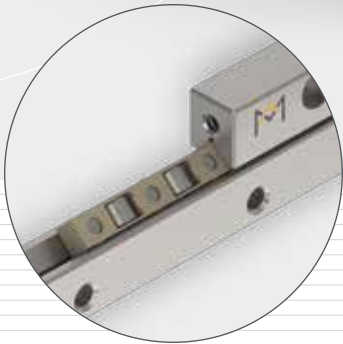


OVER  
**50**  
YEARS  
*of SUCCESS*



## **MINIATURE SLIDE TYPE PMMR**



## Company's headquarters in Dedemsvaart, Netherlands



Innovative design and manufacture of precision linear bearings, frictionless slides, positioning stages and engineered-to-spec motion systems.





# INTRODUCTION

*PM has engineered and manufactured innovative and top quality precision linear bearings and slides at our research and production facilities in the Netherlands since 1966. We are experts in finding solutions that meet the specific requirements of a wide variety of industry applications. A trusted partner for hundreds of industry heavyweights around the globe, our client base ranges from the semiconductor industry, medical technology and metrology sectors, to industrial automation, space and defence industries.*

## COMPANY

The key to the exceptional quality of PM products lies in our highly specialised manufacturing machinery and facilities. Specifically, the PM production facility is temperature controlled and built to suppress and minimise distortions caused by vibration. Our precision rails are produced with remodeled, non-standard machinery. The resulting high quality of our products makes PM an attractive supplier for various high-tech industries including semiconductor, optical and life sciences.

## NEW PRODUCTS

We constantly deploy the latest technologies to create new products or functionally enhance existing products in our range. Clients typically choose to work with PM for our proven ability to meet a complex set of requirements, mostly including maximum performance of parts in the most compact of spaces. We are always working to further refine the performance of PM products, in order to ensure that we consistently meet the requirements of clients in high-tech industries. The following new PM products are the result of our relentless drive to be operating at the cutting edge of the latest technologies:

- **Linear bearing type RNG:** is a compact design with high load capacity. Available with optional Anti Cage Creep solution (ACC). Perfectly integrates robustness and compactness.
- **Micro roller slide type PMMR:** featuring crossed-rollers. Designed for best performance in micro-sized applications.
- **Flat Mounted Bearing type FMB:** is an extremely flat, low-friction and easy to install table bearing.

## CUSTOMISED PARTS

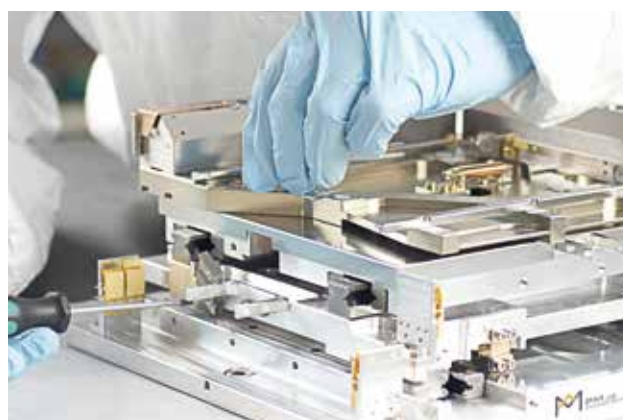
In addition to offering high-quality standardised products, we design and manufacture engineered linear bearings and positioning systems meeting our clients' application-specific requirements.

PM combines the latest knowledge from its in-house R&D department, developments in manufacturing technology

more widely as well as performance insights generated by industry deployment of precision applications.

Over the past 50 years PM has expanded its reach to serve a global client base. Our experienced, multilingual engineering and sales teams stand ready to work with you in realising your demanding projects.

Technical data in this catalogue is based on standard quality grade Q8 (no suffix). For higher quality grades please contact our product experts to discuss your requirements.



## DISCLAIMER

*This catalogue is the result of a full revision of its previous edition. It reflects the latest progress in linear bearings technology as well as insights gathered from industry application. Any information from previous editions that does not correspond to the data in this current edition, is therefore invalid. Due to the continuous development of our product range, we reserve the right to make modifications without prior notice.*

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## PRODUCT OVERVIEW

PM slides are ready-to-install single axis components with capacity for limited linear movement. These crossed roller slides use PM linear bearings type RSD come factory-preloaded, thus assuring consistently high running accuracies, extremely low uniform friction coefficients and long operating lifetimes. With a variety of models and a wide range of sizes available, the designer is given maximum flexibility to find an appropriate solution for all sorts of applications requiring linear movement.

Each type comes with attachment holes drilled to standard configuration to facilitate quick and easy assembly into your application. Thanks to their excellent running characteristics together with their proven solid reliability, these slides are today's standard for applications in the general machine industry's factory automation, including in high precision equipment. Custom designs can be supplied according to your specifications.



### 1. CROSSED ROLLER SLIDES TYPE RT

- Stroke lengths of 10 to 950 mm
- For highest accuracy performance
- Normal to high load capacity
- Steel and cast-iron slide bodies
- Available in 6 standard sizes



### 2. CROSSED ROLLER SLIDES TYPE RTA

- Stroke lengths of 10 to 950 mm
- Extremely low uniform friction coefficient
- Normal to high load capacity
- Aluminium slide bodies
- Available in 6 standard sizes



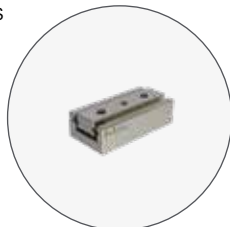
### 3. DUST-PROTECTED SLIDES TYPE RTNG

- Stroke lengths of 10 to 250 mm
- Protection against dust and dirt
- For highest accuracy performances
- Steel and cast-iron slide bodies
- High rigidity



### 4. LOW PROFILE SLIDE TYPE RTS

- Stroke lengths of 12 to 130 mm
- For highest accuracy performance
- Low overall height with high stiffness
- Steel slide bodies
- Available in 3 standard sizes



### 5. MINIATURE BALL SLIDES TYPE PMM

- Stroke lengths of 5 to 70 mm
- Ultra-compact and lightweight design
- For rapid and precise movements
- Slide parts made of stainless steel
- Available in standard 3 sizes



### 6. MINIATURE CROSSED ROLLER SLIDES TYPE PMMR

- Stroke lengths of 5 to 70 mm
- All parts made of stainless steel
- For highest stiffness and accuracy requirements in the smallest of application spaces
- $V_{max}=2$  m/s,  $a_{max}=200$  m/s<sup>2</sup> (20g)
- $C_{dyn}$  up to 1020 N



## TECHNICAL DATA

### ASSEMBLY

For each type the mounting holes are drilled to standard configuration in the slide top and slide base facilitating quick and easy installation into the application. Threaded holes in the slide parts are according to ISO-standards. Please note that dimensions listed in this catalogue are in mm.

PM linear slides are precision devices; proper mounting is a prerequisite for their performance according to specifications. Slides must be mounted onto rigid, fine-machined (preferably fine-milled or grinded), flat surfaces and must be supported over their entire base length. Specifications as listed are only valid when these conditions are met.

The surface of the side opposite to the preload set screws is ground parallel to the slide axis and can therefore be used as a reference face for mounting the slide into the application.

### OPERATING TEMPERATURE

PM slides are capable of operating in a temperature range of -30 °C to +120 °C. For slides which contain plastic components (plastic cages), the operating temperature range is -30 °C to +80 °C.

### MAXIMUM VELOCITY AND ACCELERATION RTN / RTL, RTNG and RTS types crossed roller slides

Max. recommended speed  $v = 50$  m/min.

Max. acceleration  $a = 8$  m/sec<sup>2</sup>.

### PMM type ball miniature slides

Max. recommended speed  $v = 50$  m/min.

Max. acceleration  $a = 8$  m/sec<sup>2</sup>.

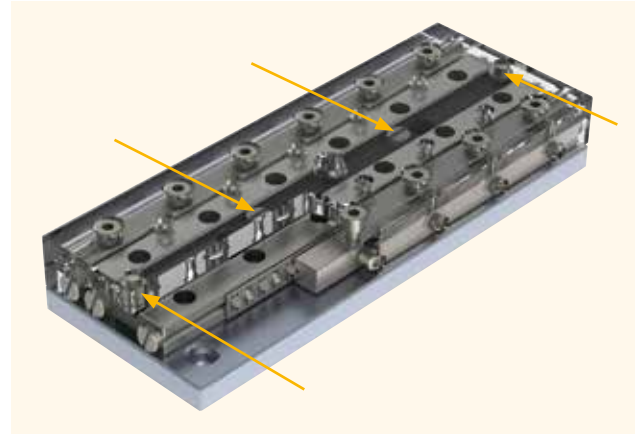
### PMMR type crossed roller miniature slides

Max. recommended speed  $v = 120$  m/min.

Max. acceleration  $a = 200$  m/sec<sup>2</sup> (20g).

### INTERNAL STROKE LIMIT SCREWS

Crossed-roller slides RTN/RTL and RTNA/RTLA have internal stroke limit screws in the center line of the slides. These screws are for emergency use only and may not be used as a regular stroke end stop, as this can cause permanent damage to the linear bearings.



*Example of location internal stroke limit screws*

### DELIVERED CONDITION

PM slides are ready-to-use. The slides are factory preloaded by the use of lateral set screws and free of play. The amount of preload is approximately 10% of the dynamic load capacity. The slides are delivered with a small quantity of oil for lubrication which also protects the rails in the slides against corrosion. The quality grade of the crossed roller linear bearings which are used in the linear slides is in standard accuracy grade Q8.

The slides are free from stick-slip. The coefficient of friction range for slides fitted with balls or cylindrical rollers is 0.0005 to 0.003. PM slides are manufactured according to the best manufacturing standards, offering high smoothness and precision of movement.

PMM and PMMR type of miniature slides are factory preloaded by means of geometry pairing.

### SERVICE

PM slides are factory-preloaded and don't need readjustment. Depending on the application requirements the linear bearings need re-lubrication. There are no specific calculations to determine the lubrication intervals for linear bearings, thus it must be determined for each application. However, we recommend a small quantity of lubrication at least twice a year for oil and at least once a year for grease.

The lubrication can be applied to the linear bearings using the lateral gap between the rails. If this is not possible cause of the design of the machine we advise the use of special lubrication holes which can be added to the rails. If this is the case for you, please consult a PM advisor.



## STORAGE

PM slides are precision components and need to be handled with great care. Slides are delivered in a package, special developed for optimum protection against external vibrations and contamination. For transport and storage use the original package. Slides should be stored at constant room temperature and under clean and dry conditions. Remove the slides from their packaging just before use.

## LOADS AND MOMENTS

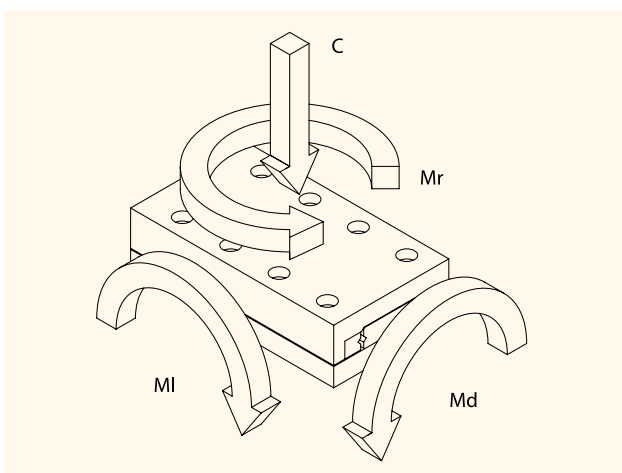
Slides listed in this catalogue are able to carry loads and moments in any direction. Load ratings are compliant with ISO and DIN standards for calculating roller bearings (ISO standard 281, for miniature slide type PMM DIN 636, part 3). To ensure high running accuracy and to prevent the occurrence of play, any vibration and overloading must be avoided.

Load capacity  $C$ , defined in ISO76-1987, is the maximum downward load or force located in the center of the upper part in horizontal zero-position.

$M_I$  = Pitch moment: when a load is cantilevered (not symmetrically mounted) off the end of a slide, parallel to the direction of travel.

$M_d$  = Roll moment: when a load is cantilevered off the side of a slide, perpendicular to the direction of travel.

$M_r$  = Yaw moment: when a force causes a rotation moment around the centre of an axis. Exceeding of the listed moment ratings may reduce the lifetime of the bearings and can degrade accuracy. Please feel free to contact one of our product specialists for information.



## VACUUM AND CLEANROOM COMPATIBLE

The majority of PM slides can be prepared for use in (ultra-high) vacuum or cleanroom environments. Special care has to be taken, for example when selecting low outgassing materials, special lubricants, surface finishings, vented stainless steel fasteners for use in blind tapped holes, special ball- or crossed roller cages as well as switches and wires. Slides are assembled in our modern cleanroom cells certified to ISO/FDIS 14644-1 class 6 with cleanspots class 5.



## CUSTOMISED LINEAR SLIDES

In a situation that a standard product does not suit your application we offer customised product service. For example in:

- Special geometry
- Non-standard materials
- Customized cages
- Vacuum and UHV-compatibility
- Low till non-magnetic linear bearings
- Improved raceway surfaces
- Higher load ratings
- Higher speeds / accelerations

With over 50 years' experience we are well equipped and capable to fulfil your orders meeting even the most demanding requirements

Please consult your PM advisor for more information.



*Customised miniature slide PMM 2*




*Higher speeds, excellent rigidity and durability as well as limited enclosure, these are the challenges of today's industry. With the PMMR we have achieved superior dynamics and precision in the smallest package possible. PMMR is the world's first miniature slide equipped with crossed roller technology.*

## MATERIALS

Slide parts and rollers: stainless steel 1.4034, hardness 54 - 57 HRC. Roller cage made of stainless steel.

## FEATURES AND SPECIFICATION

- Available in 3 sizes
- All parts are made of stainless steel
- Can be mounted in horizontal and vertical position. Purposely designed single piece U-shaped cage prevents creeping of the cage and is limited by in motion hard stops
- Slide top and slide base have equal lengths
- All mounting surfaces are finished by precision grinding
- All slide flanks are ground parallel to the rails and can serve as reference face
- Slide top and slide base have tapped attachment holes
- Maximum speed 2 m/s
- Maximum acceleration 200 m/s<sup>2</sup>
- For running accuracies please refer to page 142

## OPTIONAL FEATURES

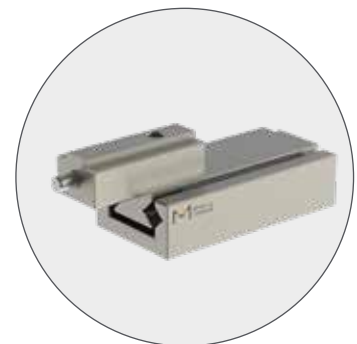
- Slides can be supplied with a height tolerance of  $\pm 0.01$  mm
- Defined sliding force
- UHV-compatible version incl. lubricants
- Full stainless steel version
- Special versions
- Higher speeds / accelerations

## ORDER NOTES

When ordering, please specify the following:

- Model no. and quantity needed

**Example:** 1 piece slide type PMMR 1-15



Example of customised PMMR slide

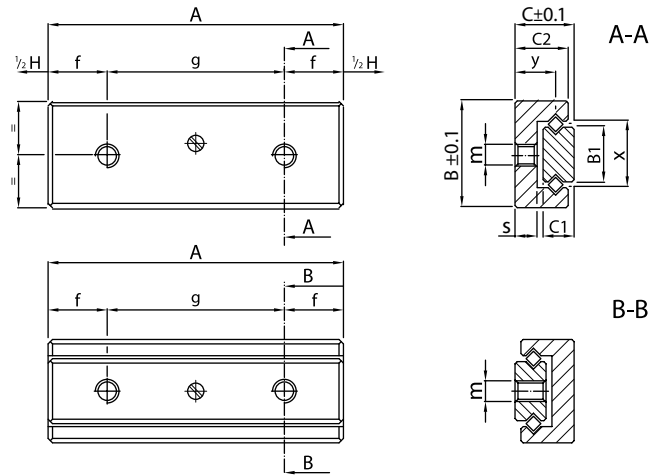


Fig. 1

Type	Main dimensions			Stroke H						
	A	B	C		B1	C1	C2	f	g	h
<b>PMMR 05-10</b>	10			5				2.5	1x5	
<b>PMMR 05-15</b>	15	7	4	10	3.6	2.1	3.85	3.5	1x8	-
<b>PMMR 05-20</b>	20			15				4	1x12	
PMMR 05-25	25			20				4.5	1x16	
<b>PMMR 1-15</b>	15			10				3.5	1x8	
<b>PMMR 1-20</b>	20			15				4	1x12	
<b>PMMR 1-30</b>	30	10	6	25	5	3	5.5	5	1x20	4
PMMR 1-40	40			35				6	1x28	
PMMR 1-50	50			45				7	1x36	
PMMR 2-30	30			20				5	1x20	
PMMR 2-40	40			30				6	1x28	
PMMR 2-50	50	15	8	40	8	4.5	7.5	7	1x36	7
PMMR 2-60	60			50				7.5	3x15	
PMMR 2-70	70			60				8	3x18	
PMMR 2-80	80			70				10	3x20	

**Bold** = Short lead time item

Regular = Long lead time item - please ask us about prices and lead times



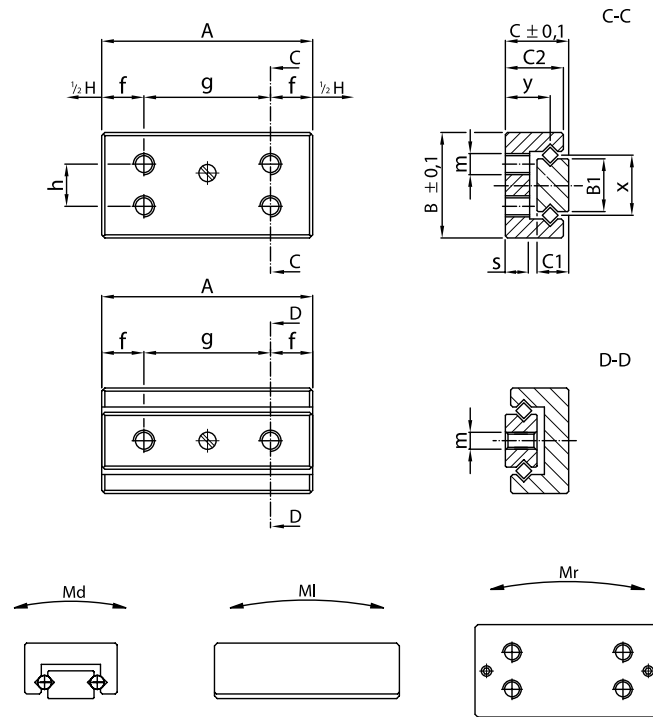


Fig. 2

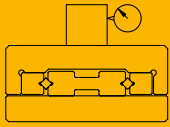
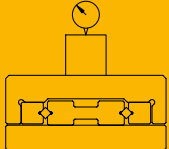
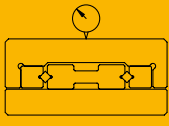
m	s	x	y						
				C in N	Weight (g)	Md in Ncm	MI in Ncm	Mr in Ncm	Fig.
M1.6	1.3	4.4	2.75	156	3	12	65	9	1
				195	4	16	98	12	1
				234	5	20	131	15	1
				273	6	24	163	18	1
M2	1.95	5.7	4.25	258	6	67	216	67	2
				322	8	83	288	85	2
				451	13	117	433	125	2
				580	18	150	577	165	2
				709	22	184	722	200	2
M2.5	2.65	8.8	5.5	510	30	217	620	180	2
				612	38	260	775	210	2
				714	47	303	930	240	2
				816	56	347	1085	270	2
				918	66	390	1240	295	2
				1020	75	433	1395	325	2

Units: mm

## RUNNING ACCURACIES AND TOLERANCES

The table below shows the accuracies for different types of PM slides. Accuracies are checked with the slides being in unloaded horizontal position. Values displayed below are also applicable to 2-axis combinations. Where relevant, please refer to the appropriate stroke lengths.

In more complex cases, for instance involving a combination of axes, please contact us for expert support. On request we are able to deliver the precision slides provided with a certificate of compliance, on the basis of measurement by laser accuracy equipment. Special higher accuracy grade slides are available on request.

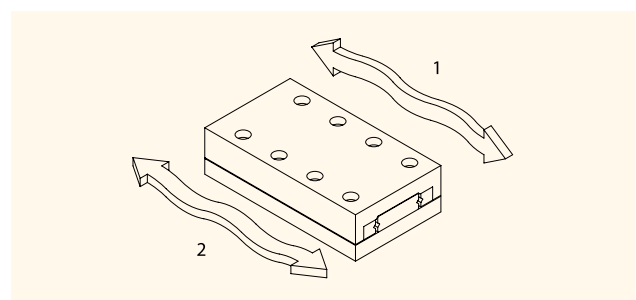
Type	A in mm	 Straight line accuracy in $\mu\text{m}$ over travel length on the side	 Flatness accuracy in $\mu\text{m}$ over travel length on the top	 Parallelism in $\mu\text{m}$ , neutral position on slide top
RT (RTN/RTL)	25-50	2	2	5
	55-95	3	2	6
	105-155	4	3	7
	160-305	4	3	8
	310-510	4	4	10
	510-710	5	4	13
	810-1010	5	5	15
RTA (RTNA/RTLA) Aluminum	25-50	2	2	5
	55-95	3	2	5
	105-155	4	3	8
	160-305	4	3	10
	310-510	4	4	15
	510-710	5	4	20
	810-1010	5	5	25
RTNG	52-91	2	2	5
	106-166	3	2	6
	171-314	3	3	7
	317-517	4	3	10
	524-817	4	4	13
	824-1028	5	5	15
RTS	25-45	3	3	2
	55-95	4	4	4
	105-155	5	5	5
PMM and PMMR	15-30	3	4	5
	35-50	4	4	6
	60-80	5	6	8

Tolerance on the height  $+0.03 \text{ mm} / -0.1 \text{ mm}$  | Optional: Slides can be supplied with a height tolerance of  $\pm 0.01 \text{ mm}$

**1. STRAIGHT LINE ACCURACY:** this is the amount of error deviance from the ideal straight line of travel in the vertical plane.

**2. FLATNESS ACCURACY:** this is the amount of error deviance from the ideal straight line of travel in the horizontal plane.

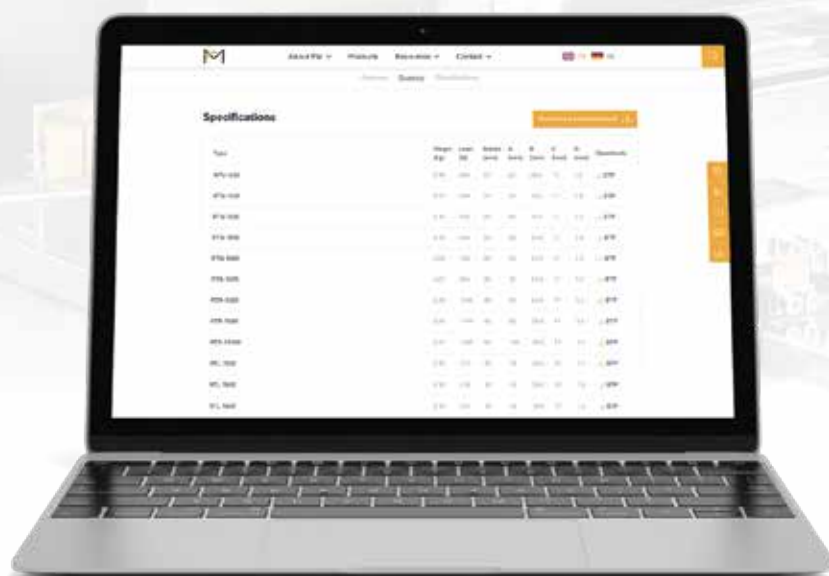
**PARALLISM IN  $\mu\text{m}$ , NEUTRAL POSITION ON SLIDE TOP:** the parallellism of the slide surfaces occurs unloaded on a flat, horizontal surface in zero-position.





## SAVE TIME!

Direct access to the 3D CAD models of our standard products



[www.PM.NL](http://www.PM.NL)

# PM RESEARCH AND PRODUCTION FACILITIES



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