3.5 x 3.5	27	47.6	34	10	20	20
MR 12ML EE	13	7.5	12	7.5	25	6 x 3.5 x 3.5	27	49	34	10.7	20	20
MR 12MN	13	7.5	12	7.5	25	6 x 3.5 x 3.5	27	35.4	22	10	15	20
MR 12MN EE	13	7.5	12	7.5	25	6 x 3.5 x 3.5	27	36.8	22	10.7	15	20
MR 9ML	10	5.5	9	5.5	20	6 x 3.5 x 3.5	20	40.9	30.8	7.8	16	15
MR 9MN	10	5.5	9	5.5	20	6 x 3.5 x 3.5	20	30.8	20.5	7.8	10	15
MR 7ML	8	5	7	4.7	15	4.2 x 2.4 x 2.3	17	31.2	21.8	6.5	13	12
MR 7MN	8	5	7	4.7	15	4.2 x 2.4 x 2.3	17	23.7	14.3	6.5	8	12
MR 5ML	6	3.5	5	3.5	15	3.5 x 2.4 x 1	12	19.6	13.5	4.5	7	–
MR 5MN	6	3.5	5	3.5	15	3.5 x 2.4 x 1	12	16.1	10	4.5	–	8
MRU 3ML	4	2.5	3	2.6	10	M1.6	8	15.7	11	3	5.5	–
MRU 3MN	4	2.5	3	2.6	10	M1.6	8	11.4	6.7	3	3.5	–

Load capacities are calculated according to DIN 636 Part 2





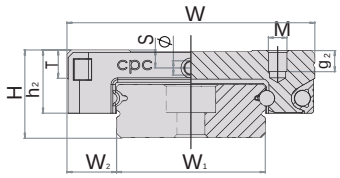
	Block Dimensions (mm)			Load Capacities (N)		Static Moment(Nm)			Weight		Model Code
M×g_2	Ø	S	T	C(dyn.)	C0(stat)	Mr0	Mp0	My0	Block(g)	Rail (g/m)	
M3 x 5.5	2.5	3.3	4.3	5350	9080	70	63.3	63.3	90	930	MR 15ML
M3 x 5.5	2.5	3.3	4.3	5350	9080	70	63.3	63.3	93	930	MR 15ML EE
M3 x 5.5	2.5	3.3	4.3	3810	5590	43.6	27	27	61	930	MR 15MN
M3 x 5.5	2.5	3.3	4.3	3810	5590	43.6	27	27	64	930	MR 15MN EE
M3 x 3.5	2	2.6	4.3	3240	5630	34.9	30.2	30.2	51	602	MR 12ML
M3 x 3.5	2	3.3	4.3	3240	5630	34.9	30.2	30.2	54	602	MR 12ML EE
M3 x 3.5	2	2.6	4.3	2308	3465	21.5	12.9	12.9	34	602	MR 12MN
M3 x 3.5	2	3.3	4.3	2308	3465	21.5	12.9	12.9	37	602	MR 12MN EE
M3 x 2.8	2	2.2	3.3	2135	3880	18.2	12.4	12.4	28	301	MR 9ML
M3 x 2.8	2	2.2	3.3	1570	2495	11.7	6.4	6.4	18	301	MR 9MN
M2 x 2.5	1.2	1.6	2.8	1310	2440	9	7.7	7.7	14	215	MR 7ML
M2 x 2.5	1.2	1.6	2.8	890	1400	5.2	3.3	3.3	8	215	MR 7MN
M2.6 x 2.0	0.8	1.1	2	470	900	2.4	2.1	2.1	4	116	MR 5ML
M2 x 1.5	0.8	1.1	2	335	550	1.7	1	1	3.5	116	MR 5MN
M2 x 1.1	0.3	0.7	1.5	295	575	0.9	1.1	1.1	1.2	53	MRU 3ML
M1.6 x 1.1	0.3	0.7	1.5	190	310	0.6	0.4	0.4	0.9	53	MRU 3MN



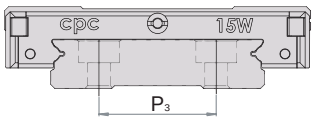
5.Dimensions and Specification

5.2 Wide MR-W series

MR3W-MR12W

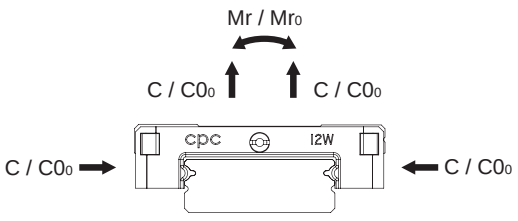


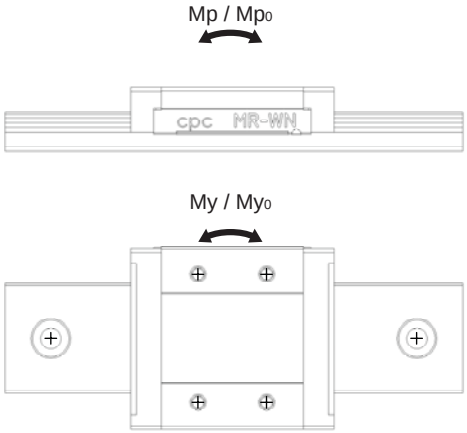
MR15W

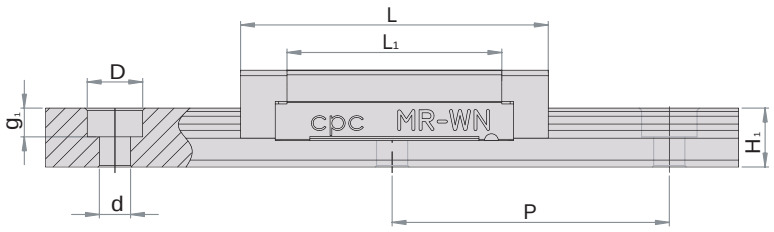


Model Code	Fabricate Dimension		Rail Dimensions (mm)					Block Dimensions (mm)					
	H	W_2	W_1	H_1	P	P_3	D×d×g_1	W	L	L_1	h_2	P_1	P_2
MR 15WL	16	9	42	9.5	40	23	8 x 4.5 x 4.5	60	74.4	57.6	12	35	45
MR 15WL EE	16	9	42	9.5	40	23	8 x 4.5 x 4.5	60	76	57.6	12.8	35	45
MR 15WN	16	9	42	9.5	40	23	8 x 4.5 x 4.5	60	55.3	38.5	12	20	45
MR 15WN EE	16	9	42	9.5	40	23	8 x 4.5 x 4.5	60	56.9	38.5	12.8	20	45
MR 12WL	14	8	24	8.5	40	–	8 x 4.5 x 4.5	40	59.4	46	10	28	28
MR 12WL EE	14	8	24	8.5	40	–	8 x 4.5 x 4.5	40	60.8	46	10.7	28	28
MR 12WN	14	8	24	8.5	40	–	8 x 4.5 x 4.5	40	44.5	31	10	15	28
MR 12WN EE	14	8	24	8.5	40	–	8 x 4.5 x 4.5	40	45.9	31	10.7	15	28
MR 9WL	12	6	18	7.5	30	–	6 x 3.5 x 4.5	30	50.7	39.5	8.6	24	23
MR 9WN	12	6	18	7.5	30	–	6 x 3.5 x 4.5	30	39	27.4	8.6	12	21
MR 7WL	9	5.5	14	5.2	30	–	6 x 3.5 x 3.5	25	40.6	30.1	7	19	19
MR 7WN	9	5.5	14	5.2	30	–	6 x 3.5 x 3.5	25	31.6	21.2	7	10	19
MR 5WL	6.5	3.5	10	4	20	–	5.5 x 3 x 1.6	17	27.2	21.2	5	11	13
MR 5WLC	6.5	3.5	10	4	20	–	5.5 x 3 x 1.6	17	27.2	21.2	5	11	13
MR 5WN	6.5	3.5	10	4	20	–	5.5 x 3 x 1.6	17	21.2	15.1	5	6.5	13
MR 5WNC	6.5	3.5	10	4	20	–	5.5 x 3 x 1.6	17	21.2	15.1	5	6.5	13
MR 3WL	4.5	3	6	2.6	15	–	4 x 2.4 x 1.5	12	20.1	15.1	3.5	8	–
MR 3WN	4.5	3	6	2.6	15	–	4 x 2.4 x 1.5	12	15.2	10	3.5	4.5	–

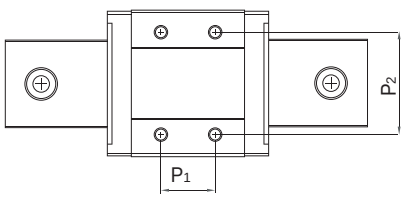
Load capacities are calculated according to DIN 636 Part 2

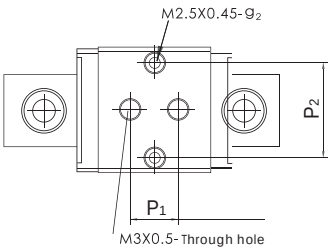






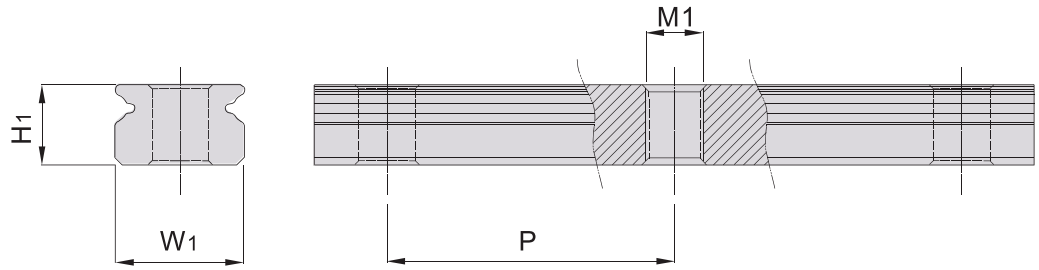
Block Dimensions (mm)				Load Capacities (N)		Static Moment(Nm)			Weight		Model Code
M×g2	Ø	S	T	C(dyn.)	C0(stat)	Mr0	Mp0	My0	**Block**(g)	**Rail** (g/m)	
M4 x 4.5	2.5	3.3	4.5	6725	12580	257.6	93.1	93.1	200	2818	MR 15WL
M4 x 4.5	2.5	3.3	4.5	6725	12580	257.6	93.1	93.1	203	2818	MR 15WL EE
M4 x 4.5	2.5	3.3	4.5	5065	8385	171.7	45.7	45.7	137	2818	MR 15WN
M4 x 4.5	2.5	3.3	4.5	5065	8385	171.7	45.7	45.7	140	2818	MR 15WN EE
M3 x 3.5	2	2.8	4.5	4070	7800	95.6	56.4	56.4	93	1472	MR 12WL
M3 x 3.5	2	3.1	4.5	4070	7800	95.6	56.4	56.4	96	1472	MR 12WL EE
M3 x 3.5	2	2.8	4.5	3065	5200	63.7	26.3	26.3	65	1472	MR 12WN
M3 x 3.5	2	3.1	4.5	3065	5200	63.7	26.3	26.3	68	1472	MR 12WN EE
M3 x 3	2	2.2	4	2550	4990	45.9	26.7	26.7	51	940	MR 9WL
M3 x 3	2	2.2	4	2030	3605	33.2	13.7	13.7	37	940	MR 9WN
M3 x 3	1.2	1.9	3.2	1570	3140	22.65	14.9	14.9	27	516	MR 7WL
M3 x 3	1.2	1.9	3.2	1180	2095	15	7.3	7.3	19	516	MR 7WN
M2.5 x 1.5	0.8	1.2	2.3	615	1315	6.8	4.1	4.1	8	280	MR 5WL
M3/M2.5 x 1.5	0.8	1.2	2.3	615	1315	6.8	4.1	4.1	8	280	MR 5WLC
M2.5 x 1.5	0.8	1.2	2.3	475	900	4.6	2.2	2.2	6	270	MR 5WN
M3/M2.5 x 1.5	0.8	1.2	2.3	475	900	4.6	2.2	2.2	6	270	MR 5WNC
M2 x 1.4	0.3	0.8	1.8	370	800	2.5	1.9	1.9	3.4	105	MR 3WL
M2 x 1.4	0.3	0.8	1.8	280	530	1.6	0.9	0.9	3.4	105	MR 3WN





MR5WNC MR5WLC

5.Dimensions and Specification



5.3 Upward Screwing Standard MRU-M series

Dimensions and Specification

Model Code	Rail Dimensions(mm)			
	H1	W	P	M1
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	4	3	10	M1.6 x0.35

5.4 Upward Screwing Wide MRU-W series

Dimensions and Specification

Model Code	Rail Dimension(mm)			
	H1	W1	P	M1
MRU 15W	9.5	42	40	M5x0.8
MRU 12W	8.5	24	40	M5x0.8
MRU 9W	7.5	18	30	M4x0.7
MRU 7W	5.2	14	30	M4x0.7
MRU 5W	4	10	20	M3x0.5

ST Miniature Stroke Slide series

1.Products Introduction

High load and high moment capacity

ST Miniature Stroke Slide series incorporate with the design of two rows of ball, the ball track has Gothic profile design with 45 degree contact angle to attain the effect of equal load capacity in all directions. The compact design with monoblock provide more space for the larger rolling elements, such enhance the load and moment capacity.

Double side pair block plate design

ST Miniature Stroke Slide series adopt pair block plate designing, both Rail and Block terminal surface sides all install block plates, can prevent linear guide from pass stroke situation effectively.

Temperature

ST Miniature Stroke Slide series can stand the temperature up to 150°C. There are two options for higher temperature application :

T1 : 200°C

T2 : 300°C

Treated with higher temperature will reduce the load capacity.

High running accuracy and smoothness

The steel balls of ST Miniature Stroke Slide series roll on the rail without re-circulation; such brings an excellent running behavior, smoothness, low fiction, and high accuracy, without vibration.

Easy mounting

The mounting of the ST Miniature Stroke Slideseries in all length can be fulfilled by fitting the fixing screw downward into the count bore of the rail by intersecting the bole pattern on the block and cage within a hole pitch movement of side. The one piece cage therefore does not influent the mounting of the rail.
The preload is preset by ball sorting.

Anti-corrosion feature

ST Miniature Stroke Slide series material use the quenched hardened process stainless steel for the Rail, Block and Steel Balls. The block plate and screw is made by stainless steel also. Easy for maintenance and check.

2. Technical Information

Accuracy

The ST Miniature Stroke Slide series have 3 options for accuracy. These are Precision (P), High (H) and Normal (N).

Preload classes

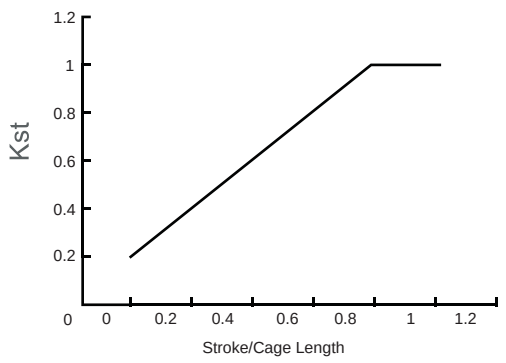
The ST Miniature Stroke Slide series have three classes of preload V0 , Vs and V1 as described in the MR Miniature Linear Guide series Table of Preload.

Rating life calculation

$$L = K_{st} \left(\frac{C}{P}\right)^3 \cdot 10^5 \qquad \text{——(19)}$$

$$L_h = \frac{L}{2 \cdot s \cdot n \cdot 60} = K_{st} \frac{L}{v_m} \cdot \left(\frac{C}{P}\right)^3 \qquad \text{——(20)}$$

Short stroke factor diagram



According to DIN636-3 short stroke factor

Lubrication

The lubrication of ST Miniature Stroke Slide series can be fulfilled by adding the lubricant onto the raceway of the rail.

Rating life L

The Rating life of ST Miniature Stroke Slide series can be calculated by the formulas (19),(20) in accordance with DIN 636 Part 3.

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 surfaces exceed the values calculated by formulas (15), (21), and (17), the life time will become shortened, as calculated by formulas (19) and (20).

$$e_{1(mm)} = b_{(mm)} \cdot f_1 \cdot 10^{-4} \quad \text{——(15)}$$

$$e_{2(mm)} = \left(\frac{d}{Lc}\frac{(mm)}{(mm)}\right) \cdot f_2 \cdot 10^{-5} \quad \text{——(21)}$$

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

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

Ordering Designation

ST 7 M V0 P 7 / 33 x 33 To

- ST: Stroke type
- 7: Size
- M: Standard; W: Wide
- V0: Clearance; Vs: Standard; V1: Light preload
- P: N: Normal; H: High; P: Precision
- 7: Max stroke (mm)
- 33: Block length (mm)
- 33: Rail length (mm)
- To: Max temperature °C; T0:150; T1:200; T2:300

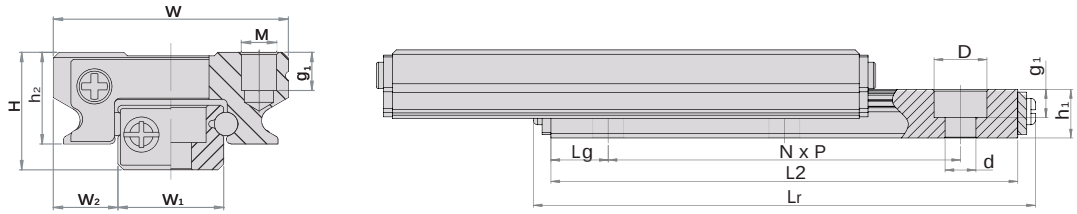
Height and chamfered the reference surface

The tables for the chamfered the reference surface corner and the height of reference surface shown on MR Miniature Linear Guide series are also suitable for the ST Miniature Stroke Slide series.

3.Order Information

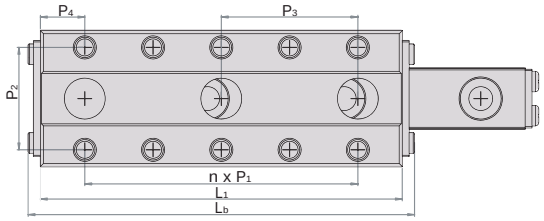
An example of the ST Miniature Stroke Slide series parts numbering system is shown in the above ordering designation.

4.Dimensions and Specification



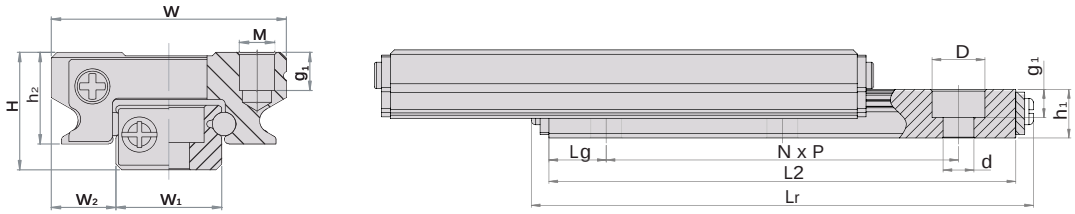
Model Code	Fabricate Dimensions (mm)		Rail Dimensions(mm)			
	H	W_2	P	W_1	h_1	D x d x g_1
ST 7 M	8	5	15	7	4.7	4.2x2.4x2.3
ST 9 M	10	5.5	20	9	5.5	6x3.5x3.3

Model Code	Maximum Stroke	Rail				Block				Load Capacities		Static Moment		
	Ls	L2	Lr	Lg	N	L1	Lb	P_4	n	C(dyn.)	Co (stat.)	Mro	Mpo	Myo
	mm	mm	mm	mm		mm	mm	mm		N	N	Nm	Nm	Nm
ST7M	7	29	33	7	1	29	33	6.5	2	1450	2775	10.4	11	11
	19	29	33	7	1	29	33	6.5	2	1185	2080	7.8	6.4	6.4
	7	42	46	6	2	42	46	5	4	1920	4160	15.5	24.1	24.1
	20	42	46	6	2	42	46	5	4	1690	3470	13	17	17
	33	42	46	6	2	42	46	5	4	1450	2775	10.4	11	11
	14	58	62	6.5	3	58	62	5	6	2350	5550	20.7	42.2	42.2
	27	58	62	6.5	3	58	62	5	6	2140	4860	18.1	32.5	32.5
	39	58	62	6.5	3	58	62	5	6	1920	4160	15.5	24.1	24.1
	52	58	62	6.5	3	58	62	5	6	1690	3470	13	17	17



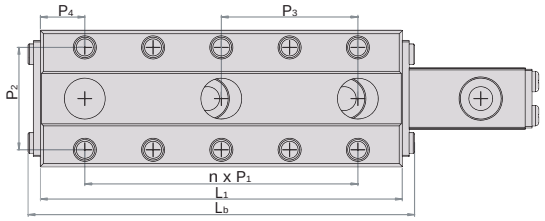
Block Dimensions(mm)							Model Code
P_1	W	P_2	P_3	h2	M	g_2	
8	17	12	16	4.7	M2x0.4	2.5	ST7M
10	20	15	26	5.5	M3x0.5	2.8	ST9M

Model Code	Maximum Stroke	Rail				Block				Load Capacities		Static Moment		
	Ls	L2	Lr	Lg	N	L1	Lb	P4	n	C(dyn.)	C0(stat.)	Mr0	Mp0	My0
	mm	mm	mm	mm		mm	mm	mm						
ST9M	12	34	38	7	1	34	38.6	7	2	2140	3845	18.3	14.7	14.7
	24	34	38	7	1	34	38.6	7	2	1810	3020	14.4	9.1	9.1
	36	34	38	7	1	34	38.6	7	2	1450	2200	10.5	4.8	4.8
	14	73	77	6.5	3	73	77.6	6.5	6	3900	9060	43.1	68.2	68.2
	26	73	77	6.5	3	73	77.6	6.5	6	3650	8230	39.2	58.9	58.9
	38	73	77	6.5	3	73	77.6	6.5	6	3390	7410	35.2	49.8	49.8
	50	73	77	6.5	3	73	77.6	6.5	6	3120	6590	31.3	41.1	41.1
	62	73	77	6.5	3	73	77.6	6.5	6	2840	5765	27.4	32.5	32.5
	24	114	118	7	5	114	118.6	7	10	5285	14000	66.5	125.2	125.2
	36	114	118	7	5	114	118.6	7	10	5070	13170	62.6	115.4	115.4
	48	114	118	7	5	114	118.6	7	10	4840	12350	58.7	105.9	105.9
	60	114	118	7	5	114	118.6	7	10	4620	11530	54.8	96.4	96.4
	72	114	118	7	5	114	118.6	7	10	4380	10700	50.9	86.8	86.8
	84	114	118	7	5	114	118.6	7	10	4140	9880	47	77.4	77.4
	96	114	118	7	5	114	118.6	7	10	3900	9060	43.1	68.2	68.2
	108	114	118	7	5	114	118.6	7	10	3650	8230	39.2	58.9	58.9



Model Code	Fabricate Dimensions (mm)		Rail Dimensions(mm)			
	H	W_2	P	W_1	h_1	D x d x g_1
ST 12	13	7.5	25	12	7.5	6 x 3.5 x 4.5

Model Code	Maximum Stroke	Rail				Block				Load Capacities		Static Moment		
	Ls	L_2	Lr	Lg	N	L_1	L_b	P_4	n	C(dyn.)	Co(stat.)	Mro	Mpo	Myo
	mm	mm	mm	mm		mm	mm	mm		N	N	Nm	Nm	Nm
ST12M	12	46	51	10.5	1	46	51	8	2	3750	6880	43	42.7	42.7
	27	46	51	10.5	1	46	51	8	2	3245	5590	35	29	29
	42	46	51	10.5	1	46	51	8	2	2700	4300	26.9	17.7	17.7
	27	91	96	8	3	91	96	8	5	5960	13330	83.3	126.4	126.4
	42	91	96	8	3	91	96	8	5	5550	12040	75.3	108.5	108.5
	57	91	96	8	3	91	96	8	5	5130	10750	67.2	91.3	91.3
	72	91	96	8	3	91	96	8	5	4690	9460	59.2	74.3	74.3
	87	91	96	8	3	91	96	8	5	4230	8170	51.1	58	58
	102	91	96	8	3	91	96	8	5	3750	6880	43	42.7	42.7



Block Dimensions(mm)							Model Code
P_1	W	P_2	P_3	h2	M	g_2	
15	27	20	30	7.5	M3x0.5	3.5	ST12M

Model Code	Maximum Stroke	Rail				Block				Load Capacities		Static Moment		
	Ls	L_2	Lr	Lg	N	L_1	L_b	P_4	n	C(dyn.)	Co(stat.)	Mro	Mpo	Myo
	mm	mm	mm	mm		mm	mm	mm		N	N	Nm	Nm	Nm
ST12M	27	166	171	8	6	166	171	8	10	9560	26230	164	314.8	314.8
	42	166	171	8	6	166	171	8	10	9240	24940	155.9	294.3	294.3
	57	166	171	8	6	166	171	8	10	8900	23650	147.8	276.3	276.3
	72	166	171	8	6	166	171	8	10	8560	22360	139.8	256	256
	87	166	171	8	6	166	171	8	10	8210	21070	131.7	237.3	237.3
	102	166	171	8	6	166	171	8	10	7855	19780	123.6	219	219
	117	166	171	8	6	166	171	8	10	7490	18490	115.6	200.9	200.9
	132	166	171	8	6	166	171	8	10	7120	17200	107.5	182.3	182.3
	147	166	171	8	6	166	171	8	10	6745	15910	99.5	163	163
	162	166	171	8	6	166	171	8	10	6355	14620	91.4	144.2	144.2

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