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MG型滚柱直线导轨
MG Monoguide

recirculating linear rollers bearing

second generation 第二代



"Evolution is done"

经过改进的第二代产品



罗萨集团



Grinding machine mod. PLATINUM TH made from Rosa Ermando SpA
for MG monoguide slide ways finishing

MG型导轨的滑道是由罗萨集团Rosa Ermando SpA公司制造的
型号为PLATINUM TH磨床进行精加工的

COMPANY PROFILE

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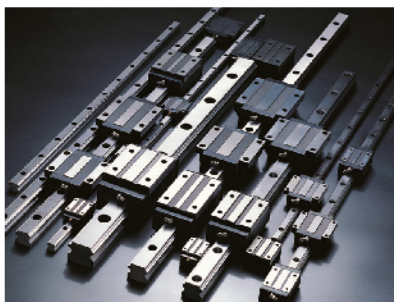
公司简介

Company Profile



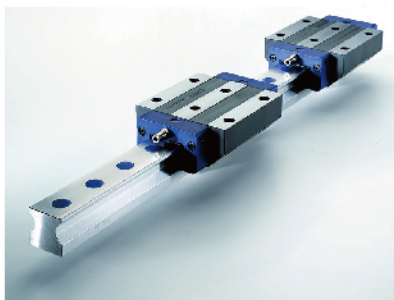
The importance assumed in recent years by the development of machinery and applications suitable to meet more and more advanced and demanding requirements has urged Rosa Sistemi S.p.A. to develop innovative solutions, thus encouraging the offer of more and more suitable products.

近年来，市场对更加先进和精密的机械设备和应用的需求日益旺盛，因此，Rosa Sistemi S.p.A.公司制定了很多创造性方案，来满足日益增长的市场需求。



The experience gained since 1979 as a manufacturer of precision linear slide guides had led our company to win a prominent place in the international survey of precision linear components' manufacturers, cooperating to the success of the most prestigious companies on the domestic and international market.

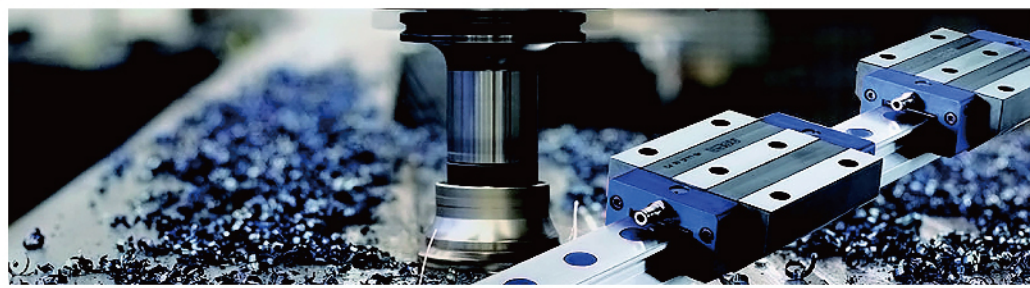
公司成立于1979年，多年来致力于生产精密直线导轨，是国际上举足轻重的精密直线部件制造商，与国内外许多知名公司都有合作关系。



Rosa Sistemi S.p.A. has set itself a challenge of constant improvement within a context of advanced technical solutions, also thanks to the continuous investments in research and development and to the modern production plant used.

公司坚持对先进技术方案进行不断改进，这也得益于我们对研发和现代化生产车间持续进行的重金投入。

公司简介 Company Profile



Our Company developed a highly technological line of products as we firmly believe in solutions where every single component is integrated in systems that can come up to the most demanding expectations of our customers.

本公司开发了一系列高科技产品，我们坚信，只有每一个部件组合起来，形成一个完整的系统，才能达到客户的严格标准。

Also thanks to the exclusive cooperation with international partners with our same business philosophy, we have increased our product range by introducing single components with high technological value which allow us to offer to the market high-performing products complying with the present and future application requirements.

秉持着相同的商业理念，我们与一些国际公司建立了独家合作关系，并通过他们引进了具有高技术价值的单个部件，从而增加了我们的产品种类，使我们能向市场提供符合当前和未来应用要求的高性能产品。



Rosa Sistemi S.p.A. created new professional figures inside the Company who paved the way towards highly innovative technical solutions in line with market demands.

我们拥有专业人才，根据市场需求来制定高度创新的技术解决方案。

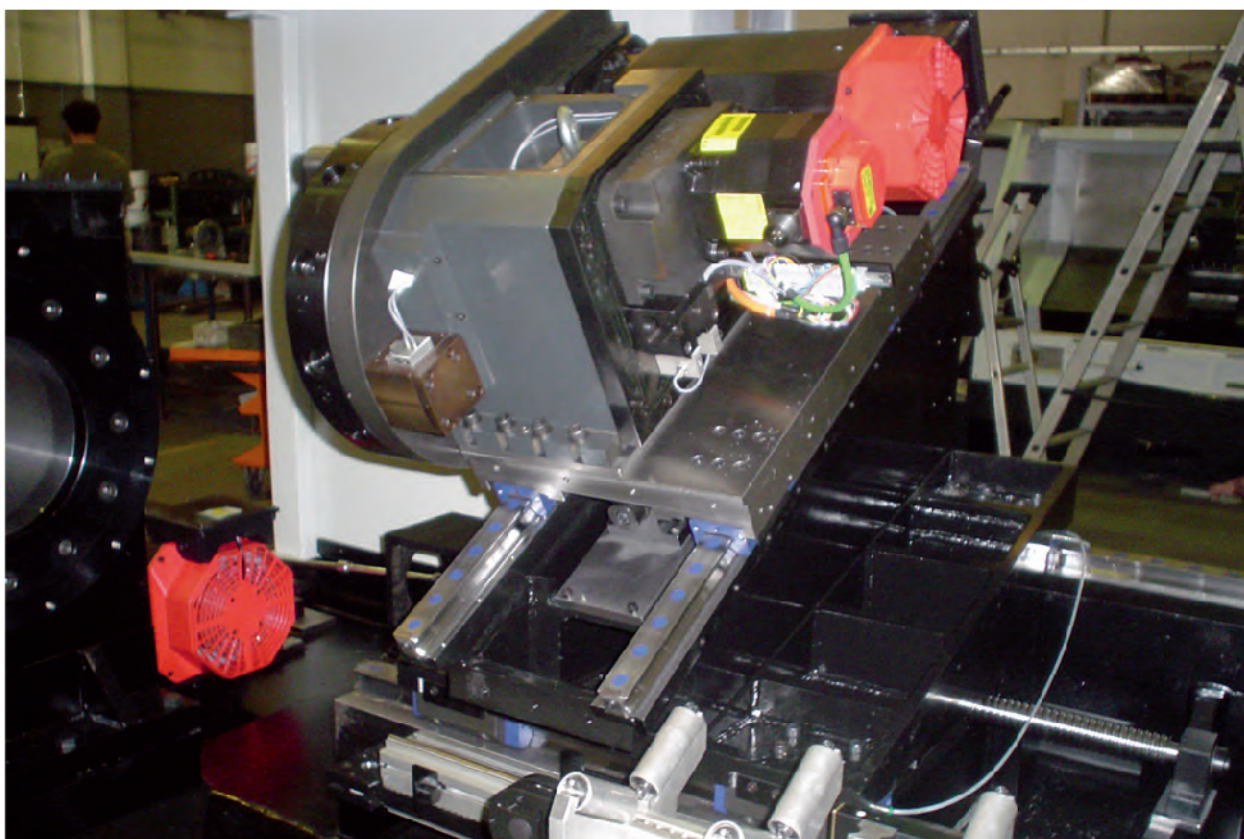


A constant increase of exports led Rosa Sistemi S.p.A. to open commercial branches in some strategic countries and to develop technical and commercial organizations in other interesting ones.

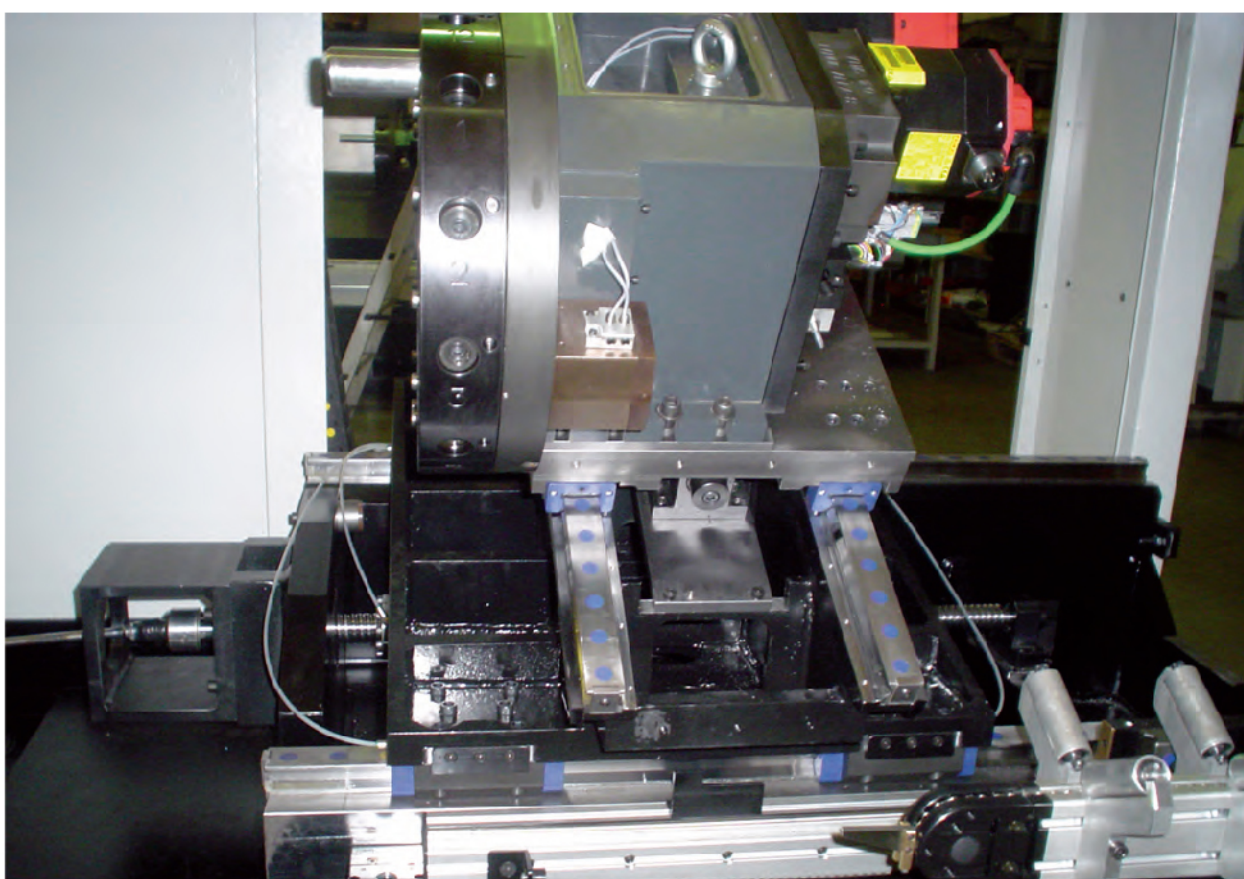
由于出口需求不断增加，公司逐步在部分国家开设了业务分公司，并在一些国家成立了技术和商业组织。

The following is a brief chronicle of our Company. 以下是本公司的简要纪事

- 1979** Ermando Rosa founded Rosa Sistemi S.p.A.
埃尔曼多·罗萨 (Ermando Rosa) 创建 Rosa Sistemi S.p.A 公司
- 1989** Fabrizio Rosa joined his father business starting to manage the Company
法布里齐奥·罗萨 (Fabrizio Rosa) 加入父亲的企业，开始管理公司
- 1996** Rosa Sistemi enlarged its head office in Legnano near Milan Rosa Sistemi
扩大了其位于米兰附近莱尼亚诺的总部
- 1997** The Company received ISO 9002 Certification
公司通过获得 ISO 9002 质量认证
- 1999** Opening of a new Branch in Switzerland:
瑞士分公司开业: ROSA GMBH Rosa GmbH 有限公司
- 2001** Opening of a new Branch in Brazil:
巴西分公司开业: ROSA Do Brasil ROSA 巴西分公司
- 2003** The Company received ISO 9001:2000 Certification
公司通过 ISO 9001:2000 质量认证
- 2007** Starting RD for MG product line
启动 MG 生产线研发
- 2008** Enlarge of production site for MG product line
扩建 MG 产品线的生产基地
- 2008** Launching of MG product line on the market
MG 产品线投放市场
- 2010** The Company Sales ROSA's MG products
公司在中国市场销售 MG 产品



MG 45 LC Monoguide on CNC lathe (Tecno V photos - kind permit)
在CNC数控车床上的MG45 LC型导轨



1.

MG型直线导轨 产品描述和特点

MG MONOGUIDE PRODUCT DESCRIPTION AND FEATURES

1. Product identification codes
产品识别代码

The new MG monoguide manufactured by Rosa Sistemi is an advanced technical solution for high-tech industries. The monoguide is suitable for high loads, great stiffness and high reliability, especially for machine tools.

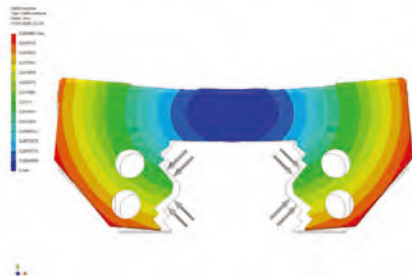
罗萨集团生产的新型MG型滚柱直线导轨是高科技工业先进技术的解决方案。导轨适用于高负载、高刚度和高可靠性的设备，尤其适合各类机床。

STREAMLINED ROLLER SLIDE WAYS

流线型的滚柱滑道

The geometries and the directions of the roller slide ways were calculated by means of FEM according to each individual preload, thus assuring the best performances of load capacities and obtainable accuracies all the time.

滚柱型滑道的几何形状和方向都是通过FEM的方式根据每个单独的预载荷计算得到的。所以这能够确保导轨时刻都能在负载能力和精度上有最佳表现。



ROLLERS WITH LOGARITHMIC PROFILE

对数外形的滚柱

The rollers are manufactured according to the most recent knowledge about rolling element-related theory, thus assuring high stiffness, maximum load capacity and long life.

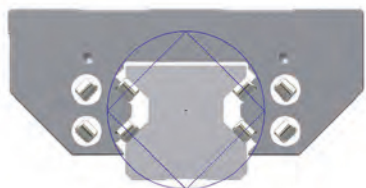
滚柱是根据最新的技术——滚动原理相关理论而制造的。因此能确保高刚度、最大的负载能力以及更长的寿命。

INNOVATORY LUBRICATION SYSTEM

革新的润滑系统

The introduction of the lubricant into the front head is controlled by means of check valves. These valves are installed on both sides of the carriage slide ways and prevent the lubricant from flowing back while sliding. With minimum quantities of lubricant, independently from the assembly position, the perfect distribution over the slide ways will be assured.

润滑油进入前盖是由单向阀控制的，这些阀安装在滑块导轨的两侧以防止润滑油在滑块滑动时回流。由于润滑系统独立于装配位置之外，使得最少量的润滑油能够确保被完全地分配到整个滑道上。



LUBRICATION VERSATILITY

多方向的润滑

Each front head of the carriage has 4 lubrication inputs: two side inputs, one front input and one on the other side.

每个滑块的前盖都有四个润滑口：两个侧面注入口，一个前注入口和一个其它面的注入口。

SLIDING UNIFORMITY

滑动的一致性

得益于内循环系统的流线型半径，震动现象已经减小到最低。因此能使前进运动的阻力更小。

Thanks to streamlined radiuses for internal recirculating systems, pulsation phenomena are reduced to the minimum, thus offering a low resistance to the forward movement.

INNOVATORY DESIGN

革新的设计

对滑块中所有塑料元件的精确研究能够减少内循环系统中的干扰，因此增加了相关的可靠性和使用寿命。

The accurate study of all plastic elements in the carriage enabled reduced the interferences in the internal recirculating systems, thus increasing relevant reliability and life.



PROTECTION OF THE CARRIAGE

滑块保护

通过横向和纵向的密封垫，滑道被很好地保护以确保良好的密封（在脏的环境下也能发挥作用）。

The slide ways are well protected by means of cross-wise and longitudinal gaskets that assure good sealing (also in contaminated environments).

INTERCHANGEABILITY

互换性

The narrow construction tolerances assure the interchangeability of the carriages. Both sides of the guide can be used as a reference.

较小的结构公差确保了滑块的互换性。导轨的两边都能用作基准。



ADDITIONAL PROTECTIONS

附加的保护

Upon demand, it is possible to supply additional wipers and scrapers.

可以根据要求提供附加的毛刷和刮板。

LONG - LIFE LUBRICATION

长使用寿命的润滑系统

A specific additional head allows long lubrication duration, thus preventing additional costs for the purchase of a lubrication station.

一个特殊的附加头使润滑能够持续更长的时间，因此减少了额外的购买润滑系统的成本。

ANTICORROSION COATING

防腐涂层

The carriages and the guides can be supplied with a HCP anticorrosion coating.

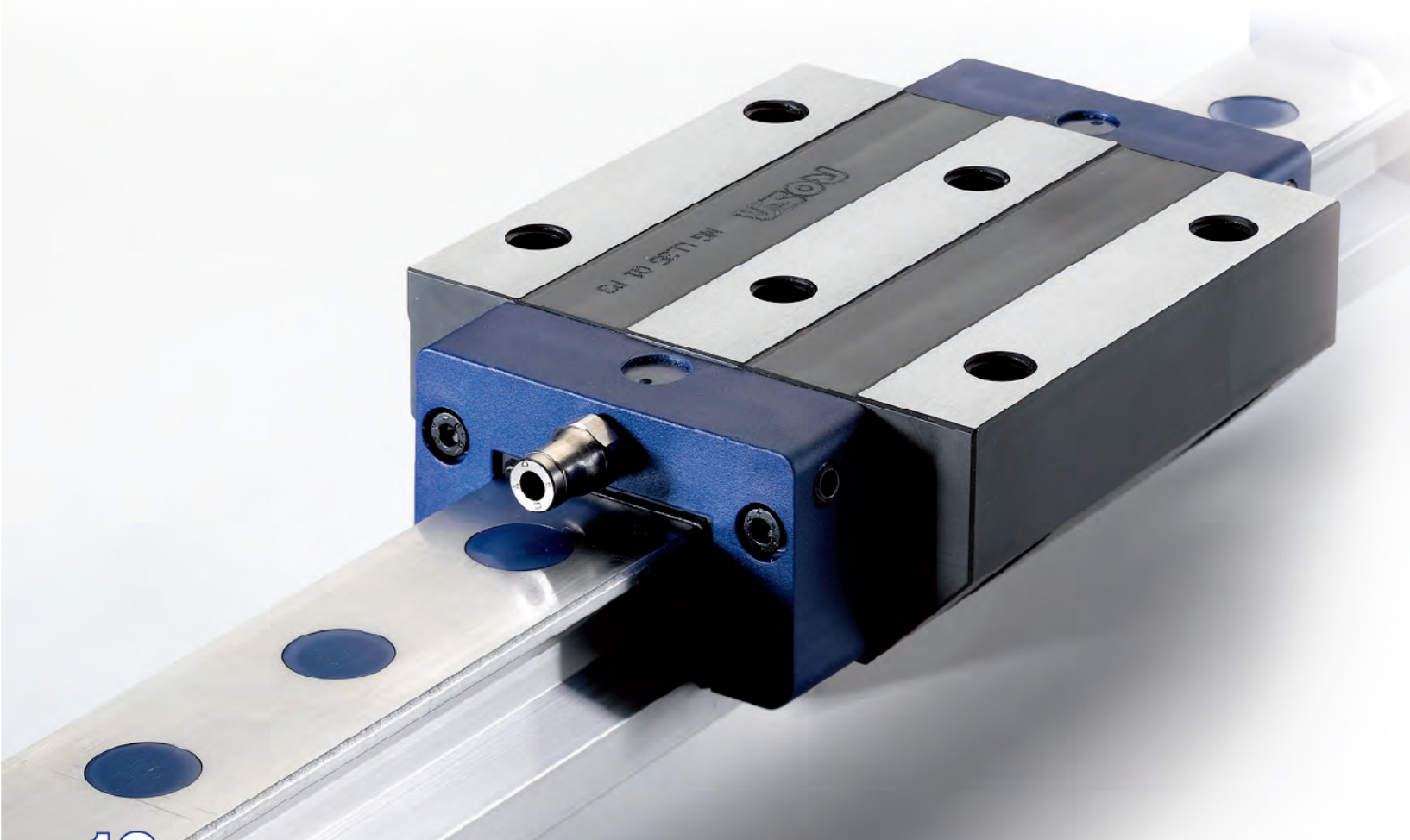
滑块和导轨都使用了HCP防腐涂层

METAL PROTECTIVE STRIP

金属保护条

The strip that protects and covers the fastening holes prevents closing caps from being used, thus considerably reducing the overall assembly times and making the wiping operation more effective.

这个保护条能保护并覆盖螺钉孔因此无需在每个螺钉孔上加装保护盖。因此大大减少了总的装配时间，使纵向滑动更有效。

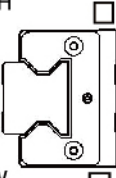


1.1 Product identification codes 产品识别代码

产品型号 Product type	MG	35	SC	2	L598	Q1	P2	II	同一平面上的 轨道数量 Rails on same plane
Rail size (25,35,45,55) 轨道尺寸									
Block type 滑块型号									预载荷 Preload (P2, P3)
SC: narrow-short SC:窄短型 LC: wide-short LC:宽短型 SL: narrow-long SL:窄长型 LL: wide-long LL:宽长型									精度等级 Accuracy class (Q0, Q1, Q2, Q3)
Number of carriages on the rail 轨道上的滑块数量									导轨长度 Rail lenght (mm)

Order sheet 订单		ROSA SYSTEMI UCIMU	
Customer 客户:		Order n° 订单号:	
Size 尺寸	<input type="checkbox"/> 25 <input type="checkbox"/> 35 <input type="checkbox"/> 45 <input type="checkbox"/> 55 <input type="checkbox"/> 65		
Carriage type 滑块型号	<input type="checkbox"/> LC <input type="checkbox"/> LL <input type="checkbox"/> SC <input type="checkbox"/> SL		
Number of carriages on the rail 轨道上的滑块数		
Set for top lubrication 顶部润滑装置	<input type="checkbox"/> DAL		
Rail lenght 轨道长度 mm		
L5 (distance of first hole) (第1个孔的距离) mm		
Joint rails: pieces lenght 对接轨道: 片段长度 mm		
Rail screwed from the bottom 从底部固定的导轨	<input type="checkbox"/> FB		
Accuracy class 精度等级	<input type="checkbox"/> Q0 <input type="checkbox"/> Q1 <input type="checkbox"/> Q2 <input type="checkbox"/> Q3		
Preload class 预载荷等级	<input type="checkbox"/> P2 <input type="checkbox"/> P3		
Caps type on request 螺纹盖类型	<input type="checkbox"/> TOMG (Brass) (黄铜) <input type="checkbox"/> TAMG (Steel) (钢)		
Caps number 螺纹盖数量 / rail		
Additional end seals/wipers 附加末端密封/毛刷	<input type="checkbox"/> TPA		
	<input type="checkbox"/> TPNBR		
	<input type="checkbox"/> TPVIT		
Long-life cartridge lubrication 长使用寿命的润滑	<input type="checkbox"/> TLL		
Lubricant type 润滑型号	<input type="checkbox"/> Grease 脂润滑 <input type="checkbox"/> Oil 油润滑		
Complete code: 完整代码			

Ref. side HIGH
参考高边



Ref. side LOW
参考低边

☐ TLL sx
 ☐ DAL dx

☐ TLL sx
 ☐ DAL dx

☐ DAL sx
 ☐ TLL dx

☐ DAL sx
 ☐ TLL dx



2.

常规技术参数

GENERAL TECHNICAL DATA

- | | | |
|-----|---|-----------------|
| 1. | Accuracy classes and tolerances | 精度等级和公差 |
| 2. | Sliding accuracy | 滑动精度 |
| 3. | Preload classes | 预载荷等级 |
| 4. | Allowed acceleration and speed | 允许的加速度和速度 |
| 5. | Operating temperatures | 操作温度 |
| 6. | Construction materials | 原材料 |
| 7. | HCP anticorrosion coating | HCP防腐蚀涂层 |
| 8. | Size tables | 尺寸表 |
| 9. | Static and dynamic load capacity. Allowable moments | 静载荷和动载荷能力。允许的力矩 |
| 10. | Top lubrication – Size table | 顶部润滑——尺寸表 |
| 11. | Guides that can be screwed from the bottom | 可以从底部坚固的导轨 |
| 12. | Life | 使用寿命 |
| 13. | Stiffness diagram | 刚度图 |

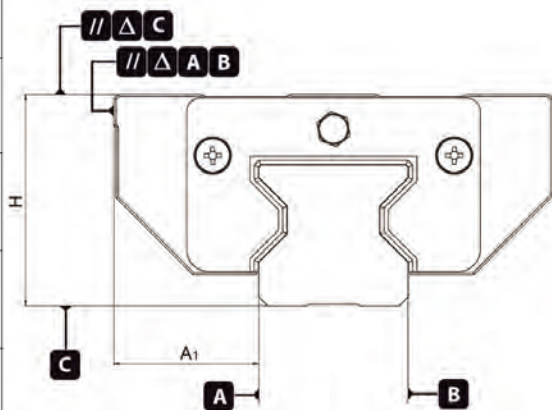
2.1 Accuracy classes and tolerances 精度等级和公差

The MG monorails are available in 4 accuracy classes: Q0, Q1, Q2, and Q3

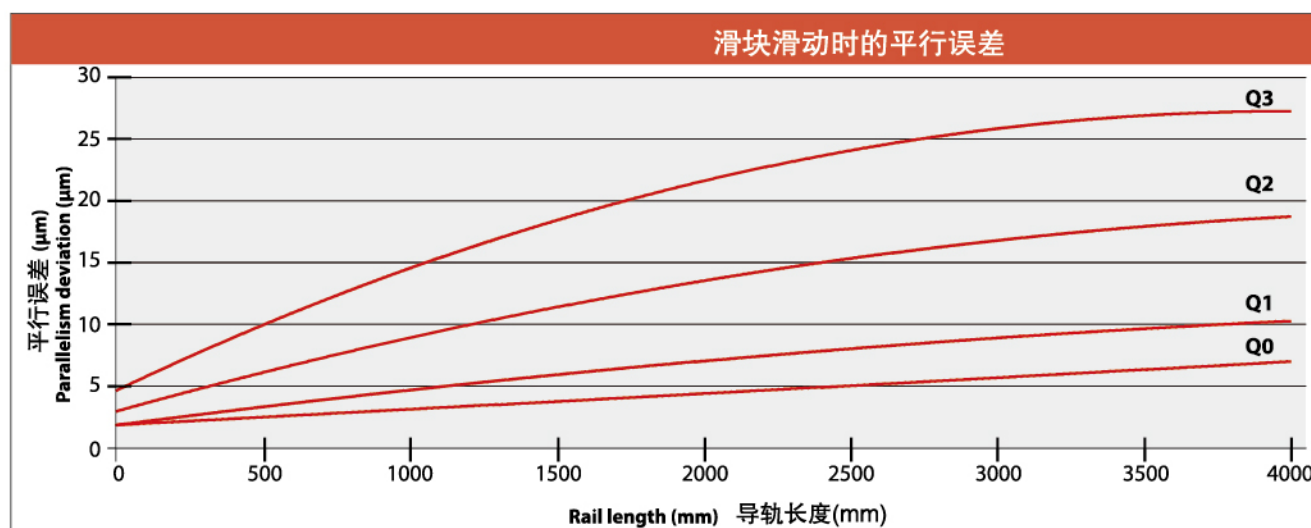
MG型直线导轨有四种精度等级：Q0，Q1，Q2和Q3

The tolerances in assembly dimensions are measured from the centre of the block and in the same position of the rail
装配尺寸中的公差是从滑块的中心和导轨的相同位置来测量的

The sliding accuracy of the carriage over the guide is measured from the centre of the carriage
滑块在导轨上的滑动精度是从滑块的中心测量的

Tolerances 公差	Accuracy class 精度等级				
	Q0	Q1	Q2	Q3	
Tolerance on H dimension 在H尺寸上的公差	± 5 μm	± 10 μm	± 20 μm	± 30 μm	
Tolerance on A1 dimension 在A1尺寸上的公差	± 5 μm	± 7 μm	± 20 μm	± 20 μm	
Variation on H dimension between block of the same rail 同一导轨上滑块间H尺寸差	3 μm	5 μm	7 μm	15 μm	
Variation on A1 dimension between block of the same rail 同一导轨上滑块间A1尺寸差	3 μm	5 μm	7 μm	15 μm	
Parallelism deviation ΔC and ΔA-B 平行度公差 ΔC 和ΔA-B	See diagram below 看下图				

2.2 Sliding accuracy 滑动精度



2.3 Preload classes 预载荷等级

The preload increases the stiffness of the guide, but influences the life and the resistance to the movement. The two preload classes that are suggested can meet the different application needs.

预载荷增加了导轨的刚度，但也影响了使用寿命和移动时的摩擦。推荐的两个预载荷等级可以满足不同的应用需求。

Preload class 预载荷等级	Preload 预载荷	Accuracy class 精度等级
P2	0.08 • C	Q0 Q1 Q2 Q3
P3	0.13 • C	Q0 Q1 Q2 Q3

P2 for high stiffness with average-high loads and variable vibrations

适用于需要高刚度和高平均负载和可变震动的场合

P3 for maximum stiffness with high impact stresses or vibrations and high loads/moments

适用于最大刚度有高冲击强度或者有震动和高负载/力矩的场合

2.4 Allowed acceleration and speed 允许的加速度和速度

Speed 速度	$V_{\max} = 3 \text{ m/s}$
Acceleration 加速度	$a_{\max} = 50 \text{ m/s}^2$

Higher accelerations and speeds are possible according to preload, load, lubrication and assembly position values. In these cases, it is advisable to contact our engineering department.

更高的加速度和速度能够根据预载荷、负载、润滑和装配位置的值来实现。如果有这些问题，您可以联系我们的工程部门。

2.5 Operating temperatures 操作温度

Allowable operating temperatures 允许的操作温度	from -10 °C to + 80 °C
--	------------------------

2.6 Construction materials 原材料

滑块 Carriage:	Hardened alloy steel	硬化合金钢
导轨 Guide:	Hardened steel	硬化钢
滚柱 Rollers:	Hardened bearing steel	硬化轴承钢
塑料部件 Plastic parts:	POM - PEI GF30 - TPE	

2.7 Anticorrosion coating HCP (硬化铬) 防腐蚀涂层

In case of particular applications, a thin hardened-chromium anticorrosion treatment is available.

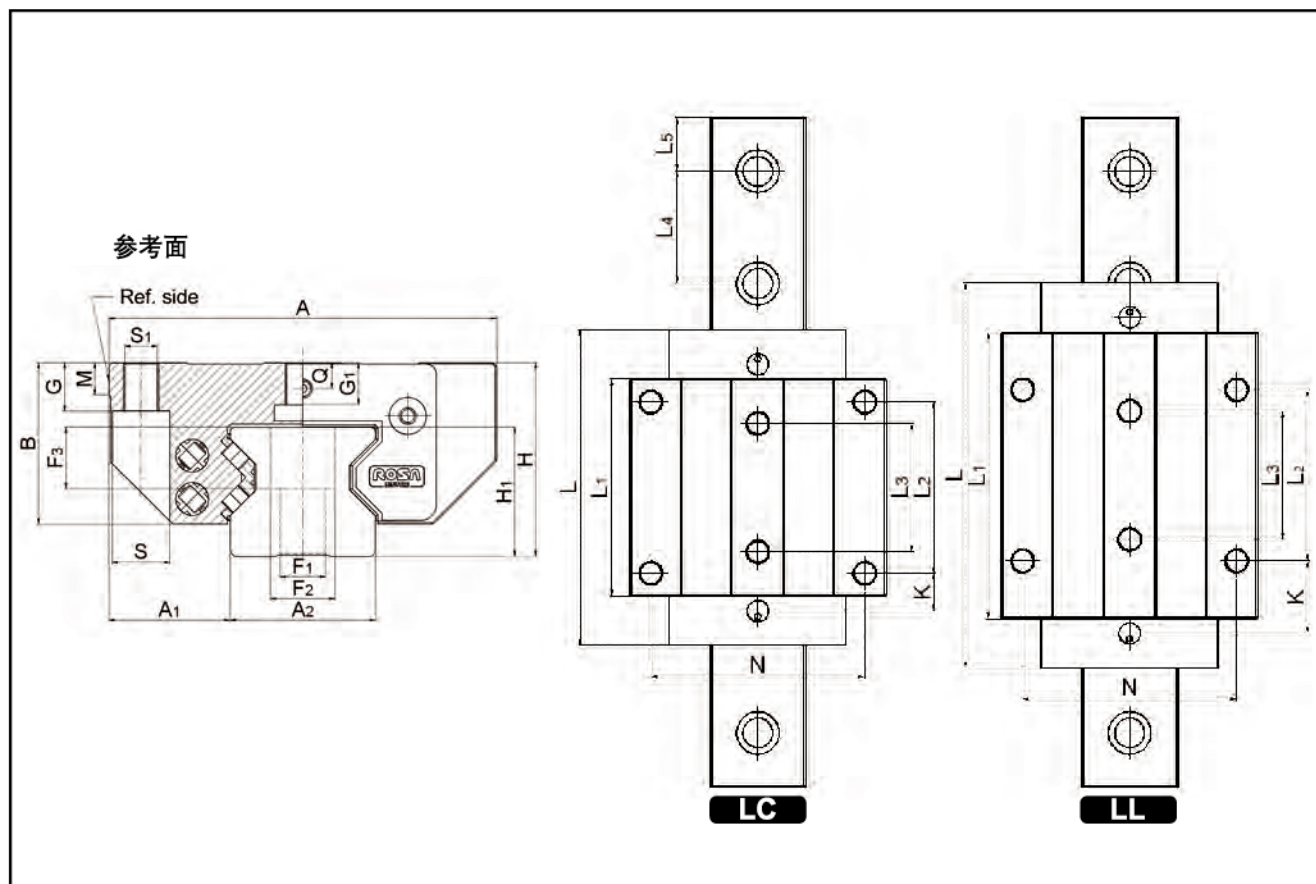
在特殊的应用中，可以使用超薄硬化铬防腐蚀处理

Technical features: HCP的技术特点

- Thickness: 2-4 μm
厚度: 2-4 μm
- Surface with silver or dull black finish
表面镀银或者暗黑色处理
- Untreated rolling elements and threads
未处理的滚动部件和螺纹
- Maximum length of the guide to be treated: 3,5 m. In case of longer lengths ask our technical office
导轨最长的处理长度: 3.5m。在长度大于3.5m时，请咨询我们的技术部
- Available for accuracy classes Q1, Q2 and Q3
可选的精度等级: Q1、Q2和Q3

2.8 Size tables 尺寸表

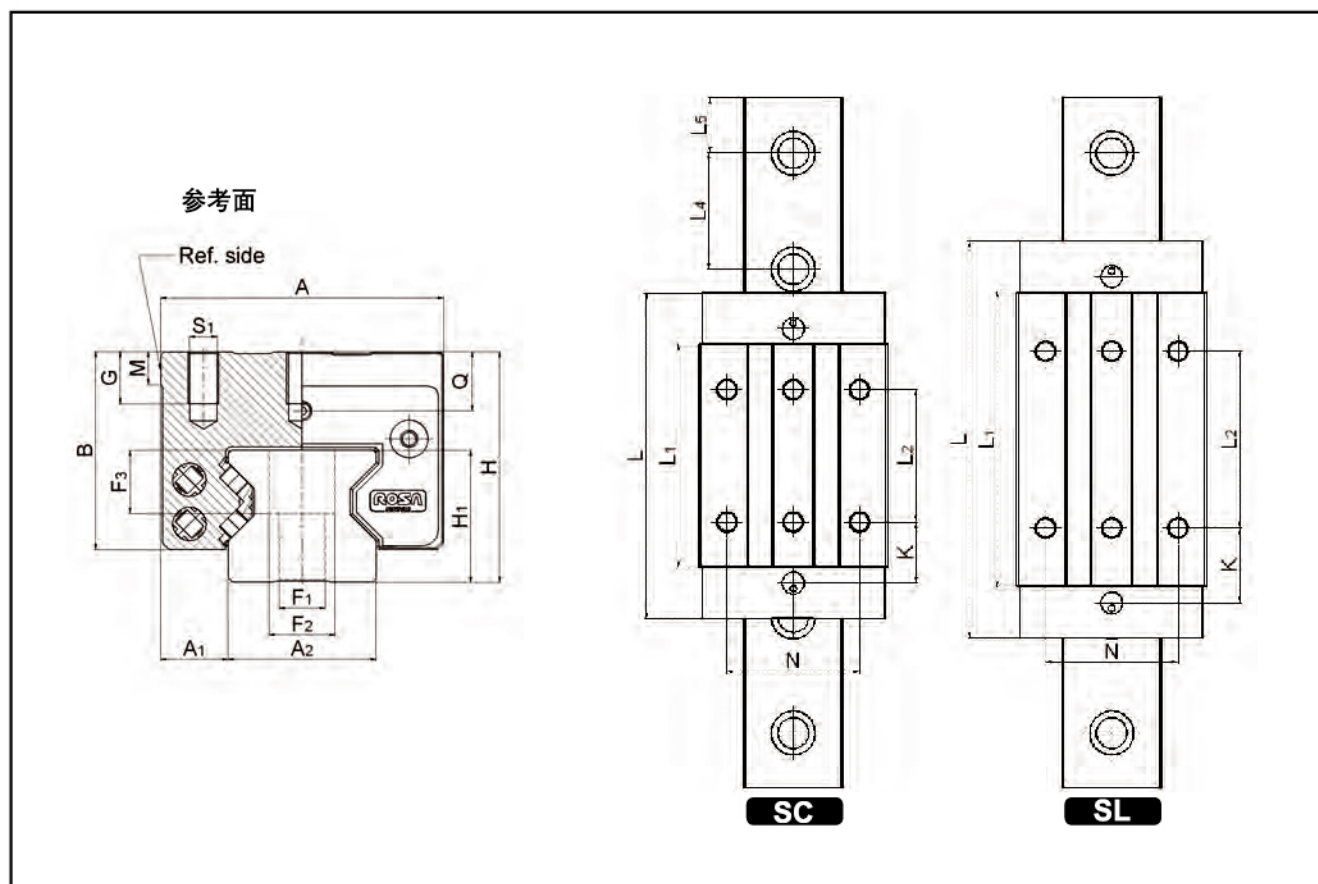
LC/LL - block type 滑块型号



Dimensions (according to the DIN 645/1 standards) 尺寸规格 (根据DIN645/1标准) L rail max: 4000 mm

Size 尺寸	H	A	A ₁	A ₂	H ₁	B	L	L ₁	L ₂	L ₃	L ₄	L ₅	N	S	S ₁	G	G ₁	F ₁	F ₂	F ₃	M	Q	K	Block Weight Kg	Rail Weight Kg/m
25 LC	36	70	23.5	23	24.35	29.5	90.2	62	45	40	30	14	57	11	M8	9	6.5	7	11	11.5	7.5	5.5	14	0.7	3.4
25 LL							109.7	81.5															23.7	0.9	3.4
35 LC	48	100	33	34	32	41	119.3	80	62	52	40	19	82	15	M10	12	10	9	15	17	8	7.9	15.5	1.7	6.5
35 LL							142.3	103															27	2.2	6.5
45 LC	60	120	37.5	45	39.85	50	147.3	101.3	80	60	52.5	25	100	18	M12	15	12	14	20	19	10	8	17.6	3.3	10.7
45 LL							179.8	133.8															33.9	4.3	10.7
55 LC	70	140	43.5	53	47.8	57	173	120	95	70	60	29	116	20	M14	18	13.5	16	24	22	12	9	21.5	5.1	15.2
55 LL							215	162															42.5	7	15.2
65 LC	90	170	53.5	63	55	78	221.8	159.8	110	82	75	36.5	142	23	M16	22	19.5	18	26	26	15.5	15	36.9	9.3	22.5
65 LL							272.3	210.3															62.15	13.5	22.5

SC/SL - block type 滑块型号

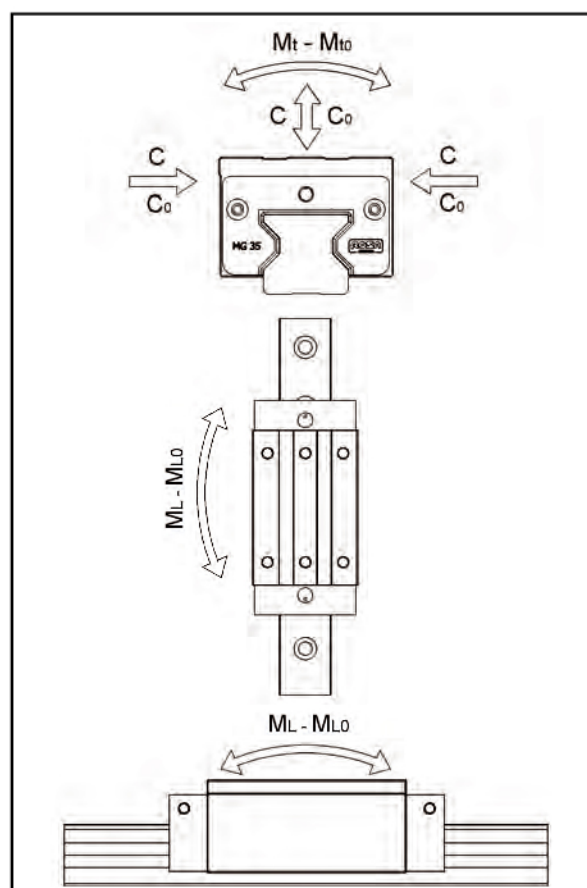


Dimensions (according to the DIN 645/1 standards) 尺寸规格 (根据DIN645/1标准) L rail max: 4000 mm

Size 尺寸	H	A	A ₁	A ₂	H ₁	B	L	L ₁	L ₂	L ₄	L ₅	N	S ₁	G	F ₁	F ₂	F ₃	M	Q	K	Block Weight Kg	Rail Weight Kg/m
25 SC	40	48	12.5	23	24.35	33.5	90.2	62	35	30	14	35	M6	9	7	11	11.5	7.5	9.5	19	0.6	3.4
25 SL							109.7	81.5	50											21.2	0.8	3.4
35 SC	55	70	18	34	32	48	119.3	80	50	40	19	50	M8	12	9	15	17	8	14.9	21.5	1.6	6.5
35 SL							142.3	103	72											22	2	6.5
45 SC	70	86	20.5	45	39.85	60	147.3	101.3	60	52.5	25	60	M10	18	14	20	19	10	18	27.6	3.1	10.7
45 SL							179.8	133.8	80											33.9	4.1	10.7
55 SC	80	100	23.5	53	47.8	67	173	120	75	60	29	75	M12	19	16	24	22	12	19.8	31.5	4.7	15.2
55 SL							215	162	95											42.5	6.2	15.2
65 SC	90	126	31.5	63	55	78	221.8	159.8	70	75	36.5	76	M16	22	18	26	26	15.5	15	51.8	8.5	22.5
65 SL							272.3	210.3	120											57	12.7	22.5

静载荷和动载荷能力以及允许的力矩

SC/SL



Size 尺寸	C (N)	Co (N)	Mt (Nm)	Mto (Nm)	ML (Nm)	MLo (Nm)
25 LC / SC	28 700	57 600	431	863	285	570
25 LL / SL	38 900	76 800	583	1150	491	970
35 LC / SC	53 300	99 000	1179	2192	674	1253
35 LL / SL	72 600	136 000	1595	3014	1187	2243
45 LC / SC	95 000	184 000	2617	5070	1538	2979
45 LL / SL	119 500	242 200	3293	6672	2444	4951
55 LC / SC	132 600	256 000	4503	8707	2576	4981
55 LL / SL	176 000	351 000	5977	11915	4470	8910
65 LC / SC	212000	414000	8100	15780	5210	10140
65 LL / SL	276000	579000	10530	22100	8980	11840

2.10 Top lubrication - size table 顶部润滑-尺寸表

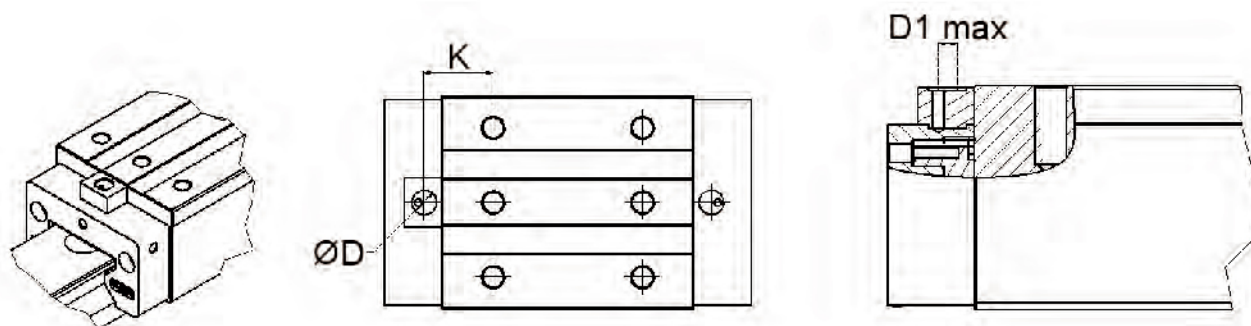
All carriage types are prepared for top lubrication. SC and SL models are provided with a spacer equipped with O-ring to compensate for the difference in height. Top lubrication must be specified in the order.

Please see the instructions on page 13.

所有型号的滑块都可以在顶部润滑。SC和SL型都有带有O型密封圈的垫片来弥补高度上的差异。顶部润滑一定要在订单中详细描述。请看第13页的说明

It is not possible to drill the heads after the assembly, as the chips created during this operation may clog the lubrication channels.

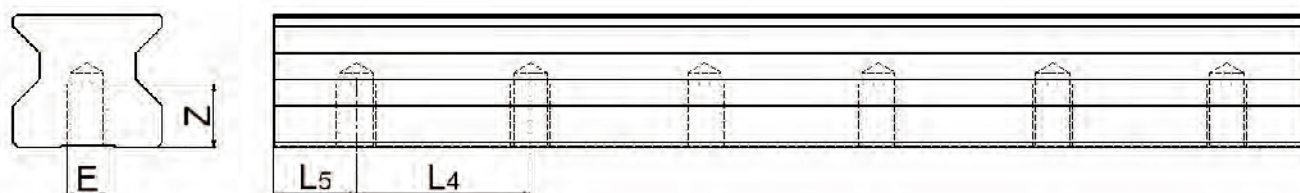
在装配后不能在头部钻孔，因为由此产生的碎屑可能会堵塞润滑管道。



		25	35	45	55	65
K	LC	14	15.5	17.6	21.5	36.90
	LL	23.7	27	33.9	42.5	62.15
	SC	19	21.5	27.6	31.5	51.80
	SL	21.2	22	33.9	42.5	57.00
	Ø D	10	10	10	10	13

2.11 Guides that can be screwed from the bottom 导轨可以从底部坚固

They are available for all accuracy classes 适用于各种精度等级



Taglia	25	35	45	55	65
Z	12	15	19	22	25
E	M6	M8	M12	M14	M16

As for L4 and L5 dimensions, see tables on page 18-19

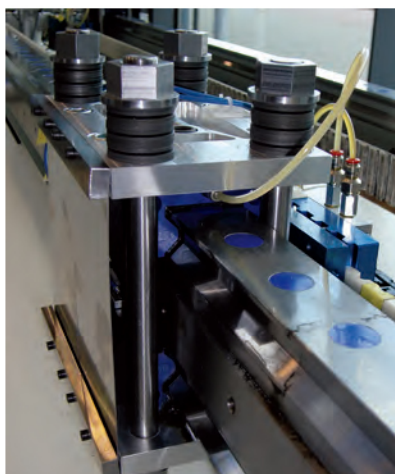
L4和L5的尺寸，参阅18-19页

2.12 Life 使用寿命

Rosa Sistemi entrusted the machine tool division of the laboratory (WZL) within the Institute of Technology of Aquisgrana with the task of performing the life tests for the new MG monoguide. During the endurance tests, the stiffness of the carriage was measured, as well.

Rosa Sistemi 罗萨集团 委托Aquisgrana理工学院机床实验室对新型MG直线导轨的寿命进行了试验，在试验的同时，对滑块的刚度也进行了测量。

Test bench 试验台



The test provides for the simultaneous check of 4 guides, each of which is equipped with a carriage.

试验在4根导轨上同时进行。每根导轨都装有滑块。

Test conditions 测试条件

Test conditions for the linear roller bearing according to the standards 直线滚柱导轨测试条件所依据的标准	DIN 631
Load coefficient MG35 MG35 负载系数	C/P = 3
Load coefficient MG25/45/55 MG25/45/55 负载系数	C/P = 2
Endurance with C/P = 3 C/P=3 的耐久度	3893 km
Endurance with C/P = 2 C/P=2 的耐久度	1050 Km
Test speed 测试速度	120 m/min
Maximum stroke 最大行程	2000 mm
Acceleration 加速度	10 m/s ²
Lubricant 润滑油脂	Oil VG-ISO 220

According to the common rules of failure mode evaluation, endurance is considered as to be achieved if the surfaces of the slide ways have no Pitting > 0.3 x roller diameter.

根据失效模式评价的一般规律，如果滑道表面没有直径大于0.3倍滚柱直径的点蚀，那么导轨可以被认为是有耐久度的。

All tests concerning the MG35 model were interrupted after a stroke equalling 4260 and 4870 km. Despite the long distance in kilometres that was covered, we detected the absence of damage to the slide ways.

所以有关MG35型的测试在平均行程为4260至4870km时停止。尽管已经经历了比较长的行程，但是导轨上仍然没有检测出磨损的痕迹。

The stiffness values are very important parameters for the accuracy of a machine tool and for calculating the life of the guide system being used.

Rosa Sistemi was convinced that the correct measurement of the stiffness in the recirculating linear roller bearing monoguide was a crucial requirement to be certified.

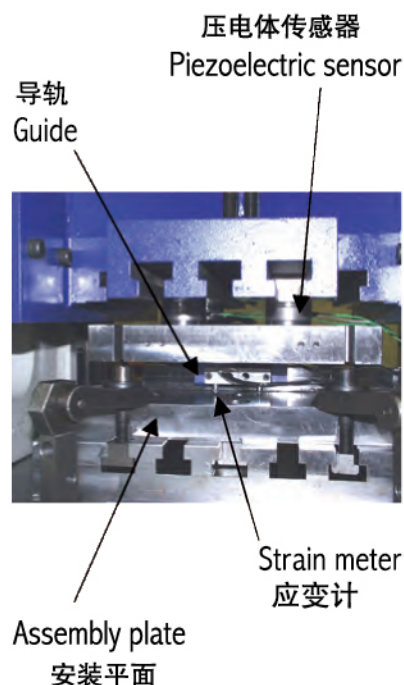
刚度值对于一台机床的精度和导轨系统的寿命计算都是一个非常重要的参数。罗萨集团确信对刚度在循环滚柱直线导轨中正确的测量在认证过程中是关键和必要的。

测试结果

Results of the tests

Setting of the test to measure the stiffness

刚度测试装置



The force is measured by means of a piezoelectric sensor that is installed between the hydraulic cylinder and the assembly plate where the carriage is fastened.

力是通过安装在液压缸和用来固定滑块的安装平面之间的压电体传感器来测量的。

To correctly measure the deformation, an incremental optical ruler was used together with four jumpered strainmeters with a 0.1μ resolution. To have a reliable deformation – force curve, eight measurement cycles are performed for each type of carriage, and then the average values will be calculated.

为了正确的测量形变量，另外使用了光栅和四个刻度为 0.1μ 的应变计。为了得到可靠的形变量—力曲线，每个型号的滑块都进行了8次循环测试，最终计算出平均值。

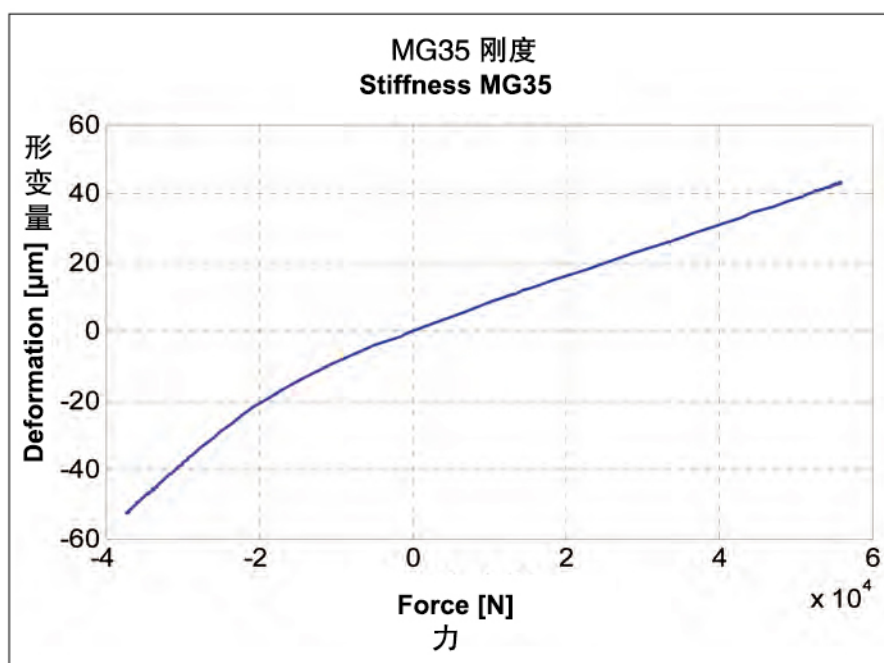
Measurement results 测量结果

The measurement of the stiffness in compression and traction conditions according to the above-mentioned modes allowed establishing the deformation - force curves for all types of carriage.

通过上述的模式在压和拉的条件下对刚度的测试，能够对所有型号的滑块建立形变量—力曲线图。

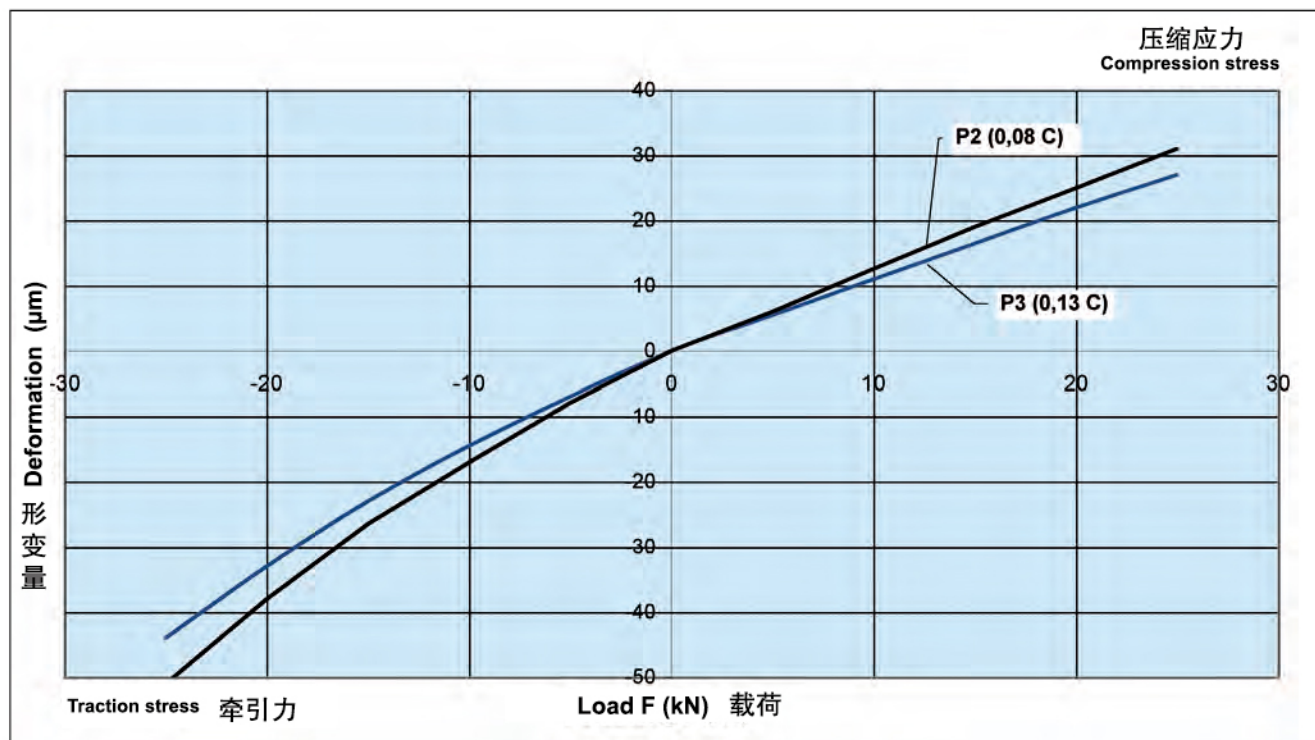
The diagram below shows the curve for MG 35 LC P3.

以下图表显示的是MG35 LC P3的曲线

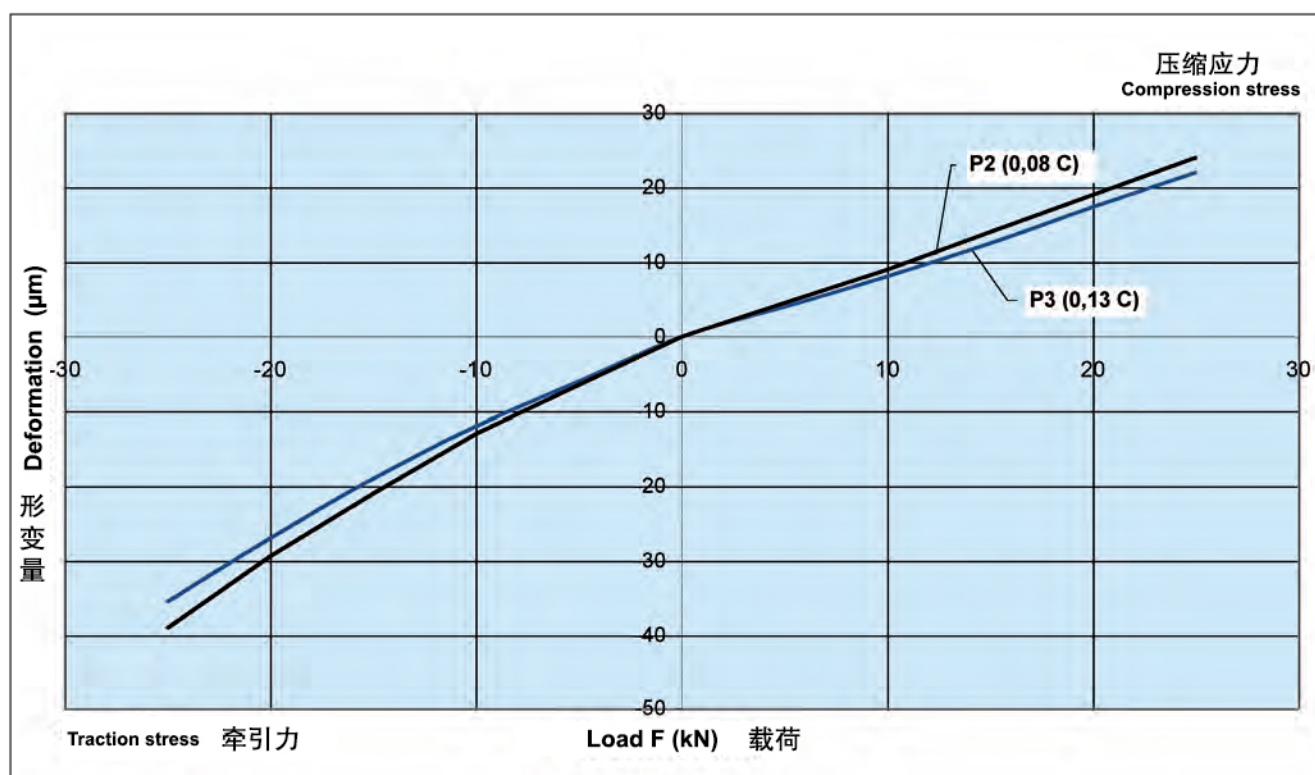


2.13 Stiffness diagram 刚度图

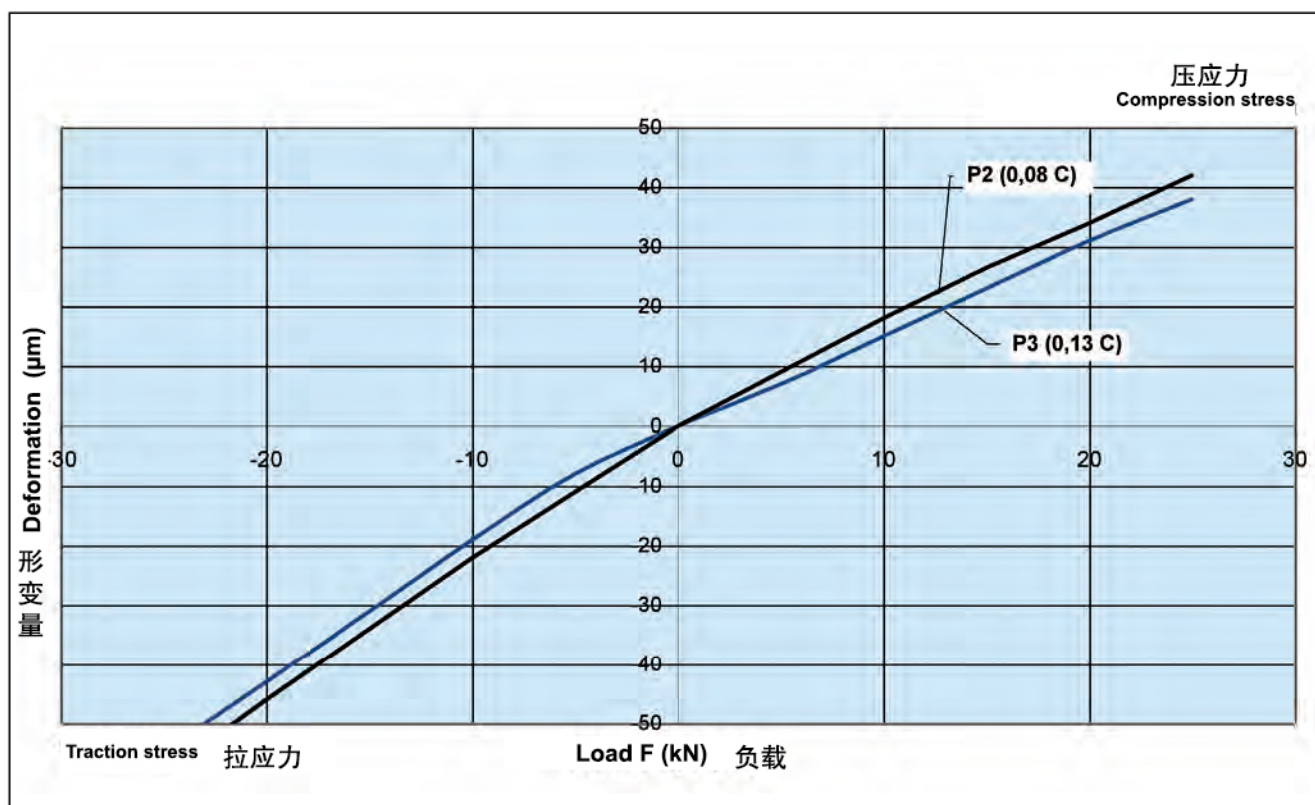
Stiffness MG25 LC MG25 LC 刚度



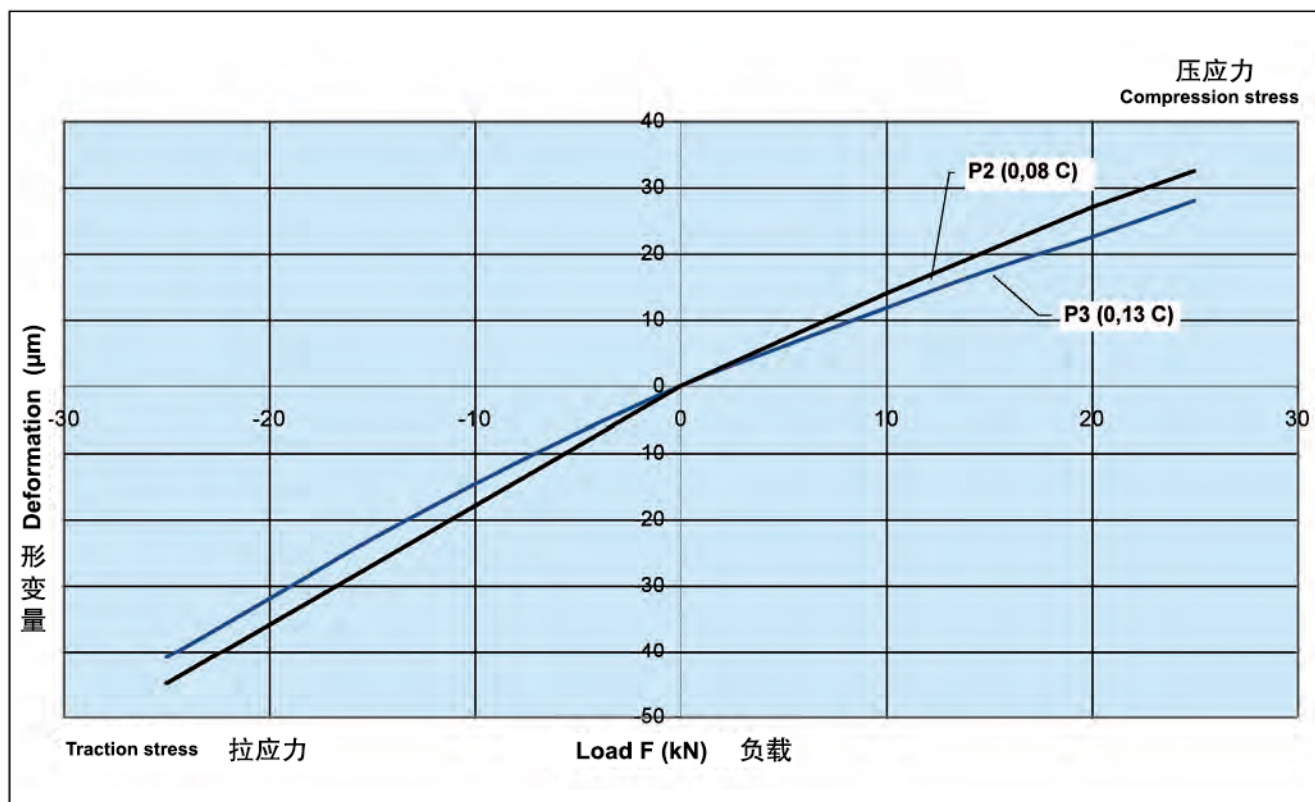
Stiffness MG25 LL MG25 LL 刚度



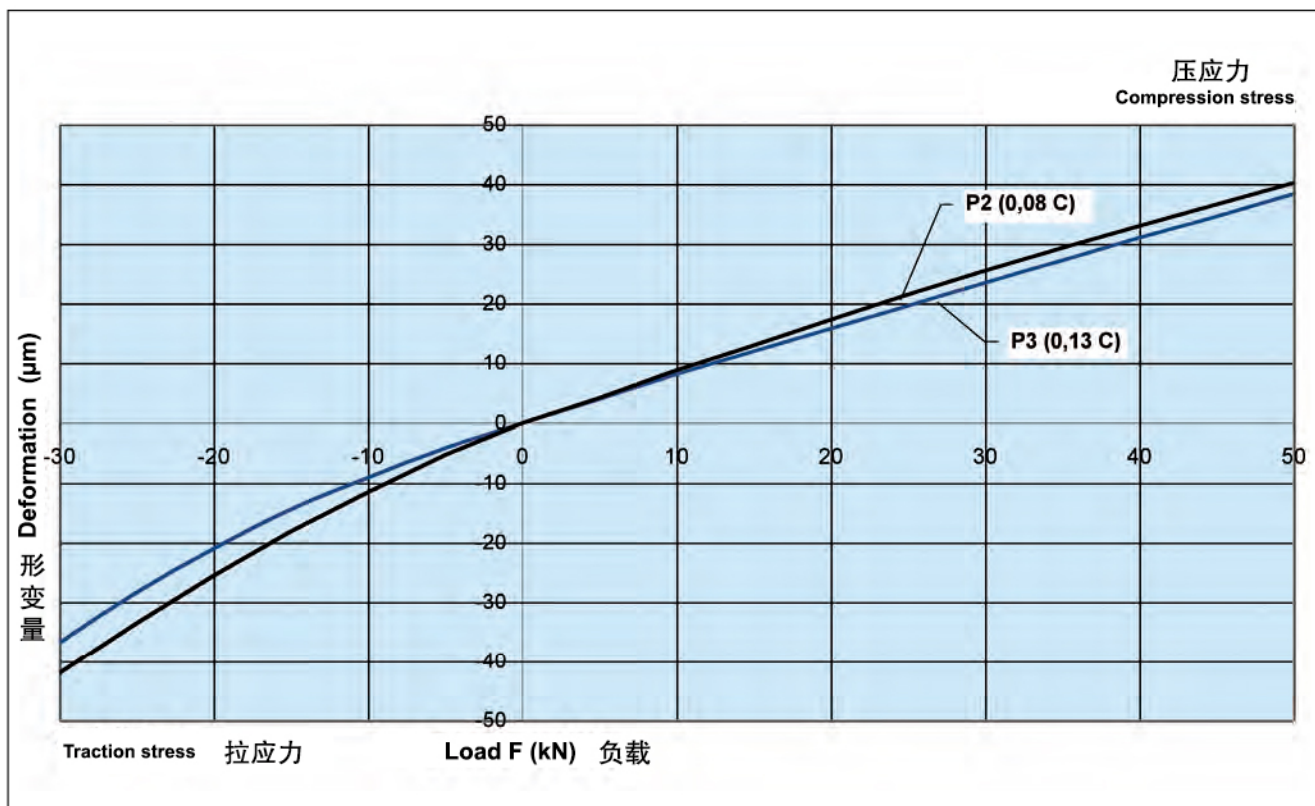
Stiffness MG25 SC MG25 SC 刚度



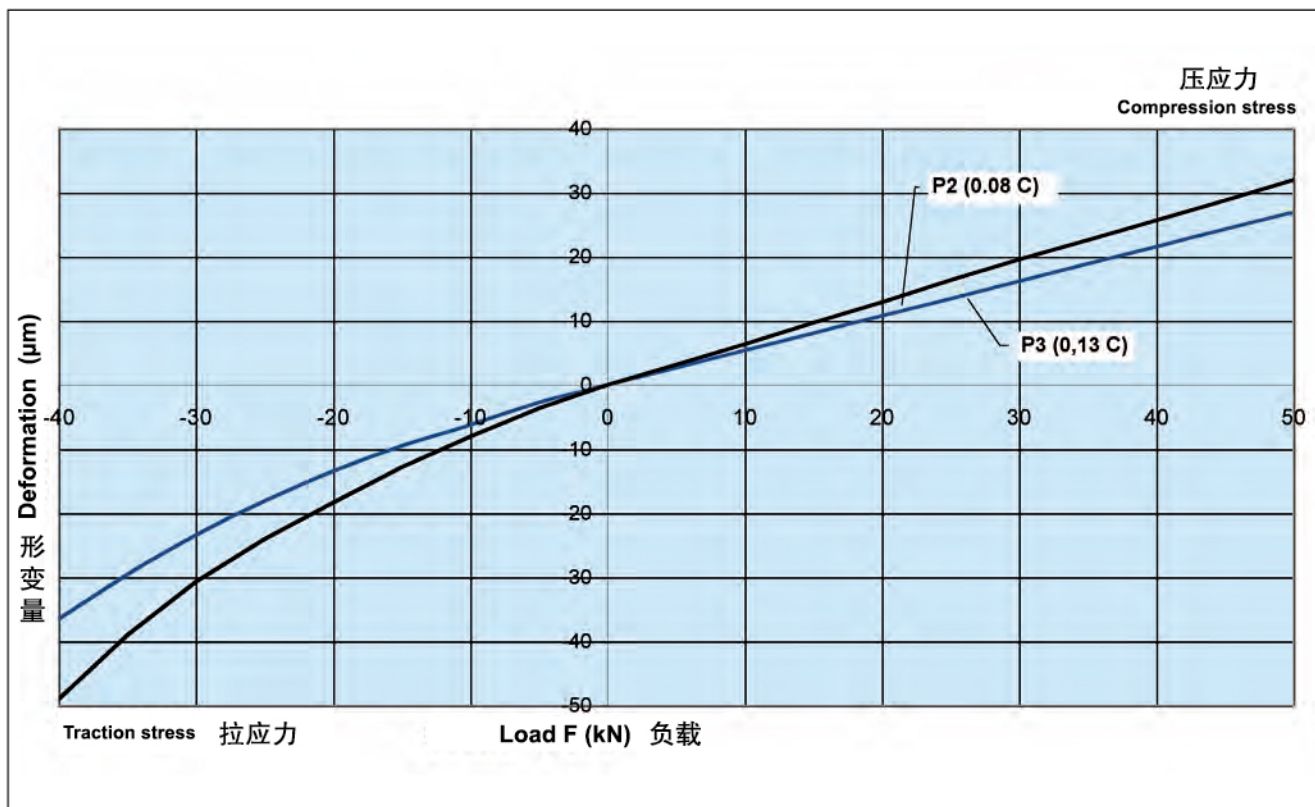
Stiffness MG25 SL MG25 SL 刚度



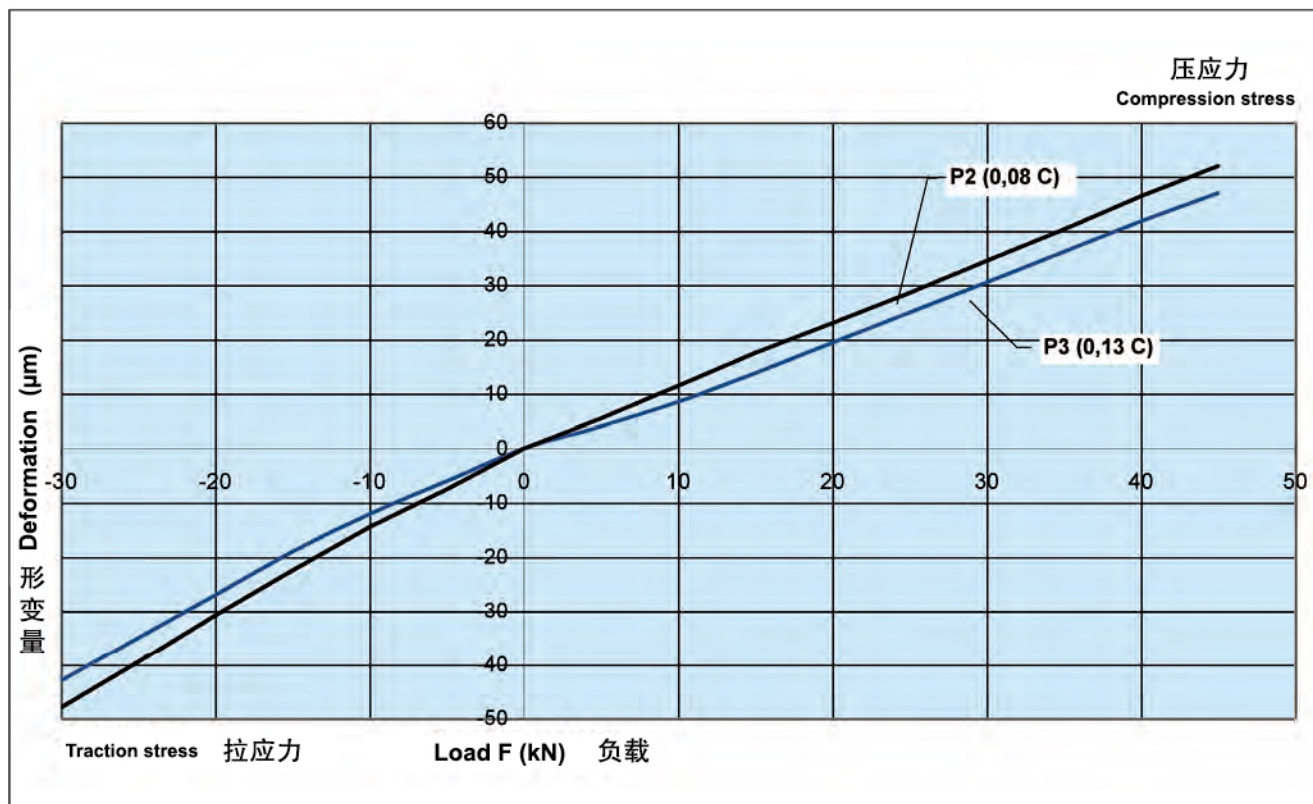
Stiffness MG35 LC MG35 LC 刚度



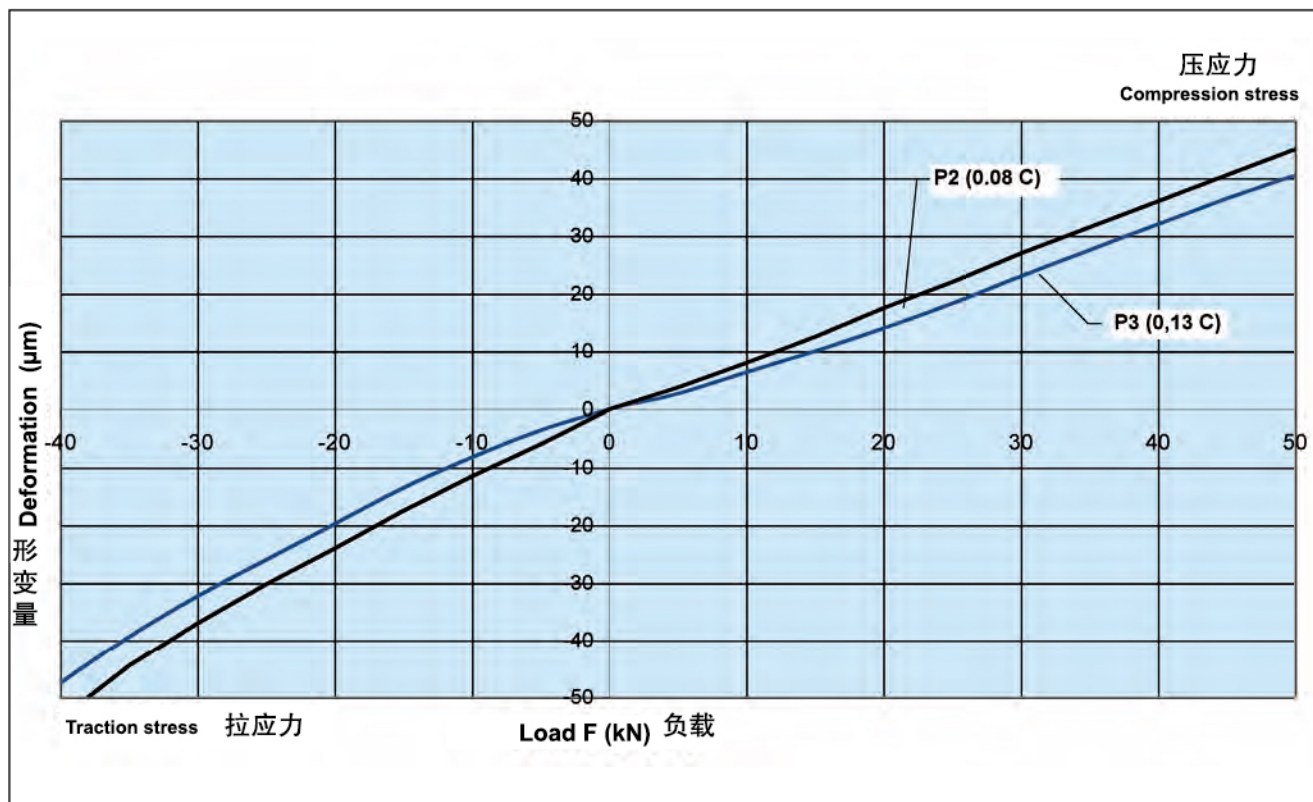
Stiffness MG35 LL MG35 LL 刚度



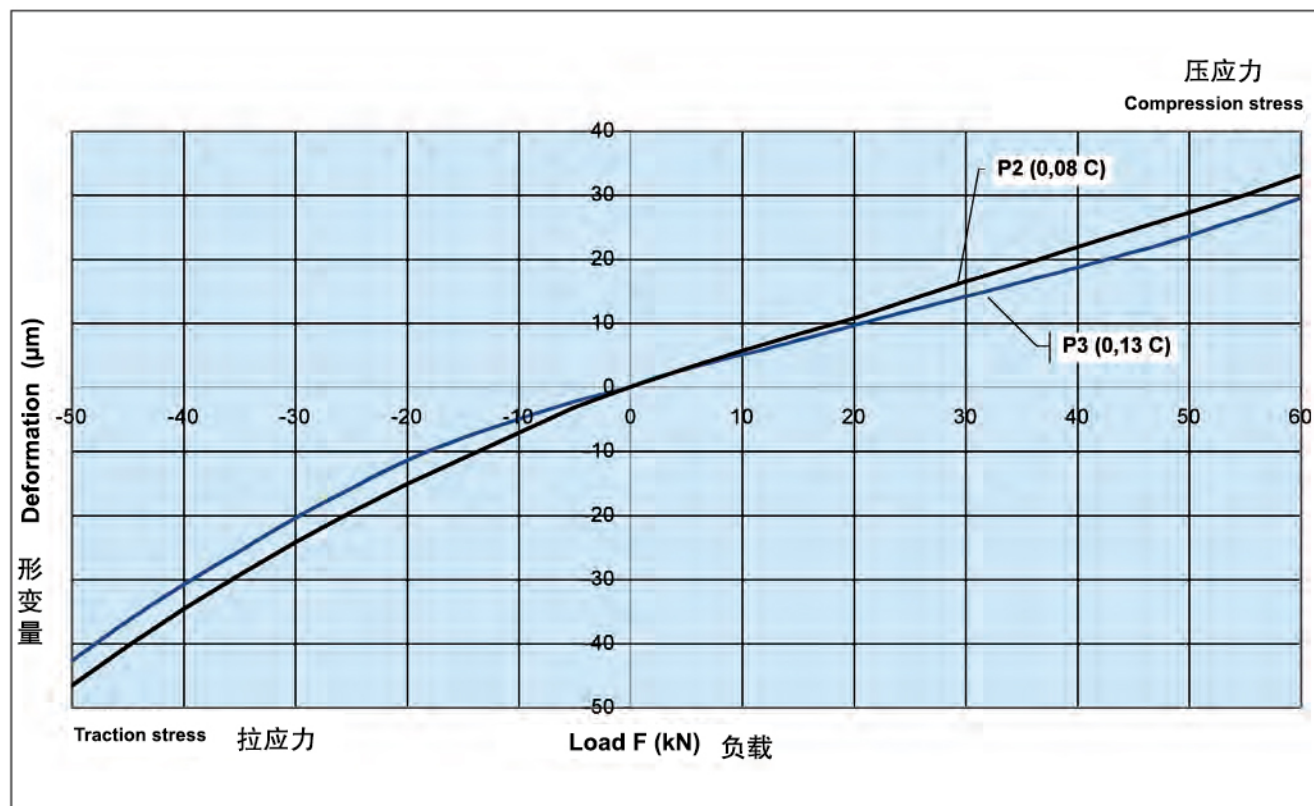
Stiffness MG35 SC MG35 SC 刚度



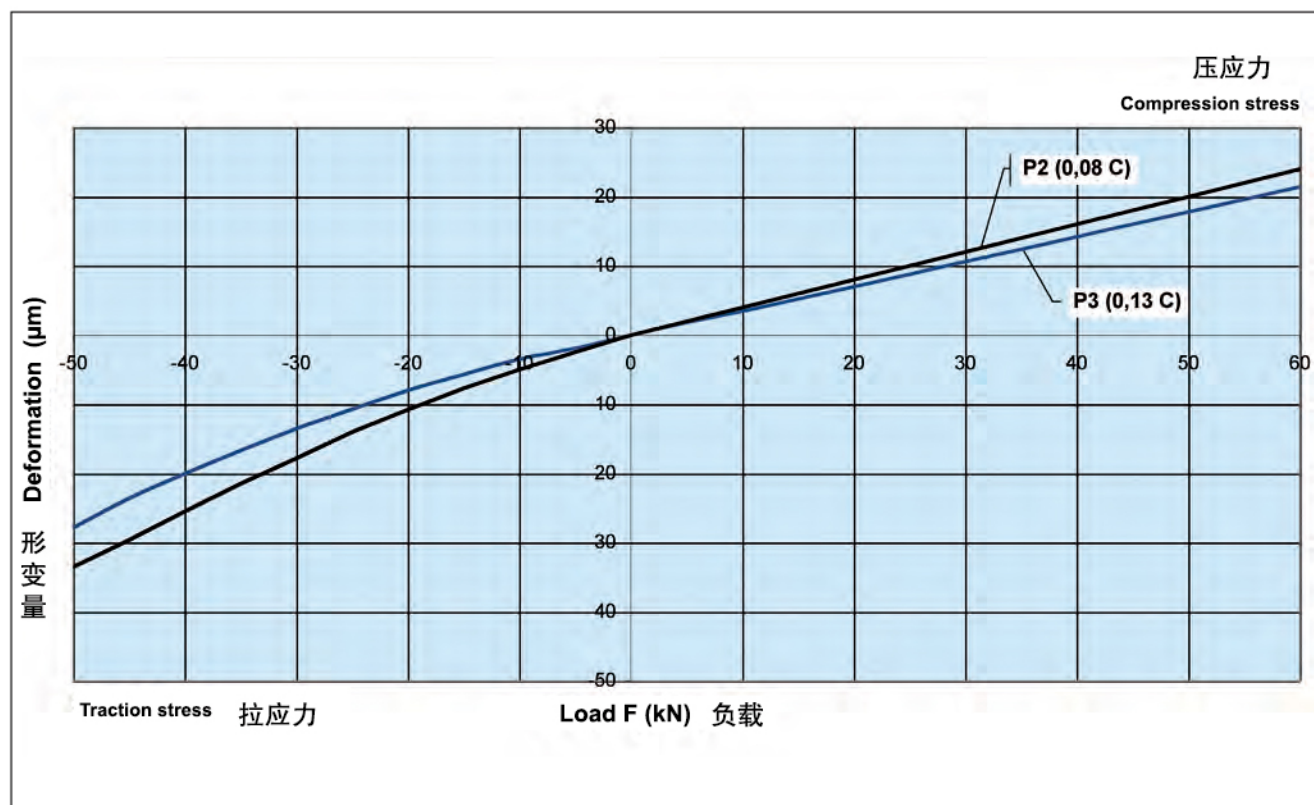
Stiffness MG35 SL MG35 SL 刚度



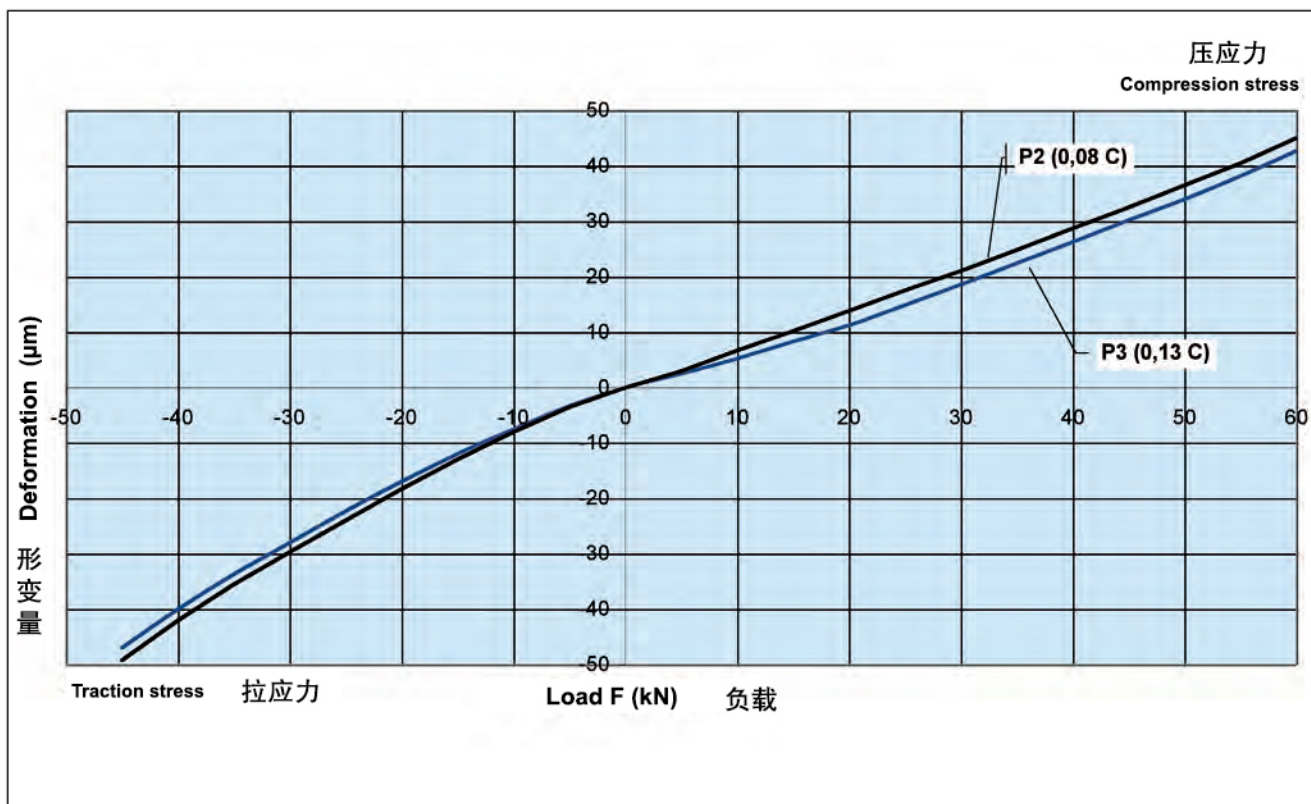
Stiffness MG45 LC MG45 LC 刚度



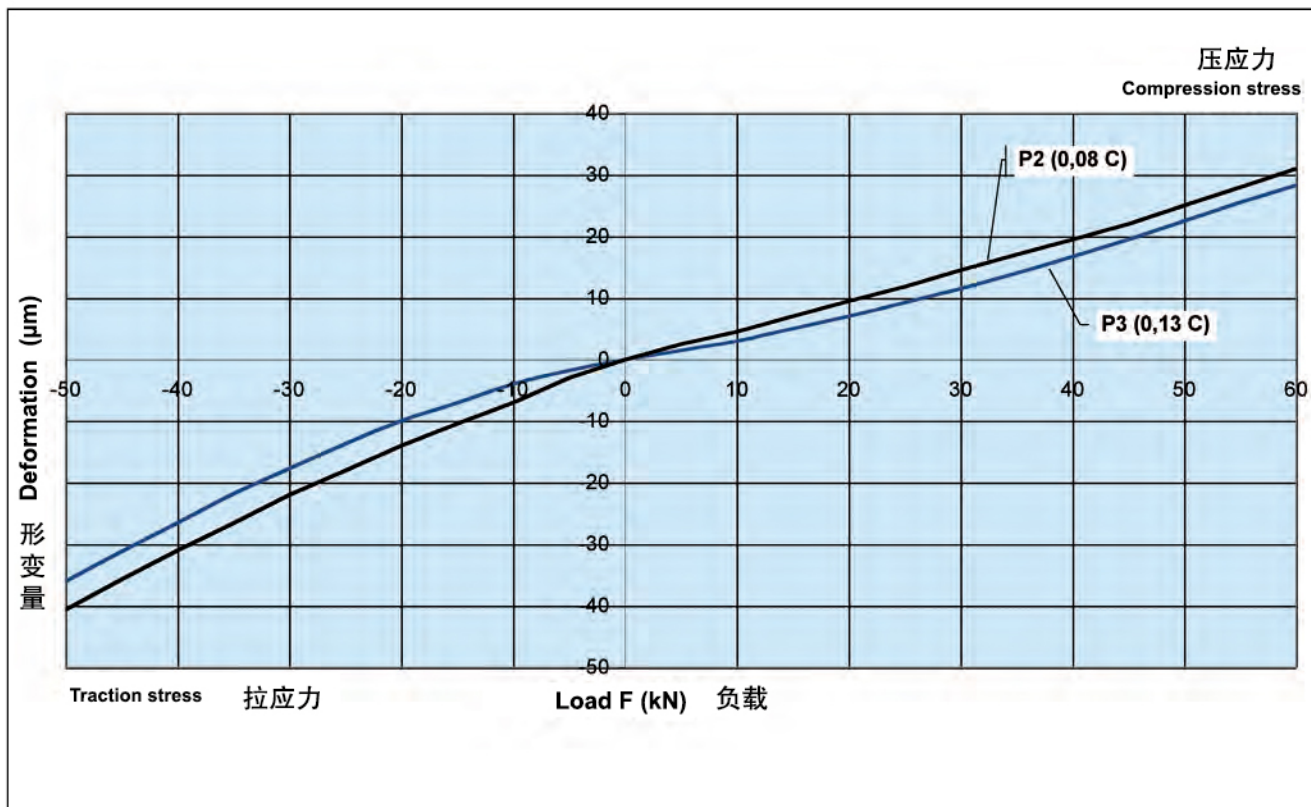
Stiffness MG45 LL MG45 LL 刚度



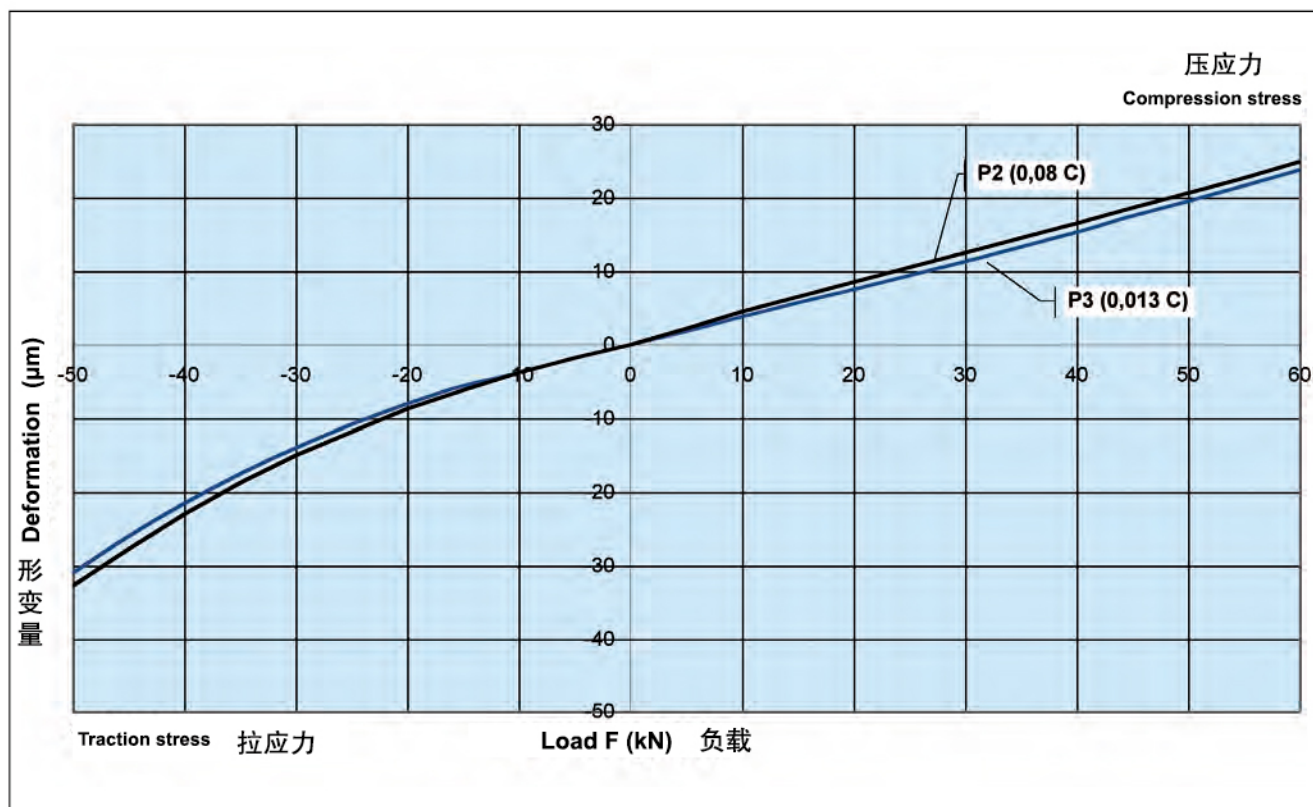
Stiffness MG45 SC MG45 SC 刚度



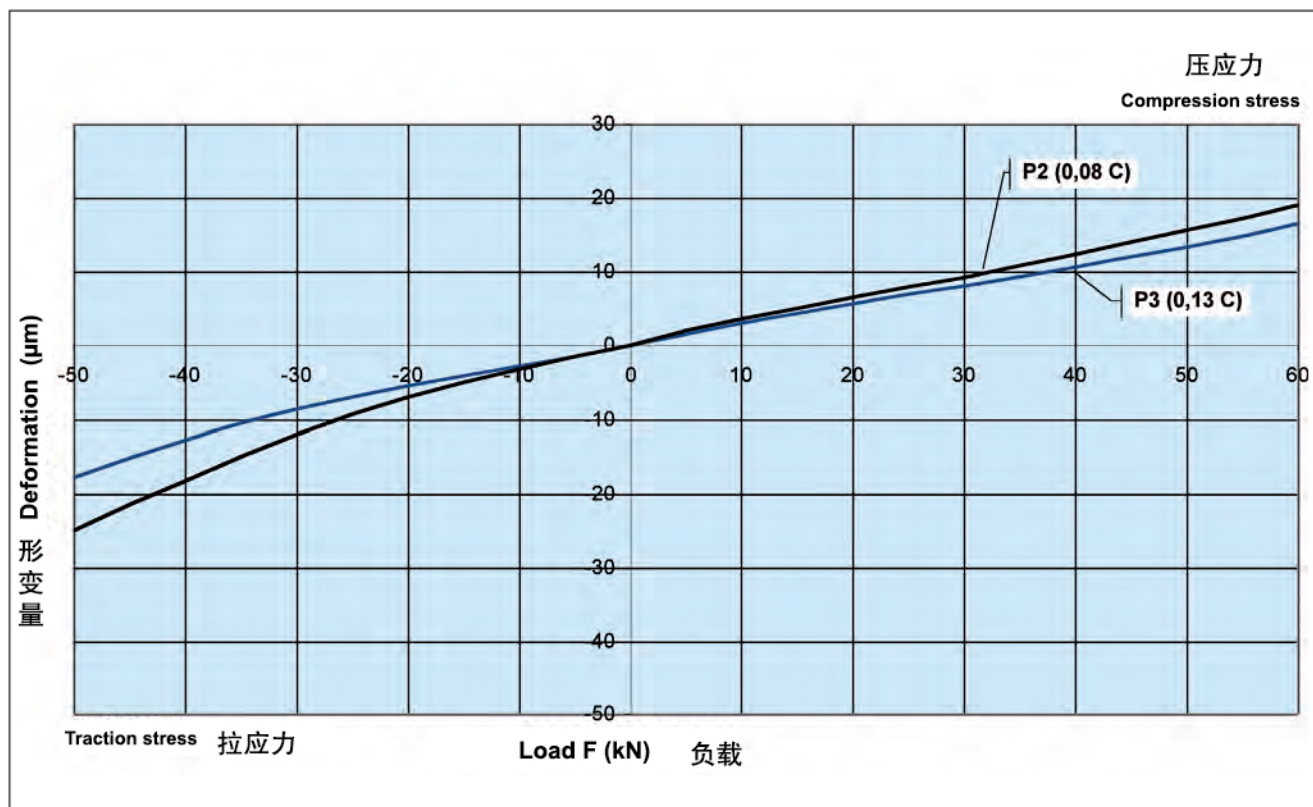
Stiffness MG45 SL MG45 SL 刚度



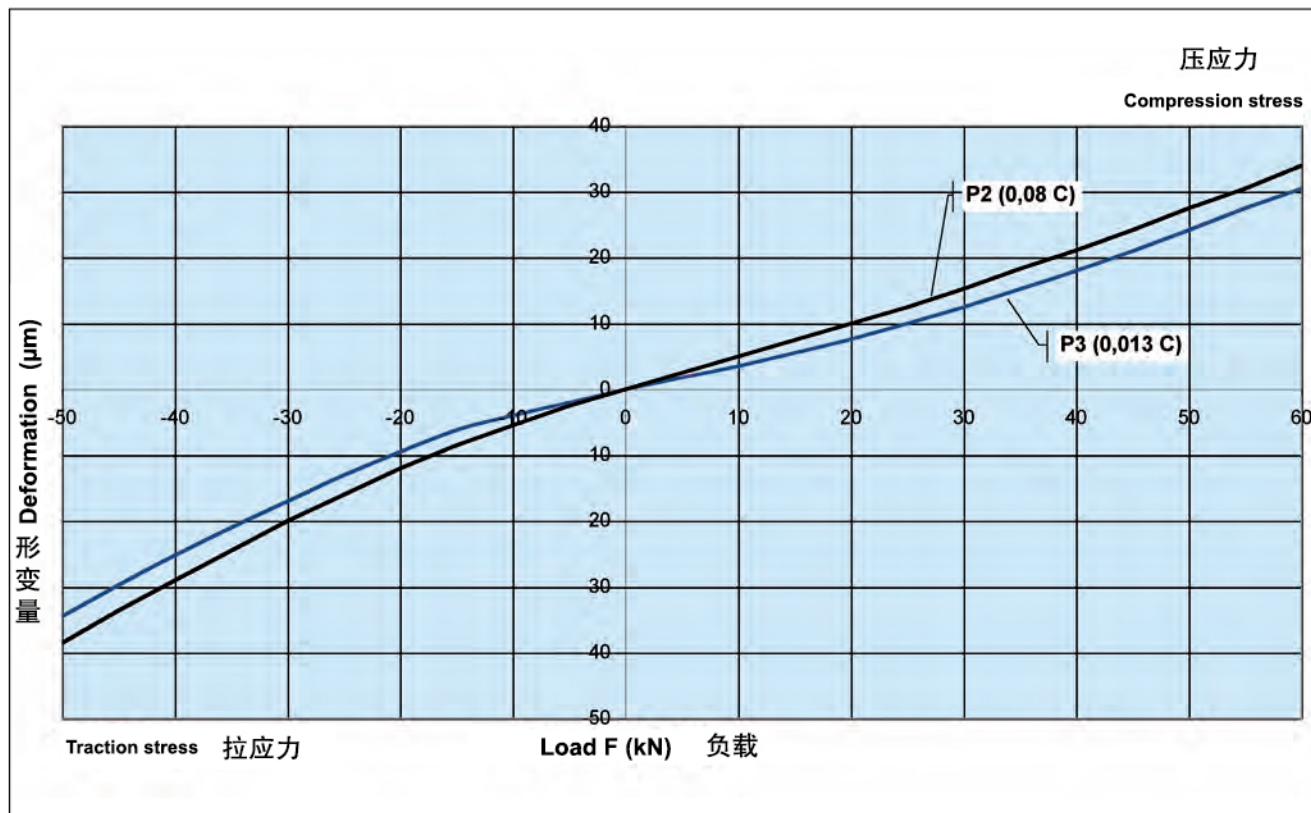
Stiffness MG55 LC MG55 LC 刚度



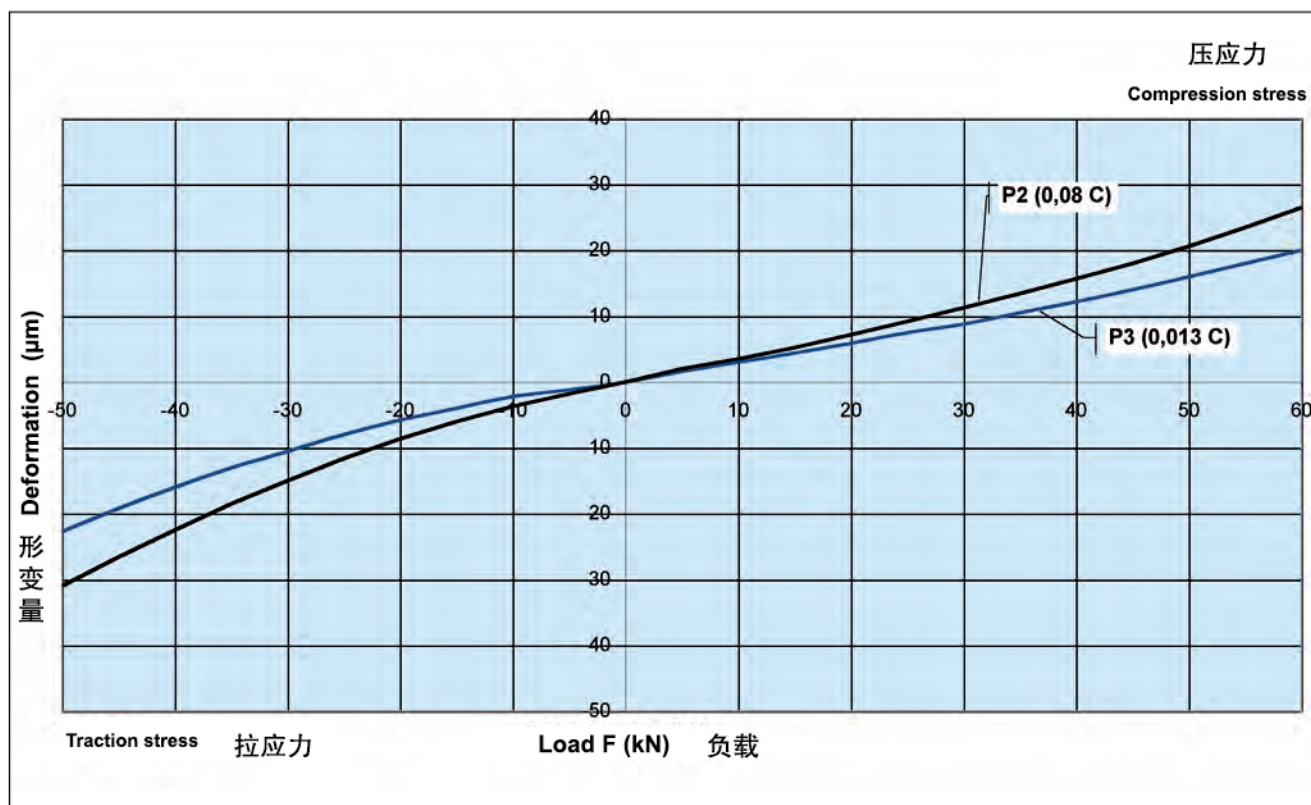
Stiffness MG55 LL MG55 LL 刚度



Stiffness MG55 SC MG55 SC 刚度



Stiffness MG55 SL MG55 SL 刚度





3.

MG 型 直线导轨的设计

DESIGN OF MG MONOGUIDE

1. Calculation base - Definition of dynamic and static loads and allowable moments
计算基础——对动载荷，静载荷以及允许力矩的定义
2. Calculation programme to design the monoguide
直线导轨设计的计算程序

There are mainly two methods to correctly design the monoguide.

The first method is the manual calculation by using the formulas that are listed below. The second method uses a computerized calculation programme that will need the consultancy of Rosa Sistemi's engineers (see page 38) after having detected all necessary data.

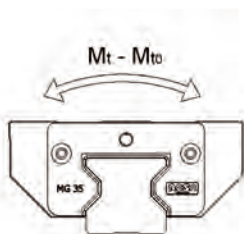
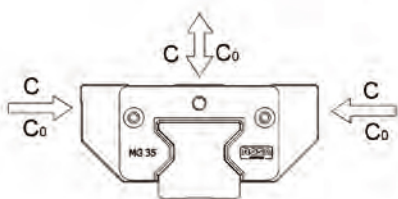
正确设计直线导轨有两种主要的方式

第一种方式是通过以下列出的公式进行人工计算。

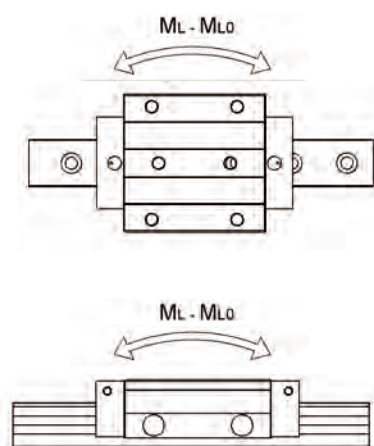
第二种方式是使用计算机程序。那需要在检测完所有必须的数据后向罗萨集团的工程师咨询（详见第38页）

3.1 Calculation base - Definition of dynamic and static loads and allowable moments

计算基础——对动载荷和静载荷以及允许力矩的定义。



Dynamic load value C 动载荷值 C	Definition according to the DIN ISO 14728-1 standard 根据 DIN ISO 14728-1 标准定义 Radial load, invariable in size and direction, which can theoretically be absorbed by a linear roller bearing for an expected life of 100 km of covered distance. 径向载荷，大小和方向不变，理论上可以被直线滚柱导轨在100Km距离的预期使用寿命上吸收。
Static load value C ₀ 静载荷值 C ₀	Definition according to the DIN ISO 14728-2 standard 根据 DIN ISO 14728-2 标准定义 Static load in load direction, which corresponds to a stress of 4000 Mpa, calculated in the centre of the contact point that is more subject to the load between the rolling element and the sliding way. 在负载方向相当于4000Mpa的压力的静载荷，以更容易受滚动单元与滑道之间的载荷的接触点为中心来计算。
Torsional moment of dynamic load M _t 动载荷扭矩 M _t	Comparison dynamic moment around the longitudinal axis X that causes a load equalling the dynamic load value C. 对照在水平X轴周围的动力矩，产生一个平均负载动载荷C。
Moment of dynamic longitudinal load M _L 水平动载荷扭矩 M _L	Comparison dynamic moment around the cross axis Y or the vertical axis Z that causes a load equalling the dynamic load value C. 对照在横轴Y和垂直轴Z的周围的动力矩产生一个平均负载动载荷C。



Torsional moment of static load M_{t0} 静载荷扭矩 M_{t0}	Comparison static moment around the longitudinal axis X that causes a load equalling the static load value C_0 . 对照在水平轴X周围的静力矩产生一个平均负载静载荷 C_0 .
Longitudinal moment of static load M_{L0} 水平静载荷扭矩 M_{L0}	Comparison static moment around the cross axis Y or the vertical axis Z that causes a load equalling the static load value C_0 . 对照在横轴y或者垂直轴z周围的静力矩产生一个平均负载静载荷 C_0 .

To correctly design the recirculating linear roller bearing monoguide, the following instructions must be followed.

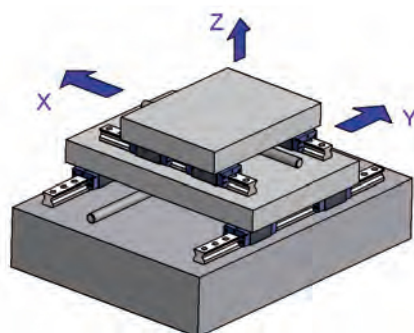
为了正确地设计循环滚柱直线导轨，必须遵守以下说明。

How to establish external forces and moments

怎样才能确定外力和力矩

The needs for accuracy, quality of surface finishing and of production cycle times influence the design of the monoguide.

对精度，加工表面的品质和生产周期的要求都会影响到导轨的设计



In modern mechanical industries, the maximum allowed elastic deformation is strictly connected to the size of the selected guide.

在现代机械工业中，允许的最大形变量是与所选的导轨尺寸紧密相关的

To calculate the life and the deformations, you must detect all external forces and the moments that influence the system according to the relevant value, direction and application point.

为了计算使用寿命和形变量，您必须根据有关数值、方向和作用点来检测所有影响系统的外力和力矩。

When establishing the total equivalent stress, you must take into consideration maximum loads and instant impact stresses, too.

当总的等效应力确认后，您也必须考虑最大的负载和瞬间冲击应力。

Distribution of forces and moments over the individual carriages

单个滑块上的力和力矩的分布

In preload conditions (almost constant stiffness), the force components that influence the carriages (traction, compression and side forces) can be calculated by using well-known mechanics formulas, by taking into consideration the crosswise and longitudinal distance of the carriages.

在有预载荷的情况下（刚度几乎恒定），考虑到滑块横向和纵向间隔，影响滑块力的组合（拉力，压力和侧向力）能够通过使用众所周知的力学公式计算出来。

Equivalent bearing stress

平均支撑应力

To calculate the life, every partial stress generated by a load will be summarised in the so-called equivalent bearing stress F_r .

为了计算使用寿命，每个部分由负载所产生的力将被相加成为平均支撑应力 F_r

An external load, which rests on the carriage with any inclination, will be split up into the components F_y and F_z with the following formula:

一个作用在滑块上任意倾角的外部负载，可以被分解成力 F_y 和 F_z ，如下列公式所示：

$$F_r = \sqrt{F_y^2 + F_z^2}$$

F_r Equivalent bearing stress (N)
平均支撑应力

F_y Value of the external force over the carriage into the Y direction (N)
Y轴方向上作用在滑块上外力的值

F_z Value of the external force over the carriage into the Z direction (N)
Z轴方向上作用在滑块上外力的值

How to establish preloads and displacements 如何确定预载荷和位移

To increase the stiffness and the accuracy of a guide system, it is advisable to use preloaded carriages. The selection criteria are listed on page 17.

为了增加刚度和导轨系统的精度，应当使用带预载荷的滑块。选择的标准在第17页上列举。

The forces that influence the carriages cause the deformations that can be quantified by the stiffness diagrams on page 24.

造成滑块形变的力可以在第24页的刚度表量化。

How to calculate the life 如何计算使用寿命

The forces that act over the monoguide, the selected preload value, the dynamic load C and the life probability are the factors that influence the relevant life.

作用在单导轨上的力、选定的负载值、动载荷C和寿命率都是影响使用寿命的因素。

Actual load of the equivalent bearing P 平均支撑P的实际负载

To establish the actual load of the equivalent bearing P, you must consider the carriage preload, too.

为了确定平均支撑P的实际负载，您同时必须考虑滑块的预负载。

F_r Equivalent bearing stress (N)
平均支撑力 (N)

F_{pr} Preload force ($F_{pr} = C \cdot P\%$) (N)
预载荷力 ($F_{pr}=C \cdot P\%$) (N)

P Equivalent actual load (N)
平均实际载荷 (N)

<p>If the load applied over the carriage is higher than the preload force by 2.9 times, the carriage will have no preload. In this case, the preload force will not influence the relevant life.</p> <p>如果作用在滑块上的载荷比预载荷大2.9倍，那么滑块上将没有预载荷。在这种情况下，预载荷力将不会影响寿命。</p>	<p>With $F_r \geq 2.9 \cdot F_{pr}$</p> <p>$P = F_r$</p>
<p>If the applied load is lower than 2.9 times compared with the preload force, part of the latter will join the actual load of the equivalent bearing P.</p> <p>如果外负载与预载荷相比小于2.9倍，那么后者的一部分将加入等量支撑P的实际负载。</p> <p>In case of limited loads, it is necessary to keep part of the preload, thus assuring the rolling of the rollers and preventing slipping phenomena.</p> <p>在极限负载中，保持部分的预载荷是十分必要的，以此来确保滚子的滚动不会产生打滑的现象。</p>	<p>With $F_r < F_{pr} \cdot 2.9$</p> <p>$P = F_{pr} + 0.66 \cdot F_r$</p>

A continuous variation of the applied load causes the rollers to lift and lower over the sliding way, thus damaging the carriage.

外加负载的连续变化造成了滚子在滑道上上下震动，导致了滑块的损害。

Equivalent dynamic load with different applied load values 不同外负载值的等量动载荷

When calculating the equivalent dynamic load, a constant force F is assumed for each partial passage lk .

当计算平均动载荷时，一个恒定的力F，被假设在每一段的 lk 上

$$P = \sqrt[10]{\frac{P_1^{10}}{100\%} \cdot \frac{lk1}{100\%} + \frac{P_2^{10}}{100\%} \cdot \frac{lk2}{100\%} + \dots + \frac{P_n^{10}}{100\%} \cdot \frac{lkn}{100\%}}$$

P Equivalent actual load (N)
平均实际负载 (N)

P_{1-n} Values of the loads to be found during the performance (N)
运行期间的负载值 (N)

lk_{1-n} Application stroke fraction concerning P_{1-n} (%)
有关 P_{1-n} 应用行程部分的百分比 (%)

Calculation of the life – life expectancy 使用寿命的计算——预期寿命

The load capacities for the rolling bearings are specified according to the DIN ISO standards, so that the life formula gives a value that can be overcome with a probability of 90%. If it is not sufficient, the life values must be reduced with a factor a_1 according to the following table.

滚动导轨的负载能力按照DIN ISO的标准，以此公式计算得到的导轨寿命值的准确率为90%。如果准确率不够，寿命值必须根据以下表格来减少 a_1 因数。

Life expectancy % 预期寿命(%)	90	95	96	97	98	99
a_1	1.00	0.62	0.53	0.44	0.33	0.21

Expected life in metres 预期寿命长度

$$L = a_1 \cdot \left(\frac{C}{P} \right)^{\frac{10}{3}} \cdot 10^5$$

L	Expected life (m)	预期使用寿命 (m)
C	Dynamic load value (N)	动载荷 (N)
P	Equivalent actual load (N)	平均实际负载 (N)
a_1	Life expectancy	预期寿命

If the length of the stroke s and the frequency of the strokes n are constant for the entire life, the following formula can be used to establish the life in working hours.

如果行程的长度 s 和行程的频率 n 对于总的使用寿命是恒定不变的，那么以下的公式就能够确定工作的小时数。

$$L_h = \frac{L}{2 \cdot s \cdot n \cdot 60} = \frac{L}{60 \cdot v_m}$$

L_h	Expected life (h) 预期使用寿命 (h)
L	Expected life (m) 预期使用寿命 (m)
s	Length of the stroke (m) 行程长度 (m)
n	Frequency of the strokes (min ⁻¹) 行程频率 (min ⁻¹)
v_m	Average displacement speed (m/min) 平均位移速度 (m/min)

Calculation of the static safety coefficient 静态安全系数的计算

The equivalent static load P_0 should keep well below the value of the allowed static load C_0 .

平均静载荷 P_0 应该被保持在允许的静载荷 C_0 值之下。

The coefficient S is defined as the ratio between the nominal static load C_0 and the equivalent static load P_0 , and quantifies the safety against permanent deformations of the rolling elements and the slide ways.

系数 S 是常规静载荷 C_0 和平均静载荷 P_0 之间的比值，量化了滚动部件和滑轨的永久形变量的安全系数。

Basically, as for the deformation of the rolling surfaces, it is the maximum value of the stress, which can also be very short.

基本上在滚柱表面的形变都是压力的最大值造成的，即使那是十分短暂的。

Expected life 预期寿命

$$S_0 = \frac{C_0}{P_0}$$

Conditions of use 使用条件	S_0
Maximum stiffness, great impact stresses and vibrations 最大刚度，巨大的冲击应力和振动	≥ 6
High stiffness, variable and average impact stresses, vibrations 高刚度，变动和平均冲击应力，振动	≥ 4
Uniform stresses, light vibrations 均匀的压力，较小的振动	≥ 3

$$P_0 = |F_y| + |F_z| + C_0 \cdot \frac{|M|}{M_{r0} / L_0}$$

S_0 Static safety coefficient
静态安全系数

C_0 Static load value (N)
静载荷值 (N)

P_0 Equivalent static load value (N)
平均静载荷值 (N)

$F_y F_z$ External static forces (N)
外部静力 (N)

M Dynamic load moment in the directions X, Y, Z (Nm)
在X、Y和Z轴方向上的静载荷力矩 (Nm)

$M_{r0} M_{L0}$ Allowable cross or longitudinal static moment in one carriage (Nm)
在滑块上允许的横向和纵向的静力矩 (Nm)

3.2 Calculation programme to design the monoguide 导轨设计的计算程序

The calculation mode to design the monoguide that is described in paragraph 3.1 is extremely complex and can be used only for simple applications. For this reason, Rosa Sistemi offers a computerized calculation service to its own Customers to simplify the manual calculation of the formulas.

在章节3.1中描述的设计单轨的计算方式十分复杂而且只能用于简单的应用中。由于这个原因，罗萨集团为它自己的客户提供了电脑计算的服务，以此简化人工的计算过程。

Results that can be obtained with the calculation programme 结果可以通过计算程序得到

- Necessary size / dimension 必要的尺寸 / 规格
- Optimal preload 最佳的预载荷
- Elastic displacement of the work point by effect of the applied loads
由外负载产生的工作点的弹性位移
- Expected life 预期寿命
- Static load safety factor 静载荷安全系数

The elastic displacement calculation takes into consideration the actual non-linear stiffnesses of the individual carriages.

弹性位移的计算需要考虑到单个滑块实际的非线性刚度。

The elastic displacements due to thermal expansions and elastic deformations of machine structure are not taken into consideration.

由热膨胀和机械结构造成的弹性位移将不被考虑。

Necessary data for the calculation programme 计算程序必须的数据

- Dimensions of all machine axes and items to be processed
所需加工的所有机械轴和零件的尺寸
- Position of barycentres
重心位置
- Geometry of the guides with indication of the number of guides and carriages, longitudinal and crosswise centre distances of the carriages
导轨的几何形状以及关于导轨和滑块的数量的说明，滑块的纵向和横向中心距离。
- Position of the axes in the space and of the distances one to the other (distances of the reference points of the adjacent axes)
轴的空间位置以及两轴之间的距离（相邻两轴参考点之间的距离）
- Position of transmission elements compared with the corresponding reference point of the axis
传动元件的位置与相应轴的参考点之间的比较
- Position of the loads (moments and forces application points)
负载的位置（力矩和力的作用点）
- Strokes of all axes
所有轴的行程
- Speed and accelerations of the axes
轴的速度和加速度
- With different loads: overall loads with speed, acceleration, stroke and percentage time value, size and direction of the forces and the moments that influence the work point according to each individual applied load.
有不同的负载：包括速度、加速度、行程和时间百分比值、尺寸和力的方向的所有负载以及根据单个负载影响作用点的力矩。

As an example of the necessary data for a correct design, see the tables and the drawings below.
 举一个正确设计所需必要数据的例子，看以下的表格和图形。

Data sheet for an X-Y system X-Y系统数据一览表

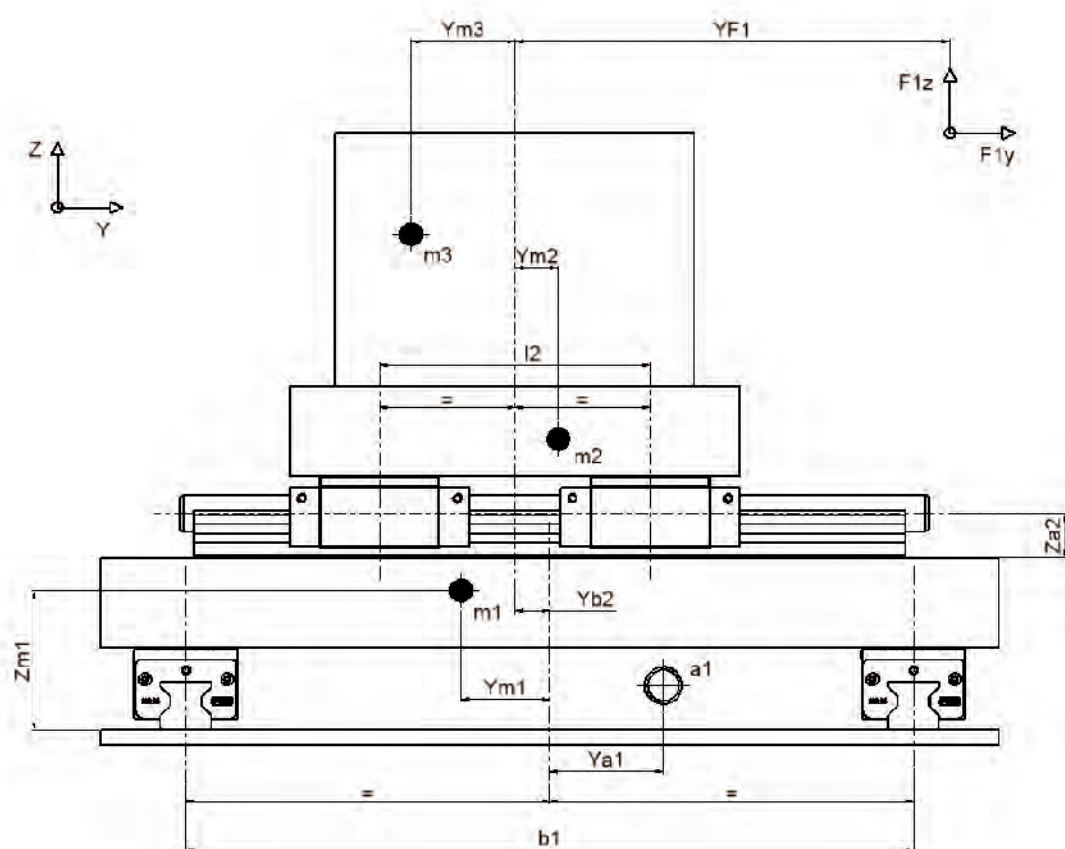
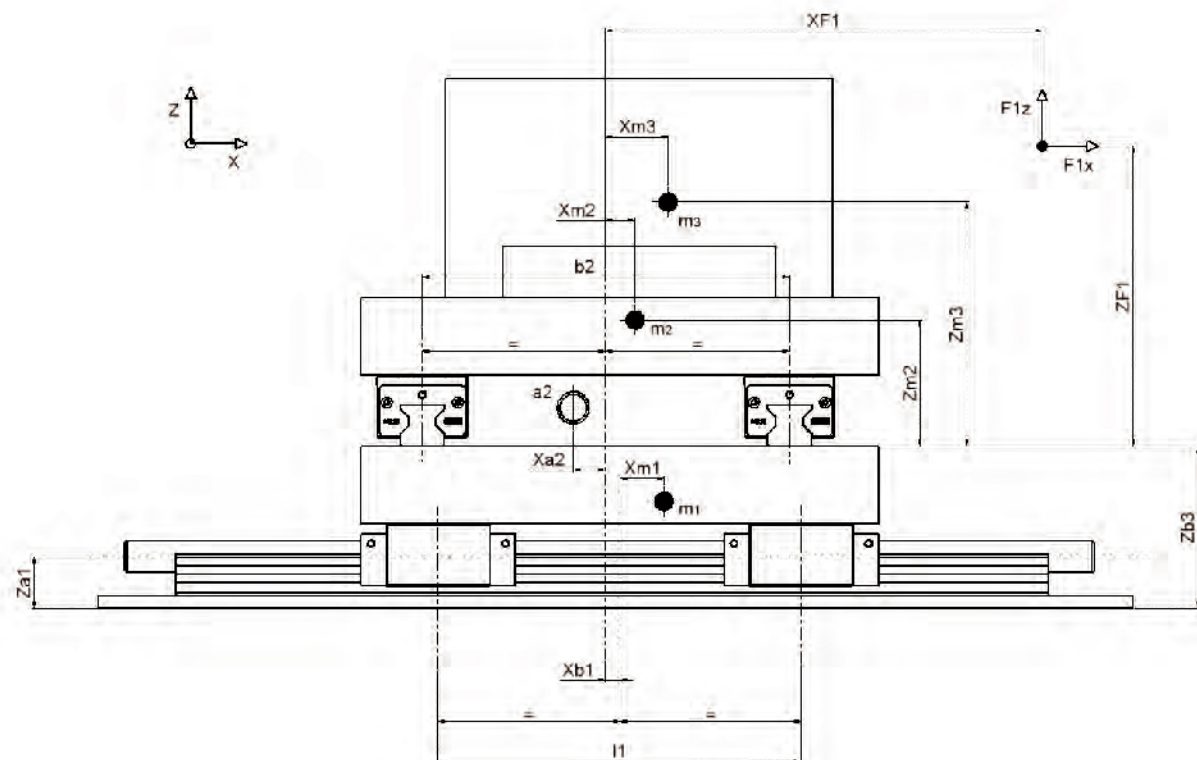
Dimensions 规格							
m_1		N	m_2		N	m_3	N
Barycentres 重心							
x_{m1}		mm	y_{m1}		mm	z_{m1}	mm
x_{m2}		mm	y_{m2}		mm	z_{m2}	mm
x_{m3}		mm	y_{m3}		mm	z_{m3}	mm
Geometry of guides/carriages 导轨/滑块的几何形状							
l_1		mm	l_2		mm		
b_1		mm	b_2		mm		
Position of the guides 导轨的位置							
x_{B1}		mm	y_{B2}		mm	z_{B3}	mm
Position of the transmission 传动的位置							
y_{A1}		mm	z_{A1}		mm		
x_{A2}		mm	z_{A2}		mm		
Force application point 力的作用点							
x_{F1}		mm	y_{F1}		mm	z_{F1}	mm
Stroke 行程							
s_x		mm	s_y		mm		
Acceleration 加速度							
a_x		m/s^2	a_y		m/s^2		

Application of forces and acting moments 力的作用和作用力矩

Nr	Cicles 循环	F_x (N)	F_y (N)	F_z (N)	M_x (Nm)	M_y (Nm)	M_z (Nm)
1							
2							
3							
4							

Working cycle (stroke/time) 工作循环 (行程/时间)

Nr	X轴速度 Speed of axis X v (m/min)	时间 Time t (%)	行程 Stroke s (mm)	Y轴速度 Speed of axis Y v (m/min)	时间 Time t (%)	行程 Stroke s (mm)
1						
2						
3						
4						



4.

配件

ACCESSORIES

Monoguide accessories 单轨道配件



Plastic caps TPMG 塑料螺纹盖 TPMG

They are used to cover the fastening holes of the guide and are included in the standard supply. The caps should not be used in case of metal chips, especially if they are hot; indeed, it is advisable to use the caps with protected axes or in environments that are not very dirty.

它们用于覆盖导轨的螺纹孔，属于标准配件。这种螺纹盖在有金属屑特别是高温金属屑的情况下不能使用。实际上，建议在密封轴或者在不太脏的环境下使用这种保护盖。



Brass caps TOMG 铜螺纹盖 TOMG

They are used in case of thermal and mechanical stresses, metal chips or rather if an absolutely smooth guide surface is required. They are supplied on demand in the order.

它们在需要耐热和有机械应力，金属碎屑或者需要绝对光滑的导轨表面的情况下使用。它们是根据客户的要求来提供的。



Steel caps TAMG 钢质螺纹盖 TAMG

They are used in case of high thermal or mechanical stresses or in working environments characterised by chip removal.

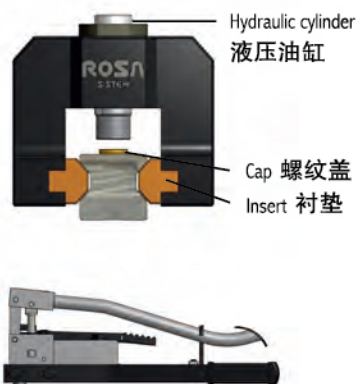
它们在高温或者高机械应力以及有去除碎屑的环境里使用。

The covering cap includes a cap and a pressure collar supplied apart. 螺纹盖包括了一个盖子和一个压力环分开提供。

Before installing the caps into the guide holes, both parts must be embedded. In order to correctly fix them, it is advisable to use the specific assembly tool DMT. They are supplied on demand in the order.

在把螺纹盖安装到导轨的螺纹孔前，两个部件都必须嵌入。为了正确的安装它们，应该使用专门的安装工具DMT。它们是根据客户需求来提供的。





Assembly tool for steel caps DMT 钢质螺纹盖安装工具 DMT

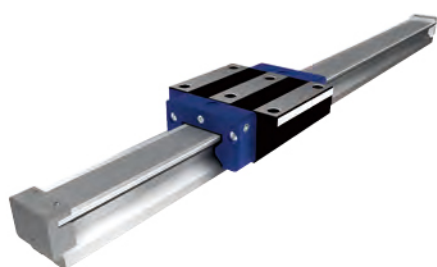
The assembly tool DMT is used to correctly assemble the steel caps that are introduced into the relevant holes. It is supplied on demand in the order.

安装工具DMT可以把螺纹盖装入螺纹孔中来进行正确地装配。这个工具根据客户的需求提供。

Strip to protect and cover the fastening holes of the guide 保护和覆盖轨道上固定孔的保护条

The use of the covering strip considerably simplifies the performance of the operations during the fastening of the monoguide.

使用密封条大大地简化了固定单轨的操作过程。



After having assembled and aligned it on the bedplate of the machine, the protection strip will be introduced into the groove of the guide, and then fastened with two heads at the ends.

把它装配到机床床身上以后，保护条将被嵌入到导轨的凹槽中，然后在两端用两个铆钉固定住。

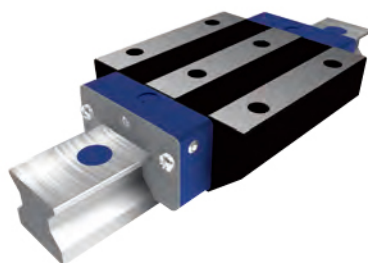
Advantages 优势:

- Corrosion-resistant material (stainless steel)
防腐蚀材料 (不锈钢)
- Particularly tough configuration thanks to the increased thickness
由于增加了厚度而特别坚固的结构
- Anchoring to a special precision groove and fastening to the ends with two closing heads
嵌入有特别高精度的凹槽中并在两端用两个铆钉固定
- Prevents closing caps from being used, thus considerably reducing the general assembly times and makes the wiping action more effective
保护关闭的螺纹盖不被使用，使得总装配时间减少并使得滑动接触更有效率

End seal TPA 末端密封 TPA

The stainless steel wiper protects the scraper rings that are built-in in the front heads of the carriage and for possible additional end seals TPNBR/TPVIT.

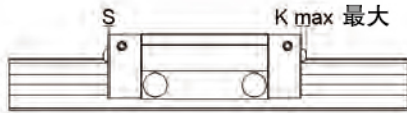
不锈钢刮刀保护了嵌入滑块前端的刮油环和在必要的情况下增加的末端密封 TPNBR/TPVIT。



In particular, it is effective in the presence of hot chips and coarse dirt particles thanks to the minimum clearance between the wiper and the guide.

由于导轨和刮片之间的间隙很小，特别是在有高温碎屑和大颗粒的尘埃的情况下这个系统能十分有效地发挥作用。

Dimensions according to the table below. 尺寸根据下列表格



Size 尺寸	S	K
25	1	2.6
35	1	3.3
45	1.5	4
55	1.5	4.8
65	2	4.8



Additional end seal TPNBR/TPVIT 附加的末端密封 TPNBR/TPVIT

The end seals TPNBR and TPVIT offer an effective additional protection to the monoguides that work in very dirty environments. They can be directly assembled on the carriages without the need to disassemble the latter.

末端密封TPNBR和TPVIT为单轨在十分脏的环境下运行提供了一个十分有效的额外保护。它们可以直接安装到滑块上而不用把滑块拆开。

Features of the NBR version

NBR型的特点

- Excellent stability in the presence of oil
在油性工作环境下极好的稳定性
- Excellent mechanical features
出众的机械性能
- Working temperature from -30°C to +110°C
工作的温度从-30°C 到+110°C

Features of the VITON version

VITON型的特点

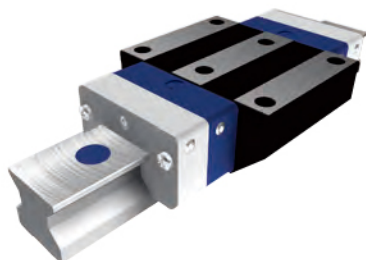
- Excellent stability in the presence of aggressive coolants and oils
在强效制冷剂和油性工作环境下极好的稳定性
- Excellent mechanical features
杰出的机械性能
- Working temperature from -30°C to +200°C
工作的温度从-30°C 到+200°C

The TPNBR/TPVIT end seals can be used together with the metal TPA end seal.
TPNBR/TPVIT末端密封可以和金属TPA末端密封一起使用。



Size 尺寸	S2	K
25	6	2.6
35	6	3.3
45	6	4
55	6	4.8
65	6	6.2

Long-life lubrication cartridge TLL 长时间润滑盒 TLL



The cartridge TLL allows a capillary lubrication of the slide ways by using minimum quantities of lubricant. Indeed, by using a special synthetic material, just the necessary quantity of lubricant flows: this way, the re-lubrication time will be extended as much as possible.

TLL润滑盒可以使用最小量的润滑油对滑轨进行微量润滑。甚至通过使用特殊的合成材料，使得润滑流量正好满足需求：这样可以尽可能地使再次润滑的周期延长。

It is advisable to use it in dry and clean environments, always in combination with the steel wipers TPA.

它应当在干净而且干燥的环境下使用，总是和钢质刮片TPA一起使用。

- For a correct functionality, it is advisable to use two cartridges TLL for each carriage (one on each side)
为了正确地发挥效用，在每个滑块上都应该用两个润滑盒TLL（滑块端上一边一个）
- The distribution of the lubricant is assured in all assembly positions
润滑确保能够被分配到各个装配位置上
- The cartridges TLL can be recharged
润滑盒TLL是可以被再次添装的
- Use only high-quality mineral oil DIN 51517 CLP or DIN 51524 HLP with ISO VG 220 viscosity
只使用高质的矿物油DIN51517或者DIN51524 HLP粘度为ISO VG220
- Lubrication interval up to 5000 km or maximum every 12 months (variable according to the use)
润滑间隔可以大到5000km或者最多12个月（具体根据使用的情况）
- Reduction of the costs relating to the lubrication system
降低润滑系统的成本
- Low environmental impact thanks to a minimum consumption of lubricant
由于使用了最少量的润滑剂对环境的污染较小

The TLL lubrication units should not be used in the presence of lubricating oil-coolants in direct contact with the guides.

TLL润滑系统不能被用在油冷却与导轨直接接触的环境。



Size 尺寸	S1	K
25	17	2.6
35	20	3.3
45	23	4
55	27	4.8
65	28	6.2



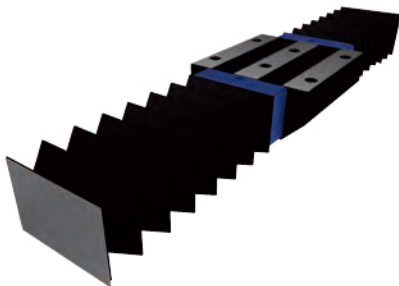
LinClamp clamping systems 线性夹持系统

LinClamp clamping systems were designed for static and dynamic locks (emergency).

线性夹持系统是为进行静态和动态的锁定（紧急情况）设计的

- Pneumatic compact system (6 bars)
气动的紧凑系统（6条）
- Active (locking with air) or passive (locking with no air) system
主动（气体锁定）或者被动（无气体锁定）系统
- Excellent locking ability even in case of grease
在脂润滑的情况下也有出色的锁定能力
- Available for all sizes
可以用于所有的尺寸
- Lower costs compared with hydraulic and electric solutions
相比液压和电气的解决方案有着较低的成本

For further information, call Rosa Sistemi's engineering department.
需要更多的信息，请联系罗萨集团工程部门



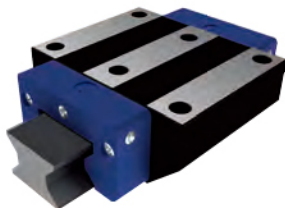
Bellows 风箱式防尘罩

The bellows are used as an additional protection against dust and water splashes.

风箱式防尘罩是一个额外的保护装置，用来防止灰尘和水的飞溅

For further information and designs, call Rosa Sistemi's engineering department

需要更多的信息，请联系罗萨集团工程部门



Assembly guide 装配轨道

The plastic-material assembly guide is used to transport the carriage and if it is necessary to remove the latter from the monoguide.

这种塑料材质的装配轨道是在运输滑块或者有必要将滑块从单轨上拆卸时使用的。

Always leave the assembly guide in the carriage to prevent losing the rollers and as a dust protection.

始终把装配轨道放在滑块内可以保护滚子不丢失以及防止灰尘的进入。

5.

润滑

LUBRICATION

- | | | |
|----|-------------------------|------|
| 1. | Greasing | 脂润滑 |
| 2. | Oiling | 油润滑 |
| 3. | Lubrication accessories | 润滑附件 |

The front head of the carriage is a particular and innovatory feature of Rosa Sistemi's monoguide. Indeed, each distribution channel is equipped with a check valve that allows the lubricant to be dosed and taken to the slide ways with minimum pulses in any assembly position.

滑块的前部是罗萨集团导轨一个独特和创新的特色。同时每个流通的通道都装配有一个单向阀使得润滑油可以以最小的频率来润滑到导轨的每个装配位置。

Lubrication 润滑

Suitable lubrication assures the correct operation of the guide. Indeed, the lubricant protects against corrosion and polluting agents, thus reducing wear and friction. You can use oil, grease and liquid grease (low viscosity).

合理的润滑能确保导轨运作正常。同时，润滑保护导轨不受腐蚀和污染也减少磨损和摩擦。您可以使用润滑油，润滑脂，以及液体润滑脂（低粘度）。

Delivery condition 交货情况

At delivery, the carriages and the guides are protected with high-quality semi-synthetic oil. This protection is sufficient to perform the first assembly. Before the commissioning, you must perform the first lubrication of the carriages according to the following instructions.

在交货时，滑块以及导轨被高质量的半合成机油保护着。这个保护对进行第一次装配是足够的。在试运转前，您必须根据所给的说明对滑块进行第一次的润滑。

Warning 警告

If you use a centralized lubrication system, the adapter and the oil input nipples will not be included in the supply. The standard supply includes one grease nipple per carriage.

如果您使用集成润滑系统，将不提供适配器和润滑油注入口。每个滑块标准的配置包含一个油脂注入口。

Lubrication fitting 润滑装置

The front heads of the carriage are equipped with several lubrication points located in the front and on the sides, and provided with the relevant M6 thread. The aforesaid holes, at delivery, are closed by means of grub screws.

在滑块的前边和侧边的位置上装配有几个润滑点，并配有相应M6的螺纹。这些孔在发货的时候是用平头螺纹进行密封。

On the top of the front head there is a fitting for the additional top lubrication. Upon demand, the carriages will be supplied with specific O-rings and adapters. As for the thicknesses and the dimensions, see paragraph 2.10 on page 21.

在前端的顶部有用于额外顶部润滑的装置。根据需求，滑块将提供特殊的O型圈和适配器。具体的厚度和尺寸，见21页章节和2.10。

Greasing: features and advantages 脂润滑：特点和优势

- Recommended grease type K (fluid grease with density class NLGI 0/1/2, according to the DIN 51825 standard)
推荐K型号润滑脂（液体的润滑脂的密度等级为NLGI 0/1/2，根据标准 DIN 51825
- Longer lubrication intervals according to the features of lubricating greases
根据脂润滑的特点有较长的润滑间隔
- Reduction of operation noise
减少运行的噪声
- Increased heating at high speeds
在高速运行时增加热量
- Increased translation force compared with oiling
比油润滑增加更多的平移力

Initial lubrication before the start-up 启动前的最初润滑

Immediately after the assembly, the carriages must be lubricated with the quantities that are specified in the table. During the greasing operation, move the carriage for a stroke that at least corresponds to three times its own length.
在装配以后，必须马上根据表格中的量来给滑块加注润滑剂。在油脂润滑操作的过程中滑块至少滑动相当于其长度三倍的行程距离。

润滑量 Quantity cm ³ / carriage	MG25	MG35	MG45	MG55	MG65
LC/SC	1.9	2.9	5.3	8.4	15
LL/SL	2.2	3.7	6.6	10.6	18.9

Following lubrication 后续的润滑

The table specifies the correct values.
表格指定了正确的值

润滑量 Quantity cm ³ / carriage	MG25	MG35	MG45	MG55	MG65
LC/SC	0.5	1.2	2.2	3.2	5.9
LL/SL	0.6	1.4	2.6	4	7.4

In case of short stroke (shorter than twice the length L of the carriage), apply a double quantity of lubricant by means of 2 lubrication points (one per each head)
在行程比较短的情况下（小于滑块两倍长度L），通过两个润滑口（每个端口一个）的方式来提供双倍的润滑。

Following lubrication interval 后续润滑的间隔

Grease quantity according to the table
润滑量根据表格

Load 负载	MG25	MG35	MG45	MG55	MG65
C/P > 8	800 km	500 km	300 km	200 km	100 Km
5 ≤ C/P < 8	500 km	300 km	150 km	100 km	50 Km
3 ≤ C/P < 5	200 km	150 km	80 km	50 km	25 Km
2 ≤ C/P < 3	120 km	80 km	40 km	25 km	15 Km

5.2 Oiling 油润滑

Oil 润滑油

It is advisable to use the following oil types:
应当使用以下润滑油型号：

- Mineral oil according to the DIN 51517 standard, type CLP, or according to the DIN 51524 standard, type HLP
DIN 51517标准下的CLP矿物油或者DIN 51524标准下的HLP矿物油。
- Viscosity range: from ISO VG 68 to ISO VG 220
粘度范围：从ISO VG 68 到 ISO VG 220

Initial lubrication before the start-up 启动前的最初润滑

Immediately after the assembly, the carriages must be lubricated with the quantities that are specified in the table; move the carriage for a stroke that at least corresponds to three times its own length.
在装配以后，必须马上根据表格中的量来给滑块加注润滑剂。至少要滑动相当于其长度三倍的行程距离。

油润滑量 Oil quantity cm ³ /carriage	MG25	MG35	MG45	MG55
	0.8	1.0	1.4	1.8

All carriage types 所有滑块型号

In case of short stroke (shorter than twice the length L of the carriage), apply a double quantity of lubricant by means of 2 lubrication points (one per each head).

在行程比较短的情况下（小于滑块两倍长度L），通过两个润滑口（每个端口一个）的方式来提供双倍的润滑。

油润滑量 Oil quantity cm ³ /carriage	MG25	MG35	MG45	MG55
C/P ≥ 8	400 km	250 km	125 km	100 km
cm ³	1.2	1.2	1.2	1.5
5 ≤ C/P < 8	250 km	180 km	90 km	60 km
cm ³	0.7	1.0	0.9	1.2
3 ≤ C/P < 5	100 km	80 km	40 km	30 km
cm ³	0.4	0.6	0.45	0.5
2 < C/P < 3	40 km	30 km	20 km	15 km
cm ³	0.2	0.25	0.25	0.25

Minimum quantity of oil allowed by impulse 冲击力所允许的最小的润滑油量

cm ³ / Impulse 冲击力	MG25	MG35	MG45	MG55
horizontal 水平	0.06	0.1	0.1	0.16
vertical 垂直	0.06	0.1	0.1	0.16
crosswise 倾斜	0.08	0.15	0.15	0.25



In case of oiling, M6 holes for the lubrication that are not used in the front head of the carriage must be hermetically sealed.

在油润滑的情况下，滑块前部的未使用的M6润滑孔必须完全封闭。



If you use lubricants other than the specified ones, you must take into consideration the need to reduce the re-lubrication intervals, the reduced performances in terms of strokes performed and the load capacity, as well as the possible chemical interactions between plastics and lubricants.

如果您使用非规定种类的润滑剂，必须考虑到再次润滑的周期的缩短，运行过程中性能以及负载能力的下降，同时要考虑塑料和润滑剂之间有可能产生的化学反应。



The lubricants that contain solid particles (graphite or MoS₂) should never be used.

请勿使用含有固体颗粒的润滑剂（石墨或者二硫化钼）。



In particular conditions of use, such as dirt, use of lubricating-oil-coolant, vibrations or impact stresses, you must adapt the quantities of lubricant to the real working conditions. Indeed, the quantities of lubricant that are specified in the tables refer to ideal conditions of use.

在特殊的使用条件下，如多尘、使用油冷却、有振动或者冲击应力的情况下，您必须改变润滑剂的量来适应工作条件。在表格中所规定的润滑剂的量是参考理想工作条件的使用量。

As for the applications in aseptic and vacuum environments, food industry, etc. please call our engineering department.

至于在无菌的或者真空条件环境下使用，使用于食品工业等等，请联络我们的工程部门。



A following change from grease to lubricating oil is possible, but you need to connect to the front head of the carriage that was not previously used (as the lubrication channels full of grease may prevent the oil from flowing)

从脂润滑换成油润滑是可以实现的，但是您必须连接先前未使用的滑块的前端润滑口（因为润滑通道充满了润滑脂可能使润滑油不能顺畅流动）。

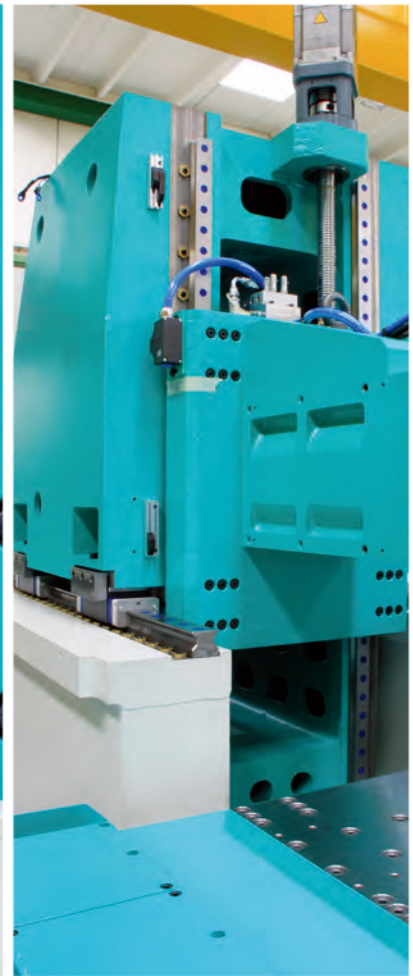


In case of greasing, the lubricant must be replaced no matter how after two years due to grease ageing.

在脂润滑的情况下，由于润滑剂老化，在使用两年后无论如何必须更换。


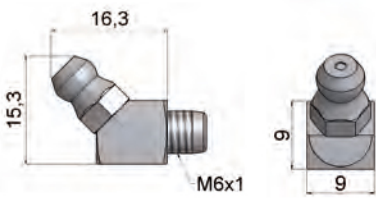
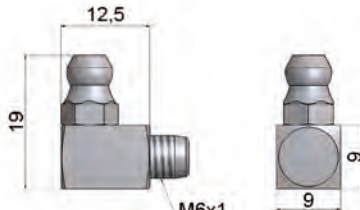
Horizontal and vertical axes on Rosa Erando SpA grinding machine.

罗萨集团生产的磨床上的水平和垂直轴

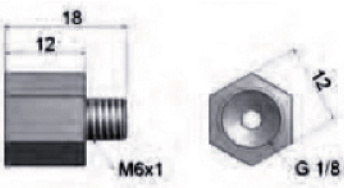
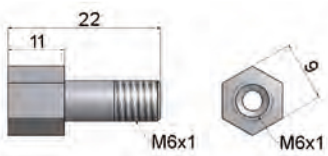

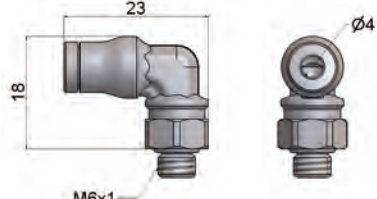


5.3 Lubrication accessories 润滑附件

Grease nipples
润滑脂注入口

	<p>润滑脂注入口 (包括在所有的配置中) Lubrication nipple (included in all supplies)</p>
	<p>45° 润滑脂注入口 45° lubrication nipple</p>
	<p>90° 润滑脂注入口 90° lubrication nipple</p>

Fittings
配件

	<p>减小配件 Reduction fitting G 1/8 – M6</p>
	<p>连接配件 Connecting fitting</p>
	<p>直线快速接头 Straight quick coupling</p>
	<p>可调节90° 快速接头 Adjustable 90° quick coupling</p>

Quick couplings
快速接头



6.

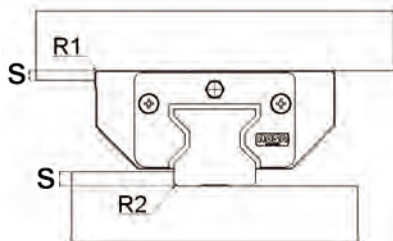
安装和装配

INSTALLATION AND ASSEMBLY

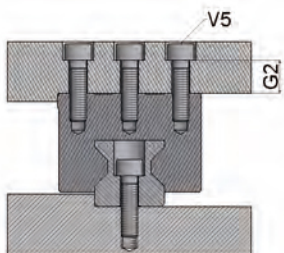
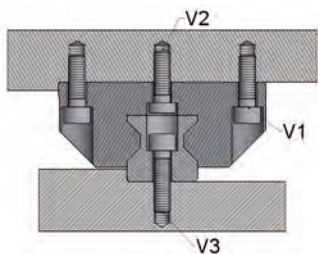
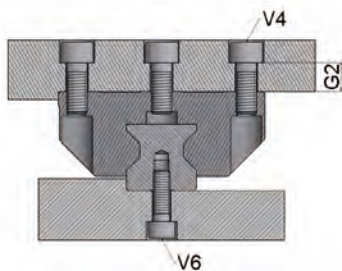
- | | | |
|----|-------------------------------|---------|
| 1. | Fastening instructions | 安装说明 |
| 2. | Accuracy of assembly surfaces | 装配表面的精度 |
| 3. | Assembly | 装配 |

6.1 Fastening instructions 安装说明

Structure of shoulder surfaces
横截面结构



Installation/Fastening screws
安装/紧固螺钉



Size 型号	Measures 测量尺寸(mm)		
	s	R1	R2
25	5	0,8	0,8
35	6	0,8	0,8
45	8	0,8	0,8
55	10	1,2	1,0
65	10	1,5	1,5

To assure maximum stiffness to the carriage (according to the diagrams on page 24-31), it is absolutely necessary to use all fastening holes.
为了确保滑块的最大刚度（根据在24-31页的图表），使用所有的紧固孔是绝对必要的

The carriages can be fastened in two ways 滑块可以通过两种方式来固定：

- Use of threaded holes as shown in fig.1 – fig.3.
This method is preferable, as it leads to a stiffer fastening as the thread allows using a screw with a bigger diameter.
使用图1-图3的螺纹孔
这种方式更可取，因为这个螺纹可以使用更大直径的螺钉使得固定更牢固。
- Use of the pass-through holes as in fig.2. In this case, as far as the central fastening holes are concerned, you must use specific socket-head screws according to the DIN 6912 standard.
如图2中使用通孔。在这种情况下，就中心固定孔而言，您必须使用根据DIN 6912标准的特殊凹头螺钉。

In case of considerable loads, suitably check the fastening of the guide to the bedplate. 对一些重要的负载，适当地检查导轨与床身之间的固定

Size 尺寸	G2	Dimension of the screws for the carriages 滑块螺钉规格			
	(min)	V1	V2	V4	V5
		ISO 4762	ISO 6912	ISO 4762	ISO 4762
		4 pieces	2 pieces	6 pieces	6 pieces
25	10	M6x20	M6x16	M8x20	M6x18
35	13	M8x25	M8x20	M10x25	M8x25
45	14	M10x30	M10x25	M12x30	M10x30
55	20	M12x40	M12x30	M14x40	M12x35
65	25	M14x45	M14x35	M16x45	M16x40
		Dimension of the screws for the monoguides 导轨螺钉规格			
				V3	V6
25				M6x30	M6x20
35				M8x35	M8x25
45				M12x45	M12x30
55				M14x50	M14x40
65				M16x60	M16x45

Allowable side force when there is no shoulder 在没有轴肩下所允许的侧向力

If no shoulder surface is provided for, the reference values for the maximum allowable side forces can be established with the help of the following table. The aforesaid values depend on the capacity of the dynamic load C, the type of fastening being used and the resistance class of the screws.

如果没有轴肩面，最大允许的侧向力的参考值可以通过下列表格确定。上述值取决于动载荷能力C，使用的固定方式以及螺钉的阻抗等级。

Resistance class 阻抗等级	Allowable side force (N) on the carriage without shoulder (Value with static friction coefficient $\mu=0,125$) 无轴肩滑块允许的侧向力 (N) (静摩擦系数 $\mu=0,125$)				
	M6	M8	M10	M12	M14
	6 screws	6 screws	6 screws	6 screws	6 screws
8.8	4400	8100	13000	19000	26000
12.9	7500	13800	21900	32000	44000
	Allowable side force (N) on the guide without shoulder (exercised by a carriage on the guide) 无轴肩导轨允许的侧向力 (N) (通过滑块在导轨上实验)				
8.8	3400	6200		13900	20000
12.9	5700	10600		23500	33700

Recommended tightening torques 建议的拧紧力矩

Resistance class 阻抗等级	Tightening torque (Nm) 拧紧力矩(Nm) For fastening screws DIN 912 / ISO 4762 坚固螺钉DIN 912/ISO 4762 Friction coefficient $\mu=0,125$ 摩擦系数 $\mu=0,125$					
	M6	M8	M10	M12	M14	M16
8.8	10	24	48	83	130	200
12.9	16	40	81	135	215	265

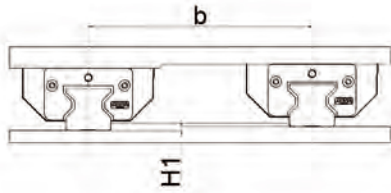


- Follow the instructions of the screw manufacturer: they will always be binding
遵从螺钉制造商的说明：它们将总是捆绑在产品上的。
- The screws according to the DIN 6912 standard, with socket head, must be tightened in compliance with the instructions for class 8.8
标准DIN 6912中带凹头的螺钉，必须根据说明中等级8.8来拧紧。
- If you use lubricating greases, the friction coefficient μ can be reduced even to half; therefore, the tightening torques must be proportionally reduced.
如果您使用油脂润滑，摩擦系数 μ 能够减小到原来的一半，因此拧紧力矩必须被成比例地减少。
- If you lubricate the fastening screws of the guides with grease and tighten them with a dynamometric wrench, you will obtain a more uniform tightening force, and thus a clear improvement of the sliding accuracy.
如果您使用润滑脂润滑导轨的坚固螺钉并使用测力扳手拉紧，您将获得更一致的拉紧力，这样可以在滑动精度上取得明显的改善。

6.2 Accuracy of assembly surfaces 装配表面精度

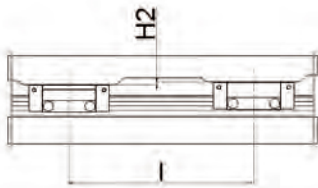
Maximum allowable deviation
in height

高度上允许的最大误差



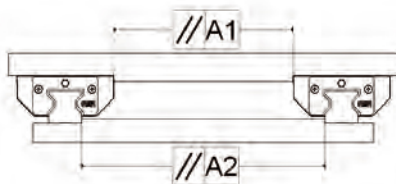
Maximum allowable deviation
in longitudinal direction

纵向允许的最大误差



Parallelism tolerance for
shoulder surfaces

轴肩表面的平行度公差



To obtain the maximum allowable deviation value in height, subtract the tolerance value of the dimension H (see the table about the accuracy classes on page 16) from the value $\Delta H1$ obtained by means of the following formula:
为了获得高度上允许的最大误差，去掉H长度上的公差值（见第16页的精度等级表）可以通过以下公式来得到 $\Delta H1$ 值。

$$\Delta H1 = X \cdot b$$

Calculation factor 计算系数	Preload class 预载荷等级	
	P2	P3
X	$1,7 \cdot 10^{-4}$	$1,2 \cdot 10^{-4}$

To obtain the maximum allowable deviation value in longitudinal direction, subtract the tolerance value of the dimension H (see the table about the accuracy classes on page 16) from the value $\Delta H2$ obtained by means of the following formula:

为了获得纵向上允许的最大偏差，去掉H长度上的公差值（见第16页的精度等级表）可以通过以下公式来得到 $\Delta H2$ 值。

$$\Delta H2 = Y \cdot l$$

Calculation factor 计算系数	Carriage type 滑块型号	
	LC/SC	LL/SL
Y	$4,5 \cdot 10^{-5}$	$3,5 \cdot 10^{-5}$

The specified tolerances are valid also for the guides and the carriages that are assembled without shoulders. The parallelism errors A1 and A2 cause an increase in the preload, but if the values specified in the table are not exceeded, their influence on the expected life will usually be negligible.

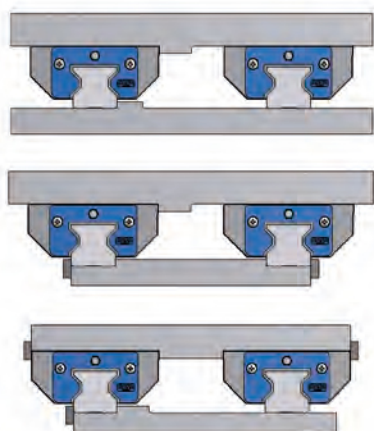
指定的公差对导轨和没有安装轴肩的滑块也同样有效。平行度A1和A2间的误差造成了负载的增加，但是如果这个增加的值没有超过表格中指定的值的时候，这个误差对使用寿命的影响是微不足道的。

Parallelism ΔA per preload class (mm) 每个预载荷等级的平行度 ΔA (mm)		
Size	P2	P3
25	0,008	0,005
35	0,012	0,008
45	0,014	0,009
55	0,017	0,011
65	0,018	0,011

6.3 Assembly types 装配

Assembly examples

装配范例



Some typical types of assembly are shown on the side. They differ as per the type of fastening for the carriage and the guide, as well as per the position of end stop surfaces in the machine.

在左边展示了一些典型的装配方式，它们是根据不同的滑块和导轨的固定方式以及在机床中末端面的位置来分类的。

Monoguide 单导轨

Both side supports of the guide can be used as a reference side.

每根导轨的支撑面都可以被用作基准面。

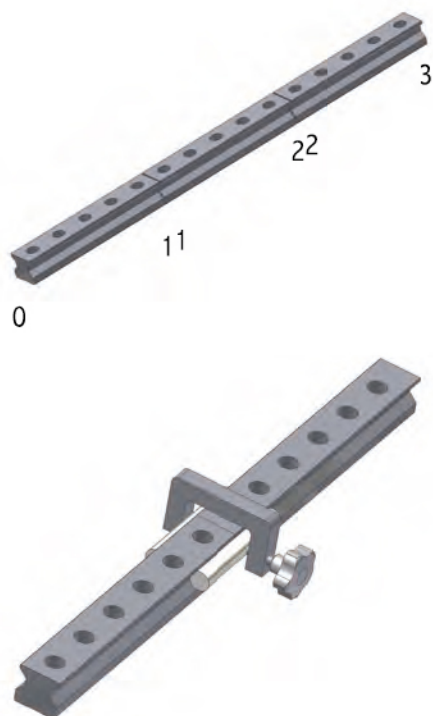
Carriages 滑块

The ground side surface is used as a reference side.

磨削边的表面被用作基准面

General instructions for the assembly of the guides

导轨装配的总体说明



Comply with the following instructions:

请遵守以下说明：

- Always put the monoguide against the supporting end stop (if available)
始终保持单导轨固定在支撑止动块上（如果有的话）
- Always tighten the screws in an alternating way by starting from the centre of the guide and preferably by using a dynamometric wrench
总是以交互的方式来拧紧螺钉，并且要从导轨的中心开始拧，最好使用带测力计的扳手

- The guides formed by several parts are marked with numbers in the joints. During the assembly, you must match the aforesaid numbers. Always check that the guides are aligned one close to the other without leaving empty spaces, even tiny ones.

导轨由几个部分组成并且在接头处用数字标上了记号。在装配时，您必须使上述数字匹配。检查导轨之间是否一个一个对齐，不要留缝隙，哪怕非常微小的缝隙。

As for the assembly of thee guides in several parts (no side end stop), align the joints of the guides by using ground shafts and clamp, as shown in the picture.

关于如何安装分成几部分的导轨（无侧边末端止动块），通过使用磨削的轴和夹爪来使导轨对齐，如图所示。

Notes

[illegible]

